Komoditas : Gandum
Tahun 2004-2008 (1.000 judul)

Carmela Lamacchia, Antonietta Baiano, Sara Lamparelli, Ennio La Notte, Aldo Di Luccia, Changes in durum wheat kernel and pasta proteins induced by toasting and drying processes, Food Chemistry, Volume 118, Issue 2, 15 January 2010, Pages 191-198, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.100.
(http://www.sciencedirect.com/science/article/B6T6R-4W6YDXJ-5/2/0a29158f728bd931e9a8f69d76d6ced2)
Abstract:
Durum wheat kernels were subjected to a toasting process and the proteins characterised by size exclusion-high performance liquid chromatography (SE-HPLC) and sodium dodecyl sulphate-polyacrylamide gel electrophoresis. With this physical process, albumins and globulins, as well as glutenins and gliadins, polymerised as seen by a shift of the SE-HPLC profile to lower elution times. The polymerisation seemed to happen mainly through disulphide bonds, even though the participation of [omega]-gliadins to the aggregation suggested the involvement of other kinds of interactions. It led to the revelation of a new peak originated by thermal aggregation of small polymeric proteins. The changes in the chromatographic profile were accompanied by increasing amounts of total unextractable polymeric proteins. The replacement of semolina with toasted durum wheat flour (5%, 10%, 15%, 20% and 30%) for the production of pasta in the shape of spaghetti significantly ($p < 0.001$) affected the molecular size distribution of the polymeric proteins, even though the replacement of semolina with 5% and 10% of toasted durum wheat flour (TDWF) did not significantly ($p > 0.05$) change the unextractable polymeric proteins (UPP) when compared with spaghetti made with 100% durum semolina. On the other hand, the replacements of semolina with 15-30% TDWF showed significant ($p < 0.001$) increase in UPP when compared with 100% durum semolina spaghetti.
Keywords: Protein size distribution; Intermediate aggregate proteins; Composite pasta; Toasted durum wheat seed; Toasted durum wheat flour

M.S. Madhukumar, G. Muralikrishna, Structural characterisation and determination of prebiotic activity of purified xylo-oligosaccharides obtained from Bengal gram husk (Cicer arietinum L.) and wheat bran (Triticum aestivum), Food Chemistry, Volume 118, Issue 2, 15 January 2010, Pages 215-223, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.108.
(http://www.sciencedirect.com/science/article/B6T6R-4W74243-1/2/b8d34153a648ff1775d5e32354a9128f)
Abstract:
Water extractable polysaccharides (WEPs) were isolated from Bengal gram husk and wheat bran. These WEP were subjected to driselase enzyme hydrolysis to obtain oligosaccharide mixtures, which were purified successively on Biogel P-2 and high performance liquid chromatographies. The molecular weight and structural features of the purified oligosaccharides were deduced using ESI-MS and 1H NMR, respectively. The prebiotic properties of these purified oligosaccharides were studied by using Bifidobacterium adolescentis NDRI 236. Increase in dry cell mass (0.7-0.9 mg/ml) and decrease in pH (<5.8) due to production of short chain fatty acid (SCFA) indicated oligosaccharide fermentation. Acetate was the chief SCFA produced and its amount varied from 97.2% to 100%. The activities of xylanase (257-470 mU/ml), xylopyranosidase (53-60 mU/ml) and arabinofuranosidase (60-70 mU/ml) in the culture broth indicated the breakdown of xylo-oligosaccharides and their subsequent utilisation by the bacterium for its growth.
Keywords: Water extractable polysaccharides; Bengal gram husk; Wheat bran; Xylo-oligosaccharides; Prebiotic activity

Yijun Sang, Paul A. Seib, Alvaro I. Herrera, Om Prakash, Yong-Cheng Shi, Effects of alkaline treatment on the structure of phosphorylated wheat starch and its digestibility, Food Chemistry, Volume 118, Issue 2, 15 January 2010, Pages 323-327, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.121.
(http://www.sciencedirect.com/science/article/B6T6R-4W7RYJ6-9/2/4787b06153aeed713cef76d9a2c9c648)
Abstract:
Phosphorylated wheat starch (PWS) was prepared with sodium trimetaphosphate and sodium tripolyphosphate (99/1, w/w), and the modified starch gave 88.8% total dietary fibre by the Prosky method and 68.7% resistant starch (RS) by the Englyst method. The stability of the phosphate esters in aqueous sodium hydroxide was investigated and related to total dietary fibre and RS contents. The phosphorylated starch was slurried (40%, w/w) at 40 [degree sign]C for 4 h at pH 9.0, 10.0, 11.0, and 12.0. The phosphorus content of the PWS decreased from 0.37% to 0.29% after treatment at pH 12.0, whereas only a slight decrease in phosphorus content occurred after treatments at pH 9.0-11.0. Despite the 22% decrease in total phosphorus content, total dietary fibre content and RS content of the alkali-treated PWS changed only slightly. 31P nuclear magnetic resonance spectroscopy showed that after the alkali treatment at pH 12.0, cyclic monostarch monophosphate and monostarch diphosphate were not detectable and that the level of total monostarch monophosphate decreased from 0.077% to 0.067%. Conversely, distarch monophosphate increased from 0.17% to 0.20%, of [approximate]18%. The increase in distarch monophosphate (cross-linking) content after alkali treatment at pH 12.0 probably explained the retention of total dietary fibre and RS contents in the alkali-treated PWS.
Keywords: Phosphorylated starch; Digestibility; Resistant starch; Dietary fibre

Matthias Knodler, Maike Most, Andreas Schieber, Reinhold Carle, A novel approach to authenticity control of whole grain durum wheat (Triticum durum Desf.) flour and pasta, based on analysis of alkylresorcinol composition, Food Chemistry, Volume 118, Issue 1, 1 January 2010, Pages 177-181, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.080.
(http://www.sciencedirect.com/science/article/B6T6R-4W6Y5PV-3/2/2da55af26ce1898a7bd5c7a48559d4b0)
Abstract:
Since durum wheat is ~20% more expensive than common wheat and considered of superior quality for the manufacture of pasta products, efficient methods for the detection of accidental or intentional admixtures of common wheat to durum wheat products are required. This paper describes a novel approach for the detection and quantification of whole grain common wheat adulteration in whole grain durum flour and dried pasta. We found that differences in the C17:0 to C21:0 alkylresorcinol homologue ratios between the two cereal species may serve as a suitable tool for whole grain durum product authentification. To detect and estimate adulteration, the C17:0/C21:0 ratios of flour and pasta admixtures with added whole grain flour of common wheat were analysed. A linear relationship between C17:0/C21:0 ratios and level of admixture in pasta samples showed that adulteration can be estimated within the range of 5-100% of admixture. Furthermore, di- and triunsaturated as well as oxygenated alk(en)ylresorcinols are reported to occur in Triticum durum Desf. for the first time.
Keywords: Alkylresorcinols; Triticum durum Desf.; T. aestivum L.; Homologue composition; Whole grain pasta; Adulteration

Prasad Kaparaju, Maria Serrano, Irini Angelidaki, Effect of reactor configuration on biogas production from wheat straw hydrolysate, Bioresource Technology, Volume 100, Issue 24, December 2009, Pages 6317-6323, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.06.101.
(http://www.sciencedirect.com/science/article/B6V24-4WWP9YS-1/2/c0ae926a7f47874e3d87dfb4efecd77b)

Abstract:
The potential of wheat straw hydrolysate for biogas production was investigated in continuous stirred tank reactor (CSTR) and up-flow anaerobic sludge bed (UASB) reactors. The hydrolysate originated as a side stream from a pilot plant pretreating wheat straw hydrothermally (195 [degree sign]C for 10-12 min) for producing 2nd generation bioethanol [Kaparaju, P., Serrano, M., Thomsen, A.B., Kongjan, P., Angelidaki, I., 2009. Bioethanol, biohydrogen and biogas production from wheat straw in a biorefinery concept. Bioresource Technology 100 (9), 2562-2568]. Results from batch assays showed that hydrolysate had a methane potential of 384 ml/g-volatile solids (VS)added. Process performance in CTSR and UASB reactors was investigated by varying hydrolysate concentration and/or organic loading rate (OLR). In CSTR, methane yields increased with increase in hydrolysate concentration and maximum yield of 297 ml/g-COD was obtained at an OLR of 1.9 g-COD/l d and 100% (v/v) hydrolysate. On the other hand, process performance and methane yields in UASB were affected by OLR and/or substrate concentration. Maximum methane yields of 267 ml/g-COD (COD removal of 72%) was obtained in UASB reactor when operated at an OLR of 2.8 g-COD/l d but with only 10% (v/v) hydrolysate. However, co-digestion of hydrolysate with pig manure (1:3 v/v ratio) improved the process performance and resulted in methane yield of 219 ml/g-COD (COD removal of 72%). Thus, anaerobic digestion of hydrolysate for biogas production was feasible in both CSTR and UASB reactor types. However, biogas process was affected by the reactor type and operating conditions.
Keywords: Wheat straw; Hydrolysate; Biogas; Bioethanol; Lignocellulose

Miguel Jurado, Alicia Prieto, Angeles Martinez-Alcala, Angel T. Martinez, Maria Jesus Martinez, Laccase detoxification of steam-exploded wheat straw for second generation bioethanol, Bioresource Technology, Volume 100, Issue 24, December 2009, Pages 6378-6384, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.07.049.
(http://www.sciencedirect.com/science/article/B6V24-4X0MP8S-4/2/3f9654f204ed7dc6f30891d33870310e)
Abstract:
In this work we compared the efficiency of a laccase treatment performed on steam-exploded wheat straw pretreated under soft conditions (water impregnation) or harsh conditions (impregnation with diluted acid). The effect of several enzymatic treatment parameters (pH, time of incubation, laccase origin and loading) was analysed. The results obtained indicated that severity conditions applied during steam explosion have an influence on the efficiency of detoxification. A reduction of the toxic effect of phenolic compounds by laccase polymerization of free phenols was demonstrated. Laccase treatment of steam-exploded wheat straw reduced sugar recovery after enzymatic hydrolysis, and it should be better performed after hydrolysis with cellulases. The fermentability of hydrolysates was greatly improved by the laccase treatment in all the samples. Our results demonstrate the action of phenolic compounds as fermentation inhibitors, and the advantages of a laccase treatment to increase the ethanol production from steam-exploded wheat straw.
Keywords: Laccase; Phenols; Steam-explosion; Bioethanol; Wheat straw

Yan Zhao, Wen-Jing Lu, Hong-Tao Wang, Jin-Long Yang, Fermentable hexose production from corn stalks and wheat straw with combined supercritical and subcritical hydrothermal technology, Bioresource Technology, Volume 100, Issue 23, December 2009, Pages 5884-5889, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.06.079.
(http://www.sciencedirect.com/science/article/B6V24-4WSWYF8-4/2/7b3523457470c40f7dffc20cb8d52827)
Abstract:
Lignocellulosic wastes, including corn stalks and wheat straw, were pretreated and hydrolyzed with combined supercritical and subcritical hydrothermal technology. Soluble sugars were

collected by pre-washing the crushed materials before hydrolysis. The effects of solid-liquid ratio, temperature, and reaction time on oligosaccharide production were investigated and the optimum supercritical conditions were found to be 20 mg/2.5 ml water, 384 [degree sign]C, 17 s for corn stalks and 20 mg/2.5 ml water, 384 [degree sign]C, 19 s for wheat straw. Subsequent subcritical processing of the hydrolyzate (with or without the water extract) from supercritical treatment was guided by a previous analysis of cellulose hydrolysis kinetics. The highest yield of fermentable hexoses from corn stalks (27.4% of raw material) was obtained at 280 [degree sign]C, 27 s, and from wheat straw (6.7% of raw material) at 280 [degree sign]C, 54 s. This study provides novel key parameters for fermentable hexose production from lignocellulosic feedstocks using combined supercritical and subcritical hydrothermal treatment.
Keywords: Combined supercritical/subcritical process; Lignocellulosic waste; Cellulose hydrolysis; Oligosaccharide and glucose; Fermentable hexose production

Venkata S.P. Bitra, Alvin R. Womac, C. Igathinathane, Petre I. Miu, Yuechuan T. Yang, David R. Smith, Nehru Chevanan, Shahab Sokhansanj, Direct measures of mechanical energy for knife mill size reduction of switchgrass, wheat straw, and corn stover, Bioresource Technology, Volume 100, Issue 24, December 2009, Pages 6578-6585, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.07.069.
(http://www.sciencedirect.com/science/article/B6V24-4X0W4KT-3/2/2806cc974a7eb6d3fb3f077aac3dc08e)
Abstract:
Lengthy straw/stalk of biomass may not be directly fed into grinders such as hammer mills and disc refiners. Hence, biomass needs to be preprocessed using coarse grinders like a knife mill to allow for efficient feeding in refiner mills without bridging and choking. Size reduction mechanical energy was directly measured for switchgrass (Panicum virgatum L.), wheat straw (Triticum aestivum L.), and corn stover (Zea mays L.) in an instrumented knife mill. Direct power inputs were determined for different knife mill screen openings from 12.7 to 50.8 mm, rotor speeds between 250 and 500 rpm, and mass feed rates from 1 to 11 kg/min. Overall accuracy of power measurement was calculated to be +/-0.003 kW. Total specific energy (kWh/Mg) was defined as size reduction energy to operate mill with biomass. Effective specific energy was defined as the energy that can be assumed to reach the biomass. The difference is parasitic or no-load energy of mill. Total specific energy for switchgrass, wheat straw, and corn stover chopping increased with knife mill speed, whereas, effective specific energy decreased marginally for switchgrass and increased for wheat straw and corn stover. Total and effective specific energy decreased with an increase in screen size for all the crops studied. Total specific energy decreased with increase in mass feed rate, but effective specific energy increased for switchgrass and wheat straw, and decreased for corn stover at increased feed rate. For knife mill screen size of 25.4 mm and optimum speed of 250 rpm, optimum feed rates were 7.6, 5.8, and 4.5 kg/min for switchgrass, wheat straw, and corn stover, respectively, and the corresponding total specific energies were 7.57, 10.53, and 8.87 kWh/Mg and effective specific energies were 1.27, 1.50, and 0.24 kWh/Mg for switchgrass, wheat straw, and corn stover, respectively. Energy utilization ratios were calculated as 16.8%, 14.3%, and 2.8% for switchgrass, wheat straw, and corn stover, respectively. These data will be useful for preparing the feed material for subsequent fine grinding operations and designing new mills.
Keywords: Screen size; Feed rate; Rotor speed; Effective specific energy consumption; Total specific energy consumption

Vitaly L. Budarin, James H. Clark, Brigid A. Lanigan, Peter Shuttleworth, Simon W. Breeden, Ashley J. Wilson, Duncan J. Macquarrie, Kris Milkowski, Jenny Jones, Toby Bridgeman, Andy Ross, The preparation of high-grade bio-oils through the controlled, low temperature microwave

activation of wheat straw, Bioresource Technology, Volume 100, Issue 23, December 2009, Pages 6064-6068, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.06.068.
(http://www.sciencedirect.com/science/article/B6V24-4WSG2PC-3/2/be05845ab0c560c76a5d3da93ebbf8d3)
Abstract:
The low temperature microwave activation of biomass has been investigated as a novel, energy efficient route to bio-oils. The properties of the bio-oil produced were considered in terms of fuel suitability. Water content, elemental composition and calorific value have all been found to be comparable to and in many cases better than conventional pyrolysis oils. Compositional analysis shows further differences with conventional pyrolysis oils including simpler chemical mixtures, which have potential as fuel and chemical intermediates. The use of simple additives, e.g. HCl, H2SO4 and NH3, affects the process product distribution, along with changes in the chemical composition of the oils. Clearly the use of our low temperature technology gives significant advantages in terms of preparing a product that is much closer to that which is required for transport fuel applications.
Keywords: Biomass; Pyrolysis oil; Microwave; Wheat straw

Loulouda A. Bosnea, Yiannis Kourkoutas, Natalia Albantaki, Constantina Tzia, Athanasios A. Koutinas, Maria Kanellaki, Functionality of freeze-dried L. casei cells immobilized on wheat grains, LWT - Food Science and Technology, Volume 42, Issue 10, December 2009, Pages 1696-1702, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.05.011.
(http://www.sciencedirect.com/science/article/B6WMV-4WBT4CX-2/2/492c2bf562a24f741664df3bc7d6b4fd)
Abstract:
Lactobacillus casei cells were immobilized on wheat grains and the effect of nine cryoprotectants during freeze-drying was investigated. Survival and fermentative activity of the freeze-dried immobilized biocatalysts was studied by monitoring pH, lactic acid and lactose content in successive fermentations batches of both synthetic lactose medium and milk. Freeze-dried L. casei cells immobilized on wheat grains without using cryoprotectants resulted in high cell survival and metabolic activity. The same biocatalysts were stored at room temperature for 9 months and at 4 [degree sign]C and -18 [degree sign]C for 12 months. Reactivation of the stored biocatalysts was carried out in synthetic lactose medium. Storage at room and low temperatures (4 [degree sign]C and -18 [degree sign]C) resulted in about 5.11, 4.9 and 4.3 final pH respectively during fermentations, indicating the suitability of the immobilized biocatalysts for the production of mild and low pH dairy products. The immobilization of a probiotic microorganism, such as L. casei, on boiled wheat which contains prebiotic compounds might provide a potential synbiotic preparation.
Keywords: L. casei; Probiotic; Wheat; Immobilization; Freeze-drying

Marion Alignan, Jane Roche, Andree Bouniols, Muriel Cerny, Zephirin Mouloungui, Othmane Merah, Effects of genotype and sowing date on phytostanol-phytosterol content and agronomic traits in wheat under organic agriculture, Food Chemistry, Volume 117, Issue 2, 15 November 2009, Pages 219-225, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.102.
(http://www.sciencedirect.com/science/article/B6T6R-4W0WJB9-2/2/8c93b3b7c3ab4cc0a74eac05c155135f)
Abstract:
Cereals are an important source of sterols and stanols in the human diet. The present study underlines the effect of genotype and weather conditions in bread wheat, on total sterol and stanol content (TSS), agronomic traits, proteins and ash content under organic conditions. Variations in TSS as well as other characters between two sowing dates were observed. A broad genotypic variability was also reported since extreme genotypes differed by more than 30 mg 100 g-1 DW for TSS, with total stanol content varying twofold. Moreover, two groups of genotypes that differed in

agronomic production, ash and protein content were depicted, based on their response to an increase in temperature. This result suggests that the genotypic factor prevails over the sowing date factor for determining sterol and stanol traits in wheat cultivated under organic conditions. Nevertheless, a strong interaction exists between the two factors, which can be used to drive bioaccumulation of these molecules.
Keywords: Bread wheat; Phytosterols; Phytostanols; Genetic variability; Crop management; Organic conditions; Bioaccumulation

Umran Uygun, Berrin Senoz, Serpil Ozturk, Hamit Koksel, Degradation of organophosphorus pesticides in wheat during cookie processing, Food Chemistry, Volume 117, Issue 2, 15 November 2009, Pages 261-264, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.111.
(http://www.sciencedirect.com/science/article/B6T6R-4W0WJB9-C/2/c132d25e8fe9c0a47f1b1e57cb376940)
Abstract:
For investigating carryover of some organophosphorus pesticide residues in the cereal food chain from grain to consumer, a study was set up on wheat bran, flour and cookies, with and without bran. Special emphasis was given to malathion and chlorpyrifos-methyl residues in cookies for better protection of consumers. Pesticide-free wheat was placed in a small-scale model of a commercial storage vessel and treated with these pesticides. The residue levels of insecticides were determined in wheat, as well as in bran, flour and cookies produced from stored wheat at various time intervals during storage. A multiresidue analysis was performed using GC-NPD and GC-MS. Malathion and chlorpyrifos-methyl residue levels were higher than the maximum residue limits (MRLs) in wheat after 240 days of storage. MRLs established by the EC for malathion and chlorpyrifos-methyl in wheat are 8 and 3 mg kg-1, respectively. The residue levels of insecticides in flour samples also exceeded the MRL (2 mg kg-1 for both insecticides). Eight months of storage were not effective for reducing the residues in wheat to the levels below MRLs. Although, considerable amounts of the insecticides remained in the bran and flour, the cookie processing significantly reduced the concentrations in general. Chlorpyrifos-methyl was more persistent than was malathion and comparatively less degradation occurred during milling and cookie processing due to its physicochemical properties.
Keywords: Malathion; Chlorpyrifos-methyl; Wheat; Cookies

S.K. Behera, R.K. Panda, Integrated management of irrigation water and fertilizers for wheat crop using field experiments and simulation modeling, Agricultural Water Management, Volume 96, Issue 11, November 2009, Pages 1532-1540, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.06.016.
(http://www.sciencedirect.com/science/article/B6T3X-4WT39S3-2/2/46dca29b5ebb31dbd4047fa0b79053f5)
Abstract:
The reported study aimed at developing an integrated management strategy for irrigation water and fertilizers in case of wheat crop in a sub-tropical sub-humid region. Field experiments were conducted on wheat crop (cultivar Sonalika) during the years 2002-2003, 2003-2004 and 2004-2005. Each experiment included four fertilizer treatments and three irrigation treatments during the wheat growth period. During the experiment, the irrigation treatments considered were I1 = 10% maximum allowable depletion (MAD) of available soil water (ASW); I2 = 40% MAD of ASW; I3 = 60% MAD of ASW. The fertilizer treatments considered in the experiments were F1 = control treatment with N:P2O5:K2O as 0:0:0 kg ha-1, F2 = fertilizer application of N:P2O5:K2O as 80:40:40 kg ha-1; F3 = fertilizer application of N:P2O5:K2O as 120:60:60 kg ha-1 and F4 = fertilizer application of N:P2O5:K2O as 160:80:80 kg ha-1. In this study CERES-wheat crop growth model of the DSSAT v4.0 was used to simulate the growth, development and yield of wheat crop using soil, daily weather and management inputs, to aid farmers and decision makers in

developing strategies for effective management of inputs. The results of the investigation revealed that magnitudes of grain yield, straw yield and maximum LAI of wheat crop were higher in low volume high frequency irrigation (I1) than the high volume low frequency irrigation (I3). The grain yield, straw yield and maximum LAI increased with increase in fertilization rate for the wheat crop. The results also revealed that increase in level of fertilization increased water use efficiency (WUE) considerably. However, WUE of the I2 irrigation schedule was comparatively higher than the I1 and I3 irrigation schedules due to higher grain yield per unit use of water. Therefore, irrigation schedule with 40% maximum allowable depletion of available soil water (I2) could safely be maintained during the non-critical stages to save water without sacrificing the crop yield. Increase in level of fertilization increases the WUE but it will cause environmental problem beyond certain limit. The calibrated CERES-wheat model could predict the grain yield, straw yield and maximum LAI of wheat crop with considerable accuracy and therefore can be recommended for decision-making in similar regions.
Keywords: Irrigation schedule; Fertilization; Water use efficiency; Depletion level; CERES-wheat

Alfonsina Szpeiner, M. Alejandra Martinez-Ghersa, Claudio M. Ghersa, Wheat volatile emissions modified by top-soil chemical characteristics and herbivory alter the performance of neighbouring wheat plants, Agriculture, Ecosystems & Environment, Volume 134, Issues 1-2, November 2009, Pages 99-107, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.06.005.
(http://www.sciencedirect.com/science/article/B6T3Y-4WNWW2R-2/2/3b13940d10296014493435994f223130)
Abstract:
Plant emission of volatile organic compounds (VOCs) has a significant impact on arthropods and plants and alters important functions in the agroecosystems. Three field source-sink microcosm experiments evaluated variation in wheat plants volatile emissions and its impact on neighbouring wheat plants' performance caused by genotype, aphid herbivory and soil nutrient availability due to different cropping histories. An electronic nose detected qualitative differences in volatile emissions. Two of the experiments established the source-sink relationships forcing the volatiles through pipes. In these experiments wheat genotype was introduced as a variable of the source plants. In the third experiment, the emissions of volatiles dispersed naturally affecting the neighbourhood only by proximity and wheat genotype was a controlled factor. Plant genotype, aphid attack and soil chemical changes caused by different cropping histories affected wheat volatile emissions despite independent variations in plant biomass or resource allocation. This is the first report of changes in distant plant biomass according to neighbouring plant genotype and agricultural history. Wheat VOCs emissions were associated with changes in soil organic C, Ca, Mg, total nitrogen and cation exchange capacity caused by the different cropping histories of the soils tested. Variability in total biomass and resource allocation increased due to changes in VOCs emissions promoted by longer cropping history or aphid feeding in two genotypes. When volatiles were naturally dispersed into the neighbourhood, tiller weight in the sink individuals depended on plant genotype and cropping history of its neighbours (i.e. VOCs source). These findings highlight that ecological and environmental consequences of agricultural practices are more complex than normally thought.
Keywords: Soil; Herbivory; Genotype; VOCs; Agroecosystems

Charilaos Xiros, Petros Katapodis, Paul Christakopoulos, Evaluation of Fusarium oxysporum cellulolytic system for an efficient hydrolysis of hydrothermally treated wheat straw, Bioresource Technology, Volume 100, Issue 21, November 2009, Pages 5362-5365, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.05.065.
(http://www.sciencedirect.com/science/article/B6V24-4WK3YFM-B/2/04cb152f66c889a749cc9ffccea5a180)
Abstract:

The crude multienzyme extract produced by Fusarium oxysporum cultivated under submerged conditions in 20 L bioreactor using brewers spent grain and corn cobs in a ratio 2:1 as the carbon source was evaluated with regard to an efficient saccharification of hydrothermally treated wheat straw. Several factors concerning the obtained hydrolysis yield and reaction rate were investigated. The takeout of product sugars (in situ) was effective at reducing end-product inhibition and lead to a bioconversion about 80% of the theoretical. A kinetic model incorporating dynamic adsorption, enzymatic hydrolysis, and product inhibition was developed. The model predicted very satisfactorily the experimental data.
Keywords: Enzymatic hydrolysis; Fusarium oxysporum cellulolytic system; Kinetic model; Hydrothermally treated wheat straw

Chenyu Du, Sze Ki Carol Lin, Apostolis Koutinas, Ruohang Wang, Maria Pilar Dorado, Colin Webb, Corrigendum to 'A wheat biorefining strategy based on solid-state fermentation for fermentative production of succinic acid' Bioresource Technology Vol. 99 Issue 17 (2008) 8310-8315, Bioresource Technology, Volume 100, Issue 21, November 2009, Page 5370, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.05.001.
(http://www.sciencedirect.com/science/article/B6V24-4WDFC7V-1/2/bc6f5a346c2509ced224ce0cf1ed5a50)

A. Ktenioudaki, F. Butler, U. Gonzales-Barron, U. Mc Carthy, E. Gallagher, Monitoring the dynamic density of wheat dough during fermentation, Journal of Food Engineering, Volume 95, Issue 2, November 2009, Pages 332-338, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.05.012.
(http://www.sciencedirect.com/science/article/B6T8J-4WBT41D-1/2/d37cd3f898ef72d118cdc954908e3b18)
Abstract:
Three different methods for measuring dynamic dough density during proofing were investigated. The three methods included: monitoring the change in apparent mass of a dough piece suspended in silicone oil at 35 [degree sign]C; monitoring the change in dough volume during actual proofing conditions with a novel imaging technique using structured lighting; and finally monitoring the dough volume changes in a rheofermentometer at 35 [degree sign]C. All the methods resulted in similar dough density profiles. However, dough density appeared to level off sooner when the oil displacement method was used. This was not the case with the other two methods where density continued to decrease up to the end of proofing. Dough density at the end of fermentation process was related to the loaf volume after baking. The novel structured lighting method had the advantage of being low cost and measuring dough density in actual proofing conditions as used in breadmaking.
Keywords: Dough density; Dough proofing; Fermentation process; Wheat dough

Antonietta Baiano, Roberto Romaniello, Carmela Lamacchia, Ennio La Notte, Physical and mechanical properties of bread loaves produced by incorporation of two types of toasted durum wheat flour, Journal of Food Engineering, Volume 95, Issue 1, November 2009, Pages 199-207, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.04.029.
(http://www.sciencedirect.com/science/article/B6T8J-4W7B08C-2/2/555f5516c30bd07cd0b23346e5e1802b)
Abstract:
The aim was to study the effects of toasting of durum wheat kernels on the physical and mechanical properties of bread containing increasing amounts of toasted wholemeal. Two toasting procedures were considered: heating of the kernels arranged on tin cans (TDW1) and the stubble burning (TDW2). The addition of toasted flour determined a decrease in volume (greater when TDW2 was used) and detrimental effects on mechanical properties caused by the thermal denaturation of the gluten-forming proteins and the interference of bran. Volume was negatively

correlated with compressibility, gumminess, masticability and positively correlated with elasticity ($0.824 < R < 0.971$). The bread structural parameters were quantified by digital image analysis and correlated to the variations of the mechanical properties. The addition of increasing percentages of toasted wheat flour (especially, TDW1) determined significant increases of the cell density, and decreases of cell mean area, and cell equivalent diameter. Statistically significant correlations were obtained between cell density or equivalent diameter and the mechanical properties of all the bread types according to a second order polynomial regression but only the former allowed to predict approximately 60% of the variation of crumb compressibility and 87% of the variation of elasticity and gumminess both in bread produced with TDW1 and in bread produced with TDW2.
Keywords: Bread; Mechanical properties; Structure; Toasting

B.P. Lamsal, J.M. Faubion, Effect of an enzyme preparation on wheat flour and dough color, mixing, and test baking, LWT - Food Science and Technology, Volume 42, Issue 9, November 2009, Pages 1461-1467, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.04.003.
(http://www.sciencedirect.com/science/article/B6WMV-4W38RR2-3/2/493abb465c0fd7ea3b63c40e8d1385e0)
Abstract:
Bleaching flours with natural rather than chemical extracts is attractive because it reduces risks upon exposure and appeals to natural food consumers. This paper reports effects of a commercial proprietary blend of `natural' bleaching enzymes on wheat flour and dough color, mixing behavior and test bake performance. Enzyme preparation did not improve whiteness (L*) and yellowness (b*) of flour system, but benzoyl peroxide sharply reduced b*. For whole wheat flour dough, L* increased for enzyme-treated dough after 2-h resting, ending higher than benzoyl peroxide and control dough. Yellowness increased in enzyme-treated dough. When enzyme application was during milling, resulting whole wheat flour dough had much higher L*. Mixograms of flours with increasing enzyme concentration showed severe dough weakness and rapid breakdown. Dialysis of the enzyme preparation in 3500 molecular weight cutoff (MWCO) tubes and freeze-drying prior to flour application recovered dough strength. l-cysteine in the enzyme mix was thought to adversely affect dough strength, and dialysis helped recover dough strength. However, pup loaf baking with dialyzed enzyme showed some loss of baking characteristics (loaf volume, loaf weight, and proof height) over the control. Although the natural enzyme extract addition enhanced whiteness for whole wheat dough, its effects on dough and baking properties were not favorable.
Keywords: Enzyme bleaching; Wheat flour; Dough rheology; Test baking

Xiuli Han, Xiaojian Ma, Jindun Liu, Hongping Li, Adsorption characterisation of water and ethanol on wheat starch and wheat gluten using inverse gas chromatography, Carbohydrate Polymers, Volume 78, Issue 3, 15 October 2009, Pages 533-537, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.05.012.
(http://www.sciencedirect.com/science/article/B6TFD-4WC115V-2/2/a87766f24d7103ccc022278caa3ef5a8)
Abstract:
Adsorption of water and ethanol on wheat starch and wheat gluten has been studied in the temperature range of 60-150 [degree sign]C using inverse gas chromatography (IGC). From the chromatographic retention data it is able to calculate the separation factors for the two solutes and obtain values for thermodynamic parameters such as Gibbs free energy ([Delta]Gs) and the enthalpy ([Delta]Hs) of adsorption of water and ethanol. The results indicate that water is adsorbed more strongly than ethanol at all temperatures, and the low temperature is found to facilitate the adsorptive separation of water from ethanol. It is also shown that the starch definitely plays a crucial role for the water and ethanol separation, despite that wheat flour includes both gluten and starch. The wheat starch is seen to have potential application in biomass water-ethanol separation to obtain fuel ethanol through the preferential adsorption of water from aqueous ethanol.

Keywords: Wheat starch; Wheat gluten; Adsorption; Inverse gas chromatography; Fuel ethanol

B. Verma, P. Hucl, R.N. Chibbar, Phenolic acid composition and antioxidant capacity of acid and alkali hydrolysed wheat bran fractions, Food Chemistry, Volume 116, Issue 4, 15 October 2009, Pages 947-954, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.060.
(http://www.sciencedirect.com/science/article/B6T6R-4VWHW73-1/2/448e6eceebf6f8748290ad1c1bd138d1)
Abstract:
Phenolic acid concentrations, profiles and antioxidant capacity of acid and alkali hydrolysates from the bran of six wheat cultivars representing six Canadian market classes were determined. Aqueous ethanol was used to extract the free phenolics (FP) and diethyl ether to extract the insoluble bound phenolics released after acid and alkaline hydrolysis of the bran. Folin-Ciocalteu (FC) reagent was used to estimate the total phenolic content and HPLC-UV to detect and quantitate 14 phenolic acids and one lignan. trans-Ferulic acid was the dominant acid in the bran extracts but mass spectrometric analysis showed tryptophan to be dominant in the FP extracts. The antioxidant capacity of individual phenolic acids and extracts was assessed using 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS), and 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (Trolox) equivalent antioxidant assays. The FP extracts had the lowest average antioxidant capacity and the hydrolysates the highest. Based on the concentration of each phenolic acid in the extracts, and the antioxidant capability of each phenolic standard, trans-ferulic acid was the dominant contributor (66.4-95.5%) to antioxidant capacity of the wheat bran extract.
Keywords: Antioxidant; Phenolics; Phenolic acids; Hard wheat; Soft wheat; Durum; Spring wheat; HPLC; DPPH; ABTS; Tryptophan

M.J. Khan, A. Razzaq, M.K. Khattak, L. Garcia, Effect of different pre-sowing water application depths on wheat yield under spate irrigation in Dera Ismael Khan District of Pakistan, Agricultural Water Management, Volume 96, Issue 10, October 2009, Pages 1467-1474, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.05.001.
(http://www.sciencedirect.com/science/article/B6T3X-4WGHJKV-1/2/85fd4f1711bb8758272245e78ef66b71)
Abstract:
Spate irrigation is a method of flood water harvesting, practiced in Dera Ismael Khan (D.I. Khan), Pakistan for agricultural production for the last several hundred years in which during monsoon period flood water is used for irrigation before wheat sowing. A field study on the effect of different pre-sowing water application depths on the yield of wheat was conducted during 2006-2007. The spate irrigation command areas normally receive the flood water as a result of rainfall on the mountains during the months of July to September, which also carries a significant amount of sediment load. The flood water flows in different torrents and is diverted through earthen bunds to the fields for irrigation with depth of water application ranging from 21 to 73 cm and resulted in sediment deposition of 1.8-3.6 cm per irrigation. In this study, the effect on wheat yield of three different pre-sowing water application depths (D1 < 30 cm, D2 = 30-45 cm and D3 > 45 cm) were studied under field conditions. Fifteen fields with field sizes of about 2-3 ha were randomly selected, in each field five samples were collected for analysis of soil physical properties, yield and yield components. Five major soil texture classes (silty clay, clay loam, silty clay loam, silt loam and loam) were found in the area with water-holding capacity ranging from 23% to 36.3% (on a volume basis) and bulk density varied from 1.35 to 1.42 g cm-3. About 36% more grain yield was obtained from loam soil fields, followed by silt loam (24%) as compared to wheat grown on silty clay soil condition. The maximum wheat grain yield of 3448 kg ha-1 was obtained from fields with water application depths of 30-45 cm and the lowest wheat yield was recorded in fields with water application depths greater than 45 cm. On-farm application efficiencies ranged from 22% to 93%

with an overall average of about 49%. Due to large and uneven fields, a lot of water is lost. In general, the application efficiency decreased with increasing water application depth. Based on the results of this research, in arid to semi-arid environments, for optimum wheat yield under spate irrigation, the pre-sowing water application depth may be about 30-45 cm (September to July) and under or over irrigation should be avoided.
Keywords: Spate irrigation; Application efficiency; Bulk density; Wheat yield; Water right and distribution; Spate irrigation system

Rowena T. Romano, Ruihong Zhang, Sarah Teter, Jeffery A. McGarvey, The effect of enzyme addition on anaerobic digestion of Jose Tall Wheat Grass, Bioresource Technology, Volume 100, Issue 20, October 2009, Pages 4564-4571, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.12.065.
(http://www.sciencedirect.com/science/article/B6V24-4WC4WJ0-5/2/ed824114f62debf3e35898c53aff5140)
Abstract:
The effects of the addition of enzyme products containing cellulase, hemicellulase, and [beta]-glucosidase to anaerobic digestion systems were studied using Jose Tall Wheat Grass (wheat grass) as a model substrate. Anaerobic digestion tests were performed using batch reactors operated at 50 [degree sign]C. The application of enzyme products in three digestion configurations were simulated and investigated: (1) enzyme addition to a single-stage digester, (2) pre-treatment of wheat grass with enzymes followed by a single-stage anaerobic digestion, and (3) enzyme addition to the first stage (hydrolysis and acidification) of a two-stage digestion system. The enzyme products showed positive effects on the solubilization of wheat grass when used alone to treat the wheat grass. However, no significant differences in biogas and methane yields, and volatile solids reduction resulted when the enzyme products were tested in the anaerobic digestion systems. This reveals that the microorganisms present in the inoculum were effective in carrying out the digestion of wheat grass. The types of microorganisms present in the inoculum were identified using 16S rRNA sequence analysis. A comparison of the sequences between the different inocula revealed that the prevalent operational taxonomic units were similar, but that the acidified inoculum contained a higher percentage of the species Thermotogae.
Keywords: Cellulase; Wheat grass; Anaerobic digestion; 16S rRNA

Maria J. Dinis, Rui M.F. Bezerra, Fernando Nunes, Albino A. Dias, Cristina V. Guedes, Luis M.M. Ferreira, John W. Cone, Guilhermina S.M. Marques, Ana R.N. Barros, Miguel A.M. Rodrigues, Modification of wheat straw lignin by solid state fermentation with white-rot fungi, Bioresource Technology, Volume 100, Issue 20, October 2009, Pages 4829-4835, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.04.036.
(http://www.sciencedirect.com/science/article/B6V24-4W9V7F4-3/2/65d51911da6ecc2ff8655e8c668a1ae4)
Abstract:
The potential of crude enzyme extracts, obtained from solid state cultivation of four white-rot fungi (Trametes versicolor, Bjerkandera adusta, Ganoderma applanatum and Phlebia rufa), was exploited to modify wheat straw cell wall. At different fermentation times, manganese-dependent peroxidase (MnP), lignin peroxidase (LiP), laccase, carboxymethylcellulase (CMCase), avicelase, xylanase and feruloyl esterase activities were screened and the content of lignin as well as hydroxycinnamic acids in fermented straw were determined. All fungi secreted feruloyl esterase while LiP was only detected in crude extracts from B. adusta. Since no significant differences ($P > 0.05$) were observed in remaining lignin content of fermented straw, LiP activity was not a limiting factor of enzymatic lignin removal process. The levels of esterified hydroxycinnamic acids degradation were considerably higher than previous reports with lignocellulosic biomass. The data

show that P. rufa, may be considered for more specific studies as higher ferulic and p-coumaric acids degradation was observed for earlier incubation times.
Keywords: Wheat straw; White-rot fungi; Biodegradation

Mohamed Aqiel Dalvie, Leslie London, Risk assessment of pesticide residues in South African raw wheat, Crop Protection, Volume 28, Issue 10, October 2009, Pages 864-869, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.07.008.
(http://www.sciencedirect.com/science/article/B6T5T-4WXXV32-1/2/f1d246912d68e2ce5ee808135cab0bec)
Abstract:
The presence of pesticide residues in wheat produced and imported in South Africa was determined and their health risks assessed. Pesticides were detected in all local (median = 1, range: 1-3, n = 71) and imported (median = 1, range: 1-6, n = 13) samples. Multiple pesticides (>1 pesticide) were detected in about 30% local samples and 39% imported samples. Eight different pesticides were detected in total. The most frequently detected pesticides were mercaptothion (99%), permethrin (19%) and chlorpyrifos (17%). Nine (11%) samples exceeded the EU wheat MRL for permethrin (0.05 mg/kg) which included 7 (10%) local samples and 2 (15%) imported samples. The highest fenitrothion level (0.65 mg/kg) corresponds to an intake that was below but near the estimated short-term safety threshold. The results call for an investigation into the levels of pesticide residues in cereal-based food and for tighter regulation and regular monitoring by government and industry.
Keywords: Pesticides; Wheat; Health standards; Acceptable daily intake; Cancer; Endocrine disruption

W. Guan, Q. Zhang, The effect of moisture content and compaction on the strength and arch formation of wheat flour in a model bin, Journal of Food Engineering, Volume 94, Issues 3-4, October 2009, Pages 227-232, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.013.
(http://www.sciencedirect.com/science/article/B6T8J-4VXDTNW-1/2/157c36602798c986023e4647e560b2cf)
Abstract:
An experimental study was carried out to determine the effect of compaction on arching of wheat flour in storage. A model bin 475 mm in height and 600 x 375 mm in cross-section was used to conduct tests and wheat flour at moisture contents (MC) of 8.6% and 14.2% was tested. Direct shear tests were performed to determine the angle of internal friction and cohesion of wheat flour subjected to various compaction pressures. It was observed that the internal friction angles were about the same for the wheat flour at two moisture contents (37.6[degree sign] vs. 37.5[degree sign]), but cohesion for 14.2% MC was 72% higher than that for 8.6% MC. The flowability of wheat flour decreased with increasing compaction pressure sharply at the initial stage of compaction. Compaction led to a 64% increase in required hopper opening for arching-free flow for flour at 8.6% MC, and 49% at 14.2% MC. However, compaction pressure had little effect on arch formation after it reached above 5 kPa.
Keywords: Wheat flour; Internal friction; Cohesion; Unconfined yield strength; Arching; Compaction

Maria Eugenia Barcenas, Jessica De la O-Keller, Cristina M. Rosell, Influence of different hydrocolloids on major wheat dough components (gluten and starch), Journal of Food Engineering, Volume 94, Issues 3-4, October 2009, Pages 241-247, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.012.
(http://www.sciencedirect.com/science/article/B6T8J-4VXB6XF-1/2/566095adf8690822ea83a413d07406a1)
Abstract:

The aim of this study was to determine the effect of three hydrocolloids from different sources (arabic gum, pectin and hydroxypropylmethylcellulose) on wheat dough major components (gluten and starch) using hydrated model systems. Gluten characteristics were evaluated concerning hydration properties (swelling, water retention capacity, water binding capacity), gluten quality (gluten index, the amount of wet and dry gluten), protein sodium dodecyl sulphate extractability, and rheological properties (elastic and viscous moduli); whereas the effect of hydrocolloids on wheat starch was assessed by recording the viscometric profile. Results showed that hydrocolloids tested affected in different extent to starch and gluten properties, being their effect dependent on the hydrocolloid type and also its concentration. All the hydrocolloids, with the exception of arabic gum, decreased the viscoelastic moduli during heating and cooling, yielding a weakening effect on gluten. Pectin mainly acted on gluten properties, varying gluten hydration, and also the quantity and quality of gluten. In addition, arabic gum acted primarily on the viscometric properties of starch. Therefore, hydrocolloid effect was greatly dependent on the hydrocolloid type, which defines its interaction with other components of the system.
Keywords: Gluten properties; Starch properties; Arabic gum; Pectin; HPMC

Yihu Song, Cui Jianrui, Qiang Zheng, Influence of methylcellulose on dynamic rheology of dilute wheat gliadin solution in 50% (v/v) aqueous propanol, Journal of Food Engineering, Volume 94, Issues 3-4, October 2009, Pages 290-294, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.029.
(http://www.sciencedirect.com/science/article/B6T8J-4W15KMB-1/2/a179258de72d2abc1b3c23c5569dbc0a)
Abstract:
Influences of methylcellulose on dynamic rheological behaviors of 50 g L-1 (dilute) wheat gliadins in 50% (v/v) aqueous propanol were investigated as a function of methylcellulose concentration C ranging from 5 to 20 g L-1. The mixture solutions exhibit shear rate thinning that becomes pronounced with increasing C. Specific viscosities of the first and the second Newtonian plateau viscosities, as well as the steady-flow viscosity as a function of C, reveal that methylcellulose is in the semi-dilute unentangled regime at temperatures from 5 to 65 [degree sign]C. The intermolecular interaction between methylcellulose and gliadins provides high flow resistance, improved shear thinning and steady-flow activation energy of the mixture solution in comparison with pure gliadins solution.
Keywords: Methylcellulose; Gliadins; Solution; Rheology

S. El-Meccawi, M. Kam, A. Brosh, A.A. Degen, Energy intake, heat production and energy and nitrogen balances of sheep and goats fed wheat straw as a sole diet, Livestock Science, Volume 125, Issue 1, October 2009, Pages 88-91, ISSN 1871-1413, DOI: 10.1016/j.livsci.2009.02.018.
(http://www.sciencedirect.com/science/article/B7XNX-4VVN50X-1/2/d7c32efb490c8c0cad72494aa6103239)
Abstract:
Large areas of the Negev desert are used for rain-fed winter cereal production. Consequently, cereal straw is an important dietary component of sheep and goats raised by the Bedouin in the Negev Desert under both grazing and pen-fed conditions. Often, it is the sole feed offered, although it is relatively low in crude protein content and metabolizable energy yield. We determined metabolizable energy intake and heat production in desert adapted fat-tailed Awassi sheep (n = 8; 49.5 +/- 6.6 kg) and mixed breed goats (n = 8; 42.6 +/- 11.7 kg) when offered only wheat straw ad libitum, and calculated their energy and nitrogen balances. We hypothesized that there is a difference between sheep and goats in the ability to use wheat straw and predicted that goats would be better able to use wheat straw as an energy and nitrogen source than would sheep. Dry matter intakes of the wheat straw by sheep and goats were similar, 43.4 and 42.6 g kg-0.75 d- 1, respectively, as were apparent dry matter digestibilities, 44.1% and 43.6%, respectively.

Metabolizable energy intakes in sheep and goats were also similar, 308.9 and 302.9 kJ kg - 0.75 d- 1, respectively, as were their heat productions, 502.3 and 501.0 kJ kg - 0.75 d- 1, respectively. Sheep and goats were in negative energy balance, and both lost similar amounts of body reserves, 193.6 and 198.1 kJ kg - 0.75 d- 1, respectively. Also, both were in negative nitrogen balances; however, the goats were in a lesser deficit ($P < 0.05$) than the sheep, 0.161 and 0.196 g kg - 0.75 d- 1, respectively. Therefore, our predictions were partially confirmed in that the goats were better able to use the nitrogen but not the energy when consuming low-quality wheat straw.
Keywords: Desert adapted sheep and goats; Low-quality wheat straw; Dry matter intake and digestibility; Heat production; Energy balance; Nitrogen balance

Tengfang Ling, Bo Zhang, Weiti Cui, Mingzhu Wu, Jinshan Lin, Wenting Zhou, Jingjing Huang, Wenbiao Shen, Carbon monoxide mitigates salt-induced inhibition of root growth and suppresses programmed cell death in wheat primary roots by inhibiting superoxide anion overproduction, Plant Science, Volume 177, Issue 4, October 2009, Pages 331-340, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.06.004.
(http://www.sciencedirect.com/science/article/B6TBH-4WN2XN8-1/2/956d636dc90676c0855c0269b1968c79)
Abstract:
In our experiments, treatment of wheat seedling roots with varying concentrations of NaCl caused the inhibition of primary root growth in a dose-dependent manner, which was consistent with the progressive DNA laddering in the primary root tips. Upon 100, and 200 mM NaCl stress, the increase of carbon monoxide (CO) release and heme oxygenase (HO) activity was observed. By contraries, treatment with 400 mM NaCl is otherwise, that the result displays a decreasing tendency. Besides DNA laddering, 200 mM NaCl treatment exhibited the induction of other programmed cell death (PCD) associated with phenomenon in the primary root tips, such as TUNEL staining, nuclear condense and deformation. Further, HO's catalytic product CO was able to dose-dependently mitigate 200 mM NaCl-induced inhibition of root growth and delay PCD. These effects were prevented strongly by incubation with DETC (a Cu/Zn-SOD inhibitor), and differentially influenced by Tiron (a scavenger of superoxide anion) and apocynin (an inhibitor of NADPH oxidase). Meanwhile, 50% CO aqueous solution inhibited the overproduction of superoxide anion, NADPH oxidase activities and corresponding transcript, and enhanced superoxide dismutase (SOD) activity, Mn-SOD and Cu/Zn-SOD transcript. Taken together, the results suggested that CO might be involved in plant tolerance against salinity stress, and its alleviation of PCD and inhibition of root growth was related to the decrease of superoxide anion overproduction partially via up-regulation of SOD and down-regulation of NADPH oxidase expression.
Keywords: Carbon monoxide; Programmed cell death; Salt stress; Superoxide anion; Wheat

Herve Robert, Valerie Gabriel, Catherine Fontagne-Faucher, Biodiversity of lactic acid bacteria in French wheat sourdough as determined by molecular characterization using species-specific PCR, International Journal of Food Microbiology, Volume 135, Issue 1, 30 September 2009, Pages 53-59, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.07.006.
(http://www.sciencedirect.com/science/article/B6T7K-4WRM6H5-3/2/042ef91943cce453b121dd238eec90c4)
Abstract:
The lactic acid microflora of nine traditional wheat sourdoughs from the Midi-Pyrenees area (South western France) was previously isolated and preliminary characterized using conventional morphological and biochemical analysis. However, such phenotypic methods alone are not always reliable and have a low taxonomic resolution for identification of lactic acid bacteria species. In the present study, a total of 290 LAB isolates were identified by PCR amplification using different sets of specific primers in order to provide a thorough characterization of the lactic flora from these

traditional French sourdoughs. Overall, the LAB isolates belonged to 6 genera: Lactobacillus (39%, 8 species), Pediococcus (38%, 1 species), Leuconostoc (17%, 2 species), Weissella (4%, 2 species), Lactococcus (1%, 1 species) and Enterococcus (< 1%, 1 species) and 15 different species were detected: L. plantarum, L. curvatus, L. paracasei, L. sanfranciscensis, L. pentosus, L. paraplantarum, L. sakei, L. brevis, P. pentosaceus, L. mesenteroides, L. citreum, W. cibaria, W. confusa, L. lactis and E. hirae. Facultative heterofermentative LAB represent more than 76% of the total isolates, the main species isolated herein correspond to L. plantarum and P. pentosaceus. Obligate heterofermentative lactobacilli (L. sanfranciscencis, L. brevis) represent less than 3% of the total isolates whereas Leuconostoc and Weissella species represent 21% of the total isolates and have been detected in eight of the nine samples. Detection of some LAB species was preferentially observed depending on the isolation culture medium. The number of different species within a sourdough varies from 3 to 7 and original associations of hetero- and homofermentative LAB species have been revealed. Results from this study clearly confirm the diversity encountered in the microbial community of traditional sourdough and highlight the importance of LAB cocci in the sourdough ecosystem, along with lactobacilli.
Keywords: Lactic acid bacteria; Sourdough; Identification; PCR amplification; Microbial biodiversity

Shengli Wang, Zhongren Nan, Xiaowen Liu, Yuan Li, Song Qin, Haixia Ding, Accumulation and bioavailability of copper and nickel in wheat plants grown in contaminated soils from the oasis, northwest China, Geoderma, Volume 152, Issues 3-4, 15 September 2009, Pages 290-295, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2009.06.012.
(http://www.sciencedirect.com/science/article/B6V67-4WSR0V0-2/2/d187b79c8b2538222cdb6b43a2f7c7ea)
Abstract:
This paper studied the accumulation and bioavailability of copper and nickel in wheat plants grown in contaminated soils from the oasis, northwest China. The concentrations of Cu and Ni in studied soils were all more than Cu and Ni limit of grade II soil environmental quality standards in China; furthermore the concentration of Cu in soil S5 and the concentrations of Ni in soil S1, S3, S5, and S6 exceeded grade III soil environmental quality standards in China. Among eight extractants, the extractable Cu concentrations in soils generally followed the descending order EDTA > Citric acid > NH4Ac > NH4NO3 > MgCl2 [approximate] Tartaric acid > Acetic acid > Oxalic acid. The extraction capacity of Ni was as follow: Citric acid > EDTA > NH4Ac > tartaric acid > NH4NO3 [approximate] Acetic acid [approximate] Oxalic acid > MgCl2. The sequences of Ni average concentrations in different parts of the wheat plant were roots > leaves > shells > stocks > grains; the sequences of Cu average concentrations in different parts were also roots > leaves > shells > grains > stocks. Soil studied is not fit to plant the wheat crops for human consumption; soils studied posed high potential health risk for human health through food chains. Average Bio-concentration factor (BCF) and translocation factor (TF) of Cu in different parts of wheat plants were greater than those of Ni. The process of Cu and Ni uptake and accumulation by wheat plants were probably linked to the concentrations of available copper and nickel in the oasis soils, physical and chemical parameters of soils, and different parts of wheat plants. Citric acid and NH4Ac extraction procedures provided a good indication of Cu bioavailability among nine kinds of evaluation methods.
Keywords: Copper; Nickel; Accumulation; Bioavailability; Single extraction procedure; Wheat

Bing Song Zheng, Jacques Le Gouis, Dorvillez Daniel, Maryse Brancourt-Hulmel, Optimal numbers of environments to assess slopes of joint regression for grain yield, grain protein yield and grain protein concentration under nitrogen constraint in winter wheat, Field Crops Research, Volume 113, Issue 3, 4 September 2009, Pages 187-196, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.05.001.

(http://www.sciencedirect.com/science/article/B6T6M-4WK4B1C-1/2/e8bc6b6483997f661523ede3dd1b0416)
Abstract:
Plant breeders are interested in rationally reducing the number of testing environments for breeding new genotypes adapted to diverse conditions. One way to characterize the adaptation of a genotype is to use the joint regression model. Our objectives were to estimate the stability for grain yield (GY), grain protein yield (GPY) and grain protein content (GPC) of a set of wheat genotypes grown under varying nitrogen conditions and then to determine optimal numbers of environments for assessing the slopes of joint regression.
Twenty-seven wheat genotypes were grown in Northern France in 27 environments that were combinations of two years, seven locations, three nitrogen levels and two sowing densities. Optimal number or threshold number of environments was estimated for means and slopes of a joint regression model by comparing four environment sampling methods using a bootstrap procedure. Mean environmental grain yield ranged from 5.9 t/ha to 10.5 t/ha. The 27 genotypes showed diversity for the slopes of the joint regression. The four sampling methods produced different threshold numbers of environments. Method D, where extreme environments with high and low potentials were sampled, was the most economic and time-saving method within the network. In this case, on average, 11, 10, and 12 environments were sufficient to accurately estimate the slope of joint regression for GY, GPY, and GPC respectively. Further studies should focus on identification of the morphological, physiological and molecular traits associated with adaptation to low input nitrogen with such optimal number of environments considering the economic and environmental challenges.
Keywords: Bootstrap method; Genotype x environment interaction; Joint regression; Stability statistics; Winter wheat

Andrew L. Fletcher, Peter D. Jamieson, Causes of variation in the rate of increase of wheat harvest index, Field Crops Research, Volume 113, Issue 3, 4 September 2009, Pages 268-273, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.002.
(http://www.sciencedirect.com/science/article/B6T6M-4WN8H7X-1/2/01d2a34fd07887d6dae43f93fad1b6b1)
Abstract:
Several crop simulation models calculate grain yield by assuming that the rate of change of harvest index ([delta]HI/[delta]t) is constant (at rate k) during grain growth. Such behaviour has been identified in many crops, although the literature contains many examples of variations in k. The concept is useful if it approximates the truth in most circumstances, or if departures from both linearity and constancy are predictable from either the environment or the state of the crop. In this paper we examine the hypothesis that much of the variation in k is related to both crop biomass at the start of grain filling (BGF) and the crop growth rate during grain growth (CGF). Calculations using simple partitioning rules indicated that both factors are important. We showed that k increases rapidly as BGF decreases below about 9.0 Mg DM/ha, but decreases only slowly with increases of BGF above 9.0 Mg DM/ha. The analysis also showed that the increase in HI with time is quadratic rather than linear. We analysed data from 68 field grown wheat crops with variation in cultivar, location, irrigation, ambient CO2 concentration and sowing dates. These showed an almost three-fold variation in k (0.0058-0.0164 day-1). Across all data sets, there was a negative linear relationship ($y = 0.02 - 0.0006x$, $R2 = 0.41$, $p < 0.001$) between k and BGF. Overall, these results suggest that some of the variation in k can be accounted for by differences in BGF. We suggest that any model that uses harvest index change as a basis for calculating yield should account, at least, for variations in BGF.
Keywords: Crop biomass; Crop model; Grain filling; Partitioning

M. Harunur Rashid, M. Murshedul Alam, M. Akhter Hossain Khan, J.K. Ladha, Productivity and resource use of direct-(drum)-seeded and transplanted rice in puddled soils in rice-rice and rice-wheat ecosystems, Field Crops Research, Volume 113, Issue 3, 4 September 2009, Pages 274-281, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.004.
(http://www.sciencedirect.com/science/article/B6T6M-4WR5NP6-1/2/94ca04d2a93ebe97ffe2ff15105db66f)
Abstract:
Conventional tilled transplanting, a widely practiced method of rice (Oryza sativa L.) establishment in puddled soils in rice-rice and rice-wheat (Triticum aestivum L.) systems in Asia, requires a large amount of labor and water, which are becoming scarce and expensive. Growing more food with the same production costs or even reduced costs and sustaining the quality of the natural resource base are a major concern. On-farm trials were conducted in Chuadanga District of Bangladesh during the wet season as monsoon rice (aman) and during the dry season as winter rice (boro) in 2006-07 to evaluate the effects of establishment methods with improved crop management on productivity, resource (land, water, and labor) use, and economic return. Rice was established by sowing in line with a drum seeder on conventional tilled puddled soils (CT-DrumR) and by transplanting in line on the day of CT-DrumR (CT-TPR1) and 30 and 35 days after CT-DrumR (CT-TPR2) in aman and boro seasons, respectively. Farmers' usual transplanting time corresponds to the day of CT-TPR2. Grain yields in CT-DrumR and CT-TPR2 were similar but the crop occupied the main field 22-24 days longer in CT-DrumR than in CT-TPR2, resulting in lower productivity (45 kg grain ha-1 day-1 vs. 55 kg grain ha-1 day-1) in both seasons. Drum-seeded rice matured earlier by 8 and 11 days, received 12% and 6% less irrigation water, saved 19 and 24 person-days ha-1, and gave higher gross margins of 6% and 4% but input costs increased by 20% and 12% than CT-TPR2 in aman and boro seasons, respectively. There is a need to examine these benefits of drum-seeded rice in relation to the feasibility of adoption by farmers.
Keywords: Productivity; Resource use; Direct-drum-seeded and transplanted rice

R.A. Lawes, Y.M. Oliver, M.J. Robertson, Integrating the effects of climate and plant available soil water holding capacity on wheat yield, Field Crops Research, Volume 113, Issue 3, 4 September 2009, Pages 297-305, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.008.
(http://www.sciencedirect.com/science/article/B6T6M-4WNWW5X-1/2/eae4594fba58d0e8e74dbc1ed77e4781)
Abstract:
In the Mediterranean farming systems of the Western Australian wheatbelt, crop yields are influenced primarily by the amount and distribution of rainfall and the soil's capacity to hold moisture. The wheatbelt's growing season rainfall varies in the range of 200-400 mm (average) and the plant available water holding capacity (PAWC) of soils is generally in the 40-140 mm range. The grain yield of wheat is sensitive to this combination of small rainfall and small storage capacity.
In this study, we explore the relationship between yield and PAWC using a combination of simulation modelling and analysis of field data. Crop yields and soil properties were monitored in detail at 17 locations (PAWCs 43-131 mm) across six seasons (1997-2005). Crop yields were also simulated using the APSIM crop simulator (RMSE = 311 kg/ha) to evaluate the long-term relationship between crop yield and plant available water capacity using 106 years of historical climate data.
The relationship between crop yield and PAWC varied with season, and two important factors emerged: (1) for PAWC < 65 mm, there was a linear relationship with crop yields that ranged from 17 kg/ha/mm to 58 kg/ha/mm of PAWC across seasons; (2) for PAWC 65-131 mm the crop yield response to PAWC ranged from 11.5 kg/ha/mm in 45% of seasons to no response.
The impact of PAWC on crop yield was reduced in seasons with late rainfall, and magnified in seasons with reduced rainfall late in the growing season. Six distinct season types with different

yield-PAWC relationships are identified and season-specific management strategies that exploit within-field variation in PAWC are developed to manage the spatial variation of PAWC in a field.
Keywords: Wheat yield; Yield variation; Plant available water capacity; APSIM

Daniel Z. Skinner, Bruce Mackey, Freezing tolerance of winter wheat plants frozen in saturated soil, Field Crops Research, Volume 113, Issue 3, 4 September 2009, Pages 335-341, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.014.
(http://www.sciencedirect.com/science/article/B6T6M-4WT39S6-1/2/8704e64744acc55a5327b0f31fa59e96)
Abstract:
Winter wheat is sown in the autumn and harvested the following summer, necessitating the ability to survive subfreezing temperatures for several months. Autumn months in wheat-growing regions typically experience significant rainfall. Hence, the wheat plants usually are exposed to freezing temperatures when they have high moisture content and are growing in very wet soil. Both of these conditions are conducive to freezing stresses different from those that occur under lower moisture conditions. This study was conducted to seek genetic variability among winter wheat lines and their progeny in the ability to tolerate freezing in saturated soil. Fully acclimated seedlings in saturated soil were frozen to a narrow range of temperature conditions that resulted in about 50% mortality of the most freezing tolerant lines studied. The temperature of the soil near the crowns of the plants was recorded every 2 min throughout each freezing episode. The following components were then determined for each freezing episode: the amount of time the plants remained in subfreezing temperature before all freezable water had been converted to ice; the rate of cooling from the freezing temperature to the minimum temperature; the minimum temperature; the length of time the plants remained at the minimum temperature; the rate of temperature increase from the minimum to 0 [degree sign]C after freezing; and the total amount of time the plants were actually frozen. Partial regression analysis revealed the minimum temperature significantly influenced survival in all of the progeny populations, while the other five components significantly influenced survival in some, but not all of the populations, suggesting genotypic differences in the ability to tolerate variation in specific aspects of the freezing process. Evidence from progeny populations suggested that improved freezing tolerance was associated with decreased sensitivity to the length of time held at the minimum temperature and increased responsiveness to the post-freezing warming rate. Further analysis of this kind of variation may enable the genetic combining of sources of tolerance of the stresses imposed by specific components of the freezing process, leading to cultivars with improved tolerance of freezing in saturated soil.
Keywords: Wheat; Cold; Freezing tolerance

A. Ahmadi, M. Joudi, M. Jonmaohammadi, Corrigendum to 'Late defoliation and wheat yield: Little evidence of post-anthesis source limitation' [Field Crop Res. 113 (2009) 90-93], Field Crops Research, Volume 113, Issue 3, 4 September 2009, Page 357, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.06.011.
(http://www.sciencedirect.com/science/article/B6T6M-4WS223P-1/2/f25988003a07a591465f2e4b452be526)

Laura Bertini, Carlo Caporale, Marco Testa, Silvia Proietti, Carla Caruso, Structural basis of the antifungal activity of wheat PR4 proteins, FEBS Letters, Volume 583, Issue 17, 3 September 2009, Pages 2865-2871, ISSN 0014-5793, DOI: 10.1016/j.febslet.2009.07.045.
(http://www.sciencedirect.com/science/article/B6T36-4WXH0CB-1/2/70c77c3fb584f41beb43faba9bae0cb2)
Abstract:

PR4 proteins possess antifungal activity against several pathogenic fungi suggesting a pivotal role in defence reactions against plant pathogen attack. We already showed that wheatwin1, a wheat PR protein of class 4, is endowed with ribonuclease activity. In this study we produced three mutants altering the active site and performed comparative analysis with the native protein also in the presence of the ribonuclease inhibitor 5'-ADP. We characterized the RNA binding site and its interaction with 5'-ADP by 3D modelling and docking studies. Moreover, in vitro antifungal assays have been carried out in order to study the relationship between antifungal and ribonuclease activities. Finally, localization of wheatwin1 in Fusarium culmorum spores was evaluated using fluorescence light microscope.
Keywords: PR proteins; Antifungal activity; Ribonuclease activity; Homology modelling; Molecular docking; Triticum aestivum; Fusarium culmorum

R. Lopez-Urrea, A. Montoro, J. Gonzalez-Piqueras, P. Lopez-Fuster, E. Fereres, Water use of spring wheat to raise water productivity, Agricultural Water Management, Volume 96, Issue 9, September 2009, Pages 1305-1310, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.04.015.
(http://www.sciencedirect.com/science/article/B6T3X-4W80C8F-4/2/fdd83f4380b243cdf4b3e175c083f67f)
Abstract:
In semi-arid environments with a shortage of water resources and a risk of overexplotation of water supplies, spring wheat (Triticum aestivum L.) is a crop that can reduce water use and increase water productivity, because it takes advantage of spring rainfall and is harvested before the evaporative demands of summer. We carried out an experiment in 2003 at 'Las Tiesas' farm, located between Barrax and Albacete (Central Spain), to improve accuracy in the estimation of wheat evapotranspiration (ETc) by using a weighing lysimeter. The measured seasonal ETc averages (5.63 mm day-1) measured in the lysimeter was 417 mm compared to the calculated ETc values (5.31 mm day-1) calculated with the standard FAO methodology of 393 mm. The evapotranspiration crop coefficient (Kc) derived from lysimetric measurements was Kc-mid: 1.20 and Kc-end: 0.15. The daily lysimeter Kc values were fit to the evolution linearly related to the green cover fraction (fc), which follows the crop development pattern. Seasonal soil evaporation was estimated as 135 mm and the basal crop coefficient approach was calculated in this study, Kcb which separates crop transpiration from soil evaporation (evaporation coefficient, Ke) was calculated and related to the green cover fraction (fc) and the Normalized Difference Vegetation Index (NDVI) obtained by field radiometry in case of wheat. The results obtained by this research will permit the reduction of water use and improvement of water productivity for wheat, which is of vital importance in areas of limited water resources.
Keywords: Wheat; Crop evapotranspiration; Lysimeter; Single and dual crop coefficients; Green cover fraction; Normalized Difference Vegetation Index

Tobias Persson, Jun Li Ren, Elisabeth Joelsson, Ann-Sofi Jonsson, Fractionation of wheat and barley straw to access high-molecular-mass hemicelluloses prior to ethanol production, Bioresource Technology, Volume 100, Issue 17, September 2009, Pages 3906-3913, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.02.063.
(http://www.sciencedirect.com/science/article/B6V24-4W0R3CJ-5/2/5d2b2527aef5381a0c73c43da5cc8179)
Abstract:
The cost efficiency of the biorefining process can be improved by extracting high-molecular-mass hemicelluloses from lignocellulosic biomass prior to ethanol production. These hemicelluloses can be used in several high-value-added applications and are likely to be important raw materials in the future. In this study, steam pretreatment in an alkaline environment was used to pretreat the lignocellulosic biomass for ethanol production and, at the same time, extract arabinoxylan with a high-molecular-mass. It was shown that 30% of the arabinoxylan in barley straw could be

extracted with high-molecular-mass, without dissolving the cellulose. The cellulose in the solid fraction could then be hydrolysed with cellulase enzymes giving a cellulose conversion of about 80-90% after 72 h. For wheat straw, more than 40% of the arabinoxylan could be extracted with high-molecular-mass and the cellulose conversion of the solid residue after 72 h was about 70-85%. The high cellulose conversion of the pretreated wheat and barley straw shows that they can be used for ethanol production without further treatment. It is therefore concluded that it is possible to extract high-molecular-mass arabinoxylan simultaneously with the pretreatment of biomass for ethanol production in a single steam pretreatment step.
Keywords: Steam pretreatment; Arabinoxylan; Enzymatic hydrolysis; Biorefinery

A. Gaston, R. Abalone, R.E. Bartosik, J.C. Rodriguez, Mathematical modelling of heat and moisture transfer of wheat stored in plastic bags (silobags), Biosystems Engineering, Volume 104, Issue 1, September 2009, Pages 72-85, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.06.012.
(http://www.sciencedirect.com/science/article/B6WXV-4WSWYJR-1/2/264b815397bf39bb66218446c102db06)
Abstract:
A bidimensional finite element model that predicts temperature distribution and moisture migration of wheat stored in silobags due to seasonal variation of climatic conditions is described. The model includes grain respiration and calculates carbon dioxide and oxygen concentrations during storage as well as the associated dry matter loss.
The model validation was carried out by comparing predicted with measured temperature and moisture content (MC) data. The temperature standard errors of the model validation were 1.94 [degree sign]C at the bottom, 1.35 [degree sign]C in the middle and 1.20 [degree sign]C at the top layer. The model predicted moisture increase in the top grain layer during storage ranging from 1.0 to 1.5% w.b., while the measured increase ranged from 0.4 to 0.8% w.b.
Predicted average CO2 and O2 concentrations were compared with measured data. For dry wheat (12.5% w.b.), after 100 days of storage, differences in concentrations were 1.8 and 0.6% points for CO2 and O2, respectively. For wet wheat (16.4% w.b.), the model predicted the total consumption of O2 after five days while the observed O2 data never dropped below 5%. The difference between the measured and predicted CO2 concentration for the fifth day was 1.1%. For the range of MCs considered in this work, the change in CO2 concentration during storage was satisfactorily predicted by use of White et al. (1982) estimation of CO2 production rate, but prediction of O2 concentration was poor for wet grain.

Ivan Petric, Almir Sestan, Indira Sestan, Influence of initial moisture content on the composting of poultry manure with wheat straw, Biosystems Engineering, Volume 104, Issue 1, September 2009, Pages 125-134, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.06.007.
(http://www.sciencedirect.com/science/article/B6WXV-4WPS9KW-4/2/34dc4123e35b2f8d0bed669cc515f7e6)
Abstract:
The effect of initial moisture content (MC) on the composting of poultry manure with wheat straw in terms of the temperature of the compost, its emission of carbon dioxide and ammonia, and the rate of conversion of organic matter were investigated. Three experiments were carried out in closed laboratory-scale reactors under adiabatic conditions. The initial MC of the mixture of poultry manure and wheat straw showed a significant effect on aerobic composting process. The results demonstrated that for composting poultry manure with wheat straw, relatively high MCs are better at achieving higher temperatures and retaining them for longer times. However, high MCs can lead to increased losses of ammonia, which need be controlled by the addition of suitable additives. The results of this study suggest that an initial MC of around 69% can be considered as being suitable for the efficient composting of poultry manure mixed with wheat straw.

Hua Jiang, Yang Zhang, Xuefei Wang, Effect of lipases on the surface properties of wheat straw, Industrial Crops and Products, Volume 30, Issue 2, September 2009, Pages 304-310, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2009.05.009.
(http://www.sciencedirect.com/science/article/B6T77-4WS85T7-1/2/70f68ba6d523b205338ff1fa0f268c1c)
Abstract:
Surface characteristics of untreated and lipase-treated wheat straw (WS) have been investigated using Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and SEM-Energy dispersive X-ray spectroscopy (SEM-EDX). Static contact angle of WS surface was determined by the pendant drop method. The WS thermal stability was also investigated using the thermogravimetric analysis (TGA). It was shown that the lipases from Candida cylindracea insignificantly changed the chemical group, microscopic morphology, and wettability of the WS inner surface. However, FTIR showed the lipases could effectively remove the hydrophobic lipophilic extractives and silica from the outer surface of untreated WS, and increased the hydroxyl group content in the outer surface. SEM images also exhibited the lipases stripped off the dense hydrophobic layer on the WS outer surface with the help of shear force. SEM-EDX analysis showed that the lipase treatment reduced Si content on the WS outer surface from 12.44 to 1.33%. The water contact angle of the WS outer surface decreased from 92.7[degree sign] to 65.2[degree sign] after lipase treatment, which indicated that the wettability of the lipase-treated WS outer surface was equivalent to that of the inner surface with a water contact angle of about 63[degree sign]. Lipase-treated and untreated WS had a similar thermal stability. Therefore, the lipase treatment was one of the potential methods to improve the wettability of natural fibers in composite material processing. Comparative testing of particleboards produced from the whole WS untreated and treated by the lipases is under way to evaluate the overall effects of the lipase treatment on the improvement in their mechanic performances.
Keywords: Lipase treatment; Wheat straw; Elemental analysis; Surface

Jin-shui Wang, Zhi-yan Wei, Lu Li, Ke Bian, Mou-ming Zhao, Characteristics of enzymatic hydrolysis of thermal-treated wheat gluten, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 205-209, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.004.
(http://www.sciencedirect.com/science/article/B6WHK-4WGK4H5-1/2/79ccb97430f56f71a610db7e0faaee47)
Abstract:
Effect of thermal treatment at 50-90 [degree sign]C on wheat gluten hydrolysis by papain was evaluated in this study. Thermal treatment decreased the amount of sodium dodecyl sulfate (SDS) extractable protein. The treatments at 80 and 90 [degree sign]C had a strong impact on protein extractability. Thermal treatment for 30 min resulted in a significant reduction in SDS extractable glutenin level in wheat gluten. A significant drop in free sulphydryl level was found in wheat gluten treated at 70 [degree sign]C for 30 min. It indicated that cross-linking of glutenin through S-S occurred during thermal treatment. The treatments at 70-90 [degree sign]C led to significant decreases in soluble and nitrogen level, while significant increases in peptide nitrogen amount in the hydrolysates from treated gluten were found. A time-dependent effect was observed for the changes in soluble forms of nitrogen and PN. Thermal treatment resulted in molecular mass distribution change according to gel permeation chromatography analysis. Thermal treatment significantly increased the amount of fractions with molecular mass beyond 10 K (67.2%) in the hydrolysates and greatly decreased the amounts of fractions with MM of 10-5 K and below 5 K in hydrolysates.
Keywords: Wheat gluten; Enzymatic hydrolysis; Thermal treatment; Molecular mass distribution

A.M. Digesu, C. Platani, L. Cattivelli, G. Mangini, A. Blanco, Genetic variability in yellow pigment components in cultivated and wild tetraploid wheats, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 210-218, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.002.
(http://www.sciencedirect.com/science/article/B6WHK-4WGK4H5-3/2/03bfabc2634b336d9b87668a374ca2c1)
Abstract:
Yellow pigment concentration (YPC) in durum wheat is an important criterion in the assessment of semolina quality, particularly in determining the commercial and nutritional quality of end-products. Genetic variability of YPC and carotenoid components was analysed in 102 wild and cultivated tetraploid wheat accessions in two trials. Overall, modern cultivars showed significantly higher values of YPC compared to old cultivars and wild ssp. dicoccum and ssp. dicoccoides accessions. Total carotenoid concentration varied between 1.178 and 4.416 [mu]g/g with an average of 2.460 [mu]g/g. The portion of carotenoids amounted to 33.2% of the YPC in 80 wheat accessions examined in the 2006 trial. Lutein was the main component of carotenoids, followed by zeaxanthin and [beta]-carotene. [alpha]-carotene and [beta]-cryptoxanthin were minor components. Pigment concentration was negatively correlated with kernel weight and grain protein concentration. Significant positive correlations were found between b* index and YPC. Knowledge of the carotenoid composition and concentration is useful for wheat breeders in the development of cultivars with high yellow colour and enhanced phytochemical concentrations, and provides valuable information for evaluating contributions to health benefits from the consumption of durum wheat end-products.
Keywords: Carotenoids; Yellow pigments; HPLC; T. turgidum

Yong Zhang, Jianwei Tang, Jun Yan, Yelun Zhang, Yan Zhang, Xianchun Xia, Zhonghu He, The gluten protein and interactions between components determine mixograph properties in an F6 recombinant inbred linepopulation in bread wheat, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 219-226, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.005.
(http://www.sciencedirect.com/science/article/B6WHK-4WGK6N2-1/2/f0418b5bc9ff145fb0c64877d89b17de)
Abstract:
One hundred and sixty-eight F6 recombinant inbred lines (RILs) derived from Chinese wheat cultivars, PH82-2 and Neixiang188, were used to determine the cumulative effects of HMW-GS and LMW-GS composition and quantity of gluten protein fractions on dough mixograph properties. A wide range of variation for all parameters in the RILs was detected. Major gene loci of HMW-GS were associated with variation in mixograph characters, but accounted for no more than 25.3% of the phenotypic variations. Glu-D1, together with Glu-B3, played the most important role in determining the properties. Additive effects of HMW-GS and LMW-GS showed major contributions to most of the variation of mixograph parameters, and epistatic effects were also important and could be counter to additive effects of individual loci. The quantity of gluten protein fractions, especially the quantity of glutenin, LMW-GS, and Glu-B3, showed highly significant correlations with most of the quality parameters, but the correlation coefficients were influenced by grain hardness, protein content, or both. Protein quality could be greatly improved through increasing the quantity of glutenin, while holding desirable composition of HMW-GS and LMW-GS alleles, with an appropriate ratio of quantity of glutenin to gliadin.
Keywords: Triticum aestivum L.; Gluten protein; Mixograph; 1BL.1RS; HPLC; Quantity of gluten protein fraction

P. Hogy, C. Zorb, G. Langenkamper, T. Betsche, A. Fangmeier, Atmospheric CO2 enrichment changes the wheat grain proteome, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 248-254, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.002.

(http://www.sciencedirect.com/science/article/B6WHK-4WJBBTV-2/2/2e648e6776d564c7e1b64c21b44491a2)
Abstract:
Spring wheat (Triticum aestivum L. cv. Triso) was grown in a free-air CO2 enrichment (FACE) field experiment in order to gain information on CO2-induced effects on grain composition and quality at maturity. A proteome analysis was performed using two-dimensional gel electrophoresis (2-DE) and protein identification was done with mass spectrometry (MALDI-TOF MS). In elevated CO2 (526 [mu]l l-1), an increase of 13.5% in grain yield was observed relative to 375 [mu]l l-1 at a low level of significance (P = 0.528). Total grain protein concentration was decreased by 3.5% at a high level of statistical significance. Most importantly, a number of statistically significant changes within the grain proteome were observed, as the levels of 32 proteins were affected by elevated CO2: 16 proteins were up-regulated and 16 were down-regulated. Our experiment demonstrates that high-CO2 can markedly affect the proteome of mature wheat grain. The potential role of the proteins, changed in response to CO2 enrichment, is discussed as some may affect grain quality. For the task of selecting cultivars resistant to CO2-induced quality loss, we propose to consider the proteins affected by elevated CO2 identified in this work here.
Keywords: CO2 enrichment; FACE; Wheat; Grain proteome

Ke-Xue Zhu, Xiao-Hong Sun, Hui-Ming Zhou, Optimization of ultrasound-assisted extraction of defatted wheat germ proteins by reverse micelles, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 266-271, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.006.
(http://www.sciencedirect.com/science/article/B6WHK-4WPJ61K-1/2/4054e4023a248ca60f2fa850862517b6)
Abstract:
In this work, an ultrasound-assisted procedure for the extraction of defatted wheat germ proteins by reverse micelles was established. Response surface methodology (RSM) was used to optimize the ultrasound-assisted extraction (UAE) parameters (ultrasonic output power, ultrasonic time and pulse mode) for enhancing the forward extraction efficiency of defatted wheat germ proteins by implementing a three-level, three-variable Box-Behnken experimental design. The independent variable with the largest effect on response was X2 (ultrasonic time), followed by X1 (ultrasonic output power) and X3 (pulse mode). The optimum extraction conditions were found to be ultrasonic output power 363 W, ultrasonic time 24 min and pulse mode 2.4 s on and 2 s off (2.4 s:2 s). Under these conditions, the forward extraction efficiency of defatted wheat germ proteins can increase from 37% to 57%, and the final protein extraction efficiency by reverse micelles can reach 45.6%, making the advantage of reverse micelles much more obvious than alkaline extraction and isoelectric precipitation on the separation of protein.
Keywords: Ultrasound-assisted extraction; Defatted wheat germ proteins; Reverse micelles; Forward extraction efficiency

Cristina M. Rosell, Eva Santos, Juan M. Sanz Penella, Monica Haros, Wholemeal wheat bread: A comparison of different breadmaking processes and fungal phytase addition, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 272-277, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.007.
(http://www.sciencedirect.com/science/article/B6WHK-4WPJ61K-2/2/142676dfebf1fdf17b6a4fbc72587802)
Abstract:
The effect of different breadmaking processes (conventional, frozen dough, frozen partially baked bread) and the effect of the storage period on the technological quality of fresh wholemeal wheat breads are investigated. In addition, the impact of the exogenous fungal phytase on the phytate content was also determined. Results showed that breadmaking technology significantly affected the quality parameters of wholemeal breads (specific volume, moisture content, crumb and crust

colour, crumb texture profile analysis and crust flaking) and frozen storage affected to a different extent the quality of the loaves obtained from partially baked breads and those obtained from frozen dough, particularly crust flaking. Freezing and frozen storage of wholemeal bread in the presence of fungal phytase decreased significantly the phytate content in whole wheat breads. The combination of fungal phytase addition, breadmaking process and frozen storage could be advisable for overcoming the detrimental effect of bran on the mineral bioavailability.
Keywords: Wholemeal; Breadmaking; Quality; Phytates

Hakan Pleijel, Helena Danielsson, Yield dilution of grain Zn in wheat grown in open-top chamber experiments with elevated CO2 and O3 exposure, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 278-282, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.009.
(http://www.sciencedirect.com/science/article/B6WHK-4WR1B2C-2/2/83dddf17545de8ecfe60509af09b0fe5)
Abstract:
Wheat (Triticum aestivum L.) grain Zn data from six open-top chamber experiments performed in south-west Sweden were combined to study the relationship between Zn accumulation and grain yield, grain protein, and yield components. Treatments included, in addition to open-top chamber controls, elevated CO2, elevated O3, combined CO2 and O3 exposure, combined elevated CO2 and supplemental irrigation, supplemental irrigation, and ambient air comparison plots. The grain Zn concentration was strongly correlated with grain protein (R2 = 0.90) over the range of the experimental treatments, representing non-soil factors. A significant yield dilution effect was found for Zn. For a 10% increase in grain yield, Zn yield was increased by 6.8% on average. Effects on Zn yield correlated strongly with effects on grain protein yield, with a slope close to unity, showing that yield dilution effects for grain Zn and grain protein were similar. Treatment effects on grain Zn concentration were related to effects on grain weight ($P < 0.01$) and grain number ($P < 0.05$), but not to harvest index. It was concluded that yield stimulation caused by rising CO2 concentrations is likely to lead to reduced Zn concentrations of wheat grain, thus reducing the nutritional quality.
Keywords: Carbon dioxide; Ozone; Zinc; Wheat

Shusong Zheng, Patrick F. Byrne, Guihua Bai, Xueyan Shan, Scott D. Reid, Scott D. Haley, Bradford W. Seabourn, Association analysis reveals effects of wheat glutenin alleles and rye translocations on dough-mixing properties, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 283-290, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.008.
(http://www.sciencedirect.com/science/article/B6WHK-4WR1B2C-1/2/d4dc8788584d432dd0f8826d1f1e5798)
Abstract:
The glutenin loci of wheat (Triticum aestivum L.) are important determinants of bread-making quality, although the effects of alleles at those loci are incompletely understood. We applied an association analysis method to assess the effects of glutenin alleles and 1RS wheat-rye (Secale cereale L.) translocations on dough-mixing properties in 96 wheat cultivars and advanced lines grown at three Colorado locations while accounting for population structure and relatedness of individuals in the population. The results indicated that (1) in the majority of cases, controlling relatedness of individuals reduced the significance of associations between glutenin loci and Mixograph traits; (2) the Glu-D1 and Glu-B3 loci and 1RS translocations had greater impacts on dough-mixing properties compared to other glutenin loci; (3) Glu-B1w, Glu-D1d, and Glu-B3b were consistently associated with greater (more favorable) Mixograph peak time (MPT) than other alleles at the respective loci, whereas Glu-B1e, Glu-D1a, and Glu-B3c were associated with reduced MPT; (4) the 1BL.1RS translocation was associated with a decrease in Mixograph properties. Our results indicate that taking multiple-level relatedness of individuals into account can improve the results of association analysis for wheat-quality traits.
Keywords: Glutenin subunits; End-use quality; Wheat; Association mapping

Li Liu, Aili Wang, Rudi Appels, Junhong Ma, Xianchun Xia, Ping Lan, Zhonghu He, Frank Bekes, Yueming Yan, Wujun Ma, A MALDI-TOF based analysis of high molecular weight glutenin subunits for wheat breeding, Journal of Cereal Science, Volume 50, Issue 2, September 2009, Pages 295-301, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.006.
(http://www.sciencedirect.com/science/article/B6WHK-4WH2M0H-1/2/bbc1542d50f22221ed46d13fcbd5a8c2)
Abstract:
High molecular weight glutenin subunits play an important role in determining wheat dough quality as they confer visco-elastic properties to the dough required for mixing and baking performance. In this work, a collection of 103 genotypes of common wheat from 12 countries was used to analyse the composition of HMW-GS by SDS-PAGE and MALDI-TOF-MS. Results indicated that MALDI-TOF technology is suitable for analyzing most HMW-GS alleles. The allelic diversity at Glu-B1 locus include subunits 6+8b*, 7, 7+8, 7+8a*, 7b*+8, 7OE, 7OE+8, 7OE+8a*, 7OE+8b*, 7+9, 13+16, 14+15, 17+18 and 20. The rapid identification of HMW-GS capability of MALDI-TOF-MS is discussed in relation to its value for screening lines in wheat breeding programs, especially in discriminating subunits 7OE, 8a* and 8b* associated with superior quality. A new glutenin subunit 7b*+8 was found in Japanese germplasm Eshimashinriki.
Keywords: Triticum aestivum L.; Quality; SDS-PAGE; MALDI-TOF-MS; HMW-GS

Robert Graybosch, K. Khan and P.R. Shewry, Editors, Wheat Chemistry and Technology, fourth ed., AACC International (2009) ISBN 978-1-891127-55-7 480 pp., 196 figures, 69 tables, 27 color images., Journal of Cereal Science, Volume 50, Issue 2, September 2009, Page 304, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.011.
(http://www.sciencedirect.com/science/article/B6WHK-4X076X3-1/2/98acc237605e1e00eb85cc6dfe6fd182)

Gabriella Bottega, Rosita Caramanico, Mara Lucisano, Manuela Mariotti, Laura Franzetti, M. Ambrogina Pagani, The debranning of common wheat (Triticum aestivum L.) with innovative abrasive rolls, Journal of Food Engineering, Volume 94, Issue 1, September 2009, Pages 75-82, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.002.
(http://www.sciencedirect.com/science/article/B6T8J-4VTCM2M-3/2/830a250e580a816c76bf44ec8cda09d4)
Abstract:
The physical and chemical modifications associated with the debranning of common wheat (Triticum aestivum L.) and the improvement of the hygienic characteristics of the kernels were examined. A pilot-plant debranning machine was equipped with rolls lined with synthetic diamond powder, an innovative abrasive material. The technological parameters taken into account were: the particle size of the abrasive elements, the processing time, the number of debranning passages and the hydration conditions of the kernels before treatment. The abrasive effects were observed by Scanning Electron Microscopy and quantified by evaluating the debranning level and several chemical and physical indices of kernels and waste. A preliminary hydration passage was determinant for reducing kernel breakage during debranning. Best results in terms of homogeneous removal of bran layers were obtained with the addition of 3% water and keeping the hydrated mass mixing for 5 min. Abrasive surfaces with fine particle size (<1000 mesh) gave a quite uniform debranning process, without deep grooves in the endosperm region. A final brushing of the debranned kernels assured a more accurate removal of bran layers. Debranning levels lower than 8-10% guaranteed low starch losses in the waste and, at the same time, noticeably reduced the microbial contamination of the kernels.
Keywords: Debranning; Common wheat; Microbial contamination; Waste; Scanning Electron Microscopy (SEM)

Wilfried Remus-Borel, James G. Menzies, Richard R. Belanger, Aconitate and methyl aconitate are modulated by silicon in powdery mildew-infected wheat plants, Journal of Plant Physiology, Volume 166, Issue 13, 1 September 2009, Pages 1413-1422, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.02.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4W09GD3-1/2/7940aebfc2c80507027e8ee7b1974e4f)
Abstract:
The accumulation of 5,6-O-methyl trans-aconitate in wheat was previously found to be linked with the presence of powdery mildew (Blumeria graminis) and silicon (Si) feeding. In this work, we sought to determine if trans-aconitate (TA) could act as a precursor of methylated forms of TA in wheat and if a relationship existed between Si treatment, disease development, TA and methyl TA concentration within wheat leaves. In absence of infection, TA concentration increased over time regardless of Si feeding. By contrast, TA concentration remained fairly constant over time in both Si- and Si+-infected plants but Si+ plants had a significantly lower level than Si- plants. Conversely, methyl TA concentration increased in wheat leaves in response to infection and was linked to wheat's increased resistance induced by Si. The effect of Si feeding was only noticeable on methyl TA concentration in presence of the fungus. This suggests that Si does not act directly on TA concentration in leaves but somehow accentuate the production of methyl TA in stressed plants. Based on the concurrent increase in methyl TA and leveling off of TA concentration, it appears that the latter, instead of accumulating, is used by diseased plants to produce antifungal methylated forms of TA that would act as phytoalexins to limit disease development, a phenomenon more pronounced in plants treated with Si.
Keywords: Methyl trans-aconitic acid; Phytoalexin; Powdery mildew; Silicon; trans-Aconitic acid

Alexey I. Zabotin, Tatyana S. Barisheva, Oksana I. Trofimova, Tatyana E. Toroschina, Irina A. Larskaya, Olga A. Zabotina, Oligosaccharin and ABA synergistically affect the acquisition of freezing tolerance in winter wheat, Plant Physiology and Biochemistry, Volume 47, Issue 9, September 2009, Pages 854-858, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2009.04.004.
(http://www.sciencedirect.com/science/article/B6VRD-4W7B0CB-1/2/872f92bae56509bf2aed7f943132fd0d)
Abstract:
In this paper, we continue our studies of the previously discovered [O.A. Zabotina, D.A. Ayupova, O.N. Larskaya, O.N. Nikolaeva, G.I. Petrovicheva, A.I. Zabotin, Physiologically active oligosaccharides, accumulating in the roots of winter wheat during adaptation to low temperature, Russian Journal of Plant Physiology 45 (1998) 262] oligosaccharin (physiologically active oligosaccharide) GXAG, which stimulates the acquisition of freezing tolerance in winter varieties of Triticum aestivum L. The transient accumulation of GXAG in the tissues of winter wheat correlates with the temporal activation of cell wall glycosidases during the first hours of cold acclimation (2 [degree sign]C). This finding suggests that the oligosaccharin is liberated as a result of the intensification of hemicellulose turnover. At low concentrations, GXAG initiates the acquisition of freezing tolerance in winter plants, in a manner similar to ABA, even at room temperature. The resultant effect of ABA and GXAG on the freezing tolerance of winter wheat depends on the sequence of pre-treatments with these two factors. When seedlings are pre-treated with GXAG a few hours before treatment with ABA, the effect is synergistic, and its impact depends on the duration of pre-treatment with GXAG. When ABA is applied first, the resultant effect on freezing tolerance is additive. The results obtained here lead to the conclusion that oligosaccharin, accumulating during the first hours of cold acclimation, functions as a partner of ABA during the initiation of freezing tolerance acquisition in winter plants. We hypothesize that GXAG increases cell receptivity to ABA signaling.

Keywords: ABA; Cold hardening; Freeze tolerance; Glycosidases; Oligosaccharin; Triticum aestivum L.

German Robert, Mariana Melchiorre, Roberto Racca, Victorio Trippi, H. Ramiro Lascano, Apoplastic superoxide level in wheat protoplast under photooxidative stress is regulated by chloroplast redox signals: Effects on the antioxidant system, Plant Science, Volume 177, Issue 3, September 2009, Pages 168-174, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.05.001.
(http://www.sciencedirect.com/science/article/B6TBH-4W99VTV-1/2/8487174f0048792b8b8b3be0002468ba)
Abstract:
Apoplastic superoxide radical level in wheat mesophyll protoplasts was evaluated under different light intensities. Conditions that enhanced chloroplastic reactive oxygen species (ROS) production, such as high light intensity, paraquat treatments, or choloplastic Mn-superoxide dismutase (Mn-SOD) overexpression, increased the level of apoplastic superoxide. By contrast, the addition of diphenyl iodonium, a suicide NADPH oxidase inhibitor; DCMU, an herbicide that blocks plastoquinone reduction; and EGTA, a Ca2+ chelator, decreased the superoxide level in the apoplast. Intracellular ROS production was rapidly stimulated by high light intensity and paraquat, and decreased in the presence of DCMU. The association between apoplastic superoxide level and total activities of the antioxidant enzymes superoxide dismutase (SOD) (E.C.:1.15.1.1), glutathione reductase (GR) (E.C.:1.6.4.2), ascobate peroxidase (APX) (E.C.:1.11.1.11), and catalase (CAT) (E.C.:1.11.1.6) was also evaluated. Changes in apoplastic superoxide level were positively correlated with activities of antioxidant enzymes mainly located in the chloroplasts, but not with CAT activity, which is located in peroxisomes and mitochondria. Regulation of apoplastic superoxide level by chloroplastic ROS and plastoquinone redox state is discussed, as well as its role in modulating antioxidant defense responses under photooxidative stress.
Keywords: Photooxidative stress; Apoplastic superoxide level; Chloroplastic reactive oxygen species; Antioxidant system; Wheat protoplasts

Susana B. Rosas, German Avanzini, Evelin Carlier, Carolina Pasluosta, Nicolas Pastor, Marisa Rovera, Root colonization and growth promotion of wheat and maize by Pseudomonas aurantiaca SR1, Soil Biology and Biochemistry, Volume 41, Issue 9, September 2009, Pages 1802-1806, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.10.009.
(http://www.sciencedirect.com/science/article/B6TC7-4TTF82N-9/2/f45d2eecf92875980bfefe1855ea5c74)
Abstract:
Wheat (Triticum aestivum L.), rice (Oryza sativa) and maize (Zea mays L.) are the most important cereals worldwide. However, in the last few years, soil has been submitted to both use and handling pressures due to the increase in agricultural practices, which are leading to its degradation. The use of plant growth-promoting rhizobacteria (PGPR) as inoculants constitutes a biological alternative for sustainable production. Pseudomonas aurantiaca SR1 was formulated as an inoculant in order to evaluate its growth promotion effect in the field when applied on maize and wheat seeds at the sowing time. P and N fertilization treatments were also included in the assays. P. aurantiaca SR1 colonized the root system of both crops and it persisted at appropriate population densities. It also showed a significant plant growth-promoting effect that was reflected in the yield. Another relevant finding was that both crops, when inoculated with P. aurantiaca SR1, presented higher yields with fertilization doses lower than those conventionally applied. This indicated its potential use as a reasonable alternative for crop production, with a minimization of the ecological impact.
Keywords: Pseudomonas aurantiaca SR1; Wheat; Maize; Inoculation; Growth promotion

Karen Baumann, Petra Marschner, Ronald J. Smernik, Jeffrey A. Baldock, Residue chemistry and microbial community structure during decomposition of eucalypt, wheat and vetch residues, Soil Biology and Biochemistry, Volume 41, Issue 9, September 2009, Pages 1966-1975, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.06.022.
(http://www.sciencedirect.com/science/article/B6TC7-4WR5VHP-1/2/f1500b32c8587d0792dc873a67c36c4e)
Abstract:
Previous studies have shown that residue chemistry and microbial community structure change during decomposition, however little is known about the relationship between C-chemistry and microbial community structure. To address this knowledge gap, we studied C-chemistry and microbial community structure during the decomposition of eucalypt, wheat and vetch residues with and without additional inorganic N. Bags containing ground residues of eucalypt, wheat, and vetch were buried in sand microcosms after inoculation with a diverse microbial community. Respiration was measured over an incubation period of 150 days. At different times during incubation, total C and N of the residues were analysed and residue carbon chemistry was determined by 13C-NMR (nuclear magnetic resonance) spectroscopy. Microbial communities were assessed by phospholipid fatty acid (PLFA) analyses.
Results indicated that during decomposition, residue C-chemistry and microbial community composition changed over time and differed between residue types. Changes in microbial community structure were associated with changes in residue C-chemistry, mainly the relative content of aryl-C and O-alkyl-C. Addition of N increased cumulative respiration, altered C-chemistry during decomposition, particularly in high C/N residues (wheat and eucalypt), and changed microbial succession leading to an earlier establishment of a stable microbial community structure. N addition to eucalypt and wheat reduced the decomposition of aryl-C compounds.
Keywords: C-Chemistry; Microbial community structure; NMR; PLFA; Residue decomposition

M.L. Jat, M.K. Gathala, J.K. Ladha, Y.S. Saharawat, A.S. Jat, Vipin Kumar, S.K. Sharma, V. Kumar, Raj Gupta, Evaluation of precision land leveling and double zero-till systems in the rice-wheat rotation: Water use, productivity, profitability and soil physical properties, Soil and Tillage Research, Volume 105, Issue 1, September 2009, Pages 112-121, ISSN 0167-1987, DOI: 10.1016/j.still.2009.06.003.
(http://www.sciencedirect.com/science/article/B6TC6-4WV5BBX-1/2/249752f944b0124adf7acb9accc0f101)
Abstract:
In recent years conventional production technologies in the rice-wheat (RW) system have been leading to deterioration of soil health and declining farm profitability due to high inputs of water and labour. Conservation agriculture (CA)-based resource-conserving technologies (RCTs) vis-a-vis zero-till (ZT), raised-bed planting and direct-seeded rice (DSR) have shown promise as alternatives to conventional production technologies to overcome these problems. The integration of CA-based RCTs with precision agriculture (PA)-based technologies in a systems perspective could provide a better option for sustainable RW production systems. In this study we attempted to evaluate conservation and precision agriculture (CPA)-based RCTs as a double-ZT system integrated with laser-assisted precision land leveling (PLL) in the RW system. A field experiment was conducted in the western IGP for 2 years to evaluate various tillage and crop establishment methods under PLL and traditional land leveling (TLL) practices to improve water productivity, economic profitability and soil physical quality. Irrespective of tillage and crop establishment methods (TCE), PLL improved RW system productivity by 7.4% in year 2 as compared to traditional land leveling. Total irrigation water savings under PLL versus TLL were 12-14% in rice and 10-13% in wheat. PLL improved RW system profitability by US$113 ha-1 (year 1) to $175 ha-1 (year 2). Yields were higher in conventionally transplanted rice followed by direct-drill-seeded rice after ZT. In wheat, yields were higher in ZT when followed by DSR than in the conventional-till

(CT) system. RW system productivity under double ZT was equivalent to that of the conventional method. Among different TCE, conventional puddled-transplanted rice-CT wheat required 12-33% more water than other TCE techniques. Compared with CT systems, double ZT consumed 12-20% less water with almost equal system productivity and demonstrated higher water productivity. The CT system had higher bulk density and penetration resistance in 10-15 and 15-20 cm soil layers due to compaction caused by the repeated wet tillage in rice. The steady-state infiltration rate and soil aggregation (>0.25 mm) were higher under permanent beds and double ZT and lower in the CT system. Under CT, soil aggregation was static across seasons, whereas it improved under double no-till and permanent beds. Similarly, mean weight diameter of aggregates was higher under double ZT and permanent beds and increased over time. The study reveals that to sustain the RW system, CPA-based RCTs could be more viable options: however, the long-term effects of these alternative technologies need to be studied under varying agro-ecologies.
Keywords: Double zero-tillage; Precision land leveling; Profitability; Rice-wheat system; Soil physical properties; Water use

Jan Hubert, Marta Nesvorna, Vaclav Stejskal, The efficacy of sieving, filth flotation and Tullgren heat extraction for detecting various developmental stages of Tribolium castaneum and Ephestia kuehniella in samples of wheat grain, flour and semolina, Journal of Stored Products Research, In Press, Corrected Proof, Available online 29 August 2009, ISSN 0022-474X, DOI: 10.1016/j.jspr.2009.05.003.
(http://www.sciencedirect.com/science/article/B6T8Y-4X3VM07-1/2/22332b71154c8cc5f8c5ea1b3ba67e59)
Abstract:
A prerequisite for effective pest risk management in food is the unbiased interpretation of results obtained by various detection methods. In this study we compared the sensitivity of filth flotation tests, sieving and heat extraction in Tullgren-Berlese funnels for detecting insect contaminants. Samples of wheat grain, flour and semolina were contaminated with eggs, juveniles and adults of Tribolium castaneum, and eggs or larvae of Ephestia kuehniella. Calibration methods were applied for every detection method, and total and sample recoveries and detection limits were calculated for each method, food substrate and contaminant type. The tested contaminants were not detected on a qualitative level by any single technique, instead a combination of techniques was necessary for detection. Sieving was the method with the highest total recoveries, ranging from 90 to 100%. Filth flotation was a uniquely effective for egg detection, with total recoveries ranging from 65 to 95%. The extraction of adults and larvae of both species in Tullgren-Berlese funnels failed in semolina and flour, and was of very limited success in grain. The detection limits for sieving were from 1 to 16 contaminants/kg commodity. The detection limits for filth flotation were from 224 to 508 eggs, and 58 to 507 adults or larvae/kg commodity. The sample recoveries were usually influenced by sample size, species, stadium and their interactions, and indicated how to optimize method protocols. The calibration of methods provided estimates of contaminant densities different from those obtained without calibration. Our work revealed that some currently used methods are not sensitive enough to detect all stages of insect pests, or in some cases, low levels of pest infestation. This lack of sensitivity potentially enables the infested cereal food product to continue down the food processing chain even after laboratory inspection.
Keywords: Stored-product insects; Storage; Detection; Filth flotation; Sieving; Tullgren-Berlese funnels

Humberto F. Causin, Irma N. Roberts, Victoria Criado, Susana M. Gallego, Liliana B. Pena, Maria del Carmen Rios, Atilio J. Barneix, Changes in hydrogen peroxide homeostasis and cytokinin levels contribute to the regulation of shade-induced senescence in wheat leaves, Plant Science, In Press, Accepted Manuscript, Available online 29 August 2009, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.08.014.

(http://www.sciencedirect.com/science/article/B6TBH-4X3W42C-2/2/41b8d4789813856006a36757b8e5e182)
Abstract: Summary
In a previous work we demonstrated that the suppression of blue light in shaded leaves of wheat increases their senescence rate and the development of oxidative stress symptoms. In order to better understand the interaction between the oxidative metabolism and light spectral quality in the regulation of leaf senescence, we studied the evolution of H2O2 concentration, protein oxidation, proteolytic activity and cytokinin content in excised leaves, either illuminated (control, 'C') or shaded under blue ('B', high blue light transmission) or green ('G', very low blue light transmission) light filters. H2O2 concentration significantly increased during the first 9 h after treatment initiation, an effect that was consistently higher in treatments B and C. Leaves from these treatments showed lower chlorophyll and protein degradation rates, lower concentration of oxidized proteins, and maintained higher levels of the cytokinin isopentenyl-adenosine than those from treatment G. When moderate H2O2 concentrations were supplied during 6 to 9 h after the onset of the shade treatments, senescence rate in treatment G was delayed, while the opposite effect was observed in the presence of the H2O2 scavengers catalase and, to a lesser extent, dimethylthiourea. These effects were accompanied by an increment or a decrement, respectively, of catalase activity, suggesting that the early changes in H2O2 homeostasis in leaves from treatments B and C may contribute to the prevention rather than to the induction of further oxidative damage. Altogether our results show that the suppression of blue light transmission in shaded leaves act as a stress signal that increases their sensitivity to oxidative stress and accelerates cell death.
Keywords: Catalase; hydrogen peroxide; leaf senescence; light spectral quality; oxidative metabolism; Triticum aestivum

Olaf Erenstein, Comparing water management in rice-wheat production systems in Haryana, India and Punjab, Pakistan, Agricultural Water Management, In Press, Corrected Proof, Available online 27 August 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.07.018.
(http://www.sciencedirect.com/science/article/B6T3X-4X3DRY7-2/2/fd94996002f60f86455ed6f3786677b5)
Abstract:
The intensive irrigated rice-wheat systems in the northwest Indo-Gangetic Plains of South Asia are built on a long tradition of canal irrigation and the more recent advent of tubewells. Findings from farm surveys are used to examine water management and water productivity in the rice-wheat belt of India's Haryana State and Pakistan's Punjab province. Attributes of the irrigation sources help explain the widespread interest in groundwater use and the relative demise of canal water use. In each area groundwater now is the main irrigation source, used either solely or in conjunction with surface water. The ownership of tubewells is near universal among the surveyed farms, whereas conjunctive water use is more widespread during the monsoon season, among better endowed farmers and in the Pakistan Punjab. In Pakistan Punjab farmers primarily rely on diesel powered tubewells whereas Haryana farmers mainly use relatively cheaper electric power. Water productivity indicators for rice are markedly lower than those for wheat--largely reflecting significantly higher water inputs in paddy cultivation--but also vary between the study areas and by the prevailing water use, reflecting the limited incentives for farmers to use water wisely. A combination of technological, land use and market based approaches is likely to be most effective in achieving sustainable water management in these intensive cereal systems.
Keywords: Irrigated farming; Intensive cereal systems; Indo-Gangetic Plains; South Asia; Conjunctive water use; Canal irrigation; Tubewell irrigation

Nurhan T. Dunford, Jeff Edwards, Nutritional bioactive components of wheat straw as affected by genotype and environment, Bioresource Technology, In Press, Corrected Proof, Available online 27 August 2009, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.08.009.

(http://www.sciencedirect.com/science/article/B6V24-4X3DRWB-3/2/8b038958644b54bc60ca6c6a5bb5803f)

Abstract:
Policosanol (PC) and phytosterol (PS) enriched dietary supplements and functional foods are marketed for their low density lipoprotein lowering properties. The presence of PC and PS in wheat straw has been reported previously. Wheat straw can be a potential source for recovery of high value components. A fundamental understanding of variations in chemical composition of feedstock is the key for designing efficient processes for value-added product development.
Information on variations in the PC and PS content and composition in wheat straw is limited. The objective of this study is to examine the effect of genotype and environment on PC and PS contents and compositions in wheat straw. Samples were collected from three varieties, Jagger, Trego, and Intrada grown at two locations Balko, and Goodwell, OK in 2006. Total PC and PS contents and compositions in the samples were determined by using a gas chromatography system.
This study showed that wheat straw contains significant amount of PC (approximately 137-274 mg/kg) and PS (approximately 834-1206 mg/kg). Octacosanol, tetracosanol, docosanol, hexacosanol, and tricontanol were the main PC components. Approximately 60-76% of the total PS consisted of [beta]-sitosterol. Genotype and environment had a significant effect on PC and PS contents in wheat straw. This is the first study examining the effect of environment and genotype on wheat straw chemical composition. A fundamental understanding of variations of PC and PS contents and compositions in wheat straw requires further research involving samples collected over several years.
Keywords: Wheat straw; Policosanol; Phytosterol

A. Skendi., C.G. Biliaderis, M. Papageorgiou, M.S. Izydorczyk, Effects of two barley [beta]-glucan isolates on wheat flour dough and bread properties, Food Chemistry, In Press, Accepted Manuscript, Available online 27 August 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.08.030.
(http://www.sciencedirect.com/science/article/B6T6R-4X3DN1C-3/2/1a0e27e3fe9c5d3a547bd9479c05ac1f)

Abstract:
The effects of wheat flour fortification with two different molecular weight barley [beta]-glucan isolates (1.00x105, BG-100 and 2.03x105, BG-200) on the rheological properties of dough and bread characteristics, using flours from two wheat cultivars that differ in their breadmaking quality, have been examined. The farinograph water absorption of doughs and the moisture content and water activity of the breads increased with increasing [beta]-glucan content; the [beta]-glucan isolate with the higher molecular weight (BG-200) exerted a greater effect than did BG-100. The addition of [beta]-glucans to the dough formula increased the development time, the stability, the resistance to deformation and the extensibility of the poor breadmaking quality doughs, as well as the specific volumes of the respective breads, exceeding even that of the good breadmaking cultivar. Furthermore, the colour of the bread crumbs got darker and their structure became coarser, whereas the bread crumb firmness decreased with increasing level of [beta]-glucan addition. Generally, the BG-200 was more effective in increasing the specific bread volume and reducing the crumb firmness, especially when used to fortify the poor breadmaking quality flour. The results further indicate a requirement for optimization of the fortified doughs (level and molecular size of the [beta]-glucan) to maximize bread quality attributes (loaf volume, texture, and staling events).
Keywords: barley [beta]-glucan, Molecular Weight, bread quality, dough rheology, flour quality, image acquisition analysis, bread firmness

Xinyou Yin, Wenshan Guo, J. Huub Spiertz, A quantitative approach to characterize sink-source relationships during grain filling in contrasting wheat genotypes, Field Crops Research, In Press, Corrected Proof, Available online 25 August 2009, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.07.013.
(http://www.sciencedirect.com/science/article/B6T6M-4X30C46-1/2/6fbde18dda3f0777c8736dd828296b27)
Abstract:
We present a simple generic framework to quantify source-sink relationships during grain filling, by using a determinate growth function which has a unique property, namely being able of explicitly describing the time for the end of a growth process. This model framework was applied to analyze these relationships in plants of six wheat (Triticum aestivum L.) genotypes grown in pots in climate-controlled greenhouses under two temperature regimes (day/night: 20/15 and 25/20 [degree sign]C). The function accurately described the sigmoid pattern of grain growth (sink activity), as its modified form did for the reversed sigmoid shape of flag-leaf area (source capacity), during grain filling. The six genotypes differed significantly in grain number as well as in grain yield, ranging from 54 to 81 grains and from 2.67 to 4.52 g DM per culm, respectively, when grown at 20/15 [degree sign]C. Biomass and grain yield were significantly reduced by a rise of 5 [degree sign]C. Grain nitrogen contents raised from 2.1 to 2.6% as a consequence of less carbon accumulation resulting in lower grain weights at the high temperature. On average, a rise of 5 [degree sign]C in temperature reduced the duration of grain growth by 12 days (>30%), and increased the growth rate from 1.32 to 1.67 mg grain-1 d-1 (20%). Genotypic differences in grain-filling duration were also larger than in rate of grain growth. The genetic variation in the flag-leaf area duration (a proxy for the capacity for intercepting radiation and photosynthesis) was positively associated with sink size. Model analysis showed that whether or not the timing for the cessation of grain filling and for the end of post-anthesis source activity was synchronized depended on temperature. The quantitative approach yielded parameters that characterize genotypic differences of post-anthesis source and sink capacity in responding to environmental variables.
Keywords: Grain weight; Grain number; Grain growth; Harvest index; Leaf area duration; Grain nitrogen content

Nehru Chevanan, Alvin R. Womac, Venkata S.P. Bitra, C. Igathinathane, Yuechuan T. Yang, Petre I. Miu, Shahab Sokhansanj, Bulk density and compaction behavior of knife mill chopped switchgrass, wheat straw, and corn stover, Bioresource Technology, In Press, Corrected Proof, Available online 21 August 2009, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.07.083.
(http://www.sciencedirect.com/science/article/B6V24-4X24BYF-7/2/414a0e77926970192869c268cc51268d)
Abstract:
Bulk density of comminuted biomass significantly increased by vibration during handling and transportation, and by normal pressure during storage. Compaction characteristics affecting the bulk density of switchgrass, wheat straw, and corn stover chopped in a knife mill at different operating conditions and using four different classifying screens were studied. Mean loose-filled bulk densities were 67.5 +/- 18.4 kg/m3 for switchgrass, 36.1 +/- 8.6 kg/m3 for wheat straw, and 52.1 +/- 10.8 kg/m3 for corn stover. Mean tapped bulk densities were 81.8 +/- 26.2 kg/m3 for switchgrass, 42.8 +/- 11.7 kg/m3 for wheat straw, and 58.9 +/- 13.4 kg/m3 for corn stover. Percentage changes in compressibility due to variation in particle size obtained from a knife mill ranged from 64.3 to 173.6 for chopped switchgrass, 22.2-51.5 for chopped wheat straw and 42.1-117.7 for chopped corn stover within the tested consolidation pressure range of 5-120 kPa. Pressure and volume relationship of chopped biomass during compression with application of normal pressure can be characterized by the Walker model and Kawakita and Ludde model. Parameter of Walker model was correlated to the compressibility with Pearson correlation coefficient greater than 0.9. Relationship between volume reduction in chopped biomass with

respect to number of tappings studied using Sone's model indicated that infinite compressibility was highest for chopped switchgrass followed by chopped wheat straw and corn stover. Degree of difficulty in packing measured using the parameters of Sone's model indicated that the chopped wheat straw particles compacted very rapidly by tapping compared to chopped switchgrass and corn stover. These results are very useful for solving obstacles in handling bulk biomass supply logistics issues for a biorefinery.
Keywords: Chopped biomass; Knife mill; Bulk density; Tapped bulk density; Compaction models

C.G. Athanassiou, F.H. Arthur, J.E. Throne, Efficacy of spinosad in layer-treated wheat against five stored-product insect species, Journal of Stored Products Research, In Press, Corrected Proof, Available online 21 August 2009, ISSN 0022-474X, DOI: 10.1016/j.jspr.2009.04.002.
(http://www.sciencedirect.com/science/article/B6T8Y-4X24C2S-1/2/00996b6e0f7ae1bb4b03786ef0115644)
Abstract:
The biological insecticide spinosad was evaluated in laboratory bioassays as a surface treatment for wheat to control adult Rhyzopertha dominica, Sitophilus oryzae and three psocid species, Liposcelis paeta, L. bostrychophila, and Lepinotus reticulatus. Spinosad was applied at 1 ppm to 35 g of wheat placed in a vial or to the upper one half, one fourth, or one eighth layer of the wheat; insects were either added to the vials before or after the wheat. When R. dominica were introduced into the vials after the wheat, mortality was 100% except for 83% mortality in the one eighth layer treatment. In contrast, when adults were placed in the vials before the wheat, mortality was 100% only when all of the wheat was treated. Mortality of S. oryzae was lower compared to R. dominica but there was some evidence of upward movement into the treated layers. Mortality of L. paeta and L. bostrychophila was <50% when the entire quantity was treated, in contrast to 100% mortality of L. reticulatus. However, for all psocid species, overall mortality decreased with decreasing depth of the treated layer. The results of this laboratory study show that while spinosad has some effectiveness as a layer treatment on a column of wheat, efficacy will be dependent on the target species, the depth of the treated layer, and the upward or downward mobility of the insect species.
Keywords: Beetles; Psocids; Surface treatments; Grain protectants

Giuseppe Caruso, Chiara Cavaliere, Patrizia Foglia, Riccardo Gubbiotti, Roberto Samperi, Aldo Lagana, Analysis of drought responsive proteins in wheat (Triticum durum) by 2D-PAGE and MALDI-TOF mass spectrometry, Plant Science, In Press, Uncorrected Proof, Available online 21 August 2009, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.08.007.
(http://www.sciencedirect.com/science/article/B6TBH-4X24VH5-5/2/912738354b11af2c41e14874f7f78921)
Abstract:
Drought is an abiotic stress that strongly influences plant growth, development and productivity. By proteomics study it is possible to identify the complex mechanism of water-stress response. The aim of this research was the analysis of wheat (Triticum durum) proteome changes under stress conditions by applying a severe water deficit treatment for 7 days. Stress-induced proteome changes were analyzed by two-dimensional gel electrophoresis in conjunction with matrix-assisted laser desorption ionization-time of flight mass spectrometry. Thirty-six protein spots showed a reproducible significant change between control and stressed samples. The reasonable implications in drought response of the identified proteins were discussed. Results provide new insights that can lead to a better understanding of the molecular basis of drought-sensitivity in plants. Therefore, the obtained data could suggest the development of drought resistant wheat varieties, in order to improve agricultural production in dry regions.
Keywords: Drought; Gel electrophoresis; MALDI-TOF; Proteomics; Wheat

Skendi Adriana, Papageorgiou Maria, Costas. G Biliaderis, Influence of water and barley [beta]-glucan addition on wheat dough viscoelasticity, Food Research International, In Press, Accepted Manuscript, Available online 19 August 2009, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.08.012.
(http://www.sciencedirect.com/science/article/B6T6V-4X1SB7D-5/2/2ca5aaedd4a522718e294d6d113fe2f2)
Abstract:
The effects of the addition of two barley [beta]-glucan isolates (0.2-1.0% of wheat flour), differing in molecular weight, and water (53-63% in a poor breadmaking wheat flour, cv. Dion, and 58-68% in a good breadmaking wheat flour, cv. Yekora) on the viscoelastic properties of wheat flour doughs were investigated. A response surface model (CCF) was used to evaluate the effects observed on the dynamic and creep-recovery parameters of the dough. The evaluation was done separately for each combination of [beta]-glucan isolate (BG1 of ~105Da and BG2 of ~2x105Da) and flour type. Besides the contents of [beta]-glucan and water, the molecular size of the polysaccharide and the flour quality were important determinants of the dough's viscoelastic behavior. Compared to BG1, the higher molecular weight [beta]-glucan (BG2) brought about major changes on all the rheological responses of the fortified doughs. The addition of appropriate levels of [beta]-glucans and water in the poor breadmaking cultivar (Dion) doughs could yield similar viscoelastic responses to those observed by a non-fortified good breadmaking quality flour dough (Yekora).
Keywords: dough rheology; [beta]-glucan molecular weight; water content; creep-recovery; flour quality; response surface methodology, dynamic rheometry

V. Berthelot, P. Bas, P. Schmidely, Utilization of extruded linseed to modify fatty composition of intensively-reared lamb meat: effect of associated cereals (wheat vs corn) and linoleic acid content of the diet, Meat Science, In Press, Accepted Manuscript, Available online 19 August 2009, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2009.08.034.
(http://www.sciencedirect.com/science/article/B6T9G-4X1SBJB-3/2/ac6ee241f50cbd2470cff1d4beee10be)
Abstract:
Sixty male lambs were used in 2 trials to study the efficiency of transfer and elongation of linolenic acid (ALA) in muscle and caudal adipose tissue and to assess factors affecting this process and related changes in fatty acid (FA) profile. In exp. 1, lambs were fed a control diet or extruded linseed (L) diet either with wheat (W, rapid starch) or corn (C, slow starch). In exp. 2, lambs were fed L with normal rapeseed, or high oleic rapeseed, or soybean. In exp. 1, L increased ALA proportion and total n-3 PUFA in muscle and adipose tissue. In adipose tissue but not in muscle, LC-lambs had higher proportion of ALA than LW-lambs. In exp. 2, increasing linoleic acid (LA) intake increased LA proportion in muscle and adipose tissue but did not modify ALA proportion. Moreover, in muscle, it did not change the desaturation and elongation processes of ALA to long-chain n-3 PUFA.
Keywords: Lamb; Muscle; Fat supplementation; Polyunsaturated fatty acids

Y.H. Chang, P.K.W. Ng, Extraction of ginsenosides from a blend of wheat flour and ginseng powder, Food Chemistry, Volume 115, Issue 4, 15 August 2009, Pages 1512-1518, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.039.
(http://www.sciencedirect.com/science/article/B6T6R-4VFK82H-3/2/358947930a09fc2c3aa9d2928b4cd236)
Abstract:
This study explored conditions for maximum extraction of ginsenosides (G) from a blend of wheat flour (WF) and ginseng powder (GP). WF (0.9 g), GP (0.1 g), or WF-GP (0.9 g WF + 0.1 g GP) was mixed with distilled water (4.5, 0.5, or 5.0 ml, respectively) and heated at temperatures from 25 to 90 [degree sign]C. Individual G (Rb1, Rc, and Rd) were fractionated and identified by RP-

HPLC. Interactions between WF components and G, including interactions between the wheat starch fraction (SF) and G and between the gluten fraction (GF) and G, were observed in WF-GP heated at 90 [degree sign]C. The degree of interactions between the SF and G was greater than that between the GF and G. The interactions between WF components and G decreased the amounts of G extractable from the heated WF-GP. The interactions between WF components and G could be disrupted by increasing ultrasonic extraction time to 90 min for maximum extraction.
Keywords: Wheat flour; Ginseng powder; Ginsenosides; RP-HPLC; Extraction; Interaction

Jing Wang, Xiaoping Yuan, Baoguo Sun, Yanping Cao, Yuan Tian, Chengtao Wang, On-line separation and structural characterisation of feruloylated oligosaccharides from wheat bran using HPLC-ESI-MSn, Food Chemistry, Volume 115, Issue 4, 15 August 2009, Pages 1529-1541, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.058.
(http://www.sciencedirect.com/science/article/B6T6R-4VG7MV7-5/2/dc465e9c8470d71b6a6ee27e939e7331)
Abstract:
Water-soluble feruloylated oligosaccharides (FOs) from wheat bran, ferulic acid esters of arabinoxylan oligosaccharides, have been reported as natural antioxidants. In this study, structure features of FOs were studied by FT-IR spectroscopy, and high-performance liquid chromatography (HPLC) coupled to electrospray ionisation (ESI) mass spectrometry (MS) was used for separation and characterisation of FOs. Four components of FOs were resolved on a Dikma Technologies Diamonsil(TM) C18 column eluted with water/acetonitrite (90:10) containing 0.5% HCOOH (V/V) and further analysed by ESI-MSn. In ESI-MSn, a predominant [M+NH4]+ ion in positive mode and [M-H]- ion in negative mode were observed for molecular mass information. The ESI-MSn spectra of the deprotonated molecular [M-H]- ion were used for structural elucidation. The structures of four isolated compounds were confirmed for the first time by on-line HPLC-ESI-MSn.
Keywords: ESI-MSn; Feruloylated oligosaccharides; HPLC; Wheat bran

Anvar U. Buranov, G. Mazza, Extraction and purification of ferulic acid from flax shives, wheat and corn bran by alkaline hydrolysis and pressurised solvents, Food Chemistry, Volume 115, Issue 4, 15 August 2009, Pages 1542-1548, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.059.
(http://www.sciencedirect.com/science/article/B6T6R-4VG7MV7-6/2/a178e1ee77f29d7d6fc62fcc0598848f)
Abstract:
Extraction of ferulic acid and vanillin from flax shives, wheat bran and corn bran were carried out using two extraction methods, non-pressurised alkaline hydrolysis (0.5 M NaOH) and pressurised solvents (0.5 M NaOH, water, ethanol and ammonia). There were no differences in the content of products extracted with non-pressurised and pressurised 0.5 M NaOH solution yielding mostly ferulic acid, p-coumaric acid and small amounts of vanillin. Pressurised low-polarity water (PLPW), pressurised aqueous ethanol (PAE) and pressurised aqueous ammonia (PAA) were efficient in the one-step production of vanillin from ferulic acid in flax shives (guaiacyl-rich), wheat bran and corn bran (ferulic acid-rich). Vanillin was produced from the bound-ferulic acid via cleavage of the aliphatic double bond under the pressurised conditions. Higher content of ferulic acid in the corn bran yielded higher amounts of vanillin compared to wheat bran and flax shives. A simple and efficient purification procedure for ferulic acid from the alkaline extracts is presented. This procedure exploits the solubility of ferulic acid at different ethanol concentrations.
Keywords: Flax shives; Wheat bran; Corn bran; Phenolics; Ferulic acid; Vanillin; Bioactives; Extraction; Separation; Alkaline hydrolysis; Pressurised low-polarity water; PLPW; Pressurised aqueous ethanol

Evi Croes, Kurt Gebruers, Nikkie Luyten, Jan A. Delcour, Christophe M. Courtin, The three classes of wheat xylanase-inhibiting proteins accumulate in an analogous way during wheat ear

development and germination, Journal of Plant Physiology, Volume 166, Issue 12, 15 August 2009, Pages 1253-1262, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.02.008.
(http://www.sciencedirect.com/science/article/B7GJ7-4VYMNWY-1/2/c7773de150c95a315089133e93d74212)
Abstract: Summary
Wheat contains high levels of the three classes of xylanase inhibitors (XIs), Triticum aestivum xylanase inhibitor (TAXI), xylanase-inhibiting protein (XIP) and thaumatin-like xylanase inhibitor (TLXI). These proteins have been linked to plant defense. In this study, expression of XIs during wheat ear development and germination was examined using immunoblotting. The three types of XIs accumulated at high levels between the milky and the soft dough stages of ear development, and reached the highest levels at the hard kernel stage. From the hard kernel stage to harvest ripeness, a slight drop in inhibitor levels was observed, which was more marked for TAXI and TLXI than for XIP. During germination, the levels of the three types of XIs initially decreased, but XIs accumulated again after 1-2 d, reaching maximum levels between 5 and 9 d after imbibition. The levels of TAXI, XIP and TLXI in the seedlings then gradually and continuously declined as a function of time. 1D- and 2D-immunoblotting indicated that the three types of XIs occur in a wide variety of forms. This polymorphism is maintained throughout ear development and germination, although the proportions of the different (iso)forms vary with time. A differential temporal profile was observed for the unprocessed and processed forms of TAXI-type proteins. Finally, the occurrence of TAXI and XIP, but not TLXI, in roots and shoots of young seedlings was demonstrated. No XIs were detected in roots, leaves or stems at later stages of ear development. Overall, the three classes of XIs show remarkable similarities in their temporal distribution, indicating a related function within the wheat plant.
Keywords: Development; Germination; Wheat; Xylanase inhibitors

X. Carolina Lizana, Susan Hess, Daniel F. Calderini, Crop phenology modifies wheat responses to increased UV-B radiation, Agricultural and Forest Meteorology, In Press, Corrected Proof, Available online 14 August 2009, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2009.07.003.
(http://www.sciencedirect.com/science/article/B6V8W-4X0MP6H-1/2/cc38598b64f8e4ff08fa5c7045ed650c)
Abstract:
Ozone layer depletion increases the level of ultraviolet radiation reaching the earth's surface affecting both natural and agricultural ecosystems, especially in the Southern Hemisphere. Considering the harmful effects UV-B radiation has on plant growth the future productivity of wheat crops in Southern Chile could be challenged by both (i) the forthcoming level of UV-B increase and (ii) the sensitivity of this crop to higher UV-B radiation. In this study the effect of increased UV-B radiation at different phenophases on a spring wheat cultivar (Pandora) was investigated in two experiments at plant and crop levels under out-door conditions. The experiments consisted of controls, increased UV-B radiation at specific phenophases (from 3 leaf stage to booting 3L-Bo, and from booting to maturity Bo-PM), and increased UV-B radiation for the majority of the crop cycle (from 3 leaf stage to maturity). UV-B radiation was increased by Q panel UV-313 lamps set in plastic framed structures. Control plants were grown either without frames or below the same framed structures as those which received increased UV-B treatments. Phenology, above-ground biomass, grain yield, components, grain protein concentration, leaf area index (LAI), Fv/Fm and pigments were measured at booting and/or at harvest. Above-ground biomass and yield decreased by 11-19 and 12-20%, respectively, when UV-B radiation was increased at the 3L-Bo phase, while no effect was observed when irradiation was applied later in the crop cycle (Bo-PM). No additional UV-B effects to those observed at booting were detected in plants irradiated during the majority of the entire crop cycle (3L-PM). Biomass variation was strongly associated ($r = 0.99$; $P < 0.01$) with UV-B/PAR ratio in the sensitive treatments to UV-B increases (3 L-Bo) of both experiments. Flour protein was not affected by UV-B increases at any phenophase evaluated in

this study. In both experiments, leaf green area and weight were negatively affected by increased UV-B radiation and no effect on specific leaf area (SLA) was found. Lower Fv/Fm, chlorophyll, carotenoid concentration and carotenoid:chlorophyll ratio were found at crop level (experiment 2) under higher UV-B in the 3L-Bo and 3L-PM treatments. The flavonoid concentration responded differently in the two experiments, probably due to the optimum responses these pigments had to expose UV-B doses.
Keywords: Ozone depletion; UV-B; Environmental stress; Development; Cereals; Grain yield

Carlo Giuseppe Rizzello, Luana Nionelli, Rossana Coda, Maria De Angelis, Marco Gobbetti, Effect of sourdough fermentation on stabilization, and chemical and nutritional characteristics of wheat germ, Food Chemistry, In Press, Accepted Manuscript, Available online 14 August 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.08.016.
(http://www.sciencedirect.com/science/article/B6T6R-4X0PC51-3/2/9b35371d7a61d1e8ad155c359849d146)
Abstract:
Lactic acid bacteria strains were identified from wheat germ by 16S rRNA partial sequencing, subjected to RAPD-PCR typing and screened. Lb. plantarum LB1 and Lb. rossiae LB5 were used as starters to produce sourdough fermented wheat germ (SFWG). The chemical and nutritional characteristics of SFWG were compared to those of the raw wheat germ (RWG). Lipase activity in SFWG was ca. 2.6-fold lower than that found in RWG. As shown by SPME/GC/MS analysis, most of the volatile compounds derived from lipid oxidation during storage (40 days) were at markedly lower levels in SFWG compared to RWG. Fermentation of wheat germ increased of ca. 50% the concentration of free amino acids. Glu markedly decreased in SFWG, due to its conversion in GABA. The concentration of the anti-nutritional factor raffinose also decreased in SFWG. The in vitro protein digestibility, the concentration of total phenols, phytase and antioxidant activities were increased by fermentation.
Keywords: wheat germ, lactic acid bacteria, sourdough, lipase, SPME, phytic acid

Samuel G.L. Kleemann, Gurjeet S. Gill, The role of imidazolinone herbicides for the control of Bromus rigidus (rigid brome) in wheat in southern Australia, Crop Protection, In Press, Corrected Proof, Available online 12 August 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.07.005.
(http://www.sciencedirect.com/science/article/B6T5T-4X076S2-1/2/b505073a33242612460769f443983b67)
Abstract:
Five field experiments were undertaken over a three-year period in South Australia to investigate the efficacy of imidazolinone herbicides for the control of rigid brome in imidazolinone-tolerant wheat (Clearfield(TM), CLF). Imidazolinone herbicides, imazapyr, imazapyr plus imazapic and imazapyr plus imazamox applied post-emergence to imi-wheat (cvs. CLF-Janz and CLF-Stiletto) at the four-leaf stage, provided consistent and high levels of rigid brome control (>=87%). In contrast, applications of the alternative herbicide mesosulfuron-methyl (post-emergence) provided limited and variable control of rigid brome (11-67%). Furthermore, imidazolinone treatments caused a large reduction ($P < 0.05$) in rigid brome seed production (<=6 seeds m-2) as compared to mesosulfuron-methyl (461-3983 seeds m-2) and the non-treated control (2257-11[punctuation space]865 seeds m-2). Imazapyr plus imazapic provided consistent control of rigid brome and resulted in higher grain yields (28-45%) than wheat treated with mesosulfuron-methyl. Based on these results post-emergence applications of imazapyr, imazapyr plus imazapic and imazapyr plus imazamox to imi-wheat could play an important role in the management of rigid brome in southern Australia. However, the effect of these herbicides on existing and new cultivars of imi-wheat (multiple-gene resistance) and issues concerning persistence in low rainfall environments and crop damage on sandy soils require attention.

Keywords: Clearfield(TM) wheat; Herbicide-tolerant wheat; IMI-wheat; Imazapyr; Imazapic; Imazamox; Mesosulfuron-methyl

Jonghan Ko, Giovanni Piccinni, Thomas Marek, Terry Howell, Determination of growth-stage-specific crop coefficients (Kc) of cotton and wheat, Agricultural Water Management, In Press, Corrected Proof, Available online 8 August 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.06.023.
(http://www.sciencedirect.com/science/article/B6T3X-4WYCT4H-1/2/78e2b91297242a983ab70d921cc9929c)
Abstract:
Development of crop coefficient (Kc), the ratio of crop evapotranspiration (ETc) to reference evapotranspiration (ETo), can enhance ETc estimates in relation to specific crop phenological development. This research was conducted to determine growth-stage-specific Kc and crop water use for cotton (Gossypium hirsutum) and wheat (Triticum aestivum) at the Texas AgriLife Research field at Uvalde, TX, USA from 2005 to 2008. Weighing lysimeters were used to measure crop water use and local weather data were used to determine the reference evapotranspiration (ETo). Seven lysimeters, weighing about 14 Mg, consisted of undisturbed 1.5 m x 2.0 m x 2.2 m deep soil monoliths. Six lysimeters were located in the center of a 1-ha field beneath a linear-move sprinkler system equipped with low energy precision application (LEPA) and a seventh lysimeter was established to measure reference grass ETo. Crop water requirements, Kc determination, and comparison to existing FAO Kc values were determined over a 2-year period on cotton and a 3-year period on wheat. Seasonal total amounts of crop water use ranged from 689 to 830 mm for cotton and from 483 to 505 mm for wheat. The Kc values determined over the growing seasons varied from 0.2 to 1.5 for cotton and 0.1 to 1.7 for wheat. Some of the values corresponded and some did not correspond to those from FAO-56 and from the Texas High Plains and elsewhere in other states. We assume that the development of regionally based and growth-stage-specific Kc helps in irrigation management and provides precise water applications for this region.
Keywords: Crop coefficient; ET measurement; Weighing lysimeter

Clara Fares, Cristiano Platani, Antonietta Baiano, Valeria Menga, Effect of processing and cooking on phenolic acid profile and antioxidant capacity of durum wheat pasta enriched with debranning fractions of wheat, Food Chemistry, In Press, Accepted Manuscript, Available online 8 August 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.08.006.
(http://www.sciencedirect.com/science/article/B6T6R-4WYDN4F-2/2/9d47f3eee169122839e5d1054acd6422)
Abstract:
The effect of processing and cooking on phenolic acids profile and antioxidant properties of durum wheat (Triticum turgidum L. var. durum) pasta samples enriched with debranning fractions of an Italian wheat (Triticum aestivum L.) cultivar were studied.
Trolox equivalent antioxidant capacity by free radical scavenging activity against ABTS*+ cation radical, phenolic acid profile, total phenolic content and fibre were determined. In the first debranning fractions of wheat, the highest concentration of phenolic acids, namely ferulic acid, and antioxidant capacity was found, but a diminishing trend was observed as the debranning levels proceeded. When semolina was processed into spaghetti, the main effect of processing was a reduction of the free phenolic acids content, chiefly caused by p-hydroxybenzoic acid decrease. In contrast an increase in bound phenolics fraction was observed. The boiling water could have enhanced the extraction of bound phenolics from the food matrix, primarily ferulic acid ester linked to cell walls. Cooking affected also the antioxidant capacity of pasta samples by enhancing its antioxidant properties in vitro.
Keywords: Phenolic Acids; Trolox Equivalent Antioxidant Capacity; Total Phenolic Content; Pasta Processing; Cooking; Fibre; Debranning Fractions

Cora Lilia Alvarez, Mariela Pamela Azcarate, Virginia Fernandez Pinto, Toxigenic potential of Fusarium graminearum sensu stricto isolates from wheat in Argentina, International Journal of Food Microbiology, In Press, Corrected Proof, Available online 8 August 2009, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.07.037.
(http://www.sciencedirect.com/science/article/B6T7K-4WYDMV6-2/2/9629ce370355285d5b669a293ae79884)
Abstract:
The toxigenic potential of 144 Fusarium graminearum sensu stricto strains isolated from wheat in different subregions of the main production area in Argentina during 2001, 2003 and 2004 harvests was studied. The mycotoxin producing ability of the isolates was examined by Gas Chromatography with Electron Capture Detection and confirmed by Mass Spectrometry. Analysis of the trichothecene chemotype distribution across the Argentinean wheat cropping area revealed that 15-acetyldeoxynivalenol was the most common chemotype. Two other chemotypes, the 3-acetyldeoxynivalenol and 3- and 15-acetyldeoxynivalenol, were always present. The number of isolates with simultaneous production of both acetylderivatives increased along the years. The frequency of isolates with different toxigenic profile did not shown significant differences by subregions. An increased vigilance over crop seasons and geographical areas should be carried out to detect changes in the chemotypes distribution.
Keywords: Fusarium graminearum sensu stricto; Deoxynivalenol; 3-acetyldeoxynivalenol; 15-acetyldeoxynivalenol

J. Yi, J.W. Johnson, W.L. Kerr, Properties of bread made from frozen dough containing waxy wheat flour, Journal of Cereal Science, In Press, Corrected Proof, Available online 5 August 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.07.002.
(http://www.sciencedirect.com/science/article/B6WHK-4WXSK0F-2/2/c3de7e0a20a7d201d8417cfd41acc433)
Abstract:
The quality of bread made from frozen dough is diminished, and staling rate is increased by changes that occur during freezing and storage. New cultivars of waxy wheat flour (WWF), containing higher levels of amylopectin, may help improve the quality of baked products. Bread quality and staling were investigated for bread containing 0-45% WWF and 55-65% water after freezing and 90-day frozen storage. The specific volume was highest with 15% WWF substitution and 60% water in bread made from both unfrozen and frozen dough. With higher levels of WWF and lower water content, bread staling rates decreased. Bread with higher levels of WWF were darker and had greater color variation. 1H NMR studies showed that bread with greater WWF and water had higher transverse relaxation (T2) times (9-11 ms), but less change in T2 during storage. This research demonstrated that specific combinations of WWF and water produced a better quality of bread after dough freezing.
Keywords: Waxy wheat flour; Specific volume; Firmness; Bread staling

Giles Elliott, Anne Durand, Richard K. Hughes, Paul A. Kroon, Renato D'Ovidio, Nathalie Juge, Isolation and characterisation of a xylanase inhibitor Xip-II gene from durum wheat, Journal of Cereal Science, In Press, Corrected Proof, Available online 5 August 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.013.
(http://www.sciencedirect.com/science/article/B6WHK-4WXSK0F-1/2/ca9624f0660c401501798b5eb7692b93)
Abstract:
Cereals contain xylanase inhibitor proteins (XIPs) which inhibit microbial xylanases from glycoside hydrolase families 10 and 11. Here, we report for the first time the isolation and characterisation of a genomic clone containing a xylanase inhibitor gene. This gene, Xip-II, isolated from a durum

wheat genomic library (Triticum durum Desf.) encodes a mature protein of 307 amino acid (aa) residues that shares highest aa sequence identity (64%) with the rice RIXI xylanase inhibitor. XIP-II showed inhibition against family 11 xylanases and no chitinase activity. In silico analysis of the 5' promoter region of Xip-II revealed sequences with similarity to known cis regulatory elements upstream from the initiation codon. In particular, the identification of a number of cis-acting elements controlling the expression of defence and seed-specific genes supports the role for this class of inhibitors in plant defence against pathogens but also provides new clues on a potential role in plant development.
Keywords: Xylanase inhibitor; Glycoside hydrolase family 18; Durum wheat; Chitinase; Pathogenesis-related proteins

Zhisheng Yao, Xunhua Zheng, Baohua Xie, Baoling Mei, Rui Wang, Klaus Butterbach-Bahl, Jianguo Zhu, Rui Yin, Tillage and crop residue management significantly affects N-trace gas emissions during the non-rice season of a subtropical rice-wheat rotation, Soil Biology and Biochemistry, In Press, Corrected Proof, Available online 5 August 2009, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.07.025.
(http://www.sciencedirect.com/science/article/B6TC7-4WXPXVN-2/2/2c061788734dbf70205d7fc0301a748d)
Abstract:
Field operations of tillage and residue incorporation could have potentially important influences on N-trace gas fluxes, though poorly quantified. Here we studied the effects of straw incorporation in the preceding rice season and no-tillage prior to wheat sowing on nitric oxide (NO) and nitrous oxide (N2O) emissions during the non-rice period of a typical rice-wheat rotation in the Yangtze River Delta. Compared to conventional management practice (no straw incorporation along with rotary harrowing tillage to 10 cm before wheat sowing), straw incorporation alone decreased cumulative N2O emissions over the entire non-rice period by 32% (1.53 vs. 2.24 kg N ha-1, $P < 0.05$) but did not affect NO emissions (0.88 vs. 0.87 kg N ha-1). In contrast, no-tillage alone increased N2O emissions by 75% ($P < 0.05$) while reducing NO emissions by 48% ($P < 0.01$). Combination of no-tillage and straw incorporation led to no change in N2O emissions but a reduction in NO emissions compared to the conventional management regime. The direct N2O emission factors (EFds) of applied nitrogen fertilizers during the non-rice season ranged from 0.29% to 1.35% with a coefficient of variation (CV) as large as 68% among the investigated management regimes. The EFds for NO ranged from 0.13% to 0.32% with a CV of 50%. Adoption of these new EFds will allow us to account for management effects on N-trace gas emissions when calculating emission inventories. Nevertheless, it is noteworthy that the uncertainty remains high, since the effects of soil properties such as texture or pH on management practices are not yet well defined.
Keywords: Nitrous oxide; Nitric oxide; Tillage; Crop residue; Emission factor

Jaroslav Blazek, Les Copeland, Effect of monopalmitin on pasting properties of wheat starches with varying amylose content, Carbohydrate Polymers, Volume 78, Issue 1, 4 August 2009, Pages 131-136, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.03.023.
(http://www.sciencedirect.com/science/article/B6TFD-4VXMPPJ-1/2/43a6b0e3832b43ea120e4dff2385d508)
Abstract:
The influence of varietal differences among wheat (Triticum aestivum L.) starches on properties of starch pastes and gels was studied. Wheat varieties with elevated total amylose content within a narrow range (36-43%) displayed widely differing pasting properties in a Rapid Visco Analyser (RVA). The pasting properties of the wheat starches were influenced significantly by the addition of monopalmitin. Increase in final RVA pasting viscosity of starch-monopalmitin mixtures was correlated positively with increasing amylose content. The textural characteristics of the respective

retrograded starch gels also differed greatly and were affected by varietal differences between the starches. There was no correlation between textural properties of aged gels with amylose content or the viscoelastic characteristics measured by the RVA. The strength of gels may be affected by subtle differences in starch structure that influence retrogradation, but have only limited effect on starch pasting properties.
Keywords: Wheat; Triticum aestivum; Starch; Amylose; Starch pasting; Starch gels; Starch-monopalmitin interactions

Vaclav Sip, Pavel Ruzek, Jana Chrpova, Radek Vavera, Helena Kusa, The effect of tillage practice, input level and environment on the grain yield of winter wheat in the Czech Republic, Field Crops Research, Volume 113, Issue 2, 3 August 2009, Pages 131-137, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.04.013.
(http://www.sciencedirect.com/science/article/B6T6M-4WDFC9D-1/2/dc187657d3f8e393c9d8954aec4d9dc8)
Abstract:
The response of winter wheat grain yield to four variants of treatment (two input levels, combined with either conventional or reduced tillage) was tested over six seasons at three locations. These experiments with 10 and 12 winter wheat varieties were analysed within three experimental series. The environmental (location and season) effects on grain yield were large in all combinations of input level and tillage type, and the varieties responded differentially to both season and location. However, there was no varietal response either to the tillage system used, or to the level of nitrogen (and other inputs) supplied. The high input reduced tillage system (surface stubble-ploughing to a depth of 8-10 cm) resulted in all series in significantly higher grain yields than the equivalent conventional tillage system. The reduced tillage system combined with high input level delivered a yield advantage for all of the wheat varieties tested.
Keywords: Winter wheat cultivars; Grain yield; Reduced tillage; Minimum tillage; Conventional tillage; Intensity levels; Conditions of Central Europe

Fernando Salvagiotti, Julio M. Castellarin, Daniel J. Miralles, Hugo M. Pedrol, Sulfur fertilization improves nitrogen use efficiency in wheat by increasing nitrogen uptake, Field Crops Research, Volume 113, Issue 2, 3 August 2009, Pages 170-177, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.05.003.
(http://www.sciencedirect.com/science/article/B6T6M-4WH6KKM-1/2/15ed5cddd9abc3350435d0654fbf3d01)
Abstract:
Nitrogen (N) fertilization plays a central role for improving yield in wheat and high N use efficiency (NUE) is desired to protect ground and surface waters. Several studies showed that sulfur (S) fertilization may increase NUE, but no attempts have been made to explain whether this increase is due to greater recovery efficiency (RE), an enhanced internal efficiency (IE) or by an improvement of both efficiencies. The aim of this study was to analyze the effects of different N and S fertilizer rates, and their interaction on N uptake, its partition at maturity, NUE and its main components. Field experiments were carried out during two consecutive growing seasons in the Argentinean Pampas using a single bread-wheat genotype grown under different combinations of N and S fertilizer rates. Additional experiments were performed in farmer fields using N and S fertilization evaluating different genotypes in order to analyze the components of NUE in other environmental conditions. Plant N uptake increased linearly in response to N addition until rates of ca. 80 kg N ha-1. Sulfur addition showed no effect at the lowest N fertilizer rate, but N uptake was increased when S was applied at the highest N rate, revealing a synergism between both nutrients. At the lowest S rate RE was 42%, and increased to 70% when S fertilizer was added. No changes in IE in response to S fertilization were observed. These results were also observed in farmer field experiments, in genotypes that showed different IE. This study showed that S addition

increased NUE mainly by increasing the N recovery from the soil. Thus, the concurrent management of N and S is important for reducing the potential pollution of residual soil nitrate by increasing N recovery from the soil while sustaining high nitrogen use efficiency.
Keywords: Sulfur; Nitrogen; Nitrogen uptake; Nitrogen use efficiency; Nitrogen harvest index; Wheat

Monika Garg, Hiroyuki Tanaka, Naoyuki Ishikawa, Kanenori Takata, Mikiko Yanaka, Hisashi Tsujimoto, Agropyron elongatum HMW-glutenins have a potential to improve wheat end-product quality through targeted chromosome introgression, Journal of Cereal Science, In Press, Corrected Proof, Available online 3 August 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.06.012.
(http://www.sciencedirect.com/science/article/B6WHK-4WXBM7V-1/2/5420b3dfc39a3d65c54717d2bf9363f0)
Abstract:
After screening of 177 disomic addition lines (DALs) of wheat (Triticum aestivum) containing a pair of chromosomes from different alien species, we found that the chromosome 1E addition line of Agropyron elongatum, that is known to be a potential genetic resource for drought and salinity tolerance, showed potential for improvement of bread-making quality of wheat. This was indicated by increased SDS sedimentation, specific sedimentation, mixograph peak time and SE-HPLC analysis of polymeric proteins. This addition line spontaneously gave rise to a substitution line for chromosome 1D in subsequent generations that showed weak dough strength. Analysis of the x-type HMW-glutenin subunit sequence of Ag. elongatum from DAL1E indicated that it closely resembled the x-type sequence of the A and B genomes of wheat, and the y-type was intermediate between x- and y-type HMW-glutenin subunit genes. From these observations, it was inferred that 1E-encoded seed storage proteins have considerable potential for improvement of wheat end-product quality if transferred to specific chromosomes such as 1A of Chinese Spring (CS) wheat, which has a negative overall effect on bread-making quality.
Keywords: Agropyron elongatum; Bread-making quality; HMW-glutenin; Gliadin

Chun-li ZHANG, Xin-yao HE, Zhong-hu HE, Lin-hai WANG, Xian-chun XIA, Cloning of TaCYP707A1 Gene that Encodes ABA 8'-Hydroxylase in Common Wheat (Triticum aestivum L.), Agricultural Sciences in China, Volume 8, Issue 8, August 2009, Pages 902-909, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60294-1.
(http://www.sciencedirect.com/science/article/B82XG-4X260DR-3/2/2039ad0b946031b9873c8f47b94d486e)
Abstract:
The plant hormone abscisic acid (ABA) regulates many important physiological and developmental processes in plants. The objective of this study was to clone the ABA 8'-hydroxylase gene in common wheat. In the present study, we used the cDNA sequence of barley HvCYP707A1 gene (GenBank accession no. AB239299) as a probe for BLAST search against the common wheat (Triticum aestivum L.) EST database in GenBank. All wheat ESTs sharing high similarity with the reference gene were subjected to contig assembly. Primers were designed based on the constructed contigs to clone the wheat CYP707A1 gene, designated as TaCYP707A1. The genomic DNA sequence of TaCYP707A1 gene comprised five exons and four introns, with a size of 2[punctuation space]225 bp. The corresponding cDNA sequence of TaCYP707A1 was 1[punctuation space]737 bp, containing an open reading frame (ORF) of 1[punctuation space]431 bp, a 42-bp 5'-untranslated region (UTR) and a 264-bp 3'UTR, with 94.9% of identical sequences to HvCYP707A1 gene (AB239299). The neighbor joining tree indicated that the deduced amino acid sequences of TaCYP707A1 gene was highly similar to those of barley and rice. The TaCYP707A1 gene was located on chromosome 6BL using a set of Chinese Spring nullisomic-

tetrasomic lines and ditelosomic line 6BS. These results will be of high importance in understanding of molecular mechanism of ABA catabolism.
Keywords: Triticum aestivum L.; homeologous cloning; CYP707A1 gene; ABA 8'-hydroxylase

Chang-Xing Zhao, Ming-Rong He, Zhen-Lin Wang, Yue-Fu Wang, Qi Lin, Effects of different water availability at post-anthesis stage on grain nutrition and quality in strong-gluten winter wheat, Comptes Rendus Biologies, Volume 332, Issue 8, August 2009, Pages 759-764, ISSN 1631-0691, DOI: 10.1016/j.crvi.2009.03.003.
(http://www.sciencedirect.com/science/article/B6X1F-4W5VDC9-1/2/99c9405f1c099ffb74927686abb01b88)
Abstract:
Wheat (Triticum aestivum L.) is one of the most important agricultural crops worldwide. However, water is the most important limiting factor for wheat production. This study was initiated to test water stress environmental effects on grain quality and nutritional value of wheat by using single different water conditions at post-anthesis stage. Further analyses were conducted to examine variations in concentrations and compositions of the bioactive compounds and nutritions in strong-gluten winter wheat subjected to different levels of water deficit during grain filling. For the experiment on the response to different soil water conditions during post-anthesis stage, effects of soil water environment on protein content and composition in the grains were significant. Soil water conditions in this study greatly affected mineral contents in the grains of winter wheat, particularly with regard to the major minerals (P, K, Ca and Mg). Water deficit during grain filling can result in a decrease in lipid contents in wheat grains, which agrees well with experimental findings elsewhere. Concomitantly, a mild water deficit during grain filling would be beneficial to the grain filling and starch compositions, significantly improved bread-making quality. Therefore, it was concluded that good management of wheat field water at post-anthesis stage was helpful to improving grain quality and nutritions relevant to processing and human nutrition. To cite this article: C.-X. Zhao et al., C. R. Biologies 332 (2009).
Keywords: Winter wheat; Grain quality; Water stress; Post-anthesis stage; Nutritional value

Stephen N. Wegulo, Julie A. Breathnach, P. Stephen Baenziger, Effect of growth stage on the relationship between tan spot and spot blotch severity and yield in winter wheat, Crop Protection, Volume 28, Issue 8, August 2009, Pages 696-702, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.04.003.
(http://www.sciencedirect.com/science/article/B6T5T-4W7B4XM-2/2/bbd9dca13f4e756d9d0b862cc56bbe61)
Abstract:
Foliar fungal diseases frequently cause significant economic losses in the hard red winter wheat production areas of the Great Plains of the United States. In 2007, field experiments were conducted in four environments in Nebraska, USA to determine the crop growth stage at which severity of tan spot and spot blotch was most strongly related to yield in winter wheat. Secondary objectives were to evaluate the efficacy of fungicides in controlling tan spot and spot blotch and to determine the effect of fungicide application timing on disease intensity and yield. Disease severity assessed at Zadoks growth stage (ZGS) 60 (flowering) had the strongest relationship to yield at all four locations ($0.72 <= R2 <= 0.90$, $P < 0.0001$). Disease severity assessed at ZGS 71 (kernel watery ripe) also was strongly related to yield ($0.54 <= R2 <= 0.87$, $P <= 0.0011$), but not as consistently across the four locations as disease severity assessed at ZGS 60. The relationship between yield and area under the disease progress curve (AUDPC) ($0.43 <= R2 <= 0.80$, $P <= 0.0055$) was weaker and less consistent across the four locations than the relationship between yield and disease severity assessed at ZGS 60 or ZGS 71. Disease progress was faster at Mead (southeast) and Clay Center (south central) than at North Platte (west central) and Sidney (west). The fungicides azoxystrobin, pyraclostrobin, propiconazole, azoxystrobin plus propiconazole, and

trifloxystrobin plus propiconazole effectively reduced disease severity and AUDPC. Out of a total of 60 fungicide treatments at four locations, 98%, 100%, and 100% significantly (P = 0.05) reduced disease severity, reduced AUDPC, and increased yield, respectively, compared to the check. Yield losses ranging from 27% to 42% were prevented by fungicide applications. There was no consistent effect on disease intensity or on yield of timing fungicide applications at ZGS 31 (first node on the stem detectable) versus ZGS 39 (ligule/collar of flag leaf just visible). The results from this study suggest that (i) the best predictor of yield loss caused by tan spot and spot blotch in winter wheat in Nebraska is disease severity assessed at flowering and (ii) fungicides can prevent significant yield losses from tan spot and spot blotch in winter wheat.
Keywords: Tan spot; Spot blotch; Winter wheat; Growth stage; Fungicide application timing; Disease severity; AUDPC; Predictor; Yield loss

A.M. Gazmuri, P. Bouchon, Analysis of wheat gluten and starch matrices during deep-fat frying, Food Chemistry, Volume 115, Issue 3, 1 August 2009, Pages 999-1005, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.020.
(http://www.sciencedirect.com/science/article/B6T6R-4VDS8M7-3/2/c133e5732b7db458d7cbcee5e39de6a9)
Abstract:
An important quality parameter of fried food is the amount of oil uptake, which is incompatible with recent consumer trends towards healthier food. The oil penetration mechanism is not fully understood but study of formulated products is a good way to elucidate the role of the food matrix in oil absorption.
In this context, the oil absorption capacity of a restructured matrix, made with native wheat starch and vital wheat gluten, was examined. Four different product formulations were analysed, using 2 levels of gluten content (8% and 12% d.b.) and 2 levels of water content (38% and 44% w.b.). Dough was sheeted into 2 thicknesses (1 and 2 mm) and cut into discs that were either directly fried or fried after predrying with dry air (2 min at 150 [degree sign]C).
Results showed that gluten had a predominant role in the structure, making the dough more elastic and less permeable to oil absorption. High gluten content resulted in lower oil uptake in products with low moisture content. Overall, predried discs absorbed, on average, half of the oil of undried samples. Interestingly, even though predried products with high gluten content had a higher moisture content before frying, they absorbed a low amount of oil, suggesting that oil uptake is not clearly related to the amount of moisture lost but rather to product microstructure.
Keywords: Deep-fat frying; Oil uptake; Gluten; Starch

A. Scarafoni, A. Ronchi, M. Duranti, A real-time PCR method for the detection and quantification of lupin flour in wheat flour-based matrices, Food Chemistry, Volume 115, Issue 3, 1 August 2009, Pages 1088-1093, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.12.087.
(http://www.sciencedirect.com/science/article/B6T6R-4VBT27F-1/2/af2cfad2e39d2676ab219b19304de0f2)
Abstract:
Lupin flour is growingly being used in bakery products, mainly as a soybean protein substitute. The aim of the present work was to detect and quantify the presence of lupin flour in wheat-based foods using a newly set up qPCR system based on SYBR green. Although DNA sequence information for lupin is scarce, it has been possible to design a primer pair highly specific for the target gene and devoid of any primer-dimers amplification capacity. Lupin flour revealed to be a difficult matrix, since large amounts of compounds tend to co-purify with DNA, even adopting well established extraction protocols. Nonetheless, the primers used allowed to reach high PCR efficiencies and did not show any cross-reactivity with DNAs extracted from various plant and animal foods. The sensitivity achieved was 7 pg of lupin DNA, corresponding to a percentage of less than 0.1% of lupin flour in the foods.

Keywords: Food traceability; Detection methods; Real-time PCR; Food ingredients; Allergenicity

Jaba Debnath, Asha Martin, Lalitha R. Gowda, A polymerase chain reaction directed to detect wheat glutenin: Implications for gluten-free labelling, Food Research International, Volume 42, Issue 7, August 2009, Pages 782-787, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.02.028.
(http://www.sciencedirect.com/science/article/B6T6V-4VT14F0-1/2/45b0b3944e3e25861475ffa452ce9edf)
Abstract:
Gluten enteropathy or celiac disease (CD) is treated by strict adherence to gluten-free diet for life. Trace amounts of wheat in food from farm to table manifests as a major risk to these individuals. A qualitative polymerase chain reaction method was developed by selectively amplifying a 135 bp fragment of the glutenin gene to detect wheat DNA in a plethora of raw and heat processed foods. The limit of detection was 21.5 pg of DNA. The absence of amplification in other cereals such as oat, rye, barley and maize renders this method exclusive for detection of wheat. The detection of wheat DNA in thermally processed foods by this method, despite extensive DNA fragmentation, evinces the suitability and applicability of the method for labeling gluten-free foods. This method complements the immunochemical methods toward addressing food safety in CD patients and wheat allergics.
Keywords: Gluten free food; Processed food; Low molecular weight glutenin; Traditional Indian foods; Gluten enteropathy

Prashant S. Pyati, Howard A. Bell, Elaine Fitches, Daniel R.G. Price, Angharad M.R. Gatehouse, John A. Gatehouse, Cathepsin L-like cysteine proteinase (DcCathL) from Delia coarctata (wheat bulb fly): Basis of insecticidal activity, Insect Biochemistry and Molecular Biology, Volume 39, Issue 8, August 2009, Pages 535-546, ISSN 0965-1748, DOI: 10.1016/j.ibmb.2009.05.003.
(http://www.sciencedirect.com/science/article/B6T79-4WCTWNF-1/2/4a9bc8a7f3997685bca7508caf81e1da)
Abstract:
A cDNA encoding a cathepsin L-like cysteine proteinase (DcCathL) was prepared from gut tissue of larvae of wheat bulb fly (Delia coarctata: Diptera). The predicted protein is a homologue of the product of Drosophila melanogaster gene Cp-1 (CG6692), and is similar to a sub-family of cysteine proteinases found in other insects which have roles in tissue remodelling during development, and moulting. Recombinant DcCathL was produced using the yeast Pichia pastoris as expression host, and showed hydrolytic activity in vitro towards the synthetic substrate Z-Phe-Arg-AMC with a pH optimum of 4.5. DcCathL was insecticidal to lepidopteran larvae when injected into haemolymph, causing mortality that was accompanied by systemic melanisation, suggesting that DcCathL was affecting the immune-related proteolytic activation cascade leading to production of active phenoloxidase. This process is normally negatively regulated by serpins in the haemolymph. Recombinant serpins from cabbage moth (Mamestra brassicae) did not inhibit DcCathL, and were susceptible to degradation by the enzyme in vitro in buffer and extracted haemolymph. When M. brassicae larvae were co-injected with a lethal dose of DcCathL and exogenous recombinant serpins, no mortality or systemic melanisation was observed, suggesting that the insecticidal effects of DcCathL in vivo result from degradation of endogenous serpins.
Keywords: Wheat bulb fly (Delia coarctata); Cathepsin L-like proteinase; Functional characterisation; Cabbage moth (Mamestra brassicae); Haemolymph; Phenoloxidase activation cascade; Serpin; Negative regulation; Melanisation

S. Srivalli, Renu Khanna-Chopra, Delayed wheat flag leaf senescence due to removal of spikelets is associated with increased activities of leaf antioxidant enzymes, reduced glutathione/oxidized glutathione ratio and oxidative damage to mitochondrial proteins, Plant Physiology and

Biochemistry, Volume 47, Issue 8, August 2009, Pages 663-670, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2009.03.015.
(http://www.sciencedirect.com/science/article/B6VRD-4W2W5HD-2/2/772f6c3ac3a3f9b575b9cb9d028d4683)
Abstract:
Removal of reproductive `sink' i.e. spikelets from wheat at anthesis delays the rate of flag leaf senescence. In this work, the antioxidant defense was studied in the flag leaf of Triticum aestivum cv. Kalyansona plants showing normal (S + plants) and delayed senescence via removal of spikelets (S- plants). This was done by measurement of metabolites and activities of enzymes such as superoxide dismutase, catalase, guaiacol peroxidase, ascorbate peroxidase, monodehydroascorbate reductase, dehydroascorbate reductase and glutathione reductase. S-plants had higher reduced glutathione/oxidized glutathione (GSH/GSSG) ratio and antioxidant enzyme activities than the control plants and the differences were apparent from 21 days after anthesis (DAA). The removal of the reproductive sink led to an increased antioxidant defense which may be contributing towards the delayed flag leaf senescence in wheat. Chloroplasts and mitochondria, important sources of ROS, were isolated at two stages representing early (7 DAA) and late (21 DAA) senescence. Oxidative damage to proteins was studied in these organelles in relation to SOD and APX. Mitochondria had higher levels of damaged proteins than chloroplasts at 7 DAA in both S+ and S- plants. Higher damage was related to the lower antioxidant enzyme levels of SOD and APX in mitochondria as compared to chloroplasts.
Keywords: Antioxidant enzymes; Delayed senescence; GSH/GSSG ratio; Mitochondria; Oxidative damage to proteins; Reproductive sink; Wheat

Ajay Kumar, Jitendra Kumar, Ravinder Singh, Tosh Garg, Parveen Chhuneja, H.S. Balyan, P.K. Gupta, QTL analysis for grain colour and pre-harvest sprouting in bread wheat, Plant Science, Volume 177, Issue 2, August 2009, Pages 114-122, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.04.004.
(http://www.sciencedirect.com/science/article/B6TBH-4W3PT3D-2/2/19df8e32cc625230602bd169dc4c1539)
Abstract:
A major objective in wheat breeding is the development of pre-harvest sprouting (PHS) tolerant wheat varieties with amber grain colour (GC), the latter being preferred both by the consumer in Asian markets, and by the processing industry globally. Quantitative trait loci (QTL) for these two traits were identified using a recombinant inbred line (RIL) population derived from an intervarietal cross, PH132 (red grain and PHS tolerant) x WL711 (amber grain and PHS susceptible). As many as 12 QTL for GC and 11 QTL for PHS were identified; 4 QTL for the two traits were co-localized. Most of the phenotypic variation (PV) for the two traits was explained by the main-effect QTL (M-QTL) having no interaction with environment, suggesting that selection may prove effective for improvement of both the traits. A major QTL for GC (PVE up to 40.42%), coincident with a minor QTL for PHS (PVE up to 8.10%), on the distal region of 3BL and a novel and major GC independent PHS QTL (PVE up to 29.47%) in proximal region of 6AL may prove useful for breeding PHS tolerant amber-grained wheat genotypes. Comparative genomic analysis revealed that the wheat genomic region carrying the major QTL for GC on 3BL is orthologous to a 1.63 Mb segment on rice chromosome 1, and the genomic region carrying the major QTL for PHS on 6AL is orthologous to a 5.47 Mb segment on rice chromosome 2. These rice genomic sequences may be exploited for fine mapping leading to map-based cloning of the above two major QTL, one each for GC and PHST.
Keywords: Bread wheat; Grain colour; Pre-harvest sprouting; Main-effect QTL; Epistatic QTL

A. Pacin, E. Ciancio Bovier, G. Cano, D. Taglieri, C. Hernandez Pezzani, Effect of the bread making process on wheat flour contaminated by the deoxynivalenol and exposure estimate., Food

Control, In Press, Accepted Manuscript, Available online 30 July 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.07.012.
(http://www.sciencedirect.com/science/article/B6T6S-4WWG31N-1/2/5299377f0ee858b676cef75fe48d88fb)
Abstract:
The aim of this work was to identify the occurrence of deoxynivalenol (DON) and ochratoxin A (OTA) in flour; to estimate the reduction of contamination levels in French and Vienna bread manufactured with this flour, and the exposure to these toxins through the consumption of these products. OTA was not detected in the flour. The median reduction of DON between flour and products were, for French bread 33 % and for Vienna bread 58.5 %. A low exposure (the highest percentage of the tolerable daily intake was 6.54% and the lowest 0.45%) was estimated due to the low contaminations level: French bread median was 35.5 [mu]g/kg and Vienna bread: 22.0 [mu]g/kg.
Keywords: Deoxynivalenol; Ochratoxin A; Bread; Baking; Mycotoxin exposure.

Peter R. Shewry, Fang-Jie Zhao, Godfrey B. Gowa, Nathanial D. Hawkins, Jane L. Ward, Michael H. Beale, Nigel G. Halford, Martin A. Parry, Joel Abecassis, Sulphur nutrition differentially affects the distribution of asparagine in wheat grain, Journal of Cereal Science, In Press, Corrected Proof, Available online 30 July 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.07.001.
(http://www.sciencedirect.com/science/article/B6WHK-4WWG336-1/2/2ac304820c3bd1a6ab7fc11c1c327cff)
Abstract:
Asparagine is known to accumulate in wheat grain under conditions of sulphur deficiency, leading to increased levels of acrylamide formation during processing. Analyses of milling fractions and of the outer layers of the grain prepared by hand dissection showed that the highest levels of asparagine were present in the bran fractions and in particular the aleurone layer, when grain were grown with sufficient sulphur supply. However, even mild S deficiency resulted in disproportional increases in the asparagine contents of white flour fractions, implying that optimisation of yield in a conventional milling system is not an appropriate strategy for processing grain from sulphur-deficient crops.
Keywords: Wheat; Asparagine; Acrylamide; Sulphur nutrition

Natalia Schroeder, Daniel D. Gallaher, Elizabeth A. Arndt, Len Marquart, Influence of whole grain barley, whole grain wheat, and refined rice-based foods on short-term satiety and energy intake, Appetite, In Press, Corrected Proof, Available online 28 July 2009, ISSN 0195-6663, DOI: 10.1016/j.appet.2009.07.019.
(http://www.sciencedirect.com/science/article/B6WB2-4WW2SCH-1/2/9d6532ad529ac74c249b57d79c4afbb4)
Abstract:
This study compared the effect of whole grain high-fiber barley, whole grain wheat and refined rice-based foods on energy intake and satiety. Forty-seven healthy subjects consumed a breakfast of hot cereal and a snack mix containing either barley, wheat, or refined rice, followed by an ad libitum smorgasbord lunch using a crossover design. Energy intake was measured at the lunch using plate waste. Hunger, fullness, desire to eat, amount of food consumed, and thirst were assessed using a modified Visual Analog Scale (VAS) before and after the breakfast, snack and lunch. Energy intake at lunch did not differ among products. There were no differences in the area under the time curve in modified VAS scores among products for any parameter. However, subjects reported significantly less hunger before lunch compared to their hunger before breakfast when consuming the barley, but there was no significant reduction in hunger before lunch after consumption of wheat or rice. In conclusion, intake of a whole grain high-fiber barley, whole grain wheat, or refined rice breakfast and snack did not decrease energy intake acutely, but

consumption of whole grain high-fiber barley foods significantly decreased hunger whereas whole wheat and refined rice foods did not.
Keywords: Whole grains; Barley; Wheat; Rice; Satiety; Energy intake; VAS; Hunger; Fiber; beta-Glucan

Nurhan Turgut Dunford, Sibel Irmak, Ramakanth Jonnala, Pressurised solvent extraction of policosanol from wheat straw, germ and bran, Food Chemistry, In Press, Corrected Proof, Available online 26 July 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.07.039.
(http://www.sciencedirect.com/science/article/B6T6R-4WVK4XC-6/2/92b1202bcac1d5093f2bd7039cff88f2)
Abstract:
Policosanols (PCs) are a group of long chain aliphatic alcohols that have been reported to have low-density lipoprotein (LDL) cholesterol-lowering properties. Wheat is a good source of these compounds. This study examined the effect of solvent type and temperature on extract yields and PC content and composition in the extracts. Wheat germ, straw and bran samples were extracted with petroleum ether, chloroform, n-hexane and ethanol at various temperatures ranging from 80 to 125 [degree sign]C.
Wheat germ extract yields were higher than those for straw and bran. Ethanol extraction resulted in the highest yield from wheat germ. Ethanol extract yields from both wheat germ and straw increased significantly with increasing temperature. Wheat straw had the highest PC content among the wheat fractions examined in the study. The PC composition of extracts varied with the type of solvent and wheat fraction used. Ethanol and petroleum ether extracts of wheat straw had the highest octacosanol and hexacosanol contents, respectively. This study demonstrated that solvent type and temperature have significant effects on extract yields and PC composition in extracts obtained from wheat fractions.
Keywords: Wheat; Straw; Germ; Bran; Solvent extraction; Policosanol

Xing Xu, Baoyu Gao, Wenyi Wang, Qinyan Yue, Yu Wang, Shouqing Ni, Effect of modifying agents on the preparation and properties of the new adsorbents from wheat straw, Bioresource Technology, In Press, Corrected Proof, Available online 24 July 2009, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.06.064.
(http://www.sciencedirect.com/science/article/B6V24-4WV5BFC-2/2/dd2d4cdff3940e5be0b0d6546c63b623)
Abstract:
Three different types of new adsorbents modified from wheat straw were synthesized after the reaction between epichlorohydrin and triethylamine by using ethylenediamine (EDA), diethylenetriamine (DETA) and triethylenetetramine (TETA) as modifying agents. The performance of the modified wheat straws (MWS) was characterized by Fourier transform infrared spectroscopy (FTIR), scanning electron microscope (SEM) and elemental analysis. Results showed that the optimal dosages for the three modifying agent (EDA, DETA and TETA) were 3, 4 and 3 ml. The optimum synthesis temperature for the three MWS was 80, 85 and 95 [degree sign]C, respectively. The IR spectra of the three MWS were analogical, and nitrogen contents of the MWS were found to be consistent with their adsorption capacity. The pseudo-second-order equation generated the best agreement with the experimental data for adsorption systems. In addition, the adsorption process of the three MWS reached equilibrium at 10-15 min. MWS (EDA) demonstrated the largest phosphate capacity than the other MWS.
Keywords: Modifying agent; MWS; Phosphate; Nitrogen content; Kinetic

Cemalettin Saricoban, Mustafa Tahsin Yilmaz, Mustafa Karakaya, Response surface methodology study on the optimisation of effects of fat, wheat bran and salt on chemical, textural and sensory

properties of patties, Meat Science, In Press, Corrected Proof, Available online 23 July 2009, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2009.07.010.
(http://www.sciencedirect.com/science/article/B6T9G-4WV15W5-2/2/b7c6aae792306c74c70588390bb6b57b)
Abstract:
A three-factor Box-Behnken design was adopted for studying the simultaneous effects of processing variables such as fat (10-30%), wheat bran (5-15%) and NaCl (0-2%) on physicochemical, textural and sensory properties of cooked beef patties. In addition, the ridge analysis was conducted to find the values of processing variables that maximise and minimise the texture profile analysis (TPA) parameters (hardness, chewiness, gumminess, adhesiveness, springiness, resilience and cohesiveness) and sensory ratings. Experimental design allowed for evaluation of potential interactive and quadratic effects between these variables; fat wheat bran and NaCl. It was found that protein and fat contents of patties was decreased and increased, respectively as the amount of wheat bran increased. NaCl increased the ash content of patties. Fat and wheat bran had a notable influence on textural properties, which improved the textural properties at certain levels. Lower addition of wheat bran and NaCl into patty resulted in higher acceptable product with respect to firmness, juiciness and overall quality properties.
Keywords: Patty; Fat; Wheat bran; NaCl; Texture; Optimisation

Jing Wang, Baoguo Sun, Yanping Cao, Yuan Tian, Chengtao Wang, Enzymatic preparation of wheat bran xylooligosaccharides and their stability during pasteurization and autoclave sterilization at low pH, Carbohydrate Polymers, Volume 77, Issue 4, 19 July 2009, Pages 816-821, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2009.03.005.
(http://www.sciencedirect.com/science/article/B6TFD-4VTCM73-B/2/c5a011bc86a4cff598bcfc31ff8bad10)
Abstract:
Xylooligosaccharides (XOS) were prepared from wheat bran insoluble dietary fiber (WBIDF) by treatment with commercial xylanase preparation Sunzymes. XOS, with a purity of 95% (w/w) and degree of polymerization of 2-7 and the ratio of arabinose to xylose of 0.27, was obtained with a yield of approximately 31.2% of WBIDF. Their stability was evaluated by comparing with that of commercial fructooligosaccharides (FOS) during pasteurization (60-100 [degree sign]C, 30 min) and autoclave sterilization (121 [degree sign]C, 1 kg/cm2, 10-50 min) at pH 2.0-4.0. XOS was characterized by a high thermal stability during pasteurization at pH 2.5-4.0 and sterilization at pH 3.0-4.0. Even at pH 2.0, the remaining XOS reached 97.2% (w/w) and 84.2% (w/w) during pasteurization (100 [degree sign]C, 30 min) and sterilization (50 min), respectively. Compared with FOS, XOS was strongly resistant to lower acidic conditions. The results revealed that XOS was considered to be more suitable for use as functional food ingredients.
Keywords: Fructooligosaccharides; Insoluble dietary fiber; Stability; Thermal processing; Xylooligosaccharides

L. Alvarez-Jubete, H. Wijngaard, E.K. Arendt, E. Gallagher, Polyphenol composition and in vitro antioxidant activity of amaranth, quinoa buckwheat and wheat as affected by sprouting and baking, Food Chemistry, In Press, Corrected Proof, Available online 19 July 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.07.032.
(http://www.sciencedirect.com/science/article/B6T6R-4WT3WMB-3/2/d5d0ba1878b1ca0ee481693447fc5a57)
Abstract:
This study examined the polyphenol composition and antioxidant properties of methanolic extracts from amaranth, quinoa, buckwheat and wheat, and evaluated how these properties were affected following two types of processing: sprouting and baking. The total phenol content amongst the seed extracts were significantly higher in buckwheat (323.4 mgGAE/100 g) and decreased in the

following order: buckwheat > quinoa > wheat > amaranth. Antioxidant capacity, measured by the radical 2,2-diphenyl-1-picylhydrazyl scavenging capacity and the ferric ion reducing antioxidant power assays was also highest for buckwheat seed extract ($p < 0.01$). Total phenol content and antioxidant activity was generally found to increase with sprouting, and a decrease in levels was observed following breadmaking. Analysis by liquid chromatography coupled with diode array detector revealed the presence of phenolic acids, catechins, flavanol, flavone and flavonol glycosides. Overall, quinoa and buckwheat seeds and sprouts represent potential rich sources of polyphenol compounds for enhancing the nutritive properties of foods such as gluten-free breads.
Keywords: Pseudocereals; Amaranth; Quinoa; Buckwheat; Gluten-free diet; Baking; Sprouts; Antioxidant capacity; Total phenol content; Polyphenol composition

Kati Katina, Ndegwa Henry Maina, Riikka Juvonen, Laura Flander, Liisa Johansson, Liisa Virkki, Maija Tenkanen, Arja Laitila, In situ production and analysis of Weissella confusa dextran in wheat sourdough, Food Microbiology, In Press, Corrected Proof, Available online 17 July 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.07.008.
(http://www.sciencedirect.com/science/article/B6WFP-4WSRF1C-5/2/223585c46e02b37fed1a0632493e11a0)
Abstract:
Several lactic acid bacteria belonging to the genera Leuconostoc, Lactobacillus, and Weissella have been introduced to wheat sourdough baking for in situ production of exopolysaccharides. This is considered a novel method for improving the shelf-life, volume and nutritional value of bread without additives. However, in situ production of exopolysaccharides during sourdough fermentation is challenged by simultaneous acidification due to metabolic activities of the bacteria, which may significantly diminish the positive technological impact of exopolysaccharides. In this study, the growth, activity and in situ production of dextran by Weissella confusa VTT E-90392 in wheat sourdoughs were investigated. Furthermore, the influence of dextran-enriched sourdoughs, at the addition level of 43%, on the subsequent bread quality was established. W. confusa efficiently produced dextran from the added sucrose in wheat sourdough without strong acid production. A new specific enzyme-assisted method for in situ analysis of dextran in sourdoughs was developed. With this method, we could for the first time proof significant (11-16 g/kg DW) production of polymeric dextran in sourdoughs. Concomitant formation of shorter isomaltooligosaccharides by W. confusa was also detected. The produced dextran significantly increased the viscosity of the sourdoughs. Application of dextran-enriched sourdoughs in bread baking provided mildly acidic wheat bread with improved volume (up to 10%) and crumb softness (25-40%) during 6 days of storage. Hence, W. confusa is a promising new strain for efficient in situ production of dextrans and isomaltooligosaccharides in sourdoughs without strong acidification.
Keywords: Bread quality; Dextran; Exopolysaccharides; Isomaltooligosaccharides; Weissella; Wheat sourdough

J.M. Palazzini, M.L. Ramirez, E.J. Alberione, A.M. Torres, S.N. Chulze, Osmotic stress adaptation, compatible solutes accumulation and biocontrol efficacy of two potential biocontrol agents on Fusarium head blight in wheat, Biological Control, In Press, Corrected Proof, Available online 16 July 2009, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.07.008.
(http://www.sciencedirect.com/science/article/B6WBP-4WSHK3Y-2/2/e8fa8b60556f3e81125fb8ffc226c1f7)
Abstract:
Fusarium head blight (FHB) caused by Gibberella zeae (anamorph = Fusarium graminearum) is a devastating disease that causes extensive yield and quality losses to wheat in humid and semi-humid regions of the world. Biological control has been demonstrated to be effective under laboratory conditions but a few biocontrol products have been effective under field conditions. The improvement in the physiological quality of biocontrol agents may improve survival under field

conditions, and therefore, enhance biocontrol activity. Bacillus subtilis RC 218 and Brevibacillus sp. RC 263 were isolated from wheat anthers and showed significant effect on control of FHB under greenhouse assays. This study showed the effect of water availability measured as water activity (aW) using a growth medium modified with NaCl, glycerol and glucose on: (i) osmotic stress tolerance, (ii) viability in modified liquid medium, (iii) quantitative intracellular accumulation of betaine and ectoine and (iv) the biocontrol efficacy of the physiologically improved agents. Viability of B. subtilis RC 218 in NaCl modified media was similar to the control. Brevibacillus sp. RC 263 showed a limited adaptation to growth in osmotic stress. Betaine was detected in high levels in modified cells but ectoine accumulation was similar to the control cells. Biocontrol activity was studied in greenhouse assays on wheat inoculated at anthesis period with F. graminearum RC 276. Treatments with modified bacteria reduced disease severity from 60% for the control to below 20%. The physiological improvement of biocontrol agents could be an effective strategy to enhance stress tolerance and biocontrol activity under fluctuating environmental conditions.
Keywords: Biological control; Bacillus subtilis; Brevibacillus sp.; Fusarium graminearum; Fusarium head blight; Osmotic stress tolerance; Compatible solutes

Phani Adapa, Lope Tabil, Greg Schoenau, Compaction characteristics of barley, canola, oat and wheat straw, Biosystems Engineering, In Press, Corrected Proof, Available online 16 July 2009, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.06.022.
(http://www.sciencedirect.com/science/article/B6WXV-4WSG2V8-2/2/b9da312c48b1dd12a4f4ba3f1978a2f8)
Abstract:
Agricultural biomass has the potential to be used as feedstock for biofuel production. However, crop residue after harvest must be gathered, processed and densified in order to facilitate efficient handling, transportation and usage. In this study compacts were prepared by densifying material against a base plate (representing the specific energy required to overcome friction within the straw grinds) as opposed to the process that occurs in a commercial operation where compacts are formed due to back-pressure effect in the die. Densification was measured using four selected biomass samples (barley, canola (oilseed rape), oat and wheat straw) at 10% moisture content (wb) and 1.98 mm grinder screen size using a compaction apparatus which applied four pressure levels of 31.6, 63.2, 94.7 and 138.9 MPa. The specific energy required to extrude the compact was measured; this will closely emulate the specific energy required to overcome the friction between the ground straw and die. The mean densities of barley, canola, oat and wheat straw compacts ranged from 907 +/- 31 to 988 +/- 26 kg m-3, 823 +/- 73 to 1003 +/- 21 kg m-3, 849 +/- 22 to 1011 +/- 54 kg m-3 and 813 +/- 55 to 924 +/- 23 kg m-3, respectively; while the mean total specific energy for compaction of grinds ranged from 3.69 +/- 0.28 to 9.29 +/- 0.39 MJ t-1, 3.31 +/- 0.82 to 9.44 +/- 0.33 MJ t-1, 5.25 +/- 0.42 to 9.57 +/- 0.83 MJ t-1 and 3.59 +/- 0.44 to 7.16 +/- 0.40 MJ t-1, respectively. Best predictor equations having highest coefficient of determination values (R2) and standard error of estimate or root mean square error were determined for both compact density and total specific energy required to compress the ground straw samples. The resulting R2 for pellet density from barley, canola, oat and wheat straw were 0.56, 0.79, 0.67 and 0.62, respectively, and for total specific energy the values of R2 were 0.94, 0.96, 0.90 and 0.92, respectively.

Agnes Galle, Jolan Csiszar, Maria Secenji, Adrienn Guoth, Laszlo Cseuz, Irma Tari, Janos Gyorgyey, Laszlo Erdei, Glutathione transferase activity and expression patterns during grain filling in flag leaves of wheat genotypes differing in drought tolerance: Response to water deficit, Journal of Plant Physiology, In Press, Corrected Proof, Available online 16 July 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.05.016.
(http://www.sciencedirect.com/science/article/B7GJ7-4WSG2M2-1/2/441e3f80d3165cf78154123e45bcd79c)

Abstract: Summary
Total glutathione S-transferase (GST, EC 2.5.1.18) and glutathione peroxidase (GPOX) activity were measured spectrophotometrically in Triticum aestivum cv. MV Emese and cv. Plainsman (drought tolerant) and cv. GK Elet and Cappelle Desprez (drought-sensitive) flag leaves under control and drought stress conditions during the grain-filling period, in order to reveal possible roles of different GST classes in the senescence of flag leaves. Six wheat GSTs, members of 3 GST classes, were selected and their regulation by drought and senescence was investigated. High GPOX activity (EC 1.11.1.9) was observed in well-watered controls of the drought-tolerant Plainsman cultivar. At the same time, TaGSTU1B and TaGSTF6 sequences, investigated by real-time PCR, showed high-expression levels that increased with time, indicating that the gene products of these genes may play important roles in monocarpic senescence of wheat. Expression of these genes was also induced by drought stress in all of the four investigated cultivars, but extremely high transcript amounts were detected in cv. Plainsman. Our data indicate genotypic variations of wheat GSTs. Expression levels and early induction of two senescence-associated GSTs under drought during grain filling in flag leaves correlated with high yield stability.
Keywords: Drought stress; Glutathione transferase; Grain filling; Wheat

Paola Castaldi, Pietro Melis, Margherita Silvetti, Pietrino Deiana, Giovanni Garau, Influence of pea and wheat growth on Pb, Cd, and Zn mobility and soil biological status in a polluted amended soil, Geoderma, Volume 151, Issues 3-4, 15 July 2009, Pages 241-248, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2009.04.009.
(http://www.sciencedirect.com/science/article/B6V67-4W7B55D-3/2/6ef451f10fbc85b8b01080b02ca821e7)
Abstract:
In this paper we evaluated the effects of various amendments, notably zeolite, red mud (a by-product of aluminium manufacturing) and lime on decreasing the bioavailability and phytotoxicity of Pb, Cd and Zn present in a contaminated acidic soil (pH = 4.2). Pisum sativum and Triticum vulgare were grown in a glasshouse experiment on untreated-polluted (control) and amended soils and their yield and metal uptake determined. The influence of plants on the total concentration and mobility of Pb, Cd, and Zn, and on several soil microbiological and biochemical parameters was also evaluated and compared to unplanted (control and amended) soils on which we have previously reported.
All the amendments enhanced plant yields significantly. Red mud and lime decreased Zn, Pb and Cd availability to plants, whilst zeolite was efficient only at blocking Pb. Red mud in particular decreased heavy metal uptake of pea and wheat by 60-34% (Pb), 79-80% (Cd), and 93-64% (Zn) respectively when compared to the control plants.
After plant growth, Cd and Zn solubility in the amended soils was significantly higher than in respective unplanted soils. Likewise, the number of fast-growing heterotrophic bacteria and fungi was higher after pea and wheat compared to bare soil, and this was irrespective of the treatment applied. These data together with Biolog-derived parameters (AWCD and richness) and enzyme activities (dehydrogenase, urease and [beta]-glucosidase) also suggested that pea rhizodeposits, in the different soils, were either more abundant or more readily-available to soil bacterial communities compared to wheat rhizodeposits.
Keywords: Heavy metals; Amendments; Pea; Wheat; Soil microbial community; Enzyme activity

Xiaoguang Zhao, Dong Shi-Jian, Guanjun Tao, Rongrong Xu, Miao Wang, Brad Reuhs, Yanjun Yang, Influence of phospholipase A2 (PLA2)-treated dried egg yolk on wheat dough rheological properties, LWT - Food Science and Technology, In Press, Corrected Proof, Available online 14 July 2009, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.06.027.
(http://www.sciencedirect.com/science/article/B6WMV-4WS2J3M-1/2/7a203a61523d4b3f16546eaaf1ef04af)

Abstract: Abstracts
The effects of non-treated and modified dried egg yolk on the rheological properties of flour dough were investigated. It indicated that farinograph dough development time, dough stability, and farinograph quality number of the dough increased with the incorporation of the dried egg yolk, while the dough softness decreased. The incorporation of PLA2-treated dried egg yolk into flour has more significant effect on farinograph than that of the non-treated dried egg yolk. Extensograph resistance to extension, and area below the curve (energy) significantly increased with the addition of dried egg yolk, while extensibility decreased and the water adsorption was unchanged. The addition of dried egg yolk lead to the increase of G' (the storage modulus) and G'' (loss modulus) under frequency sweep from 0.1 to 20 Hz at 1.5% strain and temperature sweep from 20 to 90 [degree sign]C at 1 Hz. The microstructure of the dough showed great difference when non-treated or PLA2-treated dried egg yolk was incorporated into wheat dough. Starch granules flowed into the continuous matrix compared to the blank wheat dough. The gluten network structure of the dough was increased when PLA2-treated dried egg yolk was added.
Keywords: Dough; Rheological properties; Phospholipase A2; Dried egg yolk

Hongyong Sun, Yanjun Shen, Qiang Yu, Gerald N. Flerchinger, Yongqiang Zhang, Changming Liu, Xiying Zhang, Effect of precipitation change on water balance and WUE of the winter wheat-summer maize rotation in the North China Plain, Agricultural Water Management, In Press, Corrected Proof, Available online 11 July 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.06.004.
(http://www.sciencedirect.com/science/article/B6T3X-4WRD678-1/2/9c4ae9c58db4e13672c15352425f93c7)
Abstract:
Limited precipitation restricts crop yield in the North China Plain, where high level of production depends largely on irrigation. Establishing the optimal irrigation scheduling according to the crop water requirement (CWR) and precipitation is the key factor to achieve rational water use. Precipitation data collected for about 40 years were employed to analyze the long-term trend, and weather data from 1984 to 2005 were used to estimate the CWR and irrigation water requirements (IWR). Field experiments were performed at the Luancheng Station from 1997 to 2005 to calculate the soil water consumption and water use efficiency (WUE). The results showed the CWR for winter wheat and summer maize were similar and about 430 mm, while the IWR ranged from 247 to 370 mm and 0 to 336 mm at the 25% and 75% precipitation exceedance probabilities for winter wheat and summer maize, respectively. The irrigation applied varied in the different rainfall years and the optimal irrigation amount was about 186, 161 and 99 mm for winter wheat and 134, 88 and 0 mm for summer maize in the dry, normal and wet seasons, respectively. However, as precipitation reduces over time especially during the maize growing periods, development of water. Therefore, development of water-saving management practices for sustainable agriculture into the future is imperative.
Keywords: Sustainable water management; Precipitation trend; Grain yield; Water use efficiency; North China Plain

D.K. Biswas, H. Xu, J.C. Yang, Y.G. Li, S.B. Chen, C.D. Jiang, W.D. Li, K.P. Ma, S.K. Adhikary, X.Z. Wang, G.M. Jiang, Impacts of methods and sites of plant breeding on ozone sensitivity in winter wheat cultivars, Agriculture, Ecosystems & Environment, In Press, Corrected Proof, Available online 10 July 2009, ISSN 0167-8809, DOI: 10.1016/j.agee.2009.06.009.
(http://www.sciencedirect.com/science/article/B6T3Y-4WR5NJV-3/2/67526197c3f98f57b8f3a0199fb4e882)
Abstract:
Development and use of ozone (O3)-resistant crop cultivars are key measures to avoid agricultural yield reduction in a high O3 environment. However, little is known about the impacts of breeding

methods and breeding sites on the development of O3 tolerance in winter wheat cultivars. To explore such impacts, 20 Chinese winter wheat cultivars bred using four breeding methods (viz. introduction, reselection, conventional breeding and hybridization) at four breeding sites having different levels of O3 exposures, were exposed to charcoal-filtered (CF) air or high O3 (82 ppb, 7 h d-1) for 21 days. O3 tolerance of cultivars was assessed by the relative levels of visible injury, growth, gas exchange, dark respiration, antioxidative activities and oxidative modification of proteins and cellular membranes. We found that conventional breeding and hybridization demonstrated higher potential capacity for O3 tolerance as indicated by a higher level of ascorbate and peroxidase activity in cultivars exposed to CF air. Despite the highest potential capacity for O3 tolerance, hybridization displayed the lowest O3 tolerance as represented by antioxidative activities, oxidative stress, photosynthesis and growth. The causes of higher O3 sensitivity in hybrid cultivars included lower O3 exclusion by stomatal closure, higher reduction in antioxidative activities, higher O3-induced modification of proteins and cellular membranes, lower level of repair of O3-induced cellular damage and higher loss of assimilation rate as well as growth in O3 relative to control plants. Cultivars bred at breeding sites experiencing higher ambient O3 exposures demonstrated higher potential capacity for O3 tolerance. The observed O3 tolerance in cultivars bred by different breeding methods was uncorrelated to ambient O3 levels in breeding sites as well as to the potential O3 tolerance capacity as observed in CF air. Results from our experiment, therefore, clearly indicated that potential O3 sensitivity would have little use in predicting actual O3 tolerance of winter wheat cultivars. Our findings also suggested that sensitivity to O3 in winter wheat cultivars was related to breeding methods, but not to O3 concentrations in breeding sites.
Keywords: Breeding sites; Triticum aestivum; O3 tolerance; Plant breeding; Winter wheat

A. Ahmadi, M. Joudi, M. Janmohammadi, Late defoliation and wheat yield: Little evidence of post-anthesis source limitation, Field Crops Research, Volume 113, Issue 1, 10 July 2009, Pages 90-93, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.04.010.
(http://www.sciencedirect.com/science/article/B6T6M-4WBR6GK-1/2/386caa20d3a6cd7db4d501ea1edf25da)
Abstract:
The effect of source reduction on yield and protein content of bread wheat under well-watered and mild drought stress condition in a semi-arid climate was studied. Field experiments were conducted at the Tehran University research farm during 2003-2004 and 2004-2005 growing seasons. Mild drought stress was imposed when plants were at the second node stage by repeatedly withholding watering and re-irrigating when they showed symptoms of wilting or leaf rolling. Partial defoliations (all leaf lamina other than flag leaves were removed) were imposed at booting and anthesis; complete defoliation was imposed at anthesis (defoliation treatments were applied to all plants of each plot). Drought stress caused a significant increase in the remobilization of pre-anthesis reserves to the grain. Defoliation did not significantly affect remobilization. Grain yield and 1000-grain weight was reduced slightly by drought stress, but in most cases it was not significantly reduced by defoliation. Significant changes were not observed for grain protein content between defoliated and control plots. The results suggested that grain yield of the cultivar used under the condition tested is more controlled by sink than source strength.
Keywords: Defoliation; Drought stress; Grain protein content; Grain yield; Wheat

Alexander V. Babosha, Regulation of resistance and susceptibility in wheat-powdery mildew pathosystem with exogenous cytokinins, Journal of Plant Physiology, In Press, Corrected Proof, Available online 9 July 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.05.014.
(http://www.sciencedirect.com/science/article/B7GJ7-4WR0CR5-2/2/21f07652c89bd9d0f8e1e9431e3fd438)
Abstract: Summary

Dose-response relationship between resistance of wheat seedlings (Triticum aestivum, cultivar Zarya) to Erysiphe graminis f. sp. tritici Marchal. (Syn. Blumeria graminis), a causal organism of wheat powdery mildew and exogenous zeatin has been investigated. Two-week-old seedlings were inoculated with the pathogen. Zeatin or zeatinriboside were added to the nutrient solution immediately after inoculation. The dose-response curve of cytokinin in the most cases was multiphasic, with peaks of increased susceptibility occurring at 0.25-1.5 and 1.5-9 [mu]M cytokinin, separated by a region of increased resistance at 0.5-3 [mu]M cytokinin. The change in mineral nutrition or simultaneous treatment with thidiazuron revealed alterations of the dose-response curve ranging from a curve with maximum of resistance to a curve with maximum of susceptibility. Both multiphase nature of dose-response and its variability were proposed as possible explanations for earlier observed discrepancies in experimental data on modification of disease resistance by cytokinins. A mathematical model for two metabolic processes with substrate inhibition connected in-series was suggested to explain the multiphase dose-response. In this model, the product of the first reaction was used as substrate for the second reaction. Numerical experiments showed the changes in the shape of dose-response curve with changes in parameters dependent of cytokinin metabolism.
Keywords: Cytokinin; Immunomodulation; Mathematical model; Powdery mildew; Wheat

Xiying Zhang, Suying Chen, Hongyong Sun, Yanmei Wang, Liwei Shao, Water use efficiency and associated traits in winter wheat cultivars in the North China Plain, Agricultural Water Management, In Press, Corrected Proof, Available online 7 July 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.06.003.
(http://www.sciencedirect.com/science/article/B6T3X-4WPHRFM-1/2/e6f703d304c5d213802ece9775e31295)
Abstract:
Selecting more water efficient cultivars is an important way to reduce water use in a water-scarce region. The objectives of this study were to measure the grain yield and water use efficiency (WUE) of winter wheat (Triticum aestivum L.) cultivars to understand the genetic gains in yield and WUE and their associated physiological and agronomic traits in Hebei province, North China Plain (NCP). Two groups of winter wheat cultivars were tested. Group 1 included 16 winter wheat cultivars that were released between 1998 and 2002 and were tested during the 2002/2003 and 2003/2004 seasons under two water regimes. Group 2 included 10 cultivars released between 1970 and 2000, and were tested during the 2005/2006 and 2006/2007 seasons under three water regimes. Results showed that WUE increased substantially from 1.0-1.2 kg m-3 for cultivars from the early 1970s to 1.4-1.5 kg m-3 for recently released cultivars. There was also a variation in yield and WUE of about 20% among Group 1 cultivars. Most of the cultivars in both groups had similar responses to water supply. WUE was greater for less irrigated treatments and maximum grain production was achieved with moderate water deficit. The genetic gains in grain yield were associated with increasing in biomass, harvest index and kernel numbers per spike for cultivars released in different years. Among the Group 1 cultivars, the ones with higher yield generally had higher WUE. No significant correlations were found between WUE and physiological traits such as ash content, chlorophyll content, or relative water content among the cultivars released recently. However, a significant relationship was found between stomatal conductance or ash contents and WUE or grain yield among the Group 2 cultivars. Relationships were apparent between WUE and date of anthesis and harvest index ($P < 0.05$) in Group 1. Earlier flowering cultivars tended to have higher grain yield. In Group 2, flowering date was advancing by about 4 days over the 30 years of crop breeding. The positive relationship between grain yield and WUE for all the cultivars indicated that using a higher yielding cultivar has the potential to improve WUE and thereby to save water.
Keywords: Winter wheat; Early and recent released cultivars; Grain yield; Water use efficiency; Physiological traits; Agronomic traits

Roman A. Serrago, Ramiro Carretero, Marie Odile Bancal, Daniel J. Miralles, Foliar diseases affect the eco-physiological attributes linked with yield and biomass in wheat (Triticum aestivum L.), European Journal of Agronomy, In Press, Corrected Proof, Available online 5 July 2009, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.06.002.
(http://www.sciencedirect.com/science/article/B6T67-4WP4BKS-1/2/fe62e15b1ee4ed1fc243eacd52b09aad)
Abstract:
Foliar diseases are the main biotic cause of yield loss in wheat crops (Triticum aestivum L.) in Argentina and other regions around the world. Most of the studies on foliar diseases take a phytopathological perspective, but few studies have analyzed the problem with an eco-physiological approach aimed at the understanding of which crop traits are affected by foliar diseases. The present study was designed to determine the effects of a foliar disease complex (including leaf rust, Septoria leaf blotch and tan spot), on (i) grain yield and (ii) the physiological components of biomass production; intercepted radiation (RI) and radiation use efficiency (RUE), in bread wheat crops growing under contrasting agronomic and environmental conditions (i.e. different cultivars, years, location and nitrogen supply). The experiments were carried out during 4 years in different locations (three in the rolling pampas of Argentina and one in northern of France). Five different commercial wheat cultivars were sown on early (E) and late (L) sowing dates (SD); and two contrasting nitrogen availability and two fungicide treatments (protected and unprotected) were applied. Foliar diseases appeared during the grain filling period and affected both, leaf area duration (LAD) and healthy area duration (HAD) during that period. Foliar diseases reduced both, above-ground biomass at harvest (1533 and 1703 g m-2 for unprotected and protected treatments, respectively) and grain yield (646 and 748 g m-2 for unprotected and protected treatments, respectively) without important effects on harvest index. Biomass reductions after anthesis, due to the effects of foliar diseases, were associated with a reduced capacity of the canopy to absorb solar radiation more than any effect on RUE. However, RUE was consistently lower--when leaf rust was the predominant disease in the crop, suggesting that this biotrophic pathogen could affect the photosynthetic activity at the leaf or canopy level.
Keywords: Leaf rust; Septoria leaf blotch; Tan spot; Yield; Above-ground biomass; Intercepted and absorbed solar radiation; Radiation use efficiency; Wheat (Triticum aestivum L.)

Z. Maache-Rezzoug, I. Zarguili, C. Loisel, J.-L. Doublier, Study of DIC hydrothermal treatment effect on rheological properties of standard maize (SMS), waxy maize (WMS), wheat (WTS) and potato (PTS) starches, Journal of Food Engineering, In Press, Corrected Proof, Available online 3 July 2009, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.06.052.
(http://www.sciencedirect.com/science/article/B6T8J-4WNRJVM-1/2/5cc23b1c4aa07c5aa5097aa7877010d7)
Abstract:
Standard maize (SMS), waxy maize (WMS), wheat (WTS) and potato (PTS) starches were hydrothermally treated by Instantaneous Controlled Pressure Drop (DIC) process at different pressure levels (1, 2 and 3 bar) corresponding to the temperatures of 100, 122 and 136 [degree sign]C, respectively. The rheological properties and particle size of treated starches under various conditions were compared to the native ones. The results showed for all starches, except for WTS, a reduction of the consistency coefficient and the yield stress ([tau]0) with increased intensity of the hydrothermal treatment conditions. Furthermore, [tau]0 vanished for severe treatment conditions. The DIC treatment yielded an increased fluidity and a loss of the conservative modulus of the pastes, as a result of partial gelatinization of starch granules. The extent of the observed effect depended on the botanical origin. Wheat starch exhibited a different behaviour: the consistency coefficient and the conservative modulus being higher for DIC treated starch except for the most severe conditions.
Keywords: Starch; DIC hydrothermal treatment; Granulometry; Rheological properties

Jun Tao, Bryan Griffiths, Shujie Zhang, Xiaoyun Chen, Manqiang Liu, Feng Hu, Huixin Li, Effects of earthworms on soil enzyme activity in an organic residue amended rice-wheat rotation agro-ecosystem, Applied Soil Ecology, Volume 42, Issue 3, July 2009, Pages 221-226, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2009.04.003.
(http://www.sciencedirect.com/science/article/B6T4B-4W7B519-1/2/262713abb596a8b7e1ebcf690a8fabcd)
Abstract:
The effect of earthworms on soil hydrolases (protease, urease, invertase, and alkaline phosphatase) and dehydrogenase activities was investigated in maize residue amended rice-wheat rotation agro-ecosystem. Experimental plots in the rotation had five treatments, i.e. incorporation or mulching of maize residues with or without added earthworms and an untreated control. The application of maize residues to soil without earthworms significantly enhanced the five soil enzyme activities compared with the control treatment during rice and wheat cultivation. The presence of earthworms further significantly enhanced protease activity in the soils with both incorporated and mulched maize residues during two cultivation seasons, but only significantly increased alkaline phosphatase activity in the soil with incorporated maize residue during the rice cultivation season. Invertase activity was significantly enhanced by the presence of earthworms in the soil with maize residue incorporation during two cultivation seasons. There were no changes in dehydrogenase activity when earthworms were present. Additionally, the five enzyme activities in earthworm casts were significant higher than those in the surrounding soil, especially dehydrogenase and invertase activities. Whatever the treatment, the values obtained for the enzyme activities in both soil and casts, except for dehydrogenase activity in earthworm casts, were significantly higher under wheat than those in rice-cultivated soil. These results indicate that the presence of earthworms strongly affected soil enzyme activities, depending on the method of organic residue application, and the enhanced enzyme activities of earthworm casts probably contributed to the surrounding soil enzyme activities.
Keywords: Earthworms; Microbial activity; Earthworm casts; Crop rotation

M. Erbs, J. Franzaring, P. Hogy, A. Fangmeier, Free-air CO2 enrichment in a wheat-weed assembly - effects on water relations, Basic and Applied Ecology, Volume 10, Issue 4, July 2009, Pages 358-367, ISSN 1439-1791, DOI: 10.1016/j.baae.2008.08.008.
(http://www.sciencedirect.com/science/article/B7GVS-4TTNCM1-1/2/65a32ecac5b2202d4ffd65813792d118)
Abstract:
In a three-year free-air CO2 enrichment study (Mini-FACE), spring wheat associated with typical arable weeds were grown under present and elevated atmospheric carbon dioxide concentrations [CO2] (ambient air+150 [mu]mol mol-1). Analyses of plant stable carbon isotope ratios and in vivo measurements of leaf gas exchange were used to describe the CO2 effects on water relations. For most species examined elevated [CO2] significantly increased the intrinsic water-use efficiency (A/gs) as derived from carbon isotope analyses. In some of the species, seasonal averages of the ratio between leaf internal to atmospheric CO2 (ci/ca) were found to be significantly reduced by elevated [CO2]. Periodic leaf gas exchange measurements confirmed the increased water-use efficiency, but significant CO2 effects became evident only over the entire season by carbon isotope analysis. In both types of analysis conducted, spring wheat was found to react significantly different from all other species examined. The relation between A/gs and biomass production was significantly influenced by elevated [CO2] in all three years of the study. At the end of the drier growing seasons 2003 and 2004, the soil water content tended to be increased in the CO2 enriched plots indicating a water saving effect. These observations demonstrate the impact of elevated [CO2] on plant water relations with a likely positive feedback leading to higher soil water availability. Due to the differences in the CO2 responses of spring wheat compared to the weeds

we suggest that rising [CO2] may cause shifts in the species composition of crop-weed communities.
Keywords: ci/ca ratio; Competition; Crop-weed interaction; [delta]13C value; FACE; Leaf gas exchange; Microclimate; Soil water content; Triticum; WUE

Qiang Li, Yu-Cai He, Mo Xian, Gao Jun, Xin Xu, Jian-Ming Yang, Liang-Zhi Li, Improving enzymatic hydrolysis of wheat straw using ionic liquid 1-ethyl-3-methyl imidazolium diethyl phosphate pretreatment, Bioresource Technology, Volume 100, Issue 14, July 2009, Pages 3570-3575, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.02.040.
(http://www.sciencedirect.com/science/article/B6V24-4VY168M-3/2/5e283f61455696ca19370c55f33e1dfa)
Abstract:
This study aims to establish a cellulose pretreatment process using ionic liquids (ILs) for efficient enzymatic hydrolysis. The IL 1-ethyl-3-methyl imidazolium diethyl phosphate ([EMIM]DEP) was selected in view of its low viscous and the potential of accelerating enzymatic hydrolysis, and it could be recyclable. The yield of reducing sugars from wheat straw pretreated with this IL at 130 [degree sign]C for 30 min reached 54.8% after being enzymatically hydrolyzed for 12 h. Wheat straw regenerated were hydrolyzed more easily than that treated with water. The fermentability of the hydrolyzates, obtained after enzymatic saccharification of the regenerated wheat straw, was evaluated using Saccharomyces cerevisiae. This microbe could ferment glucose efficiently, and the ethanol production was 0.43 g/g glucose within 26 h. In conclusion, the IL [EMIM]DEP shows promise as pretreatment solvent for wheat straw, although its cost should be reduced and in-depth exploration of this subject is needed.
Keywords: Wheat straw; Ionic liquids; 1-Ethyl-3-methyl imidazolium diethyl phosphate; Pretreatment; Enzymatic hydrolysis

M.A. Ebrahimi Nik, N. Khademolhosseini, M.H. Abbaspour-Fard, A. Mahdinia, K. Alami-Saied, Optimum utilisation of low-capacity combine harvesters in high-yielding wheat farms using multi-criteria decision making, Biosystems Engineering, Volume 103, Issue 3, July 2009, Pages 382-388, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.04.009.
(http://www.sciencedirect.com/science/article/B6WXV-4WBH5CM-3/2/e683595eca6724fae76a356031a6034e)
Abstract:
About 23% of wheat farms in Iran have yields of more than 5 t ha-1, but the technology and the capacity of over 85% of the existing combine harvesters are low and they are not suitable for handling such high yields mainly because of their high harvest losses due to high feed rates. Therefore, it is necessary to match machines with the farms by optimising their feed rate either by changing the effective width or the ground speed. However, simply reducing the effective width, which is the most common method, may also lead to a higher seed breakage (SB). A proper technical framework was developed for harvesting such fields with current combine harvesters, based on multi-criteria decision making (MCDM) technique. Several aspects mainly, SB, total harvest losses, fuel consumption, and combine field capacity were considered as harvesting attributes. Nine different combinations of ground speed and effective width were defined as harvesting candidate alternatives. The MCDM technique indicated that simply reducing the effective width is not the most suitable solution for this problem. For example, the optimum solution for a field with the average yield of 7.4 t ha-1 was to use a speed 3.5 km h-1 and the full platform width.

Zhen-Yan Fu, Zheng-Bin Zhang, Xiao-Jun Hu, Hong-Bo Shao, Xu Ping, Cloning, identification, expression analysis and phylogenetic relevance of two NADP-dependent malic enzyme genes

from hexaploid wheat, Comptes Rendus Biologies, Volume 332, Issue 7, July 2009, Pages 591-602, ISSN 1631-0691, DOI: 10.1016/j.crvi.2009.03.002.
(http://www.sciencedirect.com/science/article/B6X1F-4W7B54S-1/2/88552f3a171490dffa840fb4d411665f)
Abstract:
The NADP-dependent malic enzyme (NADP-ME; EC1.1.1.40) found in many metabolic pathways catalyzes the oxidative decarboxylation of L-malate, producing pyruvate, CO2 and NADPH. The NADP-MEs have been well studied in C4 plants but not well in C3 plants. In this study, we identified the NADP-ME isoforms from hexaploid wheat (Triticum aestivum L). Two different NADP-ME transcripts were first identified in this C3 plant. The first is named TaNADP-ME1 [NCBI: EU170134] and encodes a putative plastidic isoform, while the second is named TaNADP-ME2 [NCBI: EU082065] and encodes a cytosolic counterpart. Sequence alignment shows that the two NADP-ME isoforms share an identity of 73.26% in whole amino acids and 64.08% in nucleotide sequences. The phylogenetic analysis deciphers the two NADP-MEs as belonging to the monocots (Group II), which closely resemble OschlME6 and OscytME2, respectively. Tissue-specific analyses indicate that the two NADP-ME genes are both expressed in root, stem and leaf, and that TaNADP-ME1 is a leaf-abundant isoform. Semi-quantitative RT-PCR analysis show that the two NADP-ME transcripts in wheat leaves respond differently to low temperature, salt, dark and drought stresses stimuli and to exogenous abscisic acid (ABA) and salicylic acid (SA). Our results demonstrate that exogenous hormones (ABA and SA), as well as salt, low temperature, dark and drought stresses can regulate the expressions of TaNADP-ME1 and TaNADP-ME2 in wheat. This indicates that the two NADP-ME genes may play an important role in the response of wheat to ABA, SA, low temperature, salt, dark and drought stress. To cite this article: Z.-Y. Fu et al., C. R. Biologies 332 (2009).
Keywords: Abiotic stress; Hexaploid wheat; NADP-malic enzyme; NADP-ME; Gene expression and regulation

Patrick W. Geier, Phillip W. Stahlman, Nitrogen concentration and application timing affect imazamox efficacy in winter wheat, Crop Protection, Volume 28, Issue 7, July 2009, Pages 573-576, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.03.003.
(http://www.sciencedirect.com/science/article/B6T5T-4W1BFGV-1/2/d31c48c8eea27d397b690efbe536411a)
Abstract:
Field experiments were conducted at four locations in two years in Kansas to determine the effects of urea ammonium nitrate concentrations and application timings on imazamox control of Aegilops cylindrica Host and feral Secale cereale L. in imidazolinone-tolerant winter wheat (Triticum aestivum L.). Based on regression analysis, A. cylindrica was controlled 66-73% with imazamox at 35 g ai. ha-1 plus urea ammonium nitrate at 1-50% v/v. Averaged over urea ammonium nitrate concentrations, fall post-emergence applications of imazamox were 37-45% more efficacious on A. cylindrica than spring post-emergence treatments. Feral S. cereale control increased linearly when imazamox treatments contained urea ammonium nitrate at 1-100%, and fall treatments were more effective than spring treatments at one of two locations. Early applications of imazamox increased wheat yield compared to later applications in two of four experiments, and increased gross profits $69-168 ha-2. However, yields did not differ between imazamox treatments containing different urea ammonium nitrate concentrations at any location.
Keywords: Imazamox; Fertilizer; Herbicide tolerance; Feral Secale cereale L.; Aegilops cylindrica Host

R.H. Elliott, L. Mann, O. Olfert, Calendar and degree-day requirements for emergence of adult wheat midge, Sitodiplosis mosellana (Gehin) (Diptera: Cecidomyiidae) in Saskatchewan, Canada,

Crop Protection, Volume 28, Issue 7, July 2009, Pages 588-594, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.03.005.
(http://www.sciencedirect.com/science/article/B6T5T-4VYW643-1/2/1ecb61399f5da24eb94d91b9681791e7)
Abstract:
Insect/host plant phenologies are particularly important in the management of wheat midge in western Canada. Emergence of adult wheat midge, Sitodiplosis mosellana (Gehin), was evaluated at 19 sites in Saskatchewan in 1991-2000. Emergence was assessed in relation to calendar days and accumulated degree-days above five base air temperatures. Three sites that received less than 20 mm rainfall in May were deleted from the analysis because emergence was erratic and delayed. Males emerged 2-3 days before females. Calendar dates for 10%, 50% and 90% emergence of both sexes were July 11 +/- 5.9 days, July 18 +/- 5.4 days and July 25 +/- 5.9 days, respectively. Deviations between observed and expected emergence dates at most sites related to degree-day accumulations between March 1 and July 31. Emergence was 2-8 days earlier than expected at sites with the highest degree-day accumulation and 4-10 days later than expected at sites with the lowest accumulation. Degree-day requirements for emergence declined as the base air temperature increased. In most instances, accumulated degree-days above 5 [degree sign]C provided the most accurate estimates of emergence. With a 5 [degree sign]C base temperature, accumulated degree-days (DD) for 10%, 50% and 90% emergence of both sexes averaged 693 DD +/- 2.8 days, 784 DD +/- 2.5 days and 874 DD +/- 3.2 days, respectively. Deviations between observed and expected emergence dates at most sites related to precipitation in May and June. Emergence was 1-7 days earlier than expected at sites receiving 20-30 mm rain in May. Conversely, emergence was 2-8 days later than expected at sites receiving more than 145 mm rain in May and June. Adult emergence was re-assessed in 2008. Dates for 10%, 50% and 90% emergence of both sexes differed from expected values by one day or less. Accumulated degree-days above 5 [degree sign]C for 10%, 50% and 90% emergence differed from expected values by 8-35 DD. The merits of using calendar dates and degree-days to predict emergence of adult wheat midge are discussed.
Keywords: Wheat midge; Adult emergence; Calendar date; Accumulated degree-days

N. Katerji, M. Mastrorilli, J.W. van Hoorn, F.Z. Lahmer, A. Hamdy, T. Oweis, Durum wheat and barley productivity in saline-drought environments, European Journal of Agronomy, Volume 31, Issue 1, July 2009, Pages 1-9, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.01.003.
(http://www.sciencedirect.com/science/article/B6T67-4VR1TC5-1/2/842417c5cfa691a67d85a161092e423c)
Abstract:
In two successive years, durum wheat (Triticum turgidum Desf.) and barley (Hodeum vulgare L.) were tested in a factorial salinity-drought experiment, combining three levels of salinity and two levels of drought. The two drought treatments were obtained by applying irrigation water when the pre-dawn leaf water potential of the control treatments attained values of -0.4 and -0.7 MPa, respectively. This experiment led to the analysis of the effects of salinity, of drought, and of the drought-salinity interaction on the grain and straw yield of the two crops studied.
Salinity affected the durum wheat by reducing the grain and straw yields when the soil salinity (ECe) was higher than 5.8 dS m-1. This reduction was due to the fact that there were fewer grains per ear. As for barley, the grain yield was not reduced if ECe ranged from 0.9 to 9.8 dS m-1, but the straw yield was affected. The results obtained for durum and barley are consistent with the observations reported in the literature.
Drought affected the plant water status of both species during the ear formation and flowering stages. It reduced the grain (37%) and straw (18%) yields, on average, at the same rate for all salinity levels. These reductions were not related to the soil salinity levels. There were fewer ears

per plant, explaining the decrease in crop productivity and water use efficiency in conditions of drought.
Drought did not affect the relationship between soil salinity and relative yield.
Keywords: Pre-dawn leaf water-potential; Actual evapotranspiration; Stomatal conductance; Water use efficiency; Soil salinity

Yunchen Zhao, Ping Wang, Jianlong Li, Yuru Chen, Xianzhi Ying, Shuying Liu, The effects of two organic manures on soil properties and crop yields on a temperate calcareous soil under a wheat-maize cropping system, European Journal of Agronomy, Volume 31, Issue 1, July 2009, Pages 36-42, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.03.001.
(http://www.sciencedirect.com/science/article/B6T67-4W38766-1/2/9d100ef8c0178054f30aeab5489e2fc3)
Abstract:
To improve soil fertility, efforts need to be made to increase soil organic matter content. Straw manure is considered another important management practice to maintain soil organic matter content. This study compared effects of two organic manures (straw and farmyard manure) on soil properties and crop yields in a crop rotation system under semi-arid conditions. Soil physical, chemical and biological characteristics were determined in the experiment. After 25 years cropping and fertilization, two organic manures significantly influenced soil properties and crop yields. Farmyard manure combined with chemical fertilizer management (M + NP) resulted in higher increase in SOC, available-N, available-P, and higher activities of protease, urease, and alkaline-phosphatase compared with those found under straw manure combined with chemical fertilizer management (S + NP). However, soil of straw treatment had higher levels of potential soil respiration, soil water retention, microbial biomass, soil porosity, invertase, catalase and lower bulk density than farmyard manure treatment. M + NP produced the highest crop yields at all treatments. Biochemical properties of both treatments were positively correlated with SOC and nutrient content. These results indicate that straw management positively affected soil physical, chemical and biochemical properties as manure treatment in calcareous soil. Adding straw manure, as a replacement of farmyard manure, could be a promising strategy on some soil physical and biological properties as compared to farmyard manure in calcareous soil.
Keywords: Wheat straw; Farmyard manure; SOC; Soil enzyme; Soil respiration

L. Song, F.M. Li, X.W. Fan, Y.C. Xiong, W.Q. Wang, X.B. Wu, N.C. Turner, Soil water availability and plant competition affect the yield of spring wheat, European Journal of Agronomy, Volume 31, Issue 1, July 2009, Pages 51-60, ISSN 1161-0301, DOI: 10.1016/j.eja.2009.03.003.
(http://www.sciencedirect.com/science/article/B6T67-4W7HP4Y-2/2/f1355e52f4822a48f72a67fd2f1d2db4)
Abstract:
This study was conducted to determine the effect of both inter-cultivar and intra-cultivar competition on the growth of three spring wheat (Triticum aestivum L.) cultivars released in different periods that had different root:shoot ratios, differed in water extraction from dry soil, and differed in height. Two water regimes were imposed to compare competitive effects under irrigated and rainfed conditions. Our main hypotheses were that the different distribution of biomass between shoot and root in old and new wheat cultivars will alter their competitive ability, that differences in root size will alter their competitive ability through different water uptake patterns, and differences in the gradient for water uptake will alter their competitive ability in different environments by enabling water extraction from drier soil.
In monoculture, the recent cultivars had significantly more grain yield and higher water use efficiency for grain (WUEG) than the old cultivar. Under the two water regimes the old cultivar had more root biomass, and extracted water in deeper soil layers, whereas the modern cultivars extracted more water in dry soil layers. The old cultivar benefited from inter-cultivar competition in

terms of both grain yield and above-ground biomass accumulation at the expense of the modern cultivars, which showed significantly reduced growth in mixtures compared to in monoculture. Our study suggested that the below-ground competitive ability of cultivars may have a negative relationship with the grain yield and WUEG in monoculture. The yield superiority of modern and recent cultivars was mostly due to increased above-ground biomass, kernel number and WUEG and a smaller proportion of root biomass. Our results demonstrate that inter-plant competition is an important factor affecting spring wheat productivity in contrasting environments, but the extent and intensity of these effects depend on the adaptation of root traits to available soil water. Reducing root growth redundancy and enhancing the ability to deplete more soil water are clearly adaptive features for wheat for water-limited conditions.
Keywords: Biomass allocation; Competitive ability; Drought resistance; Growth redundancy; Root size; Water use efficiency

N. Aoudia, P. Callu, F. Grosjean, Y. Larondelle, Effectiveness of mycotoxin sequestration activity of micronized wheat fibres on distribution of ochratoxin A in plasma, liver and kidney of piglets fed a naturally contaminated diet, Food and Chemical Toxicology, Volume 47, Issue 7, July 2009, Pages 1485-1489, ISSN 0278-6915, DOI: 10.1016/j.fct.2009.03.033.
(http://www.sciencedirect.com/science/article/B6T6P-4W0SK55-1/2/95ba7cfbcb52e3781f657552d63ff95e)
Abstract:
A study was carried out to determine the ability of dietary micronized wheat fibres (MWF) to decrease the levels of ochratoxin A (OTA) in plasma, kidney and liver of piglets fed a naturally contaminated diet. A total of 96 piglets (weighting 11.4 +/- 1.5 kg) were fed one of four different diets for 28 days. Diets included (1) control diet, (2) control diet with MWF (1%), (3) OTA naturally contaminated diet (117.45 +/- 4.74 ng/g), (4) OTA naturally contaminated diet (118.13 +/- 2.85 ng/g) with MWF (1%). No difference in feed efficiency ($P > 0.05$) could be observed between the different diets. The absolute weight of kidneys and liver were significantly higher in pigs fed the OTA-contaminated diet (diet 3) as compared to the control diet (diet 1) or to the control diet amended with MWF (diet 2) ($P < 0.05$). However the use of MWF (diet 4) significantly protected against these weight changes. A significant protective effect of MWF was also observed in terms of OTA concentration in plasma (45.6% decrease), kidney (40.8% decrease) and liver (26.5% decrease). These results suggest that the addition of MWF is effective in decreasing the bioavailability of OTA from contaminated diets in piglets.
Keywords: Adsorption; Detoxification; Micronized wheat fibres; Mycotoxins; Ochratoxin A; Pigs

Jing Wang, Baoguo Sun, Yanping Cao, Yuan Tian, Protection of wheat bran feruloyl oligosaccharides against free radical-induced oxidative damage in normal human erythrocytes, Food and Chemical Toxicology, Volume 47, Issue 7, July 2009, Pages 1591-1599, ISSN 0278-6915, DOI: 10.1016/j.fct.2009.04.006.
(http://www.sciencedirect.com/science/article/B6T6P-4W2D1P2-2/2/f68d5b32fcee3050bd3afe577e5cfdec)
Abstract:
The present work assessed the protective effect of water-soluble feruloyl oligosaccharides (FSH), ferulic acid ester of oligosaccharides from wheat bran, against in vitro oxidative damage of normal human erythrocytes induced by a water-soluble free radical initiator, 2,2'-azobis-2-amidinopropane dihydrochloride (AAPH). In the whole process of AAPH-initiated oxidation, hemolysis occurred quickly after the lag time. The rate of hemolysis is correlated dose-dependently with AAPH concentration. Significant decrease in reduced glutathione (GSH) levels of erythrocyte with concomitant enhancement in oxidized gluthione (GSSG) levels was noticed. It was also observed that lipid and protein peroxidation of erythrocytes induced by AAPH was significantly increased, and scanning electron microscopy observations showed that AAPH induced obvious

morphological alteration in the erythrocytes from a smooth discoid to an echinocytic form. FSH suppressed depletion of GSH, lipid peroxidation, and methaemoglobin and protein carbonyl group formation of erythrocytes in concentration- and time-dependent manners, remarkably delayed AAPH-induced hemolysis. Morphological changes to erythrocyte caused by AAPH were effectively protected by FSH. It was also observed that FSH could work synergistically with endogenous antioxidants in erythrocytes. These results indicated that FSH efficiently protected normal human erythrocytes against oxidative stress, and they could be used as a potential source of natural antioxidants.
Keywords: Erythrocyte; Feruloyl oligosaccharides; Free radical; Oxidative damage; Wheat bran

Guangping Han, Wanli Cheng, James Deng, Chunping Dai, Shuyin Zhang, Qinglin Wu, Effect of pressurized steam treatment on selected properties of wheat straws, Industrial Crops and Products, Volume 30, Issue 1, July 2009, Pages 48-53, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2009.01.004.
(http://www.sciencedirect.com/science/article/B6T77-4VV1B74-1/2/dc3f96730d6be0808daafab2a8b89d2f)
Abstract:
Wheat straw fibers were modified via a pressurized steam treatment. The effect of steam pressure (i.e., 0.2, 0.4, 0.6, 1.0 MPa) and treatment time (i.e., 5 and 10 min) on chemical composition, sorption isotherm, thermal and mechanical properties of the treated fibers was investigated. Differential scanning calorimetry analysis showed that thermal characteristics of the treated straw samples were shifted indicating the improved thermal stability. The ash and extractive content of the treated straw was reduced; and the materials were likely removed when the steam was released. The removal of ash and extractives could improve the wettability of wheat straw when it is used in combination with polymer matrices. Sorption behavior study showed that steam treatment reduced the hydrophilic characteristic of wheat straw. Tensile strength of the treated straw was significantly enhanced. The tensile strength of straw after treatment at a steam pressure of 1.0 MPa for 5 min was more than twice higher than that of the control group. The study demonstrated that pressurized steam treatment is an effective pre-treatment process for wheat straw fibers as possible reinforcement element in polymer matrices.
Keywords: Chemical composition; Mechanical properties; Steam treatment; Sorption isotherm; Thermal stability; Wheat straw

Xiao-Hong Sun, Ke-Xue Zhu, Hui-Ming Zhou, Optimization of a novel backward extraction of defatted wheat germ protein from reverse micelles, Innovative Food Science & Emerging Technologies, Volume 10, Issue 3, July 2009, Pages 328-333, ISSN 1466-8564, DOI: 10.1016/j.ifset.2009.01.006.
(http://www.sciencedirect.com/science/article/B6W6D-4VF56WD-1/2/1e899b3bd79a897d879c54732056784b)
Abstract:
In this work, a novel backward extraction procedure of defatted wheat germ protein (DWGP) from reverse micelles was explored. Isooctane was recovered by vaporization firstly. Then the remained residue was dissolved in a small amount of KCl solution. The recovery of DWGP was easily performed by the ternary liquid system (acetone: deionized water: isooctane = 15:5:1) precipitation, while most of sulphosuccinic acid bis (2-ethylhexyl) ester sodium salt (AOT) remained in the ternary liquid system. In the end, the precipitation of DWGP was washed with 65% ethanol solution to further remove any residual AOT. The effects of KCl concentration, the amount of KCl solution and pH on the backward extraction efficiency of DWGP were tested. On the basis of single-factor experiments, the optimum backward extraction was achieved by response surface methodology (RSM). When the operation ran under optimized conditions, the backward extraction

efficiency of DWGP achieved 80% and the end protein product was completely free of AOT.Industrial relevance
This experimental result confirmed that this novel backward extraction method had many advantages on the extraction of protein compared to the traditional backward extraction method (changing the conditions of pH and ionic strength in a fresh aqueous phase). This method increased the backward extraction efficiency of defatted wheat germ protein (DWGP) from 57% to 80%, saved the water resource and offered the possibility of precipitating nearly pure DWGP, completely free of surfactant. On the basis of these advantages, it appears that this novel backward extraction technique may have great potential for being scaled-up to a commercially extraction process of protein.
Keywords: Optimization; Reverse micelles; Defatted wheat germ protein; Backward extraction

D.L. Klindworth, G.A. Hareland, E.M. Elias, J.D. Faris, S. Chao, S.S. Xu, Agronomic and quality characteristics of two new sets of Langdon durum-wild emmer wheat chromosome substitution lines, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 29-35, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.02.003.
(http://www.sciencedirect.com/science/article/B6WHK-4W1BV6G-1/2/c44913eb4c378cc669b4352c5d325b44)
Abstract:
Triticum turgidum L. var. dicoccoides has been a useful source of genes for high grain protein content (GPC) in wheat. The objective of this study was to test the agronomic and quality characteristics of 23 durum Langdon-T. dicoccoides (LDN-DIC) substitutions based on T. dicoccoides accessions PI 481521 (LDN521) and PI 478742 (LDN742), with emphasis on finding new genes for high GPC. The 23 LDN-DIC substitutions and checks were grown in replicated yield trials at Fargo and Prosper, ND in 2005-2006. The lines were evaluated for grain yield, plant height, and heading date. Twelve quality traits, including GPC, were evaluated using standard methods. Potentially useful variation for thousand-kernel weight, kernel size, semolina extraction, and semolina brightness and color, was identified. Eight lines including LDN742-6B, LDN521-7B, LDN521-5B, LDN742-7A, LDN742-5B, LDN521-2A, LDN742-7B, and LDN521-1A had significantly higher GPC than LDN, suggesting that chromosomes 1A, 2A, 5B, and 7B of PI 481521 and 7A, 5B, 6B, and 7B of PI 478742 may carry high GPC genes. Using allele specific marker Xuhw89, LDN742-6B was shown to carry the same Gpc-B1 allele as in Israel A. The remaining six lines with high GPC are potential sources of new high GPC genes for durum wheat.
Keywords: Durum; Wild emmer; Chromosome substitution; Grain protein content

Ingrid Garbus, Alicia D. Carrera, Jorge Dubcovsky, Viviana Echenique, Physical mapping of durum wheat lipoxygenase genes, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 67-73, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.02.008.
(http://www.sciencedirect.com/science/article/B6WHK-4W38RG8-3/2/5540aa00efd467f22eadc572f3c7e2f8)
Abstract:
A bright yellow color is an important quality criterion for pasta making. Yellow color depends on the amount of carotenoid pigments in grain, which is the result of the balance between pigment synthesis and degradation by lipoxygenases (LPX). The organization of genes coding for lipoxygenases in the tetraploid wheat genome is not completely understood. Here, we report the screening of a durum wheat BAC library with barley probes to characterize the physical distribution of Lpx genes. PCR characterization and BAC fingerprinting of the positive clones suggests that Lpx-B1.1 and Lpx-B3 are less than 103-kb apart, whereas Lpx-B1.2 is further apart from them. In the A genome a partially deleted copy of Lpx-1 (Lpx-A1_like) was found, colocalizing within a 42 kbp region with Lpx-A3, confirming that in both genomes these two genes are close to each other. The knowledge of the physical location of these two genes is important to understand the evolution

of this family but also has practical implications since closely linked genes are difficult to separate by recombination. This may limit the number of Lpx allele combinations that can be obtained and affect the selection of optimal Lpx allele combinations for pasta quality improvement.
Keywords: BAC library; Durum wheat; Lipoxygenase genes; Fingerprinting

Peter R. Shewry, Claudia Underwood, Yongfang Wan, Alison Lovegrove, Dhan Bhandari, Geraldine Toole, E.N. Clare Mills, Kay Denyer, Rowan A.C. Mitchell, Storage product synthesis and accumulation in developing grains of wheat, Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 106-112, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.03.009.
(http://www.sciencedirect.com/science/article/B6WHK-4W6YDS9-1/2/ed03ae7f9b83d33854c88c771d52dfc3)
Abstract:
The time course of synthesis and accumulation of the major storage components in developing grain of wheat cv Hereward has been determined. Gluten proteins were first detected at 10 dpa and accumulated most rapidly between 12 and 35 dpa, with little change after 42 dpa. Differences in the accumulation patterns of two different types of [omega]-gliadins were observed while the synthesis of the HMW subunits was initiated about 2 days later than that of the other gluten proteins. Although protein accumulation had essentially ceased by 42 dpa, grain desiccation was associated with a dramatic increase in the proportion of large glutenin polymers.
The accumulation of starch essentially paralleled that of gluten proteins, reaching 55% of the grain dry weight at maturity. This was associated with an increase in the amylose content, from about 20 to 26% of the total starch. The expression patterns of transcripts encoding enzymes of the synthesis (ADP glucose pyrophosphorylase, starch synthases), branching and modification of starch were consistent with the pattern of starch accumulation and with the expression patterns reported for orthologous genes in developing rice grain, showing high conservation between species.
Keywords: Wheat; Gluten proteins; Starch; Development

D.C. Knievel, E.-S.M. Abdel-Aal, I. Rabalski, T. Nakamura, P. Hucl, Grain color development and the inheritance of high anthocyanin blue aleurone and purple pericarp in spring wheat (Triticum aestivum L.), Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 113-120, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.03.007.
(http://www.sciencedirect.com/science/article/B6WHK-4W6Y80X-1/2/6283fb2e05743cd0c1965b766d7b7391)
Abstract:
There is renewed interest in breeding for high anthocyanin content in wheat due to its antioxidant potential. A series of adapted spring wheat lines were developed with blue aleurone or purple pericarp. The development of anthocyanin concentration and color of these selected lines was measured during grain filling for two field seasons at Saskatoon, Canada. In addition, the inheritance of the blue aleurone and purple pericarp was studied. Anthocyanin concentration increased rapidly during grain development and then decreased before maturity. Anthocyanin concentration was highest in PIG03008, a purple pericarp wheat. For mature grain, genotypic variation for anthocyanin concentration was statistically significant while the year and genotype by year interaction were not, facilitating the breeding progress. Blue aleurone was shown to be controlled by a single dominant gene in BC populations whereas purple pericarp appeared to be controlled by two loci with a segregation ratio of 11 purple: 5 white in F2 populations. The results indicate that breeding high anthocyanin blue or purple wheat is feasible.
Keywords: Anthocyanin; Blue; Pigmented; Purple; Wheat

Dongyun Ma, Yan Zhang, Xianchun Xia, Craig F. Morris, Zhonghu He, Milling and Chinese raw white noodle qualities of common wheat near-isogenic lines differing in puroindoline b alleles,

Journal of Cereal Science, Volume 50, Issue 1, July 2009, Pages 126-130, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.03.006.
(http://www.sciencedirect.com/science/article/B6WHK-4W6Y5HT-4/2/103547abb1970591dfa5788b8a4db693)
Abstract:
Understanding the effects of different alleles at the puroindoline b (Pinb) locus on processing quality will provide crucial information for quality improvement. Seven near-isogenic lines (NILs) planted at two locations in the 2008 cropping season were used to determine the effect of puroindoline b alleles on milling performance and Chinese raw white noodle (CRWN) quality. The Pina-D1b/Pinb-D1a genotype possessed significantly higher values in grain hardness, protein content and starch damage than other genotypes, whereas the Pina-D1a/Pinb-D1d genotype had the lowest grain hardness and starch damage, with higher break flour yield, and less reduction flour yield, higher flour colour L*, and lower flour colour b*, than other genotypes. Farinograph parameters, except for water absorption, were not significantly affected by variation of puroindoline b alleles. Pina-D1a/Pinb-D1e had the highest peak viscosity, whereas the lowest value was observed in a Pina-D1b/Pinb-D1a genotype. For CRWN quality, higher noodle viscoelasticity was obtained in the genotype Pina-D1a/Pinb-D1e and Pina-D1a/Pinb-D1g, whereas Pina-D1a/Pinb-D1d had a lower smoothness score. Genotypes with Pina-D1a/Pinb-D1e and Pina-D1a/Pinb-D1g produced the best total noodle score. It was concluded that genotype Pina-D1a/Pinb-D1d had better milling qualities, whereas Pina-D1a/Pinb-D1e and Pina-D1a/Pinb-D1g had slightly superior CRWN qualities in comparison with other genotypes.
Keywords: Common wheat; Puroindoline alleles; Near-isogenic lines; Chinese raw white noodles

D. Solis-Morales, C.M. Saenz-Hernandez, E. Ortega-Rivas, Attrition reduction and quality improvement of coated puffed wheat by fluidised bed technology, Journal of Food Engineering, Volume 93, Issue 2, July 2009, Pages 236-241, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.01.020.
(http://www.sciencedirect.com/science/article/B6T8J-4VHSD8V-3/2/e816c48b9e90b2522ce9c4a455662b4d)
Abstract:
Puffed wheat coated with sweet coverings is a ready-to-eat (RTE) breakfast cereal of popular consumption worldwide. Coating of puffed wheat is conventionally performed by tumbling, heating and syrup pouring, within a tumbling vessel. This tumbling process promotes attrition and causes uneven distributions of the coating syrup, with a consequent variability in quality of the final product. A fluidised bed processor, built with a top spraying nozzle, was tested as an alternative for coating of puffed wheat particulates with a sweet chocolate cover. The fluidised bed technique was compared with a tumbling method in which syrup was applied by spraying, as well as with a commercial sample. Crispness, colour, flavour and attrition resistance, were compared for the different coating techniques. No significant difference was perceived in colour, but the fluidised bed treated sample was considered crispy and more related to chocolate flavour than the commercial sample. In terms of attrition, the fluidised bed sample lost about 1% weight, while the tumbled-coated sample lost around 5% weight, and the commercial sample lost nearly 10% weight.
Keywords: Fluidisation; Coating; Puffed wheat; Friability testing; Texture attributes

Youna Hemery, Xavier Rouau, Ciprian Dragan, Mihai Bilici, Radu Beleca, Lucian Dascalescu, Electrostatic properties of wheat bran and its constitutive layers: Influence of particle size, composition, and moisture content, Journal of Food Engineering, Volume 93, Issue 1, July 2009, Pages 114-124, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.01.003.
(http://www.sciencedirect.com/science/article/B6T8J-4VG7MMX-1/2/1d66dfde5b2fc3f033d38c37d89f2b18)

Abstract:
Bran is the by-product of white flour and is composed of distinct adhesive tissues with aleurone and pericarp being the most significant. The present work pointed out the good potential of using electrostatic separation as a bran-fractionation method to produce nutritionally interesting food ingredients. The tribo- and corona-charging behavior of ground bran, an aleurone-rich fraction, and a pericarp-rich fraction were characterized, and the influence exerted by the composition, particle size, and moisture content was determined. The tribo-charging experiments showed that the opening of the aleurone cells after grinding modified the particles surface composition, and thus the samples charging behavior. The cell walls of aleurone and pericarp fractions displayed different tribo-charging characteristics, suggesting that by designing an appropriate tribo-charging device, these two bran layers might be separated. The behavior of the samples after corona-charging was found to be highly influenced by their moisture content. Dried samples were all found to behave like insulators, whereas when the materials were not dried, the pericarp-rich fraction behaved like a conductor while the fine aleurone-rich fraction behaved like an insulator, probably due to the presence of lipids at the particles surface. These characteristics could also be exploited for the development of another electrostatic separation process.
Keywords: Wheat; Bran; Aleurone; Fractionation; Corona discharge; Tribo-electricity; Surface potential; Electrostatic separation; Particle size; Humidity

Ewa Gajewska, Maria Sklodowska, Nickel-induced changes in nitrogen metabolism in wheat shoots, Journal of Plant Physiology, Volume 166, Issue 10, 1 July 2009, Pages 1034-1044, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.12.004.
(http://www.sciencedirect.com/science/article/B7GJ7-4VGMP02-3/2/f9608283614c39009546c50c53167be0)
Abstract: Summary
The influences of 50 and 100 [mu]M Ni on growth, tissue Ni accumulation, concentrations of nitrate, ammonium, glutamate, and proline as well as the activities of nitrate reductase (NR), nitrite reductase (NiR), glutamine synthetase (GS), glutamate synthase (GOGAT), glutamate dehydrogenase (GDH), alanine aminotransferase (AlaAT), and aspartate aminotransferase (AspAT) were examined in the shoots of wheat seedlings cv. Zyta. Exposure of the seedlings to Ni resulted in a rapid accumulation of this metal in the shoots, which was accompanied by significant reduction in fresh weight of these organs. Tissue nitrate content decreased in response to Ni stress, while ammonium concentration increased substantially. Glutamate concentration was slightly lowered up to the 4th day of the metal exposure. In contrast, proline content increased significantly, starting from the first day after Ni treatment. NR activity showed a decline of up to 40% below the control level after Ni application; however, its activation state remained unaltered. Heavy metal treatment also resulted in a marked decrease in NiR activity, which after 7 d of exposure to 100 [mu]M Ni was almost 80% lower than in the control. GS activity in wheat shoots was not influenced by Ni application. Contrary to Fd-GOGAT exhibiting reduced activity in the shoots of Ni-treated wheat seedlings, NADH-GOGAT activity was considerably enhanced, exceeding the control value even by 165%. After 7 d of exposure to Ni, both NADH-GDH and NAD-GDH activities in wheat shoots were markedly induced; however, NAD-GDH activity showed a significant decrease at the early stage of the experiment. Both AlaAT and AspAT glutamate-producing activities were considerably stimulated by Ni treatment. Our results suggest that induction of NADH-GOGAT, NADH-GDH, AlaAT, and AspAT activities may compensate for the reduced Fd-GOGAT activity and serve as an alternative means of glutamate synthesis in wheat shoots under Ni stress.
Keywords: Aminotransferases; Ammonium assimilation; Glutamate-synthesizing enzymes; Nickel; Triticum aestivum

C.B. Singh, D.S. Jayas, J. Paliwal, N.D.G. White, Detection of insect-damaged wheat kernels using near-infrared hyperspectral imaging, Journal of Stored Products Research, Volume 45, Issue 3, July 2009, Pages 151-158, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.12.002.
(http://www.sciencedirect.com/science/article/B6T8Y-4W1JY5C-3/2/80ad9829a22cedc46e92a1fed3860973)
Abstract:
Insect damage in wheat adversely affects its quality and is considered one of the most important degrading factors in Canada. The potential of near-infrared (NIR) hyperspectral imaging for the detection of insect-damaged wheat kernels was investigated. Healthy wheat kernels and wheat kernels visibly damaged by Sitophilus oryzae, Rhyzopertha dominica, Cryptolestes ferrugineus, and Tribolium castaneum were scanned in the 1000-1600 nm wavelength range using an NIR hyperspectral imaging system. Dimensionality of the acquired hyperspectral data was reduced using multivariate image analysis. Six statistical image features (maximum, minimum, mean, median, standard deviation, and variance) and 10 histogram features were extracted from images at 1101.69 and 1305.05 nm and given as input to statistical discriminant classifiers (linear, quadratic, and Mahalanobis) for classification. Linear discriminant analysis and quadratic discriminant analysis classifiers correctly classified 85-100% healthy and insect-damaged wheat kernels.
Keywords: Hyperspectral imaging; Near-infrared; Insect damage; Grain quality

T.T.T. Duong, K. Baumann, P. Marschner, Frequent addition of wheat straw residues to soil enhances carbon mineralization rate, Soil Biology and Biochemistry, Volume 41, Issue 7, July 2009, Pages 1475-1482, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.04.003.
(http://www.sciencedirect.com/science/article/B6TC7-4W3GJKC-6/2/b67ccb56e14d8b2c023a04d57555d745)
Abstract:
In many ecosystems, residues are added frequently to soil, in the form of root turnover and litter fall. However, in most studies on residue decomposition, residues are added once and there are few studies that have investigated the effect of frequent residue addition on C mineralization and N dynamics. To close this knowledge gap, we mixed mature wheat residue (C/N 122) into soil at a total rate of 2% w/w once at the start (R1x), every 16 days (R4x), every 8 days (R8x) or every 4 days (R16x). Un-amended soil served as control. All treatments were mixed every 4 days. Soil respiration was measured continuously over the 80-day incubation. Inorganic N, K2SO4-extractable C and N, chloroform-labile C and N (as an estimate of microbial biomass C and N), soil pH and microbial community composition were assessed every 16 days. Increasing frequency of residue addition increased C mineralization per g residue. Compared to R1x, cumulative respiration per g residue at the end of the incubation (day 80) was increased by 57, 82 and 92% in R4x, R8x and R16x, respectively. The largest differences in soil respiration per g residue occurred in the first 30 days. Despite large increases in cumulative respiration, frequent residue addition did not affect inorganic N or K2SO4-extractable N concentrations, chloroform-labile C and N or soil pH. Compared to the control, all residue treatments resulted in increases in chloroform-labile C and N and soil pH but decreased inorganic and K2SO4-extractable N. Microbial community composition was affected by residue addition, however there were no consistent differences among residue treatments. It is concluded that experiments with single residue additions may underestimate residue decomposition rates in the field. The increased C mineralization caused by frequent residue additions does not appear to be due to an increased microbial biomass or changes in microbial community composition, but rather to increased C mineralization per unit biomass.
Keywords: Inorganic N; Microbial community composition; N immobilization; PLFA; Soil respiration

Qi Li, Chonggang Xu, Wenju Liang, Shuang Zhong, Xunhua Zheng, Jianguo Zhu, Residue incorporation and N fertilization affect the response of soil nematodes to the elevated CO2 in a Chinese wheat field, Soil Biology and Biochemistry, Volume 41, Issue 7, July 2009, Pages 1497-1503, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.04.006.
(http://www.sciencedirect.com/science/article/B6TC7-4W6VPG0-1/2/6846abca8b1f3d28ba29c5b897f9f2f4)
Abstract:
The interplay between the carbon and other nutrient cycles is the key to understand the responses of soil ecosystems to climatic change. Using the free-air CO2 enrichment (FACE) techniques, we carried out a multifactorial experiment in a Chinese rice-wheat rotation system, to investigate the response of soil nematodes to elevated CO2 under different application rates of N fertilizer (225.0 kg N ha-1 (HN) and 112.5 kg N ha-1(LN), respectively) and residue incorporation (0 kg C ha-1 (ZR), 1000 kg C ha-1 (MR) and 2000 kg C ha-1 (HR), respectively). This study was conducted during the wheat growing season of 2007 after expose to the elevated CO2 for three years. The results in our study indicated that seasonality is an important factor in determining changes in the nematode abundance and diversity. The residue addition effects were more obvious than the elevated CO2, which significantly influenced the abundance of total nematodes and plant-parasites, and some ecological indices. The interactions between residue addition and CO2 significantly influenced nematode dominance and structure indices. High level of N fertilization was found to decrease the nematode diversity, generic richness and maturity indices at wheat jointing stage. There are significant interactions between N fertilization and elevated CO2 for abundance of total nematodes and different trophic groups.
Keywords: FACE; N fertilization; Residue incorporation; Soil nematodes; Wheat field

Marie Gosme, Philippe Lucas, Combining experimentation and modelling to estimate primary and secondary infections of take-all disease of wheat, Soil Biology and Biochemistry, Volume 41, Issue 7, July 2009, Pages 1523-1530, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.04.012.
(http://www.sciencedirect.com/science/article/B6TC7-4W79J1W-2/2/ed552d7f4b1f36951613549d71e402ba)
Abstract:
Primary and secondary infections are important processes in the epidemiology of plant diseases but can be difficult to quantify experimentally as they often occur at the same time. This problem is all the more challenging in the case of soil-borne diseases, as most processes are hidden in the soil and destructive sampling is time-consuming and makes it difficult to obtain enough observations of disease progress. Here we show how a combination of experimentation and modelling can be used in order to obtain parameters for primary and secondary infections for take-all disease of wheat. First, an experiment with one infected seedling and varying numbers of target seedlings allowed us to estimate the probability of secondary infection by growth of the mycelium through the soil and by growth via the crown of the plant. Several equations were tested for the contact term between susceptible and infectious roots. Secondly, an experiment with primary inoculum placed at different depths allowed us to estimate the probability of primary infection, taking into account secondary infections and the time needed for the roots to reach inoculum depth. In both experiments, the use of simple models was effective in isolating the desired effect from uncontrollable effects occurring in the soil. The probability of secondary infection through the crown was higher than the probability of infection through soil, and the contact term following the mass action or Reed-Frost equation gave a better fit to the data than the other equations tested. The probability of primary infection was higher when inoculum was placed just below the soil surface than when it was placed deeper in the soil.
Keywords: Gaeumannomyces graminis var. tritici; Wheat; Soil-borne disease; Infection rate; Primary infection; Secondary infection

Jehan Bakht, Mohammad Shafi, Mohammad Tariq Jan, Zahir Shah, Influence of crop residue management, cropping system and N fertilizer on soil N and C dynamics and sustainable wheat (Triticum aestivum L.) production, Soil and Tillage Research, Volume 104, Issue 2, July 2009, Pages 233-240, ISSN 0167-1987, DOI: 10.1016/j.still.2009.02.006.
(http://www.sciencedirect.com/science/article/B6TC6-4W1JY1N-1/2/131bfc04c5d083201fffb53d52acb211)
Abstract:
Management of N is the key for sustainable and profitable wheat production in a low N soil. We report results of irrigated crop rotation experiment, conducted in the North West Frontier Province (NWFP), Pakistan, during 1999-2002 to evaluate effects of residue retention, fertilizer N application and mung bean (Vigna radiata) on crop and N yields of wheat and soil organic fertility in a mung bean-wheat sequence. Treatments were (a) crop residue retained (+residue) or (b) removed (-residue), (c) 120 kg N ha-1 applied to wheat, (d) 160 kg N ha-1 to maize or (e) no nitrogen applied. The cropping system was rotation of wheat with maize or wheat with mung bean. The experiment was laid out in a spit plot design. Postharvest incorporation of crop residues significantly ($p < 0.05$) increased the grain and straw yields of wheat during both years. On average, crop residues incorporation increased the wheat grain yield by 1.31 times and straw yield by 1.39 times. The wheat crop also responded strongly to the previous legume (mung bean) in terms of enhanced grain yield by 2.09 times and straw yield by 2.16 times over the previous cereal (maize) treatment. Application of fertilizer N to previous maize exerted strong carry over effect on grain (1.32 times) and straw yield (1.38 times) of the following wheat. Application of N fertilizer to current wheat produced on average 1.59 times more grain and 1.77 times more straw yield over the 0 N kg ha-1 treatment. The N uptake in wheat grain and straw was increased 1.31 and 1.64 times by residues treatment, 2.08 and 2.49 times by mung bean and 1.71 and 1.86 times by fertilizer N applied to wheat, respectively. The soil mineral N was increased 1.23 times by residues, 1.34 times by mung bean and 2.49 times by the application of fertilizer N to wheat. Similarly, the soil organic C was increased 1.04-fold by residues, 1.08 times by mung bean and 1.00 times by the application of fertilizer N. We concluded that retention of residues, application of fertilizer N and involvement of legumes in crop rotation greatly improves the N economy of the cropping system and enhances crop productivity in low N soils.
Keywords: Crop residues; Cropping system; N; C; Wheat

Maria Eugenia Barcenas, Rossana Altamirano-Fortoul, Cristina M. Rosell, Effect of high pressure processing on wheat dough and bread characteristics, LWT - Food Science and Technology, In Press, Corrected Proof, Available online 30 June 2009, ISSN 0023-6438, DOI: 10.1016/j.lwt.2009.06.019.
(http://www.sciencedirect.com/science/article/B6WMV-4WN2Y1M-2/2/3ecc1aab80617b724d389fbc5d83b216)
Abstract:
Microbial, physical and structural changes in high pressured wheat dough were studied as a function of pressure level (50-250 MPa) and holding time (1-4 min). Thereafter, selected conditions of high hydrostatic processing (HPP) were applied to bread dough and the technological quality of the obtained breads was studied. The effect of HPP on wheat dough was investigated by determining microbial population (total aerobic mesophilic bacteria, moulds and yeasts), color and mechanical and texture surface related dough parameters (cohesiveness, adhesiveness, hardness and stickiness). HPP reduced the endogenous microbial population of wheat dough from 104 colony forming units/g (CFU) to levels of 102 CFU. HPP treatment significantly ($P < 0.05$) increased dough hardness and adhesiveness, whereas treatment time reduced its stickiness. Scanning electron micrographs suggested that proteins were affected when subjected to pressure levels higher than 50 MPa, but starch modification required higher pressure levels. HPP treated yeasted doughs led to wheat breads with different appearance and technological characteristics;

crumb acquired brownish color and heterogeneous cell gas distribution with increased hardness due to new crumb structure. This study suggests that high hydrostatic processing in the range 50-200 MPa could be an alternative technique for obtaining novel textured cereal based products.
Keywords: Wheat dough; High pressure processing; Microbiology; Dough texture; Bread

David H. Duncan, Josh W. Dorrough, Historical and current land use shape landscape restoration options in the Australian wheat and sheep farming zone, Landscape and Urban Planning, Volume 91, Issue 3, 30 June 2009, Pages 124-132, ISSN 0169-2046, DOI: 10.1016/j.landurbplan.2008.12.007.
(http://www.sciencedirect.com/science/article/B6V91-4VGDNJS-1/2/b3350da280396bb1c04de0fcefa44f1a)
Abstract:
A significant challenge for policy and land management is to alter agricultural systems to reduce their detrimental impacts on native vegetation and biodiversity habitat. We analysed historical, ecological and land use data to understand the threats to native vegetation, and prospects for future recovery in the wheat-sheep zone of the Wimmera and Mallee in southeastern Australia. We analysed air photos, surveyed 60 remnant vegetation sites, and interviewed land managers about a subset of 35 remnants. Our analysis confirmed that soil types favoured for cropping were largely cleared before 1945; mean cover declined from 8% to 5% between 1945 and 2000. Small patches (<5 ha) account for a quarter of remaining woody cover. Cover of crops increased at the expense of pasture. Small patches were typically frequently grazed, nutrient enriched and were dominated by an exotic annual understorey. Recruitment of woody species was uncommon, and non-existent in the small patches. Landholders valued small patches primarily for stock shelter but without recruitment their long-term persistence is doubtful, even though most farmers are grazing less now compared with 30 years ago. Meeting regional native vegetation cover targets likely depends on retention of all existing vegetation patches, plus considerable revegetation. However, although current land use trends allow the sparing of some marginal lands while cropping intensifies, this option cannot satisfy vegetation cover targets and may not preserve biodiversity. More significant gains in native vegetation cover may not occur unless new opportunities arise for the current cohort of farmers.
Keywords: Land use change; Native vegetation; Biodiversity; Intensification; Grazing

D.B. Thapa, R.C. Sharma, A. Mudwari, G. Ortiz-Ferrara, S. Sharma, R.K. Basnet, J.R. Witcombe, D.S. Virk, K.D. Joshi, Identifying superior wheat cultivars in participatory research on resource poor farms, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 124-130, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.01.011.
(http://www.sciencedirect.com/science/article/B6T6M-4W0347N-1/2/f1808bc037f10f99b2b1f902975c9ff9)
Abstract:
Improving livelihood of resource poor farmers is an important goal of wheat research in developing countries. Although remarkable success has been achieved to date in developing widely adapted wheat cultivars, many resource poor farmers in marginal areas in developing world have not benefited. Participatory research could greatly enhance identifying cultivars according to the choice of the poor farmers. This study was conducted to examine how farmers' selection criteria could assist breeders in identifying superior wheat cultivars, and determine if a new statistical analysis tool, GGE biplot, could be effectively used in selection of improved cultivar based on quantitative (grain yield) and qualitative data (farmers' preference score). The field experiments were conducted in 3 years (2003-2005) in three mid-hill districts in the central Nepal involving resource poor wheat farmers. Sixteen wheat genotypes, including a long-term and a current commercial cultivar, were used in the study. Data were collected on agronomic traits considered important by the participating farmers. These included days to heading and maturity, plant height,

effective tiller number, spike length, kernel per spike, 1000-kernel weight and grain yield. Farmers also qualitatively scored each genotype for multiple traits based on their preference. In general, the farmers used the same traits in selecting a superior cultivar that are used by breeders. However, relative importance of different traits differed, not necessarily following in line with the breeder preference. The cultivar superiority based on quantitative agronomic data (breeders' criteria) and qualitative preference scores (farmers' criteria) often showed synergies, however, there were differences as well. This indicates farmers' ability to choose superior cultivars based on qualitative observation compared to tedious quantitative data recording in the on-station testing. In the first year, a greater number of farmers selected improved check as a better choice than recent advanced breeding lines. In the 2nd and 3rd years, the farmers preferred genotypes other than the checks. This underlines the importance of testing of advanced materials in farmers' fields in multiple years. Principal component analysis using GGE-biplot was useful in identifying superior genotypes based on both quantitative and qualitative data recorded across environments. This approach could be useful in analyzing data from participatory agricultural research conducted under highly diverse farmers' field conditions where it is easier to record observations on qualitative than quantitative scale. This technique can also be extended to on-farm participatory testing of other technologies. The findings bear implications for a broad range of participatory research and technology evaluation and verification.
Keywords: GGE-biplot; On-farm evaluation; Participatory varietal selection; Wheat

Annelie Barnard, Marie F. Smith, The effect of rainfall and temperature on the preharvest sprouting tolerance of winter wheat in the dryland production areas of the Free State Province, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 158-164, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.02.011.
(http://www.sciencedirect.com/science/article/B6T6M-4VXJVX1-2/2/4eacfa388873456dab85fc515f9912ee)
Abstract:
Preharvest sprouting (PHS) is a risk factor in winter cereal farming in certain environments as even mild sprouting affects the suitability of wheat for end-use products. This is because even mild sprouting affects the suitability of wheat for end-use products. The extent of PHS is hard to predict. To establish a quantitative relationship between PHS and different climatic characteristics, eighteen winter wheat cultivars were planted in three regions representative of the wheat growing conditions of the Free State Province of South Africa over four years. Climatic characteristics during six environmental periods were investigated, namely planting to harvest (PH), anthesis to harvest (AH), grain filling (GF), 14 days prior to physiological maturity (14M) and 10 and 20 days prior to harvest (10H and 20H) respectively. These data sets were correlated with PHS resistance determined in a rain simulator to determine if climate during various stages of grain development had an effect on the expression of dormancy and subsequent PHS. Principal component analysis (PCA) on mean PHS values identified three distinct groupings of cultivars, ranging from PHS susceptible to PHS resistant. A fairly strong positive correlation ($r = 0.715$, $P = 0.008$) was found between PHS and minimum temperature during grain filling. Large variations in PHS values were also observed between the various cultivars, indicating that certain cultivars, such as Caledon, Gariep, Limpopo, Matlabas, PAN 3118, PAN 3120, PAN 3377 and SST 334, are more sensitive to environmental effects than others and that the variation in cultivar PHS is not consistent across sites and years.
Keywords: Preharvest sprouting; Rainfall; Temperature; Grain filling

C. Mariano Cossani, Gustavo A. Slafer, Roxana Savin, Yield and biomass in wheat and barley under a range of conditions in a Mediterranean site, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 205-213, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.03.003.

(http://www.sciencedirect.com/science/article/B6T6M-4W0SS8J-1/2/1edcb86365250c77759f150a0ae7e968)
Abstract:
It has been broadly accepted that barley performs better than wheat, particularly under severe stress conditions of the Mediterranean basin. However, this assumption is not based on rigorous evidence. This study compared grain yield, grain yield components and biomass accumulation performances of barley, bread wheat and durum wheat under a wide range of water and nitrogen (N) availabilities on a location in the Mediterranean basin during four consecutive growing seasons (2003/04, 2004/05, 2005/06 and 2006/07). The different experimental treatments enabled the comparison of the three species under wide grain yield ranges. Yields under these treatments ranged from 0.9 to 10.2 Mg ha-1. Grain number per unit area better explained grain yield differences in the three species across experimental years and treatments. Photothermal quotient (PTQ) during the critical growth period (from 20 days pre- to 10 days post-flowering) explained the differences in grain number for all three species (r2 = 0.64; r2 = 0.84 and r2 = 0.56 for barley, bread wheat and durum wheat, respectively). Biomass differences between wheat and barley were generated mainly by their differences in post-flowering growth. Post-flowering growth was positively and directly related to the number of grains set per m2.
It was confirmed that it is not universally true that barley yields better than wheat under Mediterranean environments.
Keywords: Bread wheat; Durum wheat; Barley; Grain yield; Grain number; Biomass accumulation; Mediterranean environment

Maria J. Poblaciones, Luis Lopez-Bellido, Rafael J. Lopez-Bellido, Field estimation of technological bread-making quality in wheat, Field Crops Research, Volume 112, Issues 2-3, 26 June 2009, Pages 253-259, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.03.011.
(http://www.sciencedirect.com/science/article/B6T6M-4W4S34B-1/2/25f5911e74a5829967dc51417d2cfc46)
Abstract:
The determination of the technological quality of bread wheat (Triticum aestivum L.) requires a strong investment of time and money on behalf of the flour industry. For this reason, a field experiment was carried out over a 2-year period on a Vertisol under rainfed Mediterranean conditions with the objective of predicting, during the growing season, the technological quality of wheat at harvest with the use of a chlorophyll meter (Minolta SPAD 502). The SPAD meter readings were taken at the start of stem elongation and at anthesis determining the grain yield, alveogram parameters and gluten content at harvest. The chlorophyll meter readings at both growing stages were related to the grain protein content, alveogram index (W), dough extensibility (L), tenacity-extensibility ratio (P/L) and gluten content values. Dough tenacity (P) was not related to the readings. The models were validated by the full cross-validation method, showing better reliability at anthesis than stem elongation. The grain yield was correlated separately for each year, due to the influence of rain variability on the grain yield. Under rainfed Mediterranean conditions, the SPAD meter is a very useful tool in predicting the technological quality of bread wheat in advance, eliminating the need for expensive instruments and, above all, reducing the analysis time dedicated to determining the technological quality.
Keywords: Bread wheat quality; Chlorophyll meter; Grain protein; Alveograph parameters; Gluten content; Predictive model

P.H. Selle, V. Ravindran, G.G. Partridge, Beneficial effects of xylanase and/or phytase inclusions on ileal amino acid digestibility, energy utilisation, mineral retention and growth performance in wheat-based broiler diets, Animal Feed Science and Technology, In Press, Corrected Proof, Available online 24 June 2009, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2009.06.011.

(http://www.sciencedirect.com/science/article/B6T42-4WKS6FS-1/2/bfc95f88107ad58d5b0460c28cfd414b)

Abstract:
The effects of individual and combined inclusions of xylanase and phytase in broiler diets based on a characterised wheat were evaluated. The positive control diet was formulated to be adequate for phosphorus (P) with 3.8 g kg-1 nonphytate P and the low-P, negative control diet contained 2.6 g kg-1 nonphytate P. The negative control diet was supplemented with xylanase (2000 XU kg-1), or phytase (500 FTU kg-1), or xylanase plus phytase (2000 XU kg-1 and 500 FTU kg-1). Treatment effects on ileal digestibility of amino acids, energy and nitrogen utilisation, ileal digestibility and total tract retention of minerals, toe ash content and the growth performance were determined. In combination, xylanase plus phytase increased mean apparent ileal digestibility (AID) coefficients of 17 amino acids by 8.6%, which exceeded the increases of 4.8% and 5.5% generated by xylanase and phytase, respectively. Increases in AID were significant ($P<0.05$) for the majority of amino acids in response to enzyme inclusions with indications of synergistic responses for five amino acids. Xylanase plus phytase increased ($P<0.05$) nitrogen-corrected AME by 0.63 MJ kg-1, ileal energy digestibility by 0.89 MJ kg-1 and energy AID coefficient by 6.7% relative to the negative control diet. The enzyme combination increased ($P<0.05$) coefficients of ileal nitrogen digestibility by 9.1% and 8.0% relative to positive and negative control diets, respectively. Phytase increased ($P<0.05$) ileal calcium digestibility by 32.2% and ileal P digestibility by 28.0% relative to the negative control. Also, phytase increased ($P<0.05$) the AID coefficient of sodium to -0.038 from -0.516 in the negative control diet and the combination increased the same coefficient to 0.043. P reduction in the control diet lowered ($P<0.05$) bone mineralisation, but toe ash contents were restored by phytase and xylanase plus phytase. P status of the control diets had no effect ($P>0.05$) on the efficiency of feed conversion, but xylanase (6.2%), phytase (2.5%) and xylanase plus phytase (3.9%) enhanced ($P<0.05$) feed efficiency relative to the negative control. The low-P diet depressed ($P<0.05$) weight gain and feed intake but phytase and xylanase plus phytase restored both weight gain and feed intake. Overall, the present data indicate that the simultaneous inclusion of xylanase plus phytase in wheat-based broiler diets was beneficial in terms of nutrient utilisation and growth performance.
Keywords: Broilers; Amino acid digestibility; Phytase; Xylanase; Wheat

Junqiang Jia, Haile Ma, Weirui Zhao, Zhenbin Wang, Wanmin Tian, Lin Luo, Ronghai He, The use of ultrasound for enzymatic preparation of ACE-inhibitory peptides from wheat germ protein, Food Chemistry, In Press, Corrected Proof, Available online 21 June 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.06.036.
(http://www.sciencedirect.com/science/article/B6T6R-4WK4SPV-1/2/0b5d07e32d904456c97350e07eaea25e)

Abstract:
The effects of ultrasonic treatment during proteolysis on kinetic characterisation of the hydrolysis of defatted wheat germ protein (DWGP), and on ACE-inhibitory activity of the hydrolysate, were investigated. The effects of ultrasonic pretreatment on the release of peptides with ACE-inhibitory were also studied. The results showed that the value of kA for DWGP hydrolysis under ultrasonic irradiation increased by about 22.2%, and KM decreased about 13.0%, compared with that obtained without ultrasound. Analysis of ACE-inhibitory activity indicated that ultrasound during enzyme treatments had less effect on the ACE-inhibitory activity, while ultrasonic pretreatment caused a 21.0-40.7% increase in ACE-inhibitory activity of DWGP hydrolysate. Analyses of hydrophobicity, microstructure, and amino acid composition revealed that ultrasonic pretreatment could accelerate the release of hydrophobic amino acids from DWGP during enzymatic hydrolysis. In conclusion, ultrasonic treatment during proteolysis could facilitate the enzymatic hydrolysis of DWGP, whereas ultrasonic pretreatment could promote the release of ACE-inhibitory peptides from DWGP during enzymatic hydrolysis.

Keywords: Defatted wheat germ; Ultrasound; Enzymatic hydrolysis; ACE-inhibitory activity

Taofik A. Shittu, Rashidat A. Aminu, Evelyn O. Abulude, Functional effects of xanthan gum on composite cassava-wheat dough and bread, Food Hydrocolloids, In Press, Corrected Proof, Available online 21 June 2009, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2009.05.016.
(http://www.sciencedirect.com/science/article/B6VP9-4WK43WX-1/2/887592067dc7f322fd65ed3cd7b18a61)
Abstract:
The use of composite flour for bread making is gradually gaining prominence worldwide due to some economic and nutritional reasons. However, studies on the application of functional ingredients purposely to improve composite bread quality are very few. This paper examines the functional role of xanthan gum (XG) on the properties of dough and bread from composite cassava-wheat flour. The viscoelastic properties of dough and gas retention characteristics of batter as well as the fresh and storage properties of bread from the composite flour (90% wheat plus 10% cassava) were studied. The crumb cell structure was also studied using digital image analysis technique. Inclusion of XG had significant effects on the dough tenacity and extensibility and sensory acceptability of fresh composite bread. The oven spring, specific volumes of bread loaf and crumb softness were higher at 1% XG content. Also, addition of XG made the composite bread samples had more open crumb structure and better sensory acceptability. However, moisture loss and crumb firming during bread storage were best reduced when 1% XG was added to bread formulation.
Keywords: xanthan gum; Dough rheology; Cassava flour; Wheat flour; Composite bread quality

Maria V. Criado, Carla Caputo, Irma N. Roberts, Maria A. Castro, Atilio J. Barneix, Cytokinin-induced changes of nitrogen remobilization and chloroplast ultrastructure in wheat (Triticum aestivum), Journal of Plant Physiology, In Press, Corrected Proof, Available online 21 June 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.05.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4WK3YC4-1/2/a290f5abc3935e4485b1b441600fc3d6)
Abstract: Summary
Nitrogen (N) remobilization in wheat (Triticum aestivum) plants is crucial because it determines the grain protein concentration and the baking quality of flour. In order to evaluate the influence of cytokinins on N remobilization during N starvation, we analyzed various N remobilization parameters in wheat plants that were watered with 6-benzylaminopurine (BAP) either with or without KNO3. Besides, the effects of BAP on protein synthesis were evaluated, and the size and ultrastructure of chloroplasts of BAP-treated plants were studied. BAP supply inhibited N remobilization of plants independently of N supply as shown by the increase in protein, Rubisco, chlorophyll, sugar and starch concentrations in the older leaves, the decrease in amino acid and sugar export to the phloem, and the decrease in protein, Rubisco and chlorophyll concentrations in the younger leaves. Besides, BAP supply increased nitrate reductase activity and decreased nitrate concentration, thus suggesting an increased assimilatory capacity. The increase in protein concentration could be explained mainly by a significant decrease in protein degradation and, to a lesser extent, by an increase in protein synthesis. Finally, an increase both in the size of the chloroplast and in the plastoglobuli and starch contents in BAP-supplied plants was observed. We propose that cytokinins retain the sink activity of the older leaves by inhibiting amino acid and sugar export to the phloem and stimulating assimilate accumulation in the chloroplasts of the older leaves. Besides, BAP may increase protein concentration of the older leaves both by decreasing protein degradation and maintaining protein synthesis even under stress conditions.
Keywords: Benzylaminopurine; Chloroplast; Nitrogen remobilization; Nitrogen starvation; Triticum aestivum

Rhanissa Hirawan, Wan Yuin Ser, Susan D. Arntfield, Trust Beta, Antioxidant properties of commercial, regular- and whole-wheat spaghetti, Food Chemistry, In Press, Corrected Proof, Available online 17 June 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.06.022.
(http://www.sciencedirect.com/science/article/B6T6R-4WJBC1T-1/2/f7fbf173cf5e73d8e4db703c353ddbf2)
Abstract:
Whole grains contain more vitamins, minerals, natural antioxidants and dietary fibre than regular, refined grain products. Therefore, consumption of whole grain products is associated with beneficial health effects. The present investigation evaluated the antioxidant properties of 10 samples of regular- and whole-wheat spaghetti that are commercially available. The methods employed were total phenolic content (TPC), 2,2-diphenyl-1-picryhydrazyl (DPPH) free radical scavenging activity, oxygen radical absorbance capacity (ORAC) and ferulic acid content by HPLC analysis. The effects of cooking on the antioxidant properties of spaghetti were also studied. Whole wheat spaghetti exhibited significantly higher levels of total phenolic content (1389 [mu]g/g) than regular wheat spaghetti (865 [mu]g/g); however, TPC in both regular and whole wheat spaghetti was 48-78% of the original content after cooking. There were no significant differences in ORAC values (34.3-100.4 [mu]mol Trolox equivalents/g) or DPPH scavenging activity (1.0-2.3 [mu]mol Trolox equivalents) among whole wheat and regular spaghetti. Whole wheat spaghetti (234 [mu]g/g) had significantly higher content of ferulic acid than regular spaghetti ($p < 0.05$). TPC and ferulic acid content were found to be good indicators of the antioxidant capacity of spaghetti with both indices demonstrating the superiority of whole wheat over regular pasta products. The current findings on spaghetti add to the mounting evidence on the potential health benefits to be derived from consuming whole grain products.
Keywords: Whole wheat; Semolina; Spaghetti; Phenolic content; Ferulic acid; Antioxidant capacity; ORAC; DPPH; HPLC

Neal Okarter, Chang-Shu Liu, Mark E. Sorrells, Rui Hai Liu, Phytochemical content and antioxidant activity of six diverse varieties of whole wheat, Food Chemistry, In Press, Corrected Proof, Available online 17 June 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.06.021.
(http://www.sciencedirect.com/science/article/B6T6R-4WJBC1T-2/2/9451cc0703c90faaac365616f3868e09)
Abstract:
The phytochemical content and antioxidant activity of six diverse varieties of whole wheat are reported. The free phenolic content ranged from 255 (KanQueen) to 499 (Roane) [mu]mol gallic acid equivalents/100 g DW. The bound phenolic content ranged from 582 (Roane) to 662 (Cham1) [mu]mol gallic acid equivalents/100 g DW. The bound fraction contributed 53.8-69.7% of the total phenolic content of the wheat varieties analysed. Ferulic acid was the predominant phenolic acid found in whole wheat. Total ferulic acid content ranged from 310.8 (Caledonia) to 496.1 (KanQueen) [mu]mol ferulic acid/100 g DW. The percentage of ferulic acid found in the insoluble-bound fraction ranged from 87.4% (Caledonia) to 97.2% (KanQueen). Other phenolic acids, p-coumaric acid, syringic acid, vanillic acid, and caffeic acid were also detected. Lutein was the predominant carotenoid found in the whole wheat varieties analysed. Zeaxanthin, [beta]-carotene, and [beta]-cryptoxanthin were also detected. Mainly [alpha]- and [beta]-tocopherols and [alpha]- and [beta]-tocotrienols were found in all varieties of whole wheat though [gamma]-tocopherol was detected in all but two varieties. [beta]-Tocotrienol was the predominant form of vitamin E found in all varieties of whole wheat. The antioxidant activity was assessed using the oxygen radical absorbance capacity (ORAC) assay. The ORAC of the free fraction ranged from 1958 to 3749 [mu]mol Trolox equivalents/100 g DW. The ORAC of the bound fraction ranged from 3190 to 5945 [mu]mol Trolox equivalents/100 g DW. Total phenolic content was correlated with oxygen radical absorbance capacity ($R2 = 0.810$; $p < 0.001$). The phytochemicals found in whole grains may be responsible for the health benefit of whole grain consumption.

Keywords: Whole grains; Wheat; Phytochemicals; Antioxidant activity; Oxygen radical absorbance capacity; Vitamin E; Carotenoids; Phenolic acids; Phenolics

Llorenc Cabrera-Bosquet, Rossella Albrizio, Jose Luis Araus, Salvador Nogues, Photosynthetic capacity of field-grown durum wheat under different N availabilities: A comparative study from leaf to canopy, Environmental and Experimental Botany, In Press, Corrected Proof, Available online 16 June 2009, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.06.004.
(http://www.sciencedirect.com/science/article/B6T66-4WJ3DTF-3/2/05e7131eba7ed14cc7d10d53b4f108da)
Abstract:
The effect of N availability on photosynthetic capacity, growth parameters and yield was studied in field-grown durum-wheat plants at both the leaf and canopy levels. Two contrasting nitrogen levels (120 and 0 kg ha-1) were assayed in a randomised block design with nine replicates each. Total biomass was measured at anthesis and yield and its agronomical components at maturity. Photosynthetic measurements were performed 2 weeks after anthesis in two plots of each N treatment. Flag leaves were measured, using a LI-COR 6400 combined with the chlorophyll fluorescence meter, and the whole canopy by measuring CO2 and H2O fluxes in an innovative canopy-chamber system. We showed a clear increase in photosynthetic gas exchange and chlorophyll contents with N fertilisation at both canopy and leaf levels. As a consequence the increase in yield as response to N fertilisation seems the result of a larger green leaf area combined with a higher photosynthetic capacity of the leaves attributable to an increase in the maximum carboxylation velocity of Rubisco. Moreover gas-exchange measurements of the flag leaf during grain filling seem to provide a realistic characterisation, not just of the photosynthetic performance of the crop, but also about the impact of N availability on yield. Thus, measurements performed on the flag leaf matched those at the canopy level, with proportional increases in terms of gas exchange and chlorophyll content, providing a fast, cheap and reliable estimation of canopy photosynthesis and the grain yield attained by the crop.
Keywords: Triticum turgidum; Nitrogen supply; Gas-exchange; Canopy scale; Leaf scale

Liangzhi You, Mark W. Rosegrant, Stanley Wood, Dongsheng Sun, Impact of growing season temperature on wheat productivity in China, Agricultural and Forest Meteorology, Volume 149, Issues 6-7, 15 June 2009, Pages 1009-1014, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.12.004.
(http://www.sciencedirect.com/science/article/B6V8W-4VFBY41-1/2/2d1473b81535e03cdb57ecc2a6731b64)
Abstract:
Climate change continues to have major impact on crop productivity all over the world. Many researchers have evaluated the possible impact of global warming on crop yields using mainly indirect crop simulation models. Here we use a 1979-2000 Chinese crop-specific panel dataset to investigate the climate impact on Chinese wheat yield growth. We find that a 1 [degree sign]C increase in wheat growing season temperature reduces wheat yields by about 3-10%. This negative impact is less severe than those reported in other regions. Rising temperature over the past two decades accounts for a 4.5% decline in wheat yields in China while the majority of the wheat yield growth, 64%, comes from increased use of physical inputs. We emphasize the necessity of including such major influencing factors as physical inputs into the crop yield-climate function in order to have an accurate estimation of climate impact on crop yields.
Keywords: Global warming; Wheat yield; Production function; Marginal impact; Panel data; China

Chaoyang Wu, Zheng Niu, Quan Tang, Wenjiang Huang, Benoit Rivard, Jilu Feng, Remote estimation of gross primary production in wheat using chlorophyll-related vegetation indices,

Agricultural and Forest Meteorology, Volume 149, Issues 6-7, 15 June 2009, Pages 1015-1021, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.12.007.
(http://www.sciencedirect.com/science/article/B6V8W-4VFBY41-2/2/4a7f7cf700a805dabebb493626bb269d)
Abstract:
A number of recent studies have focused on estimating gross primary production (GPP) using vegetation indices (VIs). In this paper, GPP is retrieved as a product of incident light use efficiency (LUE), defined as GPP/PAR, and the photosynthetically active radiation (PAR). As a good correlation is found between canopy chlorophyll content and incident LUE for six types of wheat canopy (R2 = 0.87, n = 24), indices aimed for chlorophyll assessment can be used as an indicator of incident LUE and the product of chlorophyll indices and PAR will be a proxy of GPP. In a field experiment, we investigated four canopy chlorophyll content related indices (Red edge Normalized Difference Vegetation Index [Red Edge NDVI], modified Chlorophyll Absorption Ratio Index [MCARI710], Red Edge Chlorophyll Index [CIred edge] and the MERIS Terrestrial Chlorophyll Index [MTCI]) for GPP estimation during the growth cycle of wheat. These indices are validated for leaf and canopy chlorophyll estimation with ground truth data of canopy chlorophyll content. With ground truth data, a strong correlation is observed for canopy chlorophyll estimation with correlation coefficients R2 of 0.79, 0.84, 0.85 and 0.87 for Red Edge NDVI, MCARI710, CIred edge and MTCI, respectively (n = 24). As evidence of the existence of a relationship between canopy chlorophyll and GPP/PAR, these indices are shown to be a good proxy of GPP/PAR with R2 ranging from 0.70 for Red Edge NDVI and 0.75 for MTCI (n = 240). Remote estimation of GPP from canopy chlorophyll content x PAR is proved to be relatively successful (R2 of 0.47, 0.53, 0.65 and 0.66 for Red edge NDVI, MCARI710, CIred edge and MTCI respectively, n = 240). These results open up a new possibility to estimate GPP and should inspire new models for remote sensing of GPP.
Keywords: GPP; LUE; Vegetation indices; Canopy chlorophyll content; Sensitivity; Validation

Budong Qian, Reinder De Jong, Richard Warren, Aston Chipanshi, Harvey Hill, Statistical spring wheat yield forecasting for the Canadian prairie provinces, Agricultural and Forest Meteorology, Volume 149, Issues 6-7, 15 June 2009, Pages 1022-1031, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.12.006.
(http://www.sciencedirect.com/science/article/B6V8W-4VF4YKJ-1/2/3bbdf43ba3e79af4ba31fa1d34b550b5)
Abstract:
A study to forecast regional spring wheat (Triticum aestivum L.) yields on the Canadian Prairies was conducted, based on simulated daily water use and soil water contents derived from the National Drought Model. Empirical linear regression models were calibrated from 1976 to 2006 spring wheat yield data for this purpose. Potential predictors assessed were mainly those indicators related to water stress conditions at different crop growth stages. Stepwise regression and cross-validation were employed for the selection of the predictors in multivariate linear regression models used for forecasting spring wheat yields from seeding to harvest. The cross-validated 'forecasts' for 1976-2006, using data up to harvest, explained 77%, 64%, 63% and 70% of yield variances, respectively, for Alberta, Saskatchewan, Manitoba and the entire Prairie region. Root mean squared error of the 'forecasts' ranged from 8% to 11% of the average yields. The prediction accuracy earlier in the season was often lower than later in the season. Usable prediction accuracy was found by the middle of the growing season (around heading or anthesis), but only marginally effective at seeding time, especially so for Saskatchewan.
Keywords: Yield forecast; Water stress; Crop growth stage; Versatile Soil Moisture Budget; Linear regression; Spring wheat; Canadian Prairies

Mikhail A. Semenov, Pierre Martre, Peter D. Jamieson, Quantifying effects of simple wheat traits on yield in water-limited environments using a modelling approach, Agricultural and Forest Meteorology, Volume 149, Issues 6-7, 15 June 2009, Pages 1095-1104, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2009.01.006.
(http://www.sciencedirect.com/science/article/B6V8W-4VPV8K8-1/2/7fef78f42ceffe29c31d665718e1ea15)
Abstract:
Availability of water for plant growth is a key factor determining plant distribution in natural ecosystems and is the most important limiting factor in agricultural systems. The high environmental and economical cost of irrigation, required to maintain grain yields in water scarce environments, gives an incentive for improvements in water use efficiency of the crop. The objective of our study is to quantify the effects of changes in simple component plant traits on wheat yield under limited water supplies using a modelling approach. The Sirius wheat simulation model was used to perform analyses at two contrasting European sites, Rothamsted, UK and Seville, Spain, which represent major wheat growing areas in these countries. Several physiological traits were analysed to explore their effects on yield, including drought avoidance traits such as those controlling wheat development (phyllochron and grain filling duration), canopy expansion (maximum surface area of culm leaves) and water uptake (root vertical expansion rate and efficiency of water extraction) and drought tolerance traits such as responses of biomass accumulation and leaf senescence to water stress. Changes in parameters that control the effect of water stress on leaf senescence and biomass accumulation had the largest impact on grain yield under drought. The modified cultivar produced up to 70% more yield compared with the control for very dry years. Changes in phenology parameters, phyllochron and grain filling duration, did not improve yields at either site, suggesting that these parameters have been already optimised for climates in the UK and Spain through the breeding process. Our analysis illustrates the power of modelling in exploring and understanding complex traits in wheat. This may facilitate genetic research by focusing on experimental studies of component traits with the highest potential to influence crop performance.
Keywords: Crop improvement; Deconvoluting complex traits; G x E interactions; Crop simulation model; Sirius

Fatma Bensassi, Chiraz Zaied, Salwa Abid, Mohamed Rabeh Hajlaoui, Hassan Bacha, Occurrence of deoxynivalenol in durum wheat in Tunisia, Food Control, In Press, Corrected Proof, Available online 11 June 2009, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2009.06.005.
(http://www.sciencedirect.com/science/article/B6T6S-4WH2KY7-2/2/21bb843d0507818a4a8ef5f09730a7c6)
Abstract:
Wheat is frequently contaminated by the deoxynivalenol (DON) which is a member of the trichotecene family, the most important group of mycotoxins produced by the Fusarium moulds. As Tunisian population is a big consumer of cereals mainly durum wheat, human exposure to DON can be, consequently high. This survey was performed to study the occurrence of DON in Tunisian durum wheat area during the crop of 2007. A total of 65 samples of durum wheat from five cultivating locations in the North of Tunisia, the major cropping area, were analysed. To detect and to quantify the mycotoxin DON, an efficient HPLC/UV method was developed, including immunoaffinity step for DON extraction from durum wheat followed by liquid chromatography (LC) for quantification. As DON is a water soluble toxin, the extraction procedure from wheat samples was performed using water. Samples were centrifuged then passed through the immunoaffinity columns. After column's washing, the toxin was slowly eluted by methanol. Wheat sample extracts were injected to the LC system set at a wavelength of 220 nm. From 65 samples, 83% showed DON contamination with averages ranging from 12.8 +/- 5% to 30.5 +/- 13.3% [mu]g/g exceeding the maximum permitted limit of 1.75 [mu]g/g set by the European Commission in wheat.

Keywords: Trichothecenes; Deoxynivalenol; HPLC; Durum wheat; Contamination

J. Nagel-Volkmann, C. Plieth, D. Becker, H. Luthen, K. Dorffling, Cold-induced cytosolic free calcium ion concentration changes in wheat, Journal of Plant Physiology, In Press, Corrected Proof, Available online 11 June 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.05.002.
(http://www.sciencedirect.com/science/article/B7GJ7-4WH0JKS-2/2/02910265bdb971e69b7a8e666b257677)
Abstract: Summary
Relatively little is known about changes in the cytosolic free calcium ion concentration ([Ca2+]c) in monocotyledonous plants. Therefore, we produced transgenic winter wheat lines stably expressing the calcium-sensitive photoprotein aequorin constitutively in the cytosol. [Ca2+]c was detected in vivo by luminometry, and [Ca2+]c elevations were imaged at video rate. Experiments with the transgenic seedlings focused on potential changes in [Ca2+]c during cold exposure. Temperature-induced changes in [Ca2+]c were found to be more dependent on the change in temperature (dT dt-1) than on the absolute value of temperature. [Ca2+]c increased only at cooling rates higher than 8[degree sign]C min-1, indicating that an overall cellular [Ca2+]c increase is of minor relevance as a signal for cold acclimation in wheat under ecological conditions. The results are discussed with regard to the so-called `calcium signature hypothesis'.
Keywords: Aequorin; Biolistic transformation; Calcium signal transduction; Cold acclimation; Triticum aestivum L

Rui Liang, Hongbo Yuan, Guoxi Xi, Qingxiang Zhou, Synthesis of wheat straw-g-poly(acrylic acid) superabsorbent composites and release of urea from it, Carbohydrate Polymers, Volume 77, Issue 2, 10 June 2009, Pages 181-187, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.12.018.
(http://www.sciencedirect.com/science/article/B6TFD-4V74VDB-6/2/9beefbed8089fd38202fd899f8952f8a)
Abstract:
Wheat straw (WS) was used as raw material for synthesizing a novel wheat straw-g-poly(acrylic acid) (WS/PAA) superabsorbent composite by graft polymerization with wheat straw powder and acrylic acid in aqueous solution. The effect of wheat straw on water absorbency was discussed and the highest water absorbency was obtained when the amount of wheat straw in the feed was 20%. The superabsorbent composite was characterized by Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM) and thermogravimetric analysis (TGA). The results of FTIR spectra showed OH of WS participated in graft polymerization with acrylic acid. The influences of pH, cations and anions on equilibrium water absorbency of WS/PAA were investigated. The superabsorbent composite was swollen in aqueous solution of urea to load urea, and the results showed urea concentration had no obvious effect on the swelling behaviors of WS/PAA. Furthermore, the release of urea from loaded WS/PAA was analyzed in water and in soil. Urea diffusion coefficient D was calculated.
Keywords: Wheat straw; Superabsorbent composite; Equilibrium water absorbency; Urea

Lars Wiik, Torbjorn Ewaldz, Impact of temperature and precipitation on yield and plant diseases of winter wheat in southern Sweden 1983-2007, Crop Protection, In Press, Corrected Proof, Available online 10 June 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.05.002.
(http://www.sciencedirect.com/science/article/B6T5T-4WGT5VX-1/2/d5fbe9b4ac337154cd49e7ec40d3ac6f)
Abstract:
Weather factors are driving forces in plant disease development and differ between years and locations. Results from long-term fungicide field trials 1983-2007 and disease surveys 1988-2007 in winter wheat in southern Sweden were used to evaluate relationships between yield, the yield increase obtained by fungicide treatment, thousand grain weight (TGW), disease severity and

disease incidence, and the independent variables air temperature and precipitation as monthly means. These two weather variables explained more than 50% of the variation between years regarding yield increase, TGW, LBDs (Leaf Blotch Diseases, including Septoria tritici blotch, Stagonospora nodorum blotch and tan spot), brown rust, yellow rust and eyespot, but less than 50% of the variation in yield and powdery mildew. Precipitation in May was the factor most consistently related to LBD disease intensity, and adding another two weather factors further improved the degree of explanation. Weather factors in the preceding growing season influenced growth stage, powdery mildew and brown rust. Mild winters and springs favoured the biotrophs such as powdery mildew, brown rust and yellow rust. Statistically significant correlations between incidence and severity were found for LBDs, brown rust and eyespot, but not for yellow rust and powdery mildew. Regression models with disease incidence as dependent variable generally had a higher degree of explanation and lower P-value than models with disease severity as dependent variable. Our results confirm that weather data can be successfully used in wheat disease prediction models.
Keywords: Climate; Weather; Rain; Septoria tritici; Fungicide; Disease prediction; Forecasting

Luc Saulnier, Paul Robert, Mathilde Grintchenko, Frederic Jamme, Brigitte Bouchet, Fabienne Guillon, Wheat endosperm cell walls: Spatial heterogeneity of polysaccharide structure and composition using micro-scale enzymatic fingerprinting and FT-IR microspectroscopy, Journal of Cereal Science, In Press, Corrected Proof, Available online 9 June 2009, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.05.003.
(http://www.sciencedirect.com/science/article/B6WHK-4WGK4H5-2/2/7e5d567ff63143fe6c2e2e92a64e8618)
Abstract:
Micro-scale enzymatic fingerprinting and FT-IR microspectroscopy were used to investigate changes of polysaccharide structure and composition in cell walls from wheat endosperm. These methods were applied to transverse and longitudinal sections of wheat grains harvested at maturity and 270[degree sign]D. Principal component analysis treatment of the data revealed marked differences in the (1,3)-(1,4)-beta-glucans (BG)/arabinoxylans (AX) ratio and in the structure of AX depending on both cell position in the grain and stage of development. Cell walls close to the germ were enriched in BG in both developing and mature grain. AX in developing grain were characterized by a higher proportion of di-substitution by arabinose as compared to mature grain AX. In addition, AX in mature grains exhibited a different structure depending on prismatic or central origin of cell walls in the grain. These results indicated a high spatial and temporal control of the biosynthesis of AX and BG in wheat endosperm.
Keywords: Arabinoxylans; (1,3)-(1,4)-beta-glucans; Cereal; Grain; Endoxylanase; Lichenase

Chun-hua ZHAO, Fa CUI, Hao ZONG, Yu-hai WANG, Yin-guang BAO, Yuan-feng HAO, Bin DU, Hong-gang WANG, Transmission of the Chromosome 1R in Winter Wheat Germplasm Aimengniu and Its Derivatives Revealed by Molecular Markers, Agricultural Sciences in China, Volume 8, Issue 6, June 2009, Pages 652-657, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60260-6.
(http://www.sciencedirect.com/science/article/B82XG-4WKTN1K-3/2/0a91a9c7a0d245263607b2693e65445f)
Abstract:
In order to clarify the transmission of the rye chromosome 1R in winter wheat germplasm Aimengniu and its derivatives, 17 derivatives and 7 types of Aimengniu were examined through molecular-marker technology. The results showed that the chromosome arm 1RS of Neuzucht was transmitted to 5 of the 7 types of Aimengniu, i.e., Aimengniu II and Aimengniu IV-Aimengniu VII, no segment of 1RS was identified in Aimengniu I or Aimengniu III. As for the 17 derivatives, the 1RS chromosome arm of Aimengniu was transmitted to 11 derivatives, part segments of 1RS were found in 1 derivative, while no segment was found in the remaining 5 ones. The results

provided the evidence that molecular-marker technology was an efficient approach and suitable for analysis of the transmission of chromosome 1R.
Keywords: winter wheat germplasm; Aimengniu; molecular-marker technology; 1BL.1RS translocation; derivatives; transmission

Yin-guang BAO, Sen WANG, Xiu-qin WANG, Yu-hai WANG, Xing-feng LI, Lin WANG, Hong-gang WANG, Heterosis and Combining Ability for Major Yield Traits of a New Wheat Germplasm Shannong 0095 Derived from Thinopyrum intermedium, Agricultural Sciences in China, Volume 8, Issue 6, June 2009, Pages 753-760, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60275-8.
(http://www.sciencedirect.com/science/article/B82XG-4WKTN1K-M/2/9f30cffe3e9bc0d77f3d93c359a057ca)
Abstract:
The wheatgrass, Thinopyrum intermedium (Host) Barkworth & DR Dewey, shows many beneficial characteristics, such as big spikes and high resistance to many diseases. To transfer the beneficial genes of this species, many wheat-Thinopyrum intermedium alien chromosome lines were developed. Of them, Shannong 0095 (SN0095), a disomic substitution, has long spikes and flag-leaves, and thus may be an important genetic resource for wheat yield improvement. In order to realize its heterosis and combining ability on major yield traits, a 7 x 7 complete diallel design was made according to Griffing's Method-I. The results showed that heterosis for spike length (SPL), flag-leaf area (FLA), number of spikes per plant (NSP), number of spikelets per spike (NSL), kernels per spike (KPS), 1 000-kernel weight (TKW) and grain yield per plant (GYP) existed in all the crosses by SN0095, but heterobeltiosis occurred only for KPS, TKW, and GYP. The relative mid-parent heterosis (RMH) and relative high-parent heterosis (RHH) for GYP, which valued as high as 35.32 and 29.92% respectively, were the highest among all the traits mearsured. Though additive and non-additive gene effects and cytoplasmic effects (or cytoplasmic-nuclear interaction effects) were found in governing all the traits measured above, additive gene action played a predominant role. The results also showed that SN0095 was the best-general combiner for SPL and FLA, and high-general combiner for NSP amongst all the parents. Estimates of specific combining ability (SCA) showed that SN0095 could also make high-SCA combinations for GYP, such as SN0095 x Jimai 19 (JM19). SN0095 could be a unique and important parent in hybrid wheat breeding programs.
Keywords: Triticum aestivum; Thinopyrum intermedium; diallel cross; combining ability; heterosis

Hengjia Zhang, Yantai Gan, Gaobao Huang, Wenzhi Zhao, Fengmin Li, Postharvest residual soil nutrients and yield of spring wheat under water deficit in arid northwest China, Agricultural Water Management, Volume 96, Issue 6, June 2009, Pages 1045-1051, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.02.002.
(http://www.sciencedirect.com/science/article/B6T3X-4VS9KWS-3/2/c8c5fd0254770a651b981de63a3693a8)
Abstract:
In areas where two crops are grown per year or three crops every 2 years, the status of residual soil nutrients after the harvest of the first crop is critical to the crop to be grown immediately after, while the postharvest soil nutrient status can be influenced by irrigation applied to the test crop. This study determined the effect of various soil water treatments applied to the test crop on the status of postharvest residual soil nutrient pools in an arid environment. Spring wheat (Triticum aestivum L.) was grown as test crop under conditions of full- (as control), high-, moderate-, and low-water conditions during jointing, booting-heading, and grain filling stages, in 2003 and 2004. Compared to the control, grain yield and water use efficiency (WUE) were significantly increased by subjecting the wheat crop to moderate-water conditions during various growth stages, and low-water conditions at jointing stage in both years. Soil C at harvest decreased linearly with increased grain yield of the test crop. Moderate- to high-water conditions during jointing stage resulted in 12-

24% greater soil C in the top 40 cm depth in 2003, with a marginal difference in 2004. Water treatments impacted the status of residual soil nutrients in 2003; soil total N and available soil P in the top 40 cm depth were significantly higher in low- to moderate-water treatments compared to the control, while in 2004 significantly higher total N and P, available N, P and K were found only in the top 20 cm depth. Increased yield of wheat test crop with moderate-water resulted in increased postharvest residual soil nutrients, whereas the ratios of C/N, C/P, and C/K were largely influenced by years and were less related to water treatments. We conclude that the determination of postharvest soil C and nutrient elements may provide useful information in monitoring potential changes of soil nutrient status over time in the intensified cropping systems, and that the recommendation of fertilization for the crop to be grown immediately following the first crop can be established by simply analyzing the productivity of the first crop without intensive measurements of soil nutrients.
Keywords: Water availability; Spring wheat; Soil organic C; Residual soil nutrients; Growth stages; C/N ratio

Bing Liu, Hongping Qiao, Lili Huang, Heinrich Buchenauer, Qingmei Han, Zhensheng Kang, Yufei Gong, Biological control of take-all in wheat by endophytic Bacillus subtilis E1R-j and potential mode of action, Biological Control, Volume 49, Issue 3, June 2009, Pages 277-285, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.02.007.
(http://www.sciencedirect.com/science/article/B6WBP-4VNH3Y5-1/2/b6c39203e07ede30999f588cb6d292f8)
Abstract:
The bacterial strain E1R-j, isolated as an endophyte from wheat roots, exhibited high antifungal activity to Gaeumannomyces graminis var. tritici (Ggt). Strain E1R-j was identified as Bacillus subtilis based on morphological, physiological and biochemical methods as well as on 16S rDNA analysis. This strain inhibited mycelium growth in vitro of numerous plant pathogenic fungi, especially of Ggt, Coniothyrium diplodiella, Phomopsis sp. and Sclerotinia sclerotiorum. In greenhouse experiments, soil drenches with cell densities of 106, 109 and 1012 CFU ml-1 E1R-j reduced significantly take-all disease, caused by Ggt, in wheat seedling by 62.6%, 68.6% and 70.7%, respectively, compared to the inoculated control, 4 weeks after sowing. Growth parameters such as lengths and fresh weights of roots and shoots of Ggt-inoculated control plants were significantly lower compared to Ggt-inoculated and E1R-j treated plants. Field experiments in the season 2006/2007, heights of wheat plants in the Ggt inoculated plots were significantly reduced compared to the non inoculated treatments. Yield parameters such as kernels per head and thousand kernel weight (TKW) in inoculated control plants were lower compared to the other treatments. In the experimental year 2007/2008, independent treatments with the bacterial strain E1R-j and the fungicide Triadimefon reduced take-all disease in wheat roots by 55.3% and 61.9%, compared to the inoculated control plants. In this season plant height in inoculated control was significantly lower and also the yield parameters seeds per head and especially TKW were drastically reduced compared to the other treatments. E1R-j treatment alleviated the detrimental effects of take-all on grain yield parameters to a similar extent as Triadimefon application. SEM studies revealed that in the presence of E1R-j, hyphae of Ggt showed leakage, appeared ruptured, swollen and shriveled. Following root drench, strain E1R-j was able to colonize endophytically roots and leaves of wheat seedlings. While the population of the bacterial strain in wheat roots steadily increased from the second to the fourth leaf stage, in the leaf tissue the population of the strain rapidly declined. TEM studies also showed that cells of E1R-j were present in roots of wheat seedlings and effectively retarded infection and colonization of Ggt in root tissue; suppression of Ggt by E1R-j was accompanied by disintegration of hyphal cytoplasm. In addition, in the presence of E1R-j cells in Ggt-infected root tissue morphological defense reactions were triggered such as formation of wall appositions and papillae. The results presented indicate that the endophytic strain E1R-j of B. subtilis meets demands required for biocontrol of take-all.

Keywords: Endophyte; Bacillus subtilis; Strain E1R-j; Gaeumannanyces graminis var. tritici; Take-all biocontrol; Electron microscopy

Tapati Bhanja, Anjali Kumari, Rintu Banerjee, Enrichment of phenolics and free radical scavenging property of wheat koji prepared with two filamentous fungi, Bioresource Technology, Volume 100, Issue 11, June 2009, Pages 2861-2866, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.12.055.
(http://www.sciencedirect.com/science/article/B6V24-4VM7YDY-2/2/1457b76ec233461fdeda1e4d77db5e0d)
Abstract:
In the present study, total phenolic content and antioxidant property of wheat (54% ethanolic extract) was drastically enhanced when fermented with two GRAS filamentous fungi, Aspergillus oryzae and Aspergillus awamori nakazawa. A. oryzae yielded significant ($P < 0.05$) amounts of phenolic compounds, DPPH (2,2-diphenyl-1-picrylhydrazyl) and ABTS+ [2,2'-azinobis (3-ethylbenzothiazoline-6-sulfonic acid)] scavenging properties on 4th day of incubation compared to A. awamori on 5th day of incubation. A linear correlation was observed between total phenolic contents and activities of three different carbohydrate hydrolyzing enzymes ([alpha]-amylase, [beta]-Glucosidase and xylanase) produced by A. oryzae. However, in case of A. awamori nakazawa, only two enzymes (xylanase and [beta]-glucosidase) were mainly responsible for the release of phenolics. This study demonstrated that fermented wheat grain is a better source of phytochemicals compared to non-fermented wheat. In addition, different carbohydrate cleaving enzymes are responsible for the improvement of phytochemical properties of fermented wheat.
Keywords: Wheat; Phenolic; Antioxidant; Carbohydrate cleaving enzymes; Phytochemical

M.H. Qin, Q.H. Xu, Z.Y. Shao, Y. Gao, Y.J. Fu, X.M. Lu, P.J. Gao, B. Holmbom, Effect of bio-treatment on the lipophilic and hydrophilic extractives of wheat straw, Bioresource Technology, Volume 100, Issue 12, June 2009, Pages 3082-3087, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.01.055.
(http://www.sciencedirect.com/science/article/B6V24-4VS3NXV-5/2/ba486a9b6095cfd82b00f89ac6d1b3c4)
Abstract:
Wheat straw, an important papermaking raw material in China, was treated with a white-rot fungus of Phanerochaete chrysosporium ME446, and the lipophilic and hydrophilic extractives from the control and bio-treated samples were analyzed by GC and GC-MS. Bio-treatment of wheat straw could alter the chemical composition of both the lipophylic and hydrophilic extractives. Sugars and phenolic substances such as coniferyl alcohol, 4-hydroxycinnamic acid, 1-guaiacylglycerol and ferulic acid were substantially degraded or consumed by the fungus. More lipophilic substances such as wax, glycerides and steryl esters were degraded into the corresponding components, resulting in much higher concentrations of fatty acids and sterols in the bio-treated samples. Obviously, the bio-treatment of wheat straw was of benefit to pitch control in pulping and papermaking processes, in the view of degradation of the more lipophilic substances. In addition, the bio-treatment could increase the lignin concentration in hot-water extractives of wheat straw.
Keywords: Lipophilic extractives; Hydrophilic extractives; Wheat straw; Bio-treatment; Phanerochaete chrysosporium

J. Kuckenberg, I. Tartachnyk, G. Noga, Detection and differentiation of nitrogen-deficiency, powdery mildew and leaf rust at wheat leaf and canopy level by laser-induced chlorophyll fluorescence, Biosystems Engineering, Volume 103, Issue 2, June 2009, Pages 121-128, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.09.018.
(http://www.sciencedirect.com/science/article/B6WXV-4W14HS2-1/2/b5c5c0367cdca5bcf592c9f28c51c8a0)
Abstract:

The objective of the present study was to test whether the detection of chlorophyll fluorescence in high frequency multipoint scanning mode may enable identification of nitrogen(N)-deficiency and pathogen infections such as leaf rust (Puccinia recondita) and powdery mildew (Blumeria graminis) in winter wheat. Fluorescence readings at 690 nm (F690) and 730 nm (F730) were taken in the light under constant environmental conditions at leaf and canopy level. In order to identify the sources of heterogeneity of fluorescence signals at canopy level, fluorescence recordings from upper and lower leaf sides were additionally compared. F690/F730 was tendentiously lower on the lower leaf sides in all treatments. Throughout the experiment, N-deficient wheat plants displayed lower chlorophyll content and increased F690/F730 ratio. Pathogen infected plants showed a significantly enhanced fluorescence ratio, associated with chlorophyll degradation in the infected areas, only after appearance of visual symptoms. The results of cross-validation analysis indicated that with chlorophyll fluorescence measurements, samples with pathogen infections may be misrecognised as N deficiency and vice versa. Classification rates of N deficiency and leaf rust could be improved when heterogeneity (standard deviation) of F690 and F730 was considered in addition to the mean as a parameter for discrimination.

M. Manley, M.L. Engelbrecht, P.C. Williams, M. Kidd, Assessment of variance in the measurement of hectolitre mass of wheat, using equipment from different grain producing and exporting countries, Biosystems Engineering, Volume 103, Issue 2, June 2009, Pages 176-186, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.02.018.
(http://www.sciencedirect.com/science/article/B6WXV-4W0349B-1/2/84addc6a2cdffff9e52963c1716b41d1)
Abstract:
Hectolitre mass (HLM), also referred to in some countries as bushel-, specific-, test- or hectolitre weight, is the weight of a standard volume of grain and is generally believed to be a measure of its bulk density. The effect of HLM devices from different grain producing and exporting countries (Australia, Canada, France, Germany, South Africa, United Kingdom and the United States of America) on the variance in HLM values of wheat has been investigated. It has been found that the South African device resulted in HLM values significantly lower ($P < 0.05$) and the device currently used in Australia with values significantly higher compared to the other devices ($P < 0.05$). Nevertheless it has been found that the HLM values obtained from the respective devices were highly correlated (inter-device correlation (IDC) consistency > 0.90). The possible use of calculated correction factors could therefore be investigated. An alternative is to consider the calculation of appropriate conversion tables for the devices used in Australia and South Africa. A significant ($P < 0.05$) increase was observed in HLM values after the removal of impurities and was shown to be device dependent. Statistical differences were found between the ten South African HLM devices, but these would be insignificant in practice (IDC agreement > 0.98). Consecutive wetting and drying cycles significantly ($P < 0.05$) influenced the HLM determinations.

M.D. Shaw, C. Karunakaran, L.G. Tabil, Physicochemical characteristics of densified untreated and steam exploded poplar wood and wheat straw grinds, Biosystems Engineering, Volume 103, Issue 2, June 2009, Pages 198-207, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.02.012.
(http://www.sciencedirect.com/science/article/B6WXV-4W0R3GJ-1/2/45895f1b327f623a9c0061f27bc26541)
Abstract:
The effect of steam explosion pretreatment, process (die) temperature, feedstock particle size, and moisture content was evaluated on the physical quality of pellets produced from poplar wood and wheat straw. Following feedstock preparation, which involved either pretreatment and moisture conditioning (9 and 15%, wet basis) or grinding (0.8 and 3.2 mm hammer mill screens) and moisture conditioning, the materials were compressed in a plunger-die assembly with a force of

4000 N. The resulting pretreated pellets had a higher density and tensile strength than the untreated. Also, the pretreated pellets experienced a dimensional reduction after 14 days, whereas the untreated pellets expanded in the diametric and longitudinal axes. Pretreated wheat straw generally had a higher pellet density, higher tensile strength, and higher dimensional reduction than the pretreated poplar pellets. Conversely, the untreated poplar pellets had a higher pellet physical quality than the untreated wheat straw pellets. Increasing the die temperature (from 70 to 100 [degree sign]C) and decreasing the feedstock particle size (from 3.2 to 0.8 mm) increased pellet physical quality. The effect of moisture content on pellet physical quality varied with the levels of other factors (die temperature and particle size). Using Fourier Transform Infrared Photoacoustic Spectroscopy, it was found that the lignocellulosic structure was disrupted by pretreatment. The resulting higher relative percentage, and availability, of lignin was attributed to the increased quality of the pretreated feedstock pellets.

Z. Yang, M.N. Rao, N.C. Elliott, S.D. Kindler, T.W. Popham, Differentiating stress induced by greenbugs and Russian wheat aphids in wheat using remote sensing, Computers and Electronics in Agriculture, Volume 67, Issues 1-2, June-July 2009, Pages 64-70, ISSN 0168-1699, DOI: 10.1016/j.compag.2009.03.003.
(http://www.sciencedirect.com/science/article/B6T5M-4W50JVJ-1/2/59a123bcba90684a4cbbfd9bbe8efd0a)
Abstract:
Outbreaks of greenbug and Russian wheat aphid appear in the Great Plains almost every year and have had significant impacts on wheat yields. Early detection of aphid infestation is a critical part of integrated pest management (IPM) for wheat production. A study was done to determine the feasibility of using remote sensing techniques to detect stress in wheat caused by aphid infestation. The purpose of this greenhouse study was to characterize and differentiate stress in wheat due to infestation by greenbugs and Russian Wheat aphids using a hand-held Cropscan radiometer. Reflectance data and derived vegetation indices from the 16 bands of the radiometer were analyzed using SAS PROC MIXED statistical analysis procedure. Results show that it is possible to detect the stress caused by the two aphid species and to discriminate between the two aphid-induced stresses in wheat using remote sensing. Ratio-based vegetation indices (based on 800/450 nm and 950/450 nm) were found useful in differentiating the two stresses in wheat. However, more canopy-level-studies are needed to identify bands and indices that might have potential to differentiate the two stresses on wheat under field conditions.
Keywords: Greenbugs; Russian wheat aphids; Remote sensing; Reflectance; Infestation; Stress

G.A. Lori, M.N. Sisterna, S.J. Sarandon, I. Rizzo, H. Chidichimo, Fusarium head blight in wheat: Impact of tillage and other agronomic practices under natural infection, Crop Protection, Volume 28, Issue 6, June 2009, Pages 495-502, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.01.012.
(http://www.sciencedirect.com/science/article/B6T5T-4VPV8JM-1/2/89eb0f55c354518ec21feaa457e99151)
Abstract:
Fusarium head blight (FHB) is a destructive disease of the world's wheat-growing areas. In Argentina, the area under reduced tillage has increased due to soil erosion that threatened productivity. The effect of conventional and no tillage systems on FHB combined with other agronomic practices such as nitrogen fertilization, and the influence of the environmental conditions was analysed under natural infection on different cultivars. Wheat trials were conducted in three consecutive years; maize was the previous crop in the first and wheat the previous crop in the subsequent two years of the study. The experimental design was a split plot, with tillage treatments (conventional tillage and no-till) as the main plots. Fertilizer treatments were applied as a range of urea concentrations. Fusarium head blight was observed in all three experimental years. Differences of disease expression among trials were associated with the environmental

factors prevailing during the experiments. In the first year, with moderate weather conditions, the only interactions for FHB incidence were between no-till and urea split doses. Seedling emergence, seed health, thousand kernel weight and deoxynivalenol (DON) concentration did not differ suggesting that the fertilizers and genotypes did not affect disease susceptibility. Climatic conditions prevailing in the second year were more conducive to disease development and severe FHB infection was observed. Tillage and fertilization treatments did not affect the variables analysed. Only cultivars showed significant differences and DON values were high. In the third year, unfavourable conditions for disease development resulted in low disease levels and no effect or interaction among variables was observed. The results obtained would suggest that favourable weather conditions are likely to be more important than tillage practice and fertilizer treatments. Since soil conservation practices have been widely adopted in most areas of Argentina, an integrated used of all the available strategies should be considered to decrease FHB damage.
Keywords: Argentinean pampas; Conservation tillage; Cultural practices; Fusarium graminearum; Mycotoxins; Scab

Ajebu Nurfeta, Adugna Tolera, Lars O. Eik, Frik Sundstol, Effect of enset (Ensete ventricosum) leaf supplementation on feed intake, digestibility, nitrogen utilization and body weight gain of sheep fed untreated or urea and calcium oxide-treated wheat straw, Livestock Science, Volume 122, Issues 2-3, June 2009, Pages 134-142, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.08.005.
(http://www.sciencedirect.com/science/article/B7XNX-4TF69KH-1/2/8774743e0475e7dc34c837083b15ec1d)
Abstract:
The study was carried out to evaluate the effect of supplementing leaves of enset (Ensete ventricosum) to straw-based diets on the performance of sheep. In a growth experiment, which lasted for 76 days, 36 male sheep (average body weight of 17.3 +/- 0.58 kg) were allotted to six treatments. A digestibility trial was conducted using three of the six sheep from each treatment. The treatments were untreated or 2% urea- and 3% calcium oxide-treated wheat straw as a basal diet supplemented with three levels of chopped fresh enset leaf: low (215 g), medium (417 g) and high (594 g dry matter [DM] per day). The mean total DM intake tended to be higher ($p < 0.1$) at medium and high levels of supplementation than at the low level. The intake of total DM and nitrogen (N) was higher in treated than untreated straw. There was no significant difference in organic matter (OM) intake among treatments. Sheep fed medium and high levels of enset leaf supplements had similar weight gain but higher than those supplemented at low level. The digestibility of DM was not significantly different among treatments whereas the digestibility of OM tended to be higher at medium than other levels of supplementation. The digestibility of N was lower ($p < 0.001$) for treated than untreated straw whereas the digestibility of neutral detergent fibre was higher ($p < 0.001$) in treated straw. The highest mean N retention was at medium level of supplementation. There were no significant differences in total purine derivatives excretion, absorbed microbial purines and microbial N supply among treatments. It could be concluded that there is no major beneficial effect beyond medium level of enset leaf supplementation in both treated and untreated straw. For efficient utilization of enset leaf, sources of fermentable energy are necessary.
Keywords: Sheep; Enset leaf; Urea; Calcium oxide; Wheat straw; Purine derivatives

Juan LIU, Yong HAN, Zu-Cong CAI, Decomposition and Products of Wheat and Rice Straw from a FACE Experiment Under Flooded Conditions, Pedosphere, Volume 19, Issue 3, June 2009, Pages 389-397, ISSN 1002-0160, DOI: 10.1016/S1002-0160(09)60130-2.
(http://www.sciencedirect.com/science/article/B82XV-4W85J4R-F/2/7a89e78ba271c772ef35c6914191dcd0)
Abstract: ABSTRACT

Winter wheat and rice straw produced under ambient and elevated CO2 in a China rice-wheat rotation free-air CO2 enrichment (FACE) experiment was mixed with a paddy soil at a rate of 10 g kg-1 (air-dried), and the mixture was incubated under flooded conditions at 25 [degree sign]C to examine the differences in decomposition as well as the products of crop residues produced under elevated CO2. Results showed that the C/N ratio and the amount of soluble fraction in the amended rice straw grown under elevated CO2 (FR) were 9.8% and 73.1% greater, and the cellulose and lignin were 16.0% and 9.9% lesser than those of the amended rice straw grown under ambient CO2 (AR), respectively. Compared with those of the AR treatment, the CO2-C and CH4-C emissions in the FR treatment for 25 d were increased by 7.9% and 25.0%, respectively; a higher ratio of CH4 to CO2 emissions induced by straw in the FR treatment was also observed. In contrast, in the treatments with winter wheat straw, the CO2-C and CH4-C emissions, the ratio of straw-induced CH4 to CO2 emissions, and the straw composition were not significantly affected by elevated CO2, except for an 8.0% decrease in total N and a 9.7% increase in C/N ratio in the wheat straw grown under elevated CO2. Correlation analysis showed that the net CO2-C and CH4-C emission from straw and the ratio of straw-induced CH4 to CO2 emissions were all exponentially related to the amount of soluble fraction in the amended straw ($P < 0.05$). These indicated that under flooded conditions, the turnover and CH4 emission from crop straw incorporated into soil were dependent on the effect of elevated CO2 on straw composition, and varied with crop species. Incorporation of rice straw grown under elevated CO2 would stimulate CH4 emission from flooded rice fields, whereas winter wheat straw grown under elevated CO2 had no effect on CH4 emission.
Keywords: carbon cycle; CH4; CO2; emissions; soluble fraction

M. ASHRAF, RAHMATULLAH, M.A. MAQSOOD, S. KANWAL, M.A. TAHIR, L. ALI, Growth Responses of Wheat Cultivars to Rock Phosphate in Hydroponics, Pedosphere, Volume 19, Issue 3, June 2009, Pages 398-402, ISSN 1002-0160, DOI: 10.1016/S1002-0160(09)60131-4.
(http://www.sciencedirect.com/science/article/B82XV-4W85J4R-G/2/7205fa1c98cd7c5b1ec4176c47dc9311)
Abstract: ABSTRACT
Screening cultivars to grow under conditions of low phosphorus (P) availability and utilize P efficiently from compounds of low solubility in soils may be beneficial to overcome poor plant growth in P-deficient soils. The growth behavior and P utilization efficiency of seven wheat cultivars grown in hydroponics were studied, using rock phosphate as P source. The wheat cultivars grown for 30 days were significantly different in biomass accumulation, P uptake and P utilization efficiency. The dry matter production of all the cultivars was significantly correlated with P uptake, which in turn correlated to the drop in the root medium pH. The ranking of wheat cultivars on the basis of dry matter yield, P uptake and P utilization efficiency was Zamindar 80 > Yecora > C 271 > WL 711 > Barani 83 > PARI 73 > Rohtas. The cultivar Zamindar 80 appeared to possess the best growth potential in P-deficient soils.
Keywords: cultivars; hydroponics; nutrition; rockphosphate; wheat

Lin Zhu, Zong Suo Liang, Xing Xu, Shu Hua Li, P. Monneveux, Evidences for the association between carbon isotope discrimination and grain yield--Ash content and stem carbohydrate in spring wheat grown in Ningxia (Northwest China), Plant Science, Volume 176, Issue 6, June 2009, Pages 758-767, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.02.018.
(http://www.sciencedirect.com/science/article/B6TBH-4VT0X07-1/2/c86eaa7d5e4411fcbf61302721c1b339)
Abstract:
Carbon isotope discrimination ([Delta]) has been repeatedly reported to positively correlate with grain yield in wheat grown under post-anthesis stress environments. Several hypotheses have been put forward to explain this association. However, there is few reported direct evidence

clarified the relationship between [Delta] and grain yield, which is the objective of the present work. The relationships between [Delta] and grain yield (GY), harvest index (HI), ash content (ma), specific stem dry weight (SSDW) and carbohydrate in stem, were studied in a collection of 20 bread wheat cultivars (landraces, released cultivars and advanced lines) in Yinchuan of the Ningxia region (Northwest of China) in three successive years (2006, 2007 and 2008). Relationships between GY, HI, stem specific dry weight, accumulation and mobilization of stem reserved carbohydrate and [Delta] were analyzed. The effects of year, sampling time and genotypes on measured traits were significant. Positive correlations between grain yield and [Delta] were noted in 2007 and 2008 when stress occurred after anthesis, but not in 2006 when soil water condition was nearly optimal. Significant and positive correlations among maLm, grain [Delta] and harvest index were found. Stem water-soluble carbohydrate content (SWSCC) and specific dry weight 7 days after anthesis was positively associated with [Delta]. Remobilization efficiency of stem water-soluble carbohydrate and total carbohydrate (the sum of water-soluble carbohydrate and starch) was also found to be significantly and positively correlated to [Delta]. There were negative relationships between [Delta]Gm, [Delta]Sm, and SSDW at maturity. In conclusion, [Delta] may predict yield when irrigation does not meet crop's water requirement and wheat experiences a slight water stress after anthesis in central region of Ningxia. [Delta] or maLm is related to the efficiency of carbon partitioning to the grain. Basal mature stem [Delta] seems to be an integrated character reflecting both early carbohydrate assimilation and dry matter remobilization to grain during grain-filling.
Keywords: Wheat (Triticum aestivum L.); Carbon isotope discrimination; Grain yield; Harvest index; Water-soluble carbohydrate; Specific stem dry weight

Jun-Ying Su, Qi Zheng, Hong-Wei Li, Bin Li, Rui-Lian Jing, Yi-Ping Tong, Zhen-Sheng Li, Detection of QTLs for phosphorus use efficiency in relation to agronomic performance of wheat grown under phosphorus sufficient and limited conditions, Plant Science, Volume 176, Issue 6, June 2009, Pages 824-836, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.03.006.
(http://www.sciencedirect.com/science/article/B6TBH-4VWHVW2-4/2/3e3aab342a193ccc60418e83df0f4d0f)
Abstract:
The objective of this study was to map QTLs regulating P uptake (PUP) and utilization efficiency (UTE), and analyze the association of these QTLs with agronomic traits of wheat under low P (LP) and high P (HP) conditions. Two consecutive field trials harvested at maturity and two independent pot trials harvested at seedling stage were conducted using a doubled haploid (DH) population derived from two Chinese winter wheat varieties, Hanxuan 10 and Lumai 14. Characteristics including tillers per plant (TN), shoot dry weight, PUP and UTE were investigated in the two pot trials, while PUP, UTE, biomass yield and yield components were investigated in the two field trials. Seven and six loci were detected repeatedly as controlling PUP and UTE, respectively. Each of the seven PUP loci coincided with or was linked to QTLs regulating agronomic traits, thus providing strong evidence for the hypothesis that enhancing PUP would improve agronomic performance of wheat, especially under LP condition when insufficient PUP retarded plant development. Although PUP and UTE were negatively correlated, positive linkages were observed between QTLs for PUP and UTE at two loci, allowing for the possibility of improving PUP and UTE simultaneously. Various loci controlling TN and PUP at the seedling stage were found to regulate ear number per plant, biomass yield and PUP at maturity, suggesting that selection of early vigorous plants with more tillers and higher PUP would improve PUP and plant performance at maturity.
Keywords: Ttriticum aestivum L.; Phosphorus use efficiency; Agronomic trait; QTL

Marie-Anne de Graaff, Chris Van Kessel, Johan Six, Rhizodeposition-induced decomposition increases N availability to wild and cultivated wheat genotypes under elevated CO2, Soil Biology

and Biochemistry, Volume 41, Issue 6, June 2009, Pages 1094-1103, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.02.015.
(http://www.sciencedirect.com/science/article/B6TC7-4VTC7RT-1/2/855b6da9896b05e26218c0323857f6d1)
Abstract:
Elevated CO2 may increase nutrient availability in the rhizosphere by stimulating N release from recalcitrant soil organic matter (SOM) pools through enhanced rhizodeposition. We aimed to elucidate how CO2-induced increases in rhizodeposition affect N release from recalcitrant SOM, and how wild versus cultivated genotypes of wheat mediated differential responses in soil N cycling under elevated CO2. To quantify root-derived soil carbon (C) input and release of N from stable SOM pools, plants were grown for 1 month in microcosms, exposed to 13C labeling at ambient (392 [mu]mol mol-1) and elevated (792 [mu]mol mol-1) CO2 concentrations, in soil containing 15N predominantly incorporated into recalcitrant SOM pools. Decomposition of stable soil C increased by 43%, root-derived soil C increased by 59%, and microbial-13C was enhanced by 50% under elevated compared to ambient CO2. Concurrently, plant 15N uptake increased (+7%) under elevated CO2 while 15N contents in the microbial biomass and mineral N pool decreased. Wild genotypes allocated more C to their roots, while cultivated genotypes allocated more C to their shoots under ambient and elevated CO2. This led to increased stable C decomposition, but not to increased N acquisition for the wild genotypes. Data suggest that increased rhizodeposition under elevated CO2 can stimulate mineralization of N from recalcitrant SOM pools and that contrasting C allocation patterns cannot fully explain plant mediated differential responses in soil N cycling to elevated CO2.
Keywords: Elevated CO2; Rhizodeposition; N mineralization; 13C; 15N; Genotypes

M. Khakbazan, R.M. Mohr, D.A. Derksen, M.A. Monreal, C.A. Grant, R.P. Zentner, A.P. Moulin, D.L. McLaren, R.B. Irvine, C.N. Nagy, Effects of alternative management practices on the economics, energy and GHG emissions of a wheat-pea cropping system in the Canadian prairies, Soil and Tillage Research, Volume 104, Issue 1, June 2009, Pages 30-38, ISSN 0167-1987, DOI: 10.1016/j.still.2008.11.005.
(http://www.sciencedirect.com/science/article/B6TC6-4V8FF96-2/2/6bf69ac80cee2970515afb91c0ecaf16)
Abstract:
In recent years alternative farming practices have received considerable attention from Canadian producers as a means to improve their net return from grain and oilseed production. Enhancing the efficiency of nitrogen fertilizer use, including a pulse crop in the rotation, reducing tillage and pesticide use are seen as viable options to reduce reliance on fossil fuel, lower input costs and decrease the risk of soil, air and water degradation. The objective of this study was to determine the effects of 16 alternative management practices for a 2-year spring wheat (Triticum aestivum L.)-field pea (Pisum sativum L.) rotation on economic returns, non-renewable energy use efficiency, and greenhouse gas emissions. The alternative management methods for wheat consisted of a factorial combination of high vs. low soil disturbance one pass seeding, four nitrogen (N) fertilizer rates (20 kg N ha-1, 40 kg N ha-1, 60 kg N ha-1 and 80 kg N ha-1), and recommended vs. reduced rates of in-crop herbicide application. Alternative management practices for field pea were high vs. low soil disturbance one pass seeding. The resulting 16 cropping systems were evaluated at the whole farm level based on 4 years (two rotation cycles) of data from field experiments conducted on two Orthic Black Chernozem soils (clay loam and loam textures) in Manitoba, Canada. The highest net returns on the clay loam soil were for the high disturbance system with 60 kg N ha-1 applied to wheat and the recommended rates of in-crop herbicides. The lowest application rate of N, together with low disturbance seeding, provided the highest economic returns on the loam soil. Energy use efficiency was highest for the lowest rate of N application for both tillage systems. The highest rate of N fertilizer and recommended rates of in-

crop herbicide produced little additional yield response, lower net returns, and higher GHG emissions. An increase in N fertilizer application from 20 kg ha-1 to 80 kg ha-1 increased whole farm energy requirements by about 40%, while reducing herbicide rates had negligible effects on grain yields and total energy input. Overall, as N fertilizer rate increased, the associated GHG emissions were not offset by an increase in carbon retained in the above-ground crop biomass. Moderate to high soil test NO3-N levels at experimental sites reduced the potential for positive yield responses to N fertilizer in this study, thus minimizing the economic benefits derived from N fertilizer application.
Keywords: One-pass seeding; Energy; Economics; GHG

M. Miransari, H.A. Bahrami, F. Rejali, M.J. Malakouti, Effects of arbuscular mycorrhiza, soil sterilization, and soil compaction on wheat (Triticum aestivum L.) nutrients uptake, Soil and Tillage Research, Volume 104, Issue 1, June 2009, Pages 48-55, ISSN 0167-1987, DOI: 10.1016/j.still.2008.11.006.
(http://www.sciencedirect.com/science/article/B6TC6-4V9RHMP-1/2/6d953f08087261879dbdf3abc2095070)
Abstract:
The stress of soil compaction, because of using agricultural machinery, may provide conditions such as limiting nutrient uptake, not suitable for plant growth. Here we hypothesized that using arbuscular mycorrhiza (AM, plant symbiotic fungi), as a biological method, may overcome the stress of soil compaction on wheat (Triticum aestivum L.) growth by enhancing nutrient uptake. Soil surface layer of the Experimental Research Field of Soil and Water Research Institute in Karaj, Iran, was sieved, sterilized, and compacted at 10 kg pots in two experiments. At seeding wheat seeds were inoculated with different species of Glomus fungi with different origins. Shoot nutrient uptake of N, P, K, Fe, Mn, Zn, Cu was determined. Soil sterilization significantly increased the nutrient uptake of mycorrhizal wheat even at the highest level of compaction. Even under compacted conditions, increased P uptake, due to AM inoculation had an important role to alleviate the stress. This novel finding may indicate the important role of AM to overcome the stress of soil compaction on wheat nutrient uptake, the independency of AM origin on their functionality, and the great importance of managing soil biological communities in agricultural systems.
Keywords: Soil compaction; Soil sterilization; Stress alleviation; Origin of arbuscular mycorrhiza species; Wheat (Triticum aestivum L.) nutrient uptake

Sadur Rehman, Shad K. Khalil, Abdur Rehman, Amanullah, Amir Z. Khan, Nazir Hussain Shah, Micro-watershed enhances rain water use efficiency, phenology and productivity of wheat under rainfed condition, Soil and Tillage Research, Volume 104, Issue 1, June 2009, Pages 82-87, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.013.
(http://www.sciencedirect.com/science/article/B6TC6-4VHXDPJ-1/2/9cb95d928b559f2e984e8536ab5a1472)
Abstract:
Wheat yield is low under rainfed condition in many countries of the world. The objective of this study was to determine whether micro-watershed treatment can improve rainfall use efficiency and yield of wheat under rainfed condition. Field trials were conducted during 2003-2004 and 2004-2005 under rainfed condition at Cereal Crops Research Institute Pirsabak, NWFP (Northwest Frontier Province) Pakistan. Five micro-watershed, raised 0.45-0.5 m above ground level, were treated with either (1) plastic sheets, (2) stones, (3) compacted soil, (4) un-compacted soil, (5) left as untreated control. The experiment was conducted according to randomized complete block (RCB) design with six replications. Micro-watershed treatments significantly affected emergence m-2, days to 50% heading, plant height, spikes m-2, grains spike-1, grain yield and rainfall use efficiency. Maximum emergence m-2 (83.1) and plant height (94.7 cm) were recorded from micro-

watershed treatments covered with plastic sheet, while maximum spikes m-2 (173.8), grains spike-1 (56.0), grain yield (2394 kg ha-1) and rainfall use efficiency (6.22) were recorded from micro-watersheds treatments covered with stones. Maximum days to 50% heading (116.4) were recorded in control plots. Micro-watershed enhanced days to 50% heading (114.5). It is concluded that the stone or plastic sheet covered soil surface was the best micro-watershed treatment that improved crop yield and rainfall use efficiency.
Keywords: Micro-watershed; Rainwater use efficiency; Phenology and grain yield

Arzhang Javadi, Mohammad Hashem Rahmati, Ahmad Tabatabaeefar, Sustainable tillage methods for irrigated wheat production in different regions of Iran, Soil and Tillage Research, Volume 104, Issue 1, June 2009, Pages 143-149, ISSN 0167-1987, DOI: 10.1016/j.still.2008.10.016.
(http://www.sciencedirect.com/science/article/B6TC6-4V4KC56-1/2/79171f8721711c6b5aca18ea664f7c4e)
Abstract:
Wheat (Triticum aestirum L.) is widely grown in Iran as a staple food with high nutritional value; so it is important that sustainable tillage systems are used in its production. Conventional tillage methods rely on excessive use of moldboard plows and disk harrows, and are known to cause several types of damage to soils and land in Iran. On the other hand, conservation tillage methods in recent years have demonstrated positive effects on energy consumption, time inputs, erosion control, soil properties, yields and productivity potential. The success of these methods however, varied with different regional conditions, and therefore these differences must be considered in the selection of tillage systems. The main purpose of this study was to identify and evaluate tillage methods for sustainable wheat crop production in Iran under different climatic and soil conditions.
The effects of tillage methods on soil physical properties and crop productivity were studied in various parts of Iran (center, south, west and northeast) with average annual rainfall ranging from 230 to 480 mm, and soil texture ranging from silty loam to clay loam. In local projects, tillage systems compared were conventional, minimum and no-tillage, chosen according to site-specific conditions. In a nation-wide project, conventional tillage was compared with reduced tillage. The results indicated that obviously the effects of tillage methods differed over the regions, but in practically all situations, reduced tillage methods (chisel plowing) showed promising results. No significant yield reductions were found when compared to the traditional tillage methods (moldboard plowing). The field capacity using a chisel plow increased from 0.50 to 0.75 ha h-1. On the other hand, no-tillage methods did not produce favorable results, indicating that some degree of soil disturbance is necessary. Conservation tillage by chisel plowing can be recommended in most provinces of Iran but care must be taken that the sowing operation is done correctly.
Keywords: Conservation tillage; Wheat production; Soil properties; Sustainable agriculture

Carlo Giuseppe Rizzello, Rossana Coda, Maria De Angelis, Raffaella Di Cagno, Paola Carnevali, Marco Gobbetti, Long-term fungal inhibitory activity of water-soluble extract from Amaranthus spp. seeds during storage of gluten-free and wheat flour breads, International Journal of Food Microbiology, Volume 131, Issues 2-3, 31 May 2009, Pages 189-196, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.02.025.
(http://www.sciencedirect.com/science/article/B6T7K-4VT14C2-1/2/5269a3aa09f850f8ade26153ba81aaba)
Keywords: Amaranth; Antifungal peptides; Gluten-free breads; Storage

Noureddine Bouras, Yong Min Kim, Stephen E. Strelkov, Influence of water activity and temperature on growth and mycotoxin production by isolates of Pyrenophora tritici-repentis from wheat, International Journal of Food Microbiology, Volume 131, Issues 2-3, 31 May 2009, Pages 251-255, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.02.001.

(http://www.sciencedirect.com/science/article/B6T7K-4VJBTHY-1/2/ecb7749fb9a37a2416b08d915e00d8c3)
Abstract:
Pyrenophora tritici-repentis is a phytopathogenic fungus that can infect wheat kernels and leaves, causing red smudge and tan spot, respectively. A number of P. tritici-repentis isolates have been shown to be mycotoxigenic, producing the anthraquinone mycotoxins emodin, catenarin and islandicin. The influence of water activity (aw; 0.75-0.99 aw) and temperature (5-45 [degree sign]C) on growth and mycotoxin production by five isolates of P. tritici-repentis was studied. All isolates grew at 0.95-0.99 aw and 15-25 [degree sign]C on a wheat-based medium, with three isolates also producing small colonies at 5 [degree sign]C. The optimal growth conditions for all isolates consisted of 0.99 aw and 25 [degree sign]C, and growth was significantly reduced at 0.95 aw and/or 15 [degree sign]C. Emodin and catenarin were detected in cultures of all isolates, at concentrations ranging from 0.06 +/- 0.04 to 11.31 +/- 2.96 [micro sign]g emodin/g medium, and from 0.09 +/- 0.06 to 53.42 +/- 4.36 [micro sign]g catenarin/g medium. In most isolates, the concentrations of emodin and catenarin declined under suboptimal growth conditions. However, in some isolates, significant increases in the concentrations of both compounds were observed under suboptimal conditions. Islandicin was detected in cultures of only three isolates, at concentrations ranging from 0.07 +/- 0.05 to 5.69 +/- 0.76 [micro sign]g/g medium. The results suggest that growth and mycotoxin formation by P. tritici-repentis are markedly influenced by aw and temperature, and that this fungus is hygrophilic. Therefore, infection and contamination of kernels by P. tritici-repentis are likely to occur in the field rather than in storage. To our knowledge, this is the first study on the effect of environmental factors on mycelial growth and mycotoxin production by P. tritici-repentis.
Keywords: Pyrenophora tritici-repentis; Fungal growth; Anthraquinones; Mycotoxin contamination; Wheat quality; Red smudge

Gabriella Szalai, Matyas Pap, Tibor Janda, Light-induced frost tolerance differs in winter and spring wheat plants, Journal of Plant Physiology, In Press, Corrected Proof, Available online 28 May 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.04.016.
(http://www.sciencedirect.com/science/article/B7GJ7-4WD10SJ-1/2/5fcc1b1b020216437e1b3428a2233a55)
Abstract: Summary
It has been shown that the frost hardening of wheat plants at low temperature under low light conditions is much less effective than under normal light conditions. The aim of the present work was to uncover the biochemical changes responsible for the enhanced freezing tolerance of wheat plants with different levels of frost tolerance when frost hardening takes place in the light. Ten-day-old plants grown at 20/18 [degree sign]C were cold hardened at 5 [degree sign]C for 12 d under normal (250 [mu]mol m-2 s-1) or low light (20 [mu]mol m-2 s-1) conditions. Some of the plants were kept at non-hardening temperature for 12 d at elevated light (500 [mu]mol m-2 s-1). Changes in the polyamine contents during low temperature hardening showed marked light dependence; however, these changes differed in the spring and winter wheat plants. In the winter wheat Mv Emese, the putrescine, spermidine and cadaverine contents showed a substantial increase at low temperature under normal light conditions, while in the spring wheat Nadro, only the levels of spermidine and spermine increased under these conditions. Low temperature hardening induced a similar level of glutathione S-transferase activity in both Mv Emese and Nadro. However, this induction was more pronounced under normal light than under low light. In the next step, three winter wheat varieties with a high level of frost tolerance and three spring varieties with a low level of frost tolerance were tested for freezing tolerance after being kept at normal, non-hardening temperature at elevated light. The results showed that, although elevated light increased the survival rate of spring varieties as well, even after this hardening process winter varieties had higher frost tolerance than spring varieties. This suggests that there is a correlation between the

freezing tolerance induced by low temperature and that induced by light at non-hardening temperature.
Keywords: Glutathione S-transferase; Hardening; Low temperature; Polyamine; Triticum aestivum L.

Zuoxin Liu, Yonggang Miao, Zhenying Wang, Guanghua Yin, Synthesis and characterization of a novel super-absorbent based on chemically modified pulverized wheat straw and acrylic acid, Carbohydrate Polymers, Volume 77, Issue 1, 22 May 2009, Pages 131-135, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.12.019.
(http://www.sciencedirect.com/science/article/B6TFD-4V752R4-1/2/07c3d714a2ee6a552f3b93269a1b2e59)
Abstract:
In order to develop an eco-friendly polymer, the material was prepared from pulverized wheat straw by chemical methods. And a super-absorbent hydrogel has been synthesized with chemically modified pulverized wheat straw (CMPWS) and acrylic acid (AA) in aqueous solution. Factors, such as weight ratio of AA to CMPWS, the amount of initiator and cross-linker, temperature and neutralization degree of AA that influence absorbencies of super-absorbent were investigated. Moreover, the super-absorbent had been proved with expectant polymerization structure and good thermo-stability via IR spectrum and TGA analysis. The morphological features were evidenced by SEM images. The excellent product was obtained with the absorbencies of 417 g/g in distilled water and 45 g/g in 0.9 wt% NaCl solution.
Keywords: Super-absorbent copolymer; Swelling ratio; Activator; Network structure

Chunfang Zheng, Dong Jiang, Fulai Liu, Tingbo Dai, Weicheng Liu, Qi Jing, Weixing Cao, Exogenous nitric oxide improves seed germination in wheat against mitochondrial oxidative damage induced by high salinity, Environmental and Experimental Botany, In Press, Corrected Proof, Available online 21 May 2009, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.05.002.
(http://www.sciencedirect.com/science/article/B6T66-4WBK7C4-1/2/f6afb73f0c41f55372183334abf3ace1)
Abstract:
Effects of exogenous nitric oxide (NO) on starch degradation, oxidation in mitochondria and K+/Na+ accumulation during seed germination of wheat were investigated under a high salinity level. Seeds of winter wheat (Triticum aestivum L., cv. Huaimai 17) were pre-soaked with 0 mM or 0.1 mM of sodium nitroprusside (SNP, as nitric oxide donor) for 20 h just before germination under 300 mM NaCl. At 300 mM NaCl, exogenous NO increased germination rate and weights of coleoptile and radicle, but decreased seed weight. Exogenous NO also enhanced seed respiration rate and ATP synthesis. In addition, seed starch content decreased while soluble sugar content increased by exogenous NO pre-treatment, which was in accordance with the improved amylase activities in the germinating seeds. Exogenous NO increased the activities of superoxide dismutase (SOD, EC 1.15.1.1) and catalase (CAT, EC 1.11.1.6); whereas decreased the contents of malondialdehyde (MDA) and hydrogen peroxide (H2O2), and superoxide anions (O2--) release rate in the mitochondria. Exogenous NO also decreased Na+ concentration while increased K+ concentration in the seeds thereby maintained a balance between K+ and Na+ during germination under salt stress. It is concluded that exogenous NO treatment on wheat seeds may be a good option to improve seed germination and crop establishment under saline conditions.
Keywords: Antioxidative enzymes; Ion balance; Seed respiration; Sodium nitroprusside (SNP); Starch degradation

W.X. Zhu, J. Gayin, F. Chatel, K. Dewettinck, P. Van der Meeren, Influence of electrolytes on the heat-induced swelling of aqueous dispersions of native wheat starch granules, Food

Hydrocolloids, In Press, Corrected Proof, Available online 19 May 2009, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2009.05.002.
(http://www.sciencedirect.com/science/article/B6VP9-4WB3NFR-2/2/f6265d9cc2de6335ff6d9d10f15effed)
Abstract:
The gelatinization of native wheat starch granules in some monovalent salt solutions (i.e. sodium and potassium chlorides and nitrates) was studied as a function of type and concentration of electrolyte by different techniques. The granular swelling at different temperatures was derived on a macroscopic scale from the swelling volume, whereas particle size analysis yielded information on a microscopic scale. Crosscorrelation revealed a close relationship between both approaches. Differential scanning calori-metry (DSC) indicated that all studied monovalent salts had a similar (protective) effect at 0.1 M concentration. However, at higher concentrations, a markedly different effect was observed for chlorides as compared to nitrates. A highly similar tendency was also observed from the gelatinised starch viscosity: whereas the consistency coefficient gradually decreased with increasing chloride concentration, it displayed a minimum value at low nitrate concentrations followed by a steady increase at higher concentrations. The sensitivity of the swelling of native wheat starch granules to ions could be explained from a combination of a general electrolyte effect at low concentrations and specific ion effects (in line with the Hofmeister anion series) at higher concentrations.
Keywords: Starch; Particle size; Ions; Viscosity; DSC; Hofmeister

Yao Lv, Shu-zhong Gu, Dong-mei Guo, Valuing environmental externalities from rice-wheat farming in the lower reaches of the Yangtze River, Ecological Economics, In Press, Corrected Proof, Available online 4 May 2009, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2008.12.014.
(http://www.sciencedirect.com/science/article/B6VDY-4W6X3C2-1/2/873e654faf3eb045ecb378f9254a2628)
Abstract:
Environmental externalities generated by agriculture are attracting considerable attention. However, most research has focused either on environmental services that agriculture provides as a distinct ecosystem or the negative environmental impacts that agriculture imposes. Therefore, there is a great need to re-evaluate the all-round environmental roles of agriculture, to optimize environmental performance of agriculture and non-trade concerns in World Trade Organization (WTO) negotiations. By valuing the environmental externalities of agriculture, this article aims to heighten awareness of the environmental roles of agriculture to stimulate its implication in agricultural policy-making. The study presents estimates of economic values of environmental externalities from rice-wheat farming system in Zhenjiang, in aspects of greenhouse gas emissions, non-point source pollution, carbon sequestration and water containing capacity. We provide a step-by-step analytic procedure, with each step including measurement of physical dimensions and monetary evaluation. The former is based on a large-scale literature review, which provided a vital foundation for the monetary valuation. The results reveal that the values of greenhouse gas emissions from agricultural land, agricultural non-point source pollution, carbon sequestration by crop and soil, and the flood control function provided by agricultural land are estimated as: - US$3.61 x 107 a- 1, - US$4.59 x 106 a- 1, + US$2.30 x 109 a- 1 and + US$2.21 x 107 a- 1, respectively. The net value of environmental externalities is as high as + US$2.28 x 109 a- 1, representing 17.87% of local GDP and 4.12 times the total agricultural output value in 2006. The results suggest that crops and soil in Zhenjiang are the most important carbon sinks, and that agriculture in Zhenjiang has huge positive environmental externalities, although both greenhouse gas emissions from agricultural land and agricultural non-point sources pollution have negative environmental impacts.
Keywords: Agriculture; Environment; Externality; Evaluation

S.B. Revanappa, C.D. Nandini, P.V. Salimath, Structural characterisation of pentosans from hemicellulose B of wheat varieties with varying chapati-making quality, Food Chemistry, In Press, Accepted Manuscript, Available online 4 May 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.064.
(http://www.sciencedirect.com/science/article/B6T6R-4W6XW2X-B/2/d0774314a95243fd9def95542af9631c)
Abstract:
Wheat varieties, such as DWR-162 and GW-322 (good chapati-making quality), and MACS-2496 and HD-2189 (poor chapati-making quality), were used to study the structural features of pentosans. Structural features of the purified pentosans from hemicellulose B were elucidated by a combination of methods, such as methylation analysis, 1H-NMR, FT-IR, periodate oxidation, Smith degradation and optical rotation measurements. Pentosans from hemicellulose B were mainly arabinoxylan type polysaccharides with xylan backbone in [beta]-(1-->4) linkages. Mono, and di-substituted xylosyl residues were present in these polysaccharides. Variations in structural features of pentosans could be responsible for the differences in chapati-making qualities of wheat.
Keywords: Wheat; Chapati; Hemicellulose B; Pentosans; Arabinoxylans; Methylation

Li Day, Mi Xu, Leif Lundin, Tim J. Wooster, Interfacial properties of deamidated wheat protein in relation to its ability to stabilise oil-in-water emulsions, Food Hydrocolloids, In Press, Corrected Proof, Available online 4 May 2009, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2009.04.004.
(http://www.sciencedirect.com/science/article/B6VP9-4W6Y11J-1/2/5e5a7b541225c5d6779334c6685dca91)
Abstract:
Isolated wheat protein (IWP) is an acidic deamidated wheat protein. The deamidation process enhances the protein solubility at pHs greater than 6, and therefore its potential ability to act as a food emulsifier. The interfacial properties and the mechanism by which this protein stabilises oil-in-water emulsions were investigated by measuring the protein's absorbed layer thickness on latex particles, its interfacial rheology, and the colloidal and thermal stability of IWP stabilised emulsions. IWP forms a relatively thick interfacial layer of 18 nm upon adsorption onto latex beads, suggesting that the protein adsorbed with the long axis perpendicular to the surface, i.e. end-on, at a full protein coverage. The interfacial rheology measurement showed that IWP formed a relatively weak fluid-like interface. Similar to other protein emulsifiers, the colloidal stability of IWP emulsions is provided largely through electrostatic repulsion. Although IWP emulsions were sensitive to salt induced flocculation, the presence of excess protein in the aqueous phase (e.g. 4 wt%) was able to reduce the effect of salt screening (50 mM CaCl2) on a 25 wt% oil-in-water emulsion completely. The emulsions underwent minimal coalescence when droplets were in close contact, e.g. flocculated, because the interfacial layer of IWP provides a barrier to droplet coalescence, even in high salt environments. IWP emulsions were resistant to thermal treatment with no changes in particle size observed when the emulsions were heated (up to 90 [degree sign]C for 20 min) in the absence or the presence of 150 mM NaCl. The heat stability of IWP emulsions is thought to arise from the structure of IWP at the interface. A lack of free cysteines combined with few hydrophobic regions meat that there were minimal interactions between protein molecules adsorbed onto the same droplet or on neighbouring droplets. The unique interfacial properties of IWP, e.g. its physical layer thickness and the structure provide enhanced stability for emulsions against coalescence and heating.
Keywords: Deamidated wheat protein; Protein surface architecture; Interfacial layer thickness; Emulsion colloidal stability; Emulsion thermal stability

Yue-hua GONG, Xiao-hui JI, Jun-feng GAO, Grain Sink Strength Related to Carbon Staying in the Leaves of Hybrid Wheat XN901, Agricultural Sciences in China, Volume 8, Issue 5, May 2009, Pages 546-555, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60245-X.
(http://www.sciencedirect.com/science/article/B82XG-4WCSPB7-6/2/fd2af6d662ee02b33764fa9ce502737d)
Abstract:
XN901 is a K-type three-line hybrid wheat with a high yield potential, and its leaves and stem remaining green during grain maturation, suggesting much assimilate stay in leaves and stem. The grain water content, grain volume, carbohydrate content, and enzyme activity of sucose metabolism in the grain, as well as source-sink relationship were studied in order to investigate the physiological reason of the assimilate remaining in leaves and stem at the late stage. The results showed that the hybrid grains had more water and soluble sugar, higher activities of acid invertase and sucrose synthase at the early stage that led to a faster expansion growth, greater grain volume and faster starch synthesis at the early to mid stage of grain development. Also it had a longer period for actively filling. As a result, the grain weight and yield of the hybrid were increased by 14 and 15% respectively compared to that of Shaan 229. Additionally, the biomass of XN901 was 41.7% more than that of control, but its harvest index was 9% lower than Shaan 229. However, its lower activity of sucrose synthase indicated a lower sink activity at the late stage, resulting in a slow rate of filling and starch synthesis. Also, the hybrid wheat XN901 had a large source-sink ratio. It is the main reason for much assimilate remaining in the straw at the late stage and lower harvest index. Strengthening the sink activity and raising the harvest index should be the key means of improving the yield of hybrid wheat.
Keywords: hybrid wheat; stay-green; sink strength; sink activity; sink size

R.B. Singh, C.P.S. Chauhan, P.S. Minhas, Water production functions of wheat (Triticum aestivum L.) irrigated with saline and alkali waters using double-line source sprinkler system, Agricultural Water Management, Volume 96, Issue 5, May 2009, Pages 736-744, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.09.030.
(http://www.sciencedirect.com/science/article/B6T3X-4VP1CMW-1/2/30dc0e95cb02ff9cc1372472d6d8ce0e)
Abstract:
Expected yield losses as a function of quality and quantity of water applied for irrigation are required to formulate guidelines for the effective utilisation of marginal quality waters. In an experiment conducted during 2004-2006, double-line source sprinklers were used to determine the separate and interactive effects of saline and alkali irrigation waters on wheat (Triticum aestivum L.). The study included three water qualities: groundwater (GW; electrical conductivity of water, ECw 3.5 dS m-1; sodium adsorption ratio, SAR 9.8 mmol L-1; residual sodium carbonate, RSC, nil) available at the site, and two synthesized waters, saline (SW; ECw 9.4 dS m-1, SAR 10.3 mmol L-1; RSC nil) and alkali (AW; ECw 3.7 dS m-1, SAR 15.1 mmol L-1; RSC 9.6 meq. L-1). The depths of applied SW, AW, and GW per irrigation ranged from 0.7 to 3.5 cm; the depths of applied mixtures of GW with either SW (MSW) or AW (MAW) ranged from 3.2 to 5 cm. Thereby, the water applied for post-plant irrigations using either of GW, SW or AW ranged between 15.2 and 34.6 cm and 17.1 and 48.1 cm during 2004-2005 and 2005-2006, respectively and the range was 32.1-37.0 and 53.1-60.0 cm for MSW or MAW. Grain yields, when averaged for two years, ranged between 3.08 and 4.36 Mg ha-1, 2.57 and 3.70 Mg ha-1 and 2.73 and 3.74 Mg ha-1 with various quantities of water applied using GW, SW and AW, respectively, and between 3.47 and 3.75 Mg ha-1 and 3.63 and 3.77 Mg ha-1 for MSW and MAW, respectively. The water production functions developed for the two sets of water quality treatments could be represented as: RY = 0.528 + 0.843(WA/OPE) - 0.359(WA/OPE)2 - 0.027ECw + 0.44 x 10-2(WA/OPE) x ECw for SW (R2 = 0.63); RY = 0.446 + 0.816(OPE/WA) - 0.326(WA/OPE)2 - 0.0124RSC - 0.55 x 10-4(WA/OPE) x RSC for AW (R2 = 0.56). Here, RY, WA and OPE are the relative yields in reference to the

maximum yield obtained with GW, water applied for pre- and post-plant irrigations (cm), and open pan evaporation, respectively. Crop yield increased with increasing amount of applied water for all of the irrigation waters but the maximum yields as obtained with GW, could not be attained even with increased quantities of SW and AW. Increased frequency of irrigation with sprinklers reduced the rate of yield decline with increasing salinity in irrigation water. The sodium contents of plants increased with salinity/alkalinity of sprinkled waters as also with their quantities. Simultaneous decrease in potassium contents resulted in remarkable increase in Na:K ratio.
Keywords: Alkali water; Double-line sprinkler source; Na:K ratio; Saline water; Triticum aestivum L.; Water-yield relations

M.R. Khaledian, J.C. Mailhol, P. Ruelle, P. Rosique, Adapting PILOTE model for water and yield management under direct seeding system: The case of corn and durum wheat in a Mediterranean context, Agricultural Water Management, Volume 96, Issue 5, May 2009, Pages 757-770, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.10.011.
(http://www.sciencedirect.com/science/article/B6T3X-4V4625P-1/2/09ba8e1a3171eb36cdcee36e39cb922d)
Abstract:
Crop models are useful tools for integrating knowledge of biophysical processes governing the plant-soil-atmosphere system. But few of them are easily usable for water and yield management especially under specific cropping systems such as direct seeding. Direct seeding into mulch (DSM) is an alternative for conventional tillage (CT). DSM modifies soil properties and creates a different microclimate from CT. So that, we should consequently consider these new conditions to develop or to adapt models. The aim of this study was to calibrate and validate the PILOTE [Mailhol, J.C., Olufayo, A.A., Ruelle, P., 1997. Sorghum and sunflower evapotranspiration and yield from simulated leaf area index. Agric. Water Manag. 35, 167-182; Mailhol, J.C., Zairi A., Slatni A., Ben Nouma, B., El Amami, H., 2004. Analysis of irrigation systems and irrigation strategies for durum wheat in Tunisia. Agric. Water Manag. 70, 19-37], an operative crop model based on the leaf area index (LAI) simulation, for corn and durum wheat in both DSM and CT systems in Mediterranean climate. In DSM case, simple model modifications were proposed. This modified PILOTE version accounts for mulch and its impact on soil evaporation. In addition root progression was modified to account for lower soil temperatures in DSM for winter crops. PILOTE was calibrated and validated against field data collected from a 7-year trial at the experimental station of Lavalette (SE of France). Results indicated that PILOTE satisfactorily simulates LAI, soil water reserve (SWR), grain yield, and dry matter yield in both systems. The minimum coefficient of efficiency for SWR was 0.90. This new version of PILOTE can thus be used to manage water and yield under CT and DSM systems in Mediterranean climate.
Keywords: Crop model; Soil water balance; Direct seeding; Conventional tillage

Qing-Nian Cai, Xiao-Mu Ma, Xin Zhao, Ya-Zhong Cao, Xiao-Qin Yang, Effects of host plant resistance on insect pests and its parasitoid: A case study of wheat-aphid-parasitoid system, Biological Control, Volume 49, Issue 2, May 2009, Pages 134-138, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.12.009.
(http://www.sciencedirect.com/science/article/B6WBP-4V8GB4W-2/2/63cc610a68ffecb16257ff634f98585e)
Abstract:
Host plant resistance can effectively reduce pest insect populations, but a concern is whether plant resistance could also negatively affect the natural enemies of the insect pests. In this paper the effect of three wheat cultivars on the population of an aphid species, Sitobion avenae (F.) and it's parasitoids, Aphidius spp., were investigated in the field experiments in 2004 and 2005. Percentage of parasitized aphids at peak sampling date was also recorded. Both the aphid and parasitoid populations varied in the three wheat cultivars at the sampling dates. The density peak

of parasitoid population in all the three wheat cultivars was 9-12 days behind the density peak of the aphid population. At the population peaks both the aphid and parasitoid densities were significantly higher in the susceptible than in the resistant cultivars. Furthermore, the accumulative parasitism was significantly higher in the resistant than in the susceptible cultivar, and level of resistance of the wheat cultivars had no effect on aphid mummy weight parasitized by A. spp. These results suggested that the host plant resistance against aphids enhanced the parasitism of aphid species S. avenae (F.) by its parasitoid A. spp. in wheat field.
Keywords: Aphidius spp.; Sitobion avenae; Tritrophic interaction; Wheat

Mai Ostergaard Petersen, Jan Larsen, Mette Hedegaard Thomsen, Optimization of hydrothermal pretreatment of wheat straw for production of bioethanol at low water consumption without addition of chemicals, Biomass and Bioenergy, Volume 33, Issue 5, May 2009, Pages 834-840, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2009.01.004.
(http://www.sciencedirect.com/science/article/B6V22-4VGVVB6-1/2/08eb8b939a1bfed55bfd78e91c569d96)
Abstract:
In the IBUS process (Integrated Biomass Utilization System) lignocellulosic biomass is converted into ethanol at high dry matter content without addition of chemicals and with a strong focus on energy efficiency. This study describes optimization of continuous hydrothermal pretreatment of wheat straw at pilot scale (up to 100 kg h-1) where six different pretreatment conditions have been investigated; all pretreatment conditions have been evaluated with regards to recovery of sugars after pretreatment (both C5 and C6) and convertibility of the cellulosic part of the fibers into ethanol.
The experiments show that the optimum pretreatment parameters are 195 [degree sign]C for 6-12 min. At these conditions, a total of app. 70% of the hemicellulose is recovered, 93-94% of the cellulose is recovered in the fibers and app. 89% of the cellulose in the fibers can be converted into ethanol by commercial cellulase mixtures - increasing to 92% when adding a commercial xylanase.
Keywords: IBUS; Hydrothermal; Pretreatment; Bioethanol; Enzymatic hydrolysis; High dry matter; Pilot plant; Triticum aestivum L.

Prasad Kaparaju, Maria Serrano, Anne Belinda Thomsen, Prawit Kongjan, Irini Angelidaki, Bioethanol, biohydrogen and biogas production from wheat straw in a biorefinery concept, Bioresource Technology, Volume 100, Issue 9, May 2009, Pages 2562-2568, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.11.011.
(http://www.sciencedirect.com/science/article/B6V24-4VB5582-1/2/16ce993c529ef19fc69442b5f74e06ea)
Abstract:
The production of bioethanol, biohydrogen and biogas from wheat straw was investigated within a biorefinery framework. Initially, wheat straw was hydrothermally liberated to a cellulose rich fiber fraction and a hemicellulose rich liquid fraction (hydrolysate). Enzymatic hydrolysis and subsequent fermentation of cellulose yielded 0.41 g-ethanol/g-glucose, while dark fermentation of hydrolysate produced 178.0 ml-H2/g-sugars. The effluents from both bioethanol and biohydrogen processes were further used to produce methane with the yields of 0.324 and 0.381 m3/kg volatile solids (VS)added, respectively. Additionally, evaluation of six different wheat straw-to-biofuel production scenaria showed that either use of wheat straw for biogas production or multi-fuel production were the energetically most efficient processes compared to production of mono-fuel such as bioethanol when fermenting C6 sugars alone. Thus, multiple biofuels production from wheat straw can increase the efficiency for material and energy and can presumably be more economical process for biomass utilization.
Keywords: Biorefinery; Bioethanol; Biogas; Biohydrogen; Hydrothermal pretreatment

D.S. Narvankar, C.B. Singh, D.S. Jayas, N.D.G. White, Assessment of soft X-ray imaging for detection of fungal infection in wheat, Biosystems Engineering, Volume 103, Issue 1, May 2009, Pages 49-56, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.01.016.
(http://www.sciencedirect.com/science/article/B6WXV-4VXCG2R-1/2/12bb5bc246a92723bce47f648d235b1e)
Abstract:
The potential of soft X-ray imaging to detect fungal infection in wheat was investigated. Healthy wheat kernels and kernels infected with the common storage fungi namely Aspergillus niger, A. glaucus group, and Penicillium spp. were scanned using a soft X-ray imaging system and algorithms were developed to extract the image features and for classification. A total of 34 image features (maximum, minimum, mean, median, variance, standard deviation, and 28 grey-level co-occurrence matrix (GLCM) features) were extracted and given as input to statistical discriminant classifiers (linear, quadratic, and Mahalanobis) and back-propagation neural network (BPNN) classifier. A two-class Mahalanobis discriminant classifier classified 92.2-98.9% fungal-infected wheat kernels. Linear discriminant classifier gave better results than other statistical (quadratic and Mahalanobis) and neural network classifiers in identifying healthy kernels with more than 82% classification accuracy. In most of the cases, the statistical classifiers gave better classification accuracies and lower false positive errors than the BPNN classifier.

Lingan Kong, Jisheng Si, Bo Feng, Shengdong Li, Fahong Wang, Ken Sayre, Differential responses of two types of winter wheat (Triticum aestivum L.) to autumn- and spring-applied mesosulfuron-methyl, Crop Protection, Volume 28, Issue 5, May 2009, Pages 387-392, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.12.008.
(http://www.sciencedirect.com/science/article/B6T5T-4VCNDV9-1/2/5c676be313fe8a2463bdec79c00b011b)
Abstract:
Field experiments were conducted in the 2005/2006 and 2006/2007 crop seasons to evaluate the tolerance of hard winter wheat (HWW) and soft winter wheat (SWW) varieties to post-emergence mesosulfuron-methyl treatment. The application of mesosulfuron-methyl at 11.25 g a.i. ha-1 plus a noninonic surfactant at 252 g a.i. ha-1 to three HWW and three SWW varieties in either autumn (Zadoks stage 14-15) or spring (Zadoks stage 24-25) resulted in visible injury, including chlorisis, stunting and leaf deformities. The greatest injury occurred at fourteen days after treatment (DAT) for all wheat varieties. All varieties showed the same initial sensitivity to herbicide treatment, but differed significantly in their recovery from plant damages. The HWW varieties recovered more successfully from spring-applied herbicide than the SWW varieties; conversely, the SWW varieties recovered more rapidly from damage caused by autumn-applied herbicide than the HWW varieties. Normalized Difference Vegetative Index (NDVI) values were severely affected by autumn herbicide application for HWW varieties and spring application for SWW varieties. Autumn herbicide application for SWW varieties and spring herbicide application for HWW varieties produced higher grain yields. Based on these data, we conclude that applying mesosulfuron-methyl plus a noninonic surfactant in autumn for SWW varieties and in spring for HWW varieties is optimal, and that application timing has profound implications for herbicide tolerance and production of wheat.
Keywords: Application timing; Hard winter wheat; Mesosulfuron-methyl; NDVI; Soft winter wheat; Visible injury

L.Y. Zhao, J.L. Chen, D.F. Cheng, J.R. Sun, Y. Liu, Z. Tian, Biochemical and molecular characterizations of Sitobion avenae-induced wheat defense responses, Crop Protection, Volume 28, Issue 5, May 2009, Pages 435-442, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.01.005.

(http://www.sciencedirect.com/science/article/B6T5T-4VM2K4S-1/2/d9af489a8712274c7e31324fe29a6ab9)
Abstract:
In this experiment, the aphid-wheat interaction system was chosen to study the changes in activity levels of key enzymes [lipoxygenase (LOX), polyphenoloxidase (PPO), phenylalanine ammonialyse (PAL) and [beta]-1,3-glucanase] and in transcript level of key defense genes [encoding farnesyl pyrophosphate synthetase (fps), encoding allene oxide synthase (aos), and encoding phenylalanine ammonialyse (pal)] under pressure of aphid-feeding, aphid-induced volatiles, as well as specific volatiles using enzymes assay, RT-PCR and real-time quantitative PCR techniques. At the same time, the induction of enzymatic and transcript levels of defense genes with artificial wounding, wounding-induced volatiles and inductive chemical agents (jasmonic acid and methyl salicylate) were also studied. Our results showed that the activities of key enzymes which belong to both jasmonic acid (JA) and salicylic acid (SA)-signaling pathways increased significantly with aphid-feeding. The relative transcript levels of key defense genes in the signaling pathways were also enhanced. So we propose that aphid-feeding could activate both jasmonic acid (JA) and salicylic acid (SA)-signaling transduction pathways. Mechanical wounding and aphid-feeding are not equivalent. Sitobion avenae-induced volatiles elicit the transcript of all three defense genes in neighboring plants, suggesting that the volatiles emitted from aphid-infested plants might induce the activity of LOX followed by activating the JA-signaling pathway and the transcript level of multiple defense genes that JA mediates. 6-Methyl-5-hepten-2-one, 2-tridecanone and (E)-2-hexen-1-ol in S. avenae-induced volatiles not only activated the transcript level of defense genes, but also inhibited aphid-feeding behavior and population growth.
Keywords: Sitobion avenae; Real-time quantitative PCR; Volatiles; Induced defense pathway in wheat plant; Jasmonic acid; Salicylic acid

Nader Soltani, Christy Shropshire, Peter H. Sikkema, Sensitivity of winter wheat to preplant and preemergence glyphosate tankmixes, Crop Protection, Volume 28, Issue 5, May 2009, Pages 449-452, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.01.004.
(http://www.sciencedirect.com/science/article/B6T5T-4VM2K4S-2/2/c124d300e4e3ab4869426b71c9268016)
Abstract:
Field experiments were established at the Huron Research Station and at the University of Guelph Ridgetown Campus in the autumn of 2004 and 2005 to evaluate the tolerance of winter wheat to tankmixes of glyphosate plus either amitrole, dicamba, dicamba/diflufenzopyr, 2,4-D amine, 2,4-D ester, chlorimuron-ethyl or thifensulfuron-methyl/tribenuron-methyl applied either preplant (PP) or preemergence (PRE). Contrasts comparing PP vs PRE treatments showed no difference in visible injury, plant height and yield between application timings. The tankmixes of glyphosate (1800 g ha-1) plus either amitrole (1155 g ha-1), dicamba (300 g ha-1), 2,4-D amine (700 g ha-1), 2,4-D ester (700 g ha-1) or thifensulfuron-methyl/tribenuron-methyl (15 g ha-1) caused minimal (less than 6%) and transient visible injury in winter wheat. In addition, these tankmixes had no effect on plant height and yield. The tankmix of glyphosate (1800 g ha-1) with dicamba/diflufenzopyr (200 g ha-1) or chlorimuron-ethyl (9 g ha-1) caused as much as 8 and 18% visible injury in winter wheat, respectively. Glyphosate (1800 g ha-1) plus dicamba/diflufenzopyr (200 g ha-1) did not affect plant height but glyphosate plus chlorimuron-ethyl reduced plant height 11%. Yield was reduced 15% when glyphosate was tankmixed with dicamba/diflufenzopyr and 26% when glyphosate was tankmixed with chlorimuron-ethyl.
Keywords: Glyphosate; Herbicide tank mixtures; Preemergence; Preplant; Tolerance; Yield

Janusz Bogdan, Barbara Zagdanska, Alterations in sugar metabolism coincide with a transition of wheat seedlings to dehydration intolerance, Environmental and Experimental Botany, Volume 66, Issue 2, May 2009, Pages 186-194, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.02.013.

(http://www.sciencedirect.com/science/article/B6T66-4VTVR0H-2/2/9ecb114877f73feb0312d953455aa026)
Abstract:
Wheat seedlings are tolerant to dehydration up to the fourth day of germination. In the following days, appearance of the first leaf from the coleoptile coincides with development of seedling susceptibility to water deficiency. Glucose, at concentration as low as 5 mM, considerably increased survival of the 6-day-old seedlings, whereas mannose at the same concentration significantly decreased survival of either 4- or 6-day-old seedlings. The total relative capacity for sucrose metabolism, estimated as sucrose phosphate synthase (SPS)/sucrose synthase (SS) + acid invertase (AI) ratio was almost twofold higher in 6-day-old seedlings than in 4-day-old seedlings and almost threefold higher in dehydrated and rehydrated older seedlings than in the younger ones. Although hydrolysis of sucrose was also more intensive in older seedlings, the character of the hydrolytic process was different. In the 4-day-old seedlings the activity of SS prevailed, while in the 6-day-old seedlings AI was a dominant hydrolytic enzyme with SS playing a marginal role. These differences were not associated with the activities of hexokinase (HXK) and fructokinase (FK), since changes in the time course of these enzymatic activities and the levels of hexose phosphates were the same, irrespective of the seedling age. Seedling dehydration up to 50% water saturation deficit (WSD) resulted in a transiently increased activity of HXK and FK, but further development of water deficit inhibited the activity of both investigating enzymes almost completely and depleted the contents of glucose-6-phosphate and fructose-6-phosphate to practically negligible level. The observed dehydration-induced inhibition of HXK and FK activity was easily reversible. It is proposed that the lower intensity of invertase-hexokinase pathway of sucrose catabolism and the AI/SS balance associated with higher dehydration tolerance of wheat seedlings seems to be crucial for the regulation of dehydration tolerance level.
Keywords: Dehydration tolerance; Seedlings; Sugar metabolism; Wheat

Patrizia Rampino, Giovanni Mita, Stefano Pataleo, Mariarosaria De Pascali, Natale Di Fonzo, Carla Perrotta, Acquisition of thermotolerance and HSP gene expression in durum wheat (Triticum durum Desf.) cultivars, Environmental and Experimental Botany, Volume 66, Issue 2, May 2009, Pages 257-264, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.04.001.
(http://www.sciencedirect.com/science/article/B6T66-4W3HX7B-1/2/e2c9a07afadc029886e2593bb7a0087a)
Abstract:
Plants are strongly affected by heat stress, which they overcome by modifying several physiological and biochemical mechanisms. At the cellular and molecular levels, the synthesis of heat shock proteins (HSPs) is essential in preventing or minimising the deleterious effect of high temperature. Plant responses to high temperatures are mediated by both their inherent ability to survive known as basal thermotolerance, and their ability to acquire thermotolerance after acclimation. A major aspect of the acclimation response involves the expression of HSP genes. Different Triticum durum cultivars were characterised for their response to high temperature at the physiological and molecular levels. Determination of cell membrane stability for both basal and acquired thermotolerance, and HSP gene expression analysis were performed. The two genotypes which contrasted most in their ability to acquire thermotolerance were exposed to different stress conditions and the expression of HSP101C and four small HSP genes was analysed. Differences in HSP transcripts accumulation were observed during the acclimation treatments. There is substantial evidence that induction of HSP gene expression has a role in the acquisition of thermotolerance; moreover, the accumulation of mitochondrial HSP transcripts appears to be related to the acquisition of thermotolerance.
Keywords: Acquired thermotolerance; Heat shock proteins; Basal thermotolerance; Stress response; Triticum durum

Brian S. Atkinson, Debbie L. Sparkes, Sacha J. Mooney, The impact of soil structure on the establishment of winter wheat (Triticum aestivum), European Journal of Agronomy, Volume 30, Issue 4, May 2009, Pages 243-257, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.12.002.
(http://www.sciencedirect.com/science/article/B6T67-4VFBYFS-1/2/cb9cd16b1c38d524c4f7a9be3a392899)
Abstract:
Soil physical properties affect the establishment of crops; these properties are influenced by cultivation employed during seedbed preparation and vary greatly depending upon the intensity of cultivations. However, there is little quantified data concerning the influence of cultivation on the precise soil structural arrangement of the seedbed and the effects of this on crop establishment. The dynamics of soil structure at the meso-scale (10-1000 [mu]m), on a range of seedbeds and how they relate to crop establishment are considered in this paper. Significant interactions between cultivation techniques including soil structural properties and the interaction with crop establishment were identified. The relationship between soil structure and crop establishment was highly significant, with increased pore space reducing final establishment numbers. An improvement to a previous model (soil quality of establishment (SQE)) was developed following the addition of soil structural properties, accounting for an improved predictability of 14% of the variation across soil texture (sandy loam and clay loam) from ca. 56% to ca. 70%.
Keywords: Soil quality; Tillage; Soil structure; Seedbed; Establishment

Massimo Blandino, Amedeo Reyneri, Effect of fungicide and foliar fertilizer application to winter wheat at anthesis on flag leaf senescence, grain yield, flour bread-making quality and DON contamination, European Journal of Agronomy, Volume 30, Issue 4, May 2009, Pages 275-282, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.12.005.
(http://www.sciencedirect.com/science/article/B6T67-4VHS7TT-1/2/7a12af31038bce9e6bc13d24b964157b)
Abstract:
In this study, field experiments have been conducted over three growing seasons to evaluate the effect of fungicides (triazoles and strobilurins) and a foliar fertilizer application to winter wheat at anthesis on flag leaf senescence, grain yield, bread-making quality, Fusarium head blight (FHB) disease and deoxynivalenol (DON) contamination.
Flag leaf greenness was significantly influenced by the fungicide application. A delay in flag leaf senescence following triazole use did not increase grain yield. No effects of fungicide application on protein concentration were recorded. The application of strobilurin to a triazole programme did not significantly delay senescence of the flag leaf or increased yield, compared to the triazole-only application, while a consistent benefit was observed for dough strength (W). The triazole application led to significantly lower FHB symptoms and DON contamination, while the triazole-strobilurin fungicides programme led to an increase in DON contents, that were often higher than the untreated controls.
Grain yield and quality were improved when a foliar feed containing macro- and micro-nutrients was added to a triazole fungicide programme, with no additional risk for DON contamination. Compared to the strobilurin fungicide application, the foliar fertilizer led to a longer delay of the flag leaf senescence and higher bread-making quality.
Keywords: Wheat; Fungicide; Foliar fertilizer; Flag leaf greenness; Bread-making quality; Deoxynivalenol

Yunfu Gu, Xiaoping Zhang, Shihua Tu, Kristina Lindstrom, Soil microbial biomass, crop yields, and bacterial community structure as affected by long-term fertilizer treatments under wheat-rice cropping, European Journal of Soil Biology, Volume 45, Issue 3, May-June 2009, Pages 239-246, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2009.02.005.

(http://www.sciencedirect.com/science/article/B6VR7-4VT59RS-1/2/e2f6c293e5aad883c24bd826ef6e9d12)
Abstract:
Soil microbial biomass carbon (SMBC) and nitrogen (SMBN), soil microbial community structure, and crop yields were studied in a long-term (1982-2004) fertilization experiment carried out in Suining, Sichuan province of PR China. Eight treatments included three chemical fertilizer (CF) treatments (N, NP, NPK), three CF + farmyard manure (M) treatments (NM, NPM, NPKM), M alone and no fertilizer (CK) as control. The results showed that the soil microbial biomass was higher in soil treated with CFM than in soil treated with CF alone, and that NPKM gave the highest rice and wheat yields. The SMBC and SMBN were higher after rice than those after wheat cropping. SMBC correlated closely with soil organic matter. Average yields of wheat and rice for 22 years were higher and more stable in the fertilized plots than in control plots. Bacterial community structure was analyzed by PCR-DGGE targeting eubacterial 16S rRNA genes. A higher diversity of the soil bacterial community was found in soil amended with CFM than in other fertilizer treatments. Some specific band emerged in the soil amended with M. The highest diversity of bacterial communities was found in the NPKM treated soil. The bacterial community structures differed in rice and wheat plots. Sequencing of PCR products separated in DGGE showed that some of the common and dominant bands were closely related to Aquicella lusitana and to Acidobacteria. This study demonstrated that mixed application of N, P, and K with additional M amendment increased soil microbial biomass, diversified the bacterial communities and maintained the crop production in the Calcareous Purplish Paddy soil.
Keywords: Long-term experiment; Microbial community; Biomass; Genetic fingerprint; Wheat; Rice

B.T. Manu, U.J.S. Prasada Rao, Calcium modulated activity enhancement and thermal stability study of a cationic peroxidase purified from wheat bran, Food Chemistry, Volume 114, Issue 1, 1 May 2009, Pages 66-71, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.028.
(http://www.sciencedirect.com/science/article/B6T6R-4TFM7M6-1/2/4dae8d0cc3b7a582b54c4970dfda2625)
Abstract:
A cationic form of peroxidase was purified from wheat bran, a major by-product of wheat milling industry to near homogeneity by ammonium sulphate precipitation, anion exchange, and cation exchange and gel filtration chromatography. It was a glycoprotein with a molecular weight of 44 kDa, pH optimum of 4.8 and carbohydrate content of 13.8%. The enzyme showed Ping-Pong Bi Bi type catalysis. Inclusion of calcium during purification increased the specific activity and yield of the enzyme. Activity of purified enzyme was enhanced by calcium more than 400% in a biphasic manner. Purified enzyme exhibited increased thermal stability when calcium was added. There was no change in tryptophan fluorescence by the addition of calcium, but the haem absorption at 403 nm showed a change indicating an alteration in the haem environment. Calcium is essential for maintaining the haem structure, enzymatic activity and thermal stability of wheat bran peroxidase.
Keywords: Purification of peroxidase; Wheat bran peroxidase; Cationic peroxidase; Haem; Calcium; Thermal stability

Shaomin Sun, Yihu Song, Qiang Zheng, Rheological behavior of heat-induced wheat gliadin gel, Food Hydrocolloids, Volume 23, Issue 3, May 2009, Pages 1054-1056, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2008.04.002.
(http://www.sciencedirect.com/science/article/B6VP9-4SK6310-5/2/21e12d28dc720e953d6757bb478385fe)
Abstract:
Wheat gliadin gel is prepared for the first time through heating alkaline solution of propanol/water (50/50, v/v) at pH = 9.3 and 50 [degree sign]C. Dynamic rheological tests were performed to

characterize the gelation time and the number of elastically effective chains of the gliadin gel. Scanning electron microscope was used to observe the morphology of the freeze-dried gel.
Keywords: Gliadin; Gel; Rheology; Morphology

A. Prandini, S. Sigolo, L. Filippi, P. Battilani, G. Piva, Review of predictive models for Fusarium head blight and related mycotoxin contamination in wheat, Food and Chemical Toxicology, Volume 47, Issue 5, Early Awareness of Emerging Risks to Food and Feed Safety, May 2009, Pages 927-931, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.06.010.
(http://www.sciencedirect.com/science/article/B6T6P-4SVKSV1-1/2/b125b7191af8ba48ccf67afcf428e162)
Abstract:
Mould growth and mycotoxin production are related to plant stress caused by environmental factors such as: extreme weather; insect damage; inadequate storage conditions and incorrect fertilization; these predispose plants to mycotoxin contamination in the field. Fusarium species infect wheat during the flowering period. In addition to losses of yield, these fungi can also synthesize toxic components (mycotoxins) in suitable environmental conditions, thus threatening animal and human health. Given the severe consequences and the fact that mycotoxins affect production throughout the world, the ability to predict Fusarium head blight (FHB) and deoxynivalenol (DON) and other mycotoxin contamination is important to reduce the year-to-year risk for producers. Owing to these dangerous consequences in Argentina, Belgium, Canada, Italy, the United States and in Europe, computer models, based on weather variables (temperature, rainfall and moisture level), have been developed to predict the occurrence of FHB and DON contamination in wheat.
Keywords: FHB; Mycotoxins; Predictive models; Wheat

S.E. Lerner, M.A. Kolman, W.J. Rogers, Quality and endosperm storage protein variation in Argentinean grown bread wheat. I. Allelic diversity and discrimination between cultivars, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 337-345, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.04.003.
(http://www.sciencedirect.com/science/article/B6WHK-4SCDB13-3/2/b73bf9906c60950ff2087b3ea9827925)
Abstract:
Genetic variability for endosperm storage proteins was analysed in 119 Argentinean grown bread wheat cultivars. For the HMW-GS, three, six and two alleles were observed at the Glu-A1, Glu-B1 and Glu-D1 loci, respectively, in 17 allelic combinations. The majority of these combinations were considered to be associated with good quality. For the LMW-GS, eight, seven and four alleles were provisionally observed at the Glu-A3, Glu-B3 and Glu-D3 loci, respectively, in 51 allelic combinations. Regarding quality, the alleles present at Glu-D3 were mainly those previously shown to be associated with good quality, whereas at Glu-A3 and Glu-B3, some alleles previously associated with poor quality were present at high frequency. Relatively few cultivars carried combinations for all the loci studied that would be expected to be associated with high quality. The mean genetic variation index (H) observed for the glutenin loci (0.589) was similar to values observed in other collections. Unweighted pair-group method using arithmetic averages (UPGMA) of the six loci plus the Chinese Spring-Cheyenne CSS-CNN difference showed that the 119 cultivars fell into 93 distinct combinations. For complete discrimination between all cultivars they would have to be analysed for additional loci. There remains scope for varietal quality improvement within this germplasm pool.
Keywords: HMW-GS; LMW-GS; Genetic variation index; UPGMA

Z. Maache-Rezzoug, T. Maugard, I. Zarguili, E. Bezzine, M.-N. El Marzouki, C. Loisel, Effect of instantaneous controlled pressure drop (DIC) on physicochemical properties of wheat, waxy and

standard maize starches, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 346-353, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.10.005.
(http://www.sciencedirect.com/science/article/B6WHK-4TW6HR3-1/2/45480c5cea500757435d23415f16d677)
Abstract:
Standard maize starch (SMS), waxy maize starch (WMS) and wheat starch (WTS) were hydrothermally treated by the Instantaneous Controlled Pressure Drop (DIC) process. This process consists in a short pressurisation obtained by the injection of saturated steam at fixed pressure during a predetermined time followed by a sudden pressure drop towards vacuum. The effects of DIC conditions on thermal characteristics, enzyme susceptibility, pasting (Brabender) and rheological properties of treated starches were investigated. For treated starches, an increase of transition temperatures (To and Tp), a narrowing of the width of gelatinization endotherms and a decrease of the gelatinization enthalpies ([Delta]H) were observed as the severity of processing conditions increased. WMS, SMS and WTS showed a significant increase in enzymatic hydrolysis after treatment. The saccharification yield showed an increase from 19% (native) to 44%, 21% (native) to 59% and 55% (native) to 79% for SMS, WMS and WTS, respectively. The study suggests that the structural modifications due to the previous DIC treatment influence the in-vitro hydrolysis and the access to the ultrastructure of starch granules; the susceptibility to hydrolysis increases from SMS to WMS and WTS. For all treated starches, the decrease in peak viscosity and in apparent viscosity was related to the processing conditions.
Keywords: Starch; DIC hydrothermal treatment; Gelatinization; Enzyme hydrolysis

M.R. Martelli, C. Barron, P. Delaporte, G. Viennois, X. Rouau, A. Sadoudi, Pulsed laser ablation: A new approach to reveal wheat outer layer properties, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 354-362, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.007.
(http://www.sciencedirect.com/science/article/B6WHK-4VGF3T8-1/2/4009e1c9b2551b58350589d551c02f2c)
Abstract:
A new methodology based on pulsed lasers has been developed in order to estimate wheat outer layer mechanical properties without sample preparation. Laser experiments were carried out with an Argon Fluoride ([lambda] = 193 nm) excimer laser source delivering pulses of 15 ns duration. Wheat grains from two cultivars were irradiated by single laser pulses with a quasi-uniform irradiation and two fluences (2.5 and 5 J cm-2). The ablation flux was characterized by environmental scanning electron microscopy before measuring the removed material on cross-sections observed by confocal scanning laser microscopy. Specific image treatment was carried out to obtain the ablation flux (amount of removed matter per pulse). Pericarp, seed coat and aleurone layer were gradually ablated under the laser conditions used in this work. Their ablation thresholds were different and could be related to tissue cohesion. Specific behaviour of seed coat layer (8 [mu]m) could be emphasised with this technique. Pulsed laser ablation could be a potential methodology to reveal indirectly wheat grain layer cohesion.
Keywords: Wheat grain; Bran; Aleurone layer; Cohesion

R.M. Patil, M.D. Oak, S.A. Tamhankar, V.S. Rao, Molecular mapping of QTLs for gluten strength as measured by sedimentation volume and mixograph in durum wheat (Triticum turgidum L. ssp durum), Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 378-386, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.01.001.
(http://www.sciencedirect.com/science/article/B6WHK-4VDS8D5-1/2/ceb8c5c277fb1482faed150fbeecb01a)
Abstract:
Quantitative trait loci (QTLs) responsible for gluten strength measured by SDS-sedimentation volume (SV), mixograph and grain protein content (GPC) were located on the molecular linkage

map of a durum wheat recombinant inbred line population. QSv.macs-1B.1 flanked by Xgwm550-Glu-B3 was the most consistent QTL for SV identified in all the environments. The same QTL was also associated with mixograph peak energy, peak time and total energy. The Glu-B1 locus was at the center of another QTL responsible for SV, while, Glu-B2 influenced SV as well as mixograph peak energy and peak time. Apart from glutenin coding loci, QTLs influencing mixing parameters and GPC were located in three other marker intervals Xwmc48.2-Xpsp3030 (4B), Xgwm573-Xbarc231.1 (7A) and Xgwm46-Xgwm540.1 (7B). A total of 26 main effect QTLs and 10 digenic epistatic interactions (QQ) for quality traits were distributed over 11 chromosomes. Out of these, seven main effect QTLs and three QQ interactions were involved in interactions with environments (QE, QQE). The results indicated that along with chromosome 1B, chromosomes 4B, 7A and 7B are also important for improvement of gluten strength and GPC in durum wheat.
Keywords: Durum; Gluten strength; QTL; Quality

G. Rios, L. Pinson-Gadais, J. Abecassis, N. Zakhia-Rozis, V. Lullien-Pellerin, Assessment of dehulling efficiency to reduce deoxynivalenol and Fusarium level in durum wheat grains, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 387-392, ISSN 0733-5210, DOI: 10.1016/j.jcs.2009.01.003.
(http://www.sciencedirect.com/science/article/B6WHK-4VKDMTV-1/2/ce72abbbbb4fc1e749fb873f7abf0d70)
Abstract:
The potential of dehulling to reduce mycotoxin level in two durum wheat grain samples naturally infected by Fusarium and showing contrasting levels of deoxynivalenol was examined using a pearling process. Curve plots expressing mycotoxin decrease against grain mass removal were shown to display a biphasic behavior. A sharp reduction of the deoxynivalenol level was observed at the first pearling steps (i.e. a 45% loss of deoxynivalenol for a 10% grain tissue removal) followed by a slower decrease to reach a level below 30% of remaining mycotoxin when about 35% of the grain tissue was removed. The same type of effect was also observed for reduction of Fusarium in grains analyzed by real-time polymerase chain reaction. Changes in the slope of the curves corresponding either to mycotoxin or fungi loss were found to be located between testa and aleurone layers or in the aleurone tissue, which is in accordance with the current knowledge of the fungi penetration in wheat grains. Furthermore the pearling process was proved to be more efficient than milling to reduce the grain deoxynivalenol content. These results were related to the different ways used by these distinct technologies for grain fractionation.
Keywords: Fusarium; Mycotoxins; Pearling; Wheat

G. Venora, O. Grillo, R. Saccone, Quality assessment of durum wheat storage centres in Sicily: Evaluation of vitreous, starchy and shrunken kernels using an image analysis system, Journal of Cereal Science, Volume 49, Issue 3, May 2009, Pages 429-440, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.006.
(http://www.sciencedirect.com/science/article/B6WHK-4VC7DWP-1/2/1d3cfb42a49d6754667690bbb49788a7)
Abstract:
The proportion of vitreous kernels in a sample is an internationally recognized specification for determining the value of durum wheat (Triticum durum Desf.). Vitreous kernels are mostly related to quality, which affects the pasta performance during cooking. Vitreousness and the amount of shrunken kernels are visually assessed during the grading process. This assessment is subjective and tedious.
A machine vision system was developed to determine the percentage of vitreous, starchy, piebald and shrunken kernels in approximately 100 grain samples, using a trans-illuminated image of one layer of non-singulated kernels (in bulk) acquired by a digital camera. Classification models were developed with stepwise Linear Discriminant Analysis, as well as an on-line Bayesian classifier

integrated with an image analysis system. The overall correct classification in Starchy classifier was high 98.58% in the Training set, made up of 6679 grains, following the Linear Discriminant Analysis classification, of 30 Italian cultivars harvested in 2005 in three localities. An independent Test set was constituted by samples collected in 30 Sicilian Storage Centres in the 2007 harvest season. The overall classification was 96.03%. For the Shrunken classifier 95.27% of the Training set and 99.58% of the Test set were correctly classified. The image analysis system was more reliable than the human inspectors who validated the system, both for the same samples measured many times and at different times.
Keywords: Storage centres; Image analysis; Durum wheat; Kernels; Vitreousness; Bayesian classifiers; Linear Discriminant Analysis

A. Mazzenga, M. Gianesella, M. Brscic, G. Cozzi, Feeding behaviour, diet digestibility, rumen fluid and metabolic parameters of beef cattle fed total mixed rations with a stepped substitution of wheat straw with maize silage, Livestock Science, Volume 122, Issue 1, May 2009, Pages 16-23, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.07.015.
(http://www.sciencedirect.com/science/article/B7XNX-4TC8J6X-3/2/3948fda0a54003548da56ac29d63d7a7)
Abstract:
In order to verify the possibility of using maize silage (MS) as sole forage in beef cattle diets, four isofibrous diets were formulated with stepped substitution of wheat straw (WS) with MS. The four diets, MS0 (20WS:0MS as percentage of dry matter (DM) of the total diet), MS20 (10WS:20MS), MS35 (5WS:35MS) and MS50 (0WS:50MS) were fed as total mixed rations (TMR) to 4 Simmental bulls (384 +/- 45 kg initial live weight) according to a latin square design with periods of 28 days. Diets were isocaloric and isonitrogenous and at the time of their formulation the stepped substitution of WS with MS allowed to progressively reduce the need for energy concentrates increasing the forage:concentrate ratio. The increasing inclusion of MS to replace WS affected also the particle size distribution of the diets with a significant increase of the percentage of particles retained by a 8 mm sieve ($P < 0.001$). However, dry matter intake (DMI) was not affected by these changes in the diet composition and physical characteristics. Bulls' average daily gain (ADG) was not significantly affected by the type of diet. Regardless of the different diets, the animals ate more than 70% of their daily dry matter in the first 8 h after feed delivery. Bulls took longer to consume the diet without silage (MS0) than any other diet while the time spent ruminating was similar across diets. Even when fed only a conventional MS as dietary roughage bulls did not select for the longest particles in the TMR (> 19 mm). Total tract apparent digestibility was influenced by diet type: lower values were recorded for the diets with a higher content of WS (MS0 and MS20) for DM, organic matter, crude protein, NDF, ADF (all $P < 0.001$), and to a lower extent for starch ($P < 0.05$). MS50 diet showed the highest values for all digestibility parameters. Rumen fluid parameters and blood indicators of acid-base status of bulls were similar across diets and they were at all times within safety range as the risk of acidosis is concerned. The results suggest that MS with a theoretical chopping length of 9 mm at harvest can be used as sole roughage source in beef cattle diets, without adverse effects on DMI, ADG, feeding behavior and health status of the animals.
Keywords: Beef cattle; Fibrous ingredients; Feeding behaviour; Diet digestibility; Rumen fluid; Metabolic parameters

Carla Caputo, M. Victoria Criado, Irma N. Roberts, M. Alejandra Gelso, Atilio J. Barneix, Regulation of glutamine synthetase 1 and amino acids transport in the phloem of young wheat plants, Plant Physiology and Biochemistry, Volume 47, Issue 5, May 2009, Pages 335-342, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2009.01.003.
(http://www.sciencedirect.com/science/article/B6VRD-4VGWV6D-2/2/1b7226260d7f52c263e0afc095ee4dff)

Abstract:
The possible regulation of amino acid remobilization via the phloem in wheat (Triticum aestivum L.) by the primary enzyme in nitrogen (N) assimilation and re-assimilation, glutamine synthetase (GS, E.C. 6.3.1.2) was studied using two conditions known to alter N phloem transport, N deficiency and cytokinins. The plants were grown for 15 days in controlled conditions with optimum N supply and then N was depleted from and/or 6-benzylaminopurine was added to the nutrient solution. Both treatments generated an induction of GS1, monitored at the level of gene expression, protein accumulation and enzyme activity, and a decrease in the exudation of amino acids to the phloem, obtained with EDTA technique, which correlated negatively. GS inhibition by metionine sulfoximide (MSX) produced an increase of amino acids exudation and the inhibitor successfully reversed the effect of N deficiency and cytokinin addition over phloem exudation. Our results point to an important physiological role for GS1 in the modulation of amino acids export levels in wheat plants.
Keywords: Amino acids; BAP; Glutamine synthetase; N deficiency; Phloem transport; Triticum aestivum

O. Piquer, L. Rodenas, C. Casado, E. Blas, J.J. Pascual, Whole citrus fruits as an alternative to wheat grain or citrus pulp in sheep diet: Effect on the evolution of ruminal parameters, Small Ruminant Research, Volume 83, Issues 1-3, May 2009, Pages 14-21, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2008.11.009.
(http://www.sciencedirect.com/science/article/B6TC5-4W5VDBV-1/2/80902629ee3089e3ade7df77b86be929)
Abstract:
Five ruminally fistulated Manchega ewes were fed twice daily (0900 and 1500 h) with five experimental diets in a 5 x 5 Latin square design to determine the effect of the diets on ruminal parameters. The diets were control based on wheat grain (0WCF), three diets in which whole citrus fruits (WCF) replaced wheat grain at 13% (13WCF), 26% (26WCF) and 39% (39WCF), and one diet with 26% of citrus pulp (26CP) replacing wheat grain. After 10 days of adaptation, the rumen pH, volatile fatty acids (VFA) and NH3-N of the experimental animal were measured at 0, 2, 4, 6, 8, 10 and 12 h after the first feeding.
The 39WCF diet ingestion was significantly lower than that of the other four diets. Ruminal pH increased linearly with the inclusion of WCF (+0.05 per 10%), although it was similar 2 h after meals, while VFA concentration decreased (-2.31 mmol/l per 10%), especially 4 h after the meals. Ruminal NH3-N concentration decreased with the inclusion of WCF (-0.61 mmol/l per 10%), especially during the first 5 h as of the first meal.
The acetate proportion increased from 0.61 to 0.66 mmol/mmol, while propionate proportion reduced from 0.20 to 0.18 mmol/mol when dietary WCF was increased from 0% to 39%. Also acetate:propionate ratio increased linearly from 3.2 to 4.1, while butyrate proportion decreased linearly from 0.15 to 0.11 mmol/mmol. The concentration of i-butyrate and i-valerate also decreased while that of valerate and caproate increased.
Main ruminal parameters for 26WCF and 26CP diets were similar. However, ruminal concentrations of NH3-N and molar proportion of butyrate and caproate were significantly lower when the animals received the 26CP diet (-1.1, -0.021 and -0.003 mmol/l, respectively).
Highly degradable citrus carbohydrates could be used as an alternative to cereal starch to cover the energy requirements of ewes, and did not seem to suppose a risk, as even a higher ruminal pH was maintained throughout the day. The fermentative behaviour of WCF was similar to that of CP, although higher butyrate and NH3-N production was observed.
Keywords: Ammonia; Carbohydrate; Citrus fruit; pH; Ruminant; Sheep; VFA; Wheat

Jun Tao, Xiaoyun Chen, Manqiang Liu, Feng Hu, Bryan Griffiths, Huixin Li, Earthworms change the abundance and community structure of nematodes and protozoa in a maize residue amended

rice-wheat rotation agro-ecosystem, Soil Biology and Biochemistry, Volume 41, Issue 5, Science Goes Underground in China, May 2009, Pages 898-904, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.12.002.
(http://www.sciencedirect.com/science/article/B6TC7-4V77V99-1/2/f7aeb76ba94760e0b9b0428fcf58269c)
Abstract:
The influence of earthworms on nematodes and protozoan communities was determined during the wheat phase of a six year rice-wheat rotation agro-ecosystem. Experimental plots in the rotation had five treatments, i.e. incorporation or mulching of maize residues with or without added earthworms and a control. The addition of maize residues to soil strongly affected the abundance and community structure of nematodes and protozoa in the absence of earthworms. The presence of earthworms gave significantly lower total nematode numbers at all soil depths following maize residue incorporation than the same treatment without earthworms, and also gave lower (although not significantly) total nematode numbers in the upper soil layer following maize residue mulching than the same treatment without earthworms. This was mainly due to a significant decrease in bacterial-feeding nematode numbers. Earthworms also strongly affected the distribution of the number of total nematodes and two trophic groups (bacterial and plant feeders) with soil depth. In the presence of earthworms, total protozoan and flagellate numbers significantly increased at all soil depths following both incorporation and mulching of maize residues, while numbers of amoebae increased only when maize residues were mulched. Additionally, in earthworm casts total nematode numbers (mainly bacterial and fungal feeders) were significantly higher, whereas total protozoa numbers (mainly flagellates and amoebae) were significantly lower than that in soil from 0 to 5 cm layer.
These results indicated that earthworm activity could affect the abundance and community structure of microfauna, and change their distribution between soil layers and cast material, depending on the mode of application of organic residues.
Keywords: Earthworms; Nematodes; Protozoa; Maize residues; Earthworm casts

Jing Ma, Erdeng Ma, Hua Xu, Kazuyuki Yagi, Zucong Cai, Wheat straw management affects CH4 and N2O emissions from rice fields, Soil Biology and Biochemistry, Volume 41, Issue 5, Science Goes Underground in China, May 2009, Pages 1022-1028, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2009.01.024.
(http://www.sciencedirect.com/science/article/B6TC7-4VP5VMN-3/2/b529f2ffd37c9f7fea9b2b46f9c1e87a)
Abstract:
A 3-year field experiment was conducted in Jiangsu Province, China from 2004 to 2006 to investigate CH4 and N2O emissions from paddy fields as affected by various wheat straw management practices prior to rice cultivation. Five methods of returning wheat straw, no straw, evenly incorporating, burying straw, ditch mulching and strip mulching, were adopted in the experiment. Evenly incorporating is the most common management practice in the region. Results showed that compared with no straw, evenly incorporating increased CH4 emission significantly by a factor of 3.9-10.5, while decreasing N2O emission by 1-78%. Methane emission from burying straw was comparable with that from evenly incorporating, while N2O emission from burying straw was 94-314% of that from evenly incorporating. Compared with evenly incorporating, CH4 emission was decreased by 23-32% in ditch mulching and by 32% in strip mulching, while N2O emission was increased by a factor of 1.4-3.7 in ditch mulching and by a factor of 5.1 in strip mulching. During the rice-growing season, the emitted N2O was negligible compared to that of emitted CH4. No significant difference in grain yield was observed between ditch mulching, burying straw, evenly incorporating and no straw. Compared with no straw, the grain yield was increased by 27% in strip mulching. Based on these results, the best management practice for

returning wheat straw to the soil is strip mulching wheat straw partially or completely onto the field surface, as the method reduced CH4 emission from rice fields with no decrease in rice yield.
Keywords: CH4 emission; Grain yield; N2O emission; Rice field; Wheat straw management

Brian. S. Atkinson, Debbie. L. Sparkes, Sacha. J. Mooney, Effect of seedbed cultivation and soil macrostructure on the establishment of winter wheat (Triticum aestivum), Soil and Tillage Research, Volume 103, Issue 2, Contains papers from HighLand 2006: Land Degradation and Soil and Water Conservation in Tropical Highlands, Mekelle, Ethiopia, 21-25 September 2006, May 2009, Pages 291-301, ISSN 0167-1987, DOI: 10.1016/j.still.2008.10.027.
(http://www.sciencedirect.com/science/article/B6TC6-4V57XVW-2/2/94d2ae50871abef8e5e116e304c2c523)
Abstract:
Soil physical properties affect the establishment of crops; these properties are influenced by cultivation incurred during seedbed preparation and vary greatly depending upon the intensity of applications. However, there is little quantified data concerning the influence of cultivation upon the precise soil structural arrangement and the effects of this on crop establishment. The dynamics of soil macrostructure properties on a range of seedbeds and how they relate to crop establishment are considered in this paper. Significant interactions between cultivation techniques, soil physical properties, the soil macropore structure of the seedbed and the interaction with crop establishment were identified. The relationship between soil structure and crop establishment was highly significant, with increased pore space reducing final establishment numbers. An improvement to a previously developed model (soil quality of establishment (SQE)) was developed following the addition of soil macrostructure properties, accounting for improved predictability of between ca. 6% and 19% of the variation accounted across soil types, environmental conditions.
Keywords: Soil quality; Tillage; Soil structure; Seedbed; Establishment

Pierre-Antoine Gilbert, Anne Vanasse, Denis A. Angers, Harrowing for weed control: Impacts on mineral nitrogen dynamics, soil aggregation and wheat production, Soil and Tillage Research, Volume 103, Issue 2, Contains papers from HighLand 2006: Land Degradation and Soil and Water Conservation in Tropical Highlands, Mekelle, Ethiopia, 21-25 September 2006, May 2009, Pages 373-380, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.001.
(http://www.sciencedirect.com/science/article/B6TC6-4VF0XP3-1/2/9bf82f1477f9958332de4570d4dee155)
Abstract:
Tillage with a spring tine harrow has become a recommended mechanical weeding technique for cereal crops. In this study, the impact of its use on soil mineral N content, soil aggregation and spring wheat (Triticum aestivum L.) production was investigated. The experiment was performed during 2 successive years (2005-2006) on a clay loam and on a silty loam. The two-main plot treatments consisted of a wheat crop subjected or not to intensive harrow use in a weed-free production system. Two N fertilizer treatments (mineral fertilizer and dry granular poultry manure) were also included as subplots within these main treatments and compared to a non-fertilized control. Harrowing had significant and variable effects on soil NO3- contents in the 0-5 cm soil layer. Slightly higher NO3- contents (average difference of 3.2 kg NO3- ha-1) were measured in the harrowed treatments than in the undisturbed plots in the clay loam soil in 2006. However, significantly lower mineral N contents were observed in the harrowed treatments than in the undisturbed plots in the clay loam soil in 2005 and in the silty loam soil in 2006. This apparent N immobilization amounted to 19 kg NO3- ha-1 in the clay loam soil in 2005 (for both fertilizers) and 30 kg NO3- ha-1 in the silty loam soil in 2006 (only in mineral fertilizer plots) after the successive harrowing treatments. In all cases, data of the last sampling dates in the fall indicated that residual NO3- content was not affected by the treatments. Overall harrowing had a minor decreasing and transient effect on the mean weight diameter (MWD) of soil aggregates while the dry poultry

manure tended to increase MWD. The harrowing treatment had no significant effect on wheat, grain N uptake and yield. In conclusion, harrow use had variable impacts on soil NO3- content and a minor decreasing effect on the MWD of soil aggregates. Of note, significant apparent mineral N immobilization was observed on a few sampling dates following the harrow treatments.
Keywords: Mechanical weed control; Spring tine harrow; N immobilization; Organic fertilizer; Soil aggregation; Wheat

G.P.S. Sodhi, V. Beri, D.K. Benbi, Soil aggregation and distribution of carbon and nitrogen in different fractions under long-term application of compost in rice-wheat system, Soil and Tillage Research, Volume 103, Issue 2, Contains papers from HighLand 2006: Land Degradation and Soil and Water Conservation in Tropical Highlands, Mekelle, Ethiopia, 21-25 September 2006, May 2009, Pages 412-418, ISSN 0167-1987, DOI: 10.1016/j.still.2008.12.005.
(http://www.sciencedirect.com/science/article/B6TC6-4VCNDW7-1/2/e86929ad3f28f1d69d91fa5a60fef066)
Abstract:
Soil organic matter improves the physical, chemical and biological properties of soil, and crop residue recycling is an important factor influencing soil organic matter levels. We studied the impact of continuous application of rice straw compost either alone or in conjunction with inorganic fertilizers on aggregate stability and distribution of carbon (C) and nitrogen (N) in different aggregate fractions after 10 cycles of rice-wheat cropping on a sandy loam soil at Punjab Agricultural University research farm, Ludhiana, India. Changes in water stable aggregates (WSA), mean weight diameter (MWD), aggregate-associated C and N, total soil C and N, relative to control and inorganically fertilized soil were measured. Total WSA were significantly ($p = 0.05$) higher for soils when rice straw compost either alone or in combination with inorganic fertilizers was applied as compared to control. The application of rice straw compost either alone or in combination with inorganic fertilizers increased the macroaggregate size fractions except for 0.25-0.50 mm fraction. The MWD was significantly ($p = 0.05$) higher in plots receiving rice straw compost either alone at 8 tonnes ha-1 (0.51 mm at wheat harvest and 0.41 mm at rice harvest) or at 2 tonnes ha-1 in combination with inorganic fertilizers (0.43 and 0.38 mm) as compared to control (0.34 and 0.33 mm) or inorganically fertilized plots (0.33 and 0.31 mm). The macroaggregates had higher C and N density compared to microaggregates. Application of rice straw compost at 2 tonnes ha-1 along with inorganic fertilizers (IN + 2RSC) increased C and N concentration significantly over control. The C and N concentration increased further when rice straw compost at 8 tonnes ha-1 (8RSC) was added. It is concluded that soils can be rehabilitated and can sustain the soil C and N levels with the continuous application of rice straw compost either alone or in combination with inorganic fertilizers. This will also help in controlling the rising levels of atmospheric carbon dioxide.
Keywords: Aggregate stability; Carbon fractions; Carbon sequestration; Rice-wheat cropping; Soil quality

M. Fernanda Dreccer, Anthony F. van Herwaarden, Scott C. Chapman, Grain number and grain weight in wheat lines contrasting for stem water soluble carbohydrate concentration, Field Crops Research, Volume 112, Issue 1, 30 April 2009, Pages 43-54, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.02.006.
(http://www.sciencedirect.com/science/article/B6T6M-4VTVJR9-1/2/78ff1da13c8f9de025f3ee73f9be5ff4)
Abstract:
In wheat, the ability to store and remobilise large amounts of stem water soluble carbohydrates (WSC) to grain constitutes a desirable trait to incorporate into germplasm targeted to regions with frequent terminal drought. The main aim of this paper was to examine the relationships between WSC storage, grain number and grain weight across several environments. A small set of

recombinant inbred lines (2-4) contrasting in stem WSC were grown in six field trials where water availability, sowing date and/or N level were manipulated, with line yields ranging from 400 to 850 g m-2 across experiments. Biomass, N and WSC concentration (WSCc, mg g-1 dry weight) and amount (WSCa, g m-2) were monitored. A resource-oriented area-based model [Fischer, R.A., 1984. Growth and yield of wheat. In: Smith, W.H., Bante, S.J. (Eds.), Potential Productivity of Field Crops Under Different Environments. International Rice Research Institute, Los Banos, pp. 129-154] and intrinsic rates of organ growth were used to investigate the consequences on grain number of potential competition between spike and stem around flowering.
Early sown irrigated trials allowed consistent genotypic discrimination for WSCc and WSCa. High WSC lines had similar or higher yields compared to low WSC lines. High WSC lines had consistently lower grain number m-2 linked to a lower number of spikes and stems m-2, higher individual grain weight under irrigated or more limited conditions, and individual stems with less structural biomass. The changes in plant type associated with the high WSC phenotype, mainly fewer stems and a high individual grain weight, may contribute to its moderate yield advantage despite the lower grain number m-2. A model based on resource capture per unit area around flowering was not sufficient alone to explain the differences between lines in grain number m-2. We propose that linking a resource-based model with additional understanding of controls of crop morphology would improve the prediction of differences in yield components in related genetic material.
Keywords: Wheat (Triticum aestivum); Growth; Grain number; Grain weight; Water soluble carbohydrates; Tillering; Nitrogen

Mohammad Abuzar, Garry O'Leary, Glenn Fitzgerald, Measuring water stress in a wheat crop on a spatial scale using airborne thermal and multispectral imagery, Field Crops Research, Volume 112, Issue 1, 30 April 2009, Pages 55-65, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.02.001.
(http://www.sciencedirect.com/science/article/B6T6M-4VS3P17-2/2/e8424347179d1319d1191dfdae5a1a94)
Abstract:
A modified stress index is proposed that accounts for both chronic and acute water stress. Current trapezoid methods that use vegetation cover and temperature indices do not necessarily measure chronic conditions. The modified method describes the chronic stress as the ratio of actual crop cover to its potential expressed such that zero stress occurs when actual cover equals or exceeds the potential as determined by a simulation model. The advantage of such a definition is that in areas where full groundcover is rarely achieved, such as semi-arid regions, a more realistic and conservative stress condition will be observed. Airborne thermal and multispectral images were acquired at four growth stages of a wheat crop from a site in Victoria, Australia with experimental plots having rain-fed and irrigated regimes over two seasons (2005 and 2006). The theoretical basis of vector determination was adopted for trapezoidal extent per season. The relationship between such chronic stress and acute stress is explored and show that in any 2 years large differences between these stresses exist.
Keywords: Crop water deficiency; Chronic water stress; Acute water stress; Airborne imagery; Precision agriculture

D.W. Hatcher, J.E. Dexter, M.J. Anderson, G.G. Bellido, B.X. Fu, Effect of blending durum wheat flour with hard white wheat flour on the quality of yellow alkaline noodles, Food Chemistry, Volume 113, Issue 4, 15 April 2009, Pages 980-988, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.08.049.
(http://www.sciencedirect.com/science/article/B6T6R-4T9VPC2-1/2/b041ad1bedc3dc78393324ba16b4a47e)
Abstract:

Yellow alkaline noodles (YAN) were prepared from durum and hard white wheat flour blends and evaluated for noodle color, appearance and cooked noodle texture. Raw noodle brightness, L*, and yellowness, b*, improved significantly with durum flour addition while significant increases in a* values were observed at both 2 h and 24 h. The very low noodle speck count of white wheat noodles remained constant over the 24 h period at any durum flour addition. Noodle bite, MCS, decreased with the addition of durum flour, resistance to compression (RTC) remained equivalent to the hard white flour control while an associated improvement in cooked noodle recovery (REC) was observed. The study indicates that addition of durum flour at even the 25% level, offers a viable product with improved colour characteristics, consistent RTC and improved REC textural attributes. Uniaxial stress relaxation parameters of cooked noodles significantly correlated with the empirical texture measurements.
Keywords: Durum wheat; Hard white wheat; Yellow alkaline noodles; Colour; Texture

T. Kulik, M. Jestoi, Quantification of Fusarium poae DNA and associated mycotoxins in asymptomatically contaminated wheat, International Journal of Food Microbiology, Volume 130, Issue 3, 15 April 2009, Pages 233-237, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.01.036.
(http://www.sciencedirect.com/science/article/B6T7K-4VJ4WHG-3/2/c16be2c2c8b58ee27e198384bbb68d5d)
Abstract:
Recent surveys have identified increased predominance of Fusarium poae causing FHB (Fusarium Head Blight) of wheat in Europe. Several studies revealed a correlation between levels of F. poae DNA and nivalenol (NIV) and enniatins (ENNs) in highly contaminated cereal grain. In this study, F. poae specific TaqMan assays and mycotoxin analysis were performed on 48 asymptomatically contaminated wheat grain samples obtained from six different locations in northern Poland in 2006 and 2007. TaqMan assays revealed the presence of F. poae DNA in all samples analyzed, however the amounts of target DNA between the samples differed. Mycotoxin analysis revealed the presence of 13 toxins in the grain analyzed, however only ENN B and B1 were detected at quantifiable concentrations. A significant positive correlation was revealed between F. poae DNA (R = 0.75) and monthly mean rainfalls recorded in May (a month before wheat anthesis) in both years. Additionally, a significant positive correlation was found between levels of ENN B+B1 (R = 0.49) and rainfalls in May, however, no correlation was found between the quantity F. poae DNA and the level of ENN B+B1. This paper confirms the increasing importance of F. poae in the FHB complex of wheat in Poland.
Keywords: Fusarium poae; TaqMan assay; Wheat; Enniatins

M.D. Teli, Pankaj Rohera, Javed Sheikh, Rekha Singhal, Use of Amaranthus (Rajgeera) starch vis-a-vis wheat starch in printing of vat dyes, Carbohydrate Polymers, Volume 76, Issue 3, 9 April 2009, Pages 460-463, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.11.007.
(http://www.sciencedirect.com/science/article/B6TFD-4TY9MRB-1/2/edb92da023a7cbc1e349607451b3be1c)
Abstract:
Wheat is the staple food and is widely consumed. Amaranthus (Rajgeera) has been proposed as an alternative to be used as a thickener in textile printing of vat dyes. Extraction of starch from Amaranthus (Rajgeera) and wheat was done by alkali steeping. In this paper detailed physical and chemical analysis of Amaranthus and wheat starch has been reported. Analysis of both the starches was done by measuring swelling power, paste clarity, crystallinity of starch using X-Ray diffraction and iodine binding. Printing of vat dye on 100% cotton fabric was done using Amaranthus (Rajgeera) and wheat starch pastes. The prints were then analysed by measuring K/S and L*, a*, b* values by reflectance method, bending length, washing & rubbing fastness etc. Results suggest that Amaranthus (Rajgeera) can be used to substitute wheat starch in textile printing.

Keywords: Amaranthus; Wheat starch; Vat dye printing

Fahong Wang, Zhonghu He, Ken Sayre, Shengdong Li, Jisheng Si, Bo Feng, Lingan Kong, Wheat cropping systems and technologies in China, Field Crops Research, Volume 111, Issue 3, 3 April 2009, Pages 181-188, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.004.
(http://www.sciencedirect.com/science/article/B6T6M-4VDSCYV-1/2/dfa122fc7489282d476183defe0b40d4)
Abstract:
Chinese wheat (Triticum aestivum) production has developed rapidly during the last 57 years, largely due to improved crop management technologies and new varieties. The history of wheat planting technologies in China was reviewed, and the physiological mechanisms that allow wheat to attain high yield under these planting systems were analyzed. The use of leaf number and stage of development to indicate the optimum timing for applications of fertilizers and irrigation water, and uniform seeding at reduced seeding rates to control lodging contributed significantly to the substantial progress in wheat productivity. However, flood irrigation and tillage-based practices also resulted in serious problems, including a decline in soil fertility and quality, environmental pollution, and inefficient use of water resources. The major future challenges facing wheat production are to improve water and nutrient use efficiency. Conservation agriculture-based resource conservation technologies such as zero or reduced tillage, flat or raised bed-planting systems, and rational management of crop residues to eliminate burning in the field are among the strategies we strongly recommend for improving agricultural environments and stabilizing/increasing wheat production in China.
Keywords: Conservation agriculture; Cropping systems and technology; Raised bed-planting; Wheat

Agustin Pimstein, Jan U.H. Eitel, Dan S. Long, Israel Mufradi, Arnon Karnieli, David J. Bonfil, A spectral index to monitor the head-emergence of wheat in semi-arid conditions, Field Crops Research, Volume 111, Issue 3, 3 April 2009, Pages 218-225, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.009.
(http://www.sciencedirect.com/science/article/B6T6M-4VGVYKN-1/2/587cef308b663bcad19268bb38ff6161)
Abstract:
Harvesting wheat (Triticum aestivum L.) for forage or leaving it for grain is the main decision uncertainty growers face in semi-arid regions during mid-season. To facilitate decision-making, a decision support system (DSS) has recently been proposed that requires information about crop water and nutritional status during spike emergence. Though remote sensing has been used to provide site-specific crop status information, a spectral vegetation index is needed to ensure that the information has been acquired during spike emergence. The objective of this study was to propose a spectral index sensitive to spike emergence and validate its suitability across different commercial farm fields by using ground spectral measurements and multispectral satellite imagery. To develop the index, controlled experiments with commonly grown wheat varieties were conducted during the 2004/2005 and 2005/2006 growing season in the agricultural area of the northern Negev desert of Israel. The experiments showed that spike emergence correlated most strongly ($r = 0.7$, $p < 0.05$) with spectral changes near the 1.2 [mu]m water absorption feature in contrast to the band at 1.1 [mu]m which appeared to be only weakly correlated. Thus, the spike emergence sensitive band at 1.2 [mu]m has been combined with the insensitive band at 1.1 [mu]m as reference to form the ratio-based normalized heading index (NHI). Experimental data were then used to establish an index threshold that helps separate data acquired before and after spike emergence. The proposed NHI was able to identify spike emergence with a classification accuracy varying between 53 and 83%. Accuracy was influenced by season, and whether narrow or broad spectral bands were used. Validation of the index in commercial farm fields in Israel and the

United States showed that the classification accuracy was similar for ground spectral measurements and the advanced land imager (ALI) satellite imagery. These results suggest that the NHI is suited for identifying the onset of heading throughout wheat-growing areas without the need for characterizing seasonal trends.
Keywords: Zadoks; Vegetation index; Normalized heading index (NHI); Canopy reflectance; Water status; Advanced land imager (ALI) satellite images; Decision support system (DSS)

E. Kunzova, M. Hejcman, Yield development of winter wheat over 50 years of FYM, N, P and K fertilizer application on black earth soil in the Czech Republic, Field Crops Research, Volume 111, Issue 3, 3 April 2009, Pages 226-234, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.008.
(http://www.sciencedirect.com/science/article/B6T6M-4VFBY8G-1/2/6ac66d88ad656d3f4adcd8dd97c047ea)
Abstract:
The black earths of Central Europe are an important soils for crop production but sustainability of crop production on such soils has not been examined. In the present paper, yield of winter wheat over 50 years of FYM, N, P and K fertilizer application (12 treatments altogether) was analyzed in the Ivanovice Crop Rotation Experiment (ICRE), established in 1955 on a degraded black earth soil (chernozem).
The ICRE is located in a warm (8.4 [degree sign]C mean annual temperature) and moderately dry (556 mm mean annual precipitation) sugar beet cropping area.
Summarizing 50 years' results, variety had the largest effect on grain yield followed by the effect of mineral fertilizers, the preceding crop and farmyard manure application. The highest increase in grain yields was recorded after the introduction of short-straw varieties. High year-to-year variability in grain yields was recorded and some fluctuations were consistent with oscillations in the whole Czech Republic. Despite the high fertility of black earth soils in the locality, the mean grain yield in the ICRE was lower than the mean annual yield in the Czech Republic in five cases out of 50 years. The effect of fertilizer treatment on the grain yield was not significant in the first decade (the mean grain yields ranged from 3.4 to 3.8 t ha-1), but was significant in the fifth decade of the experiment (the mean grain yields ranged from 4.2 in control to 6.6 t ha-1 in N121P89K102 treatment, respectively). Calculated by linear regression, the annual yield increased by 45.9-89.6 kg of grain per ha. The mean yield per 1 kg of applied N ha-1 increased by 18.7 kg of grain in the fifth decade of the experiment. In unfertilized soil, the concentration of plant-available P, K and Mg was still optimal for winter wheat production even after 50 years without any fertilizer input. The black earth soils in the locality clearly demonstrates a high and long-term stable natural fertility. The results from the ICRE stress the necessity for long-term research in grain yield analysis.
Keywords: Central Europe; Chernozem; Grain production; Legumes; Long-term fertilizer experiment; Preceding crop; Triticum aestivum

D.B.M. Ficco, C. Riefolo, G. Nicastro, V. De Simone, A.M. Di Gesu, R. Beleggia, C. Platani, L. Cattivelli, P. De Vita, Phytate and mineral elements concentration in a collection of Italian durum wheat cultivars, Field Crops Research, Volume 111, Issue 3, 3 April 2009, Pages 235-242, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.010.
(http://www.sciencedirect.com/science/article/B6T6M-4VH333B-1/2/6bdc3e15879fefce64109f1abd2add8a)
Abstract:
Mineral deficiencies are prevalent in human populations and the improvement of the mineral content in cereal products represents a possible strategy to increase the human mineral intake. Nevertheless, most of the inorganic phosphorus (Pi) present in mature cereal seeds (40-80%) is stored as phytate, an anti-nutritional factor that forms complexes with minerals such as Ca, Mg, Zn and Fe reducing their bioavailability. The present study was undertaken: (i) to determine the variation in phytate and mineral concentrations in the whole grains of 84 Italian durum wheat

(Triticum durum Desf.) cultivars representative of old and modern germplasm; (ii) to estimate the magnitude of genotype x environment interaction effects; and (iii) to examine the interrelationships among mineral concentrations in durum wheat with the final aim to identify superior durum wheat cultivars that possess low phytate content and high concentration of mineral elements in their whole-wheat flour. The cultivars were grown in field trials during 2004-2005 at Foggia, Italy and during 2005-2006 at Foggia and Fiorenzuola d'Arda--Southern and Northern Italy. The phytate content was estimated indirectly by using a microtitre plate assay evaluating the Pi absorbance at 820 nm, while the Cu, Fe, Mn, Ca, K, Mg, Na and Zn mineral contents were determined by ICP/OES. The contents of Zn and Fe across years and locations ranged from 28.5 to 46.3 mg/kg for Zn with an average of 37.4 mg/kg and from 33.6 to 65.6 mg/kg for Fe with an average of 49.6 mg/kg. Pi grain content was between 0.46 and 0.76 mg/g showing a positive correlation with all minerals except Cu and Zn. Although breeding activity for Fe and Zn would be difficult because G x E interaction is prevalent, multi-location evaluation of germplasm collection help to identify superior genotypes to achieve this objective. The results here reported open the possibility of designing a specific breeding program for improving the nutritional value of durum wheat through the identification of parental lines with low-Pi and high minerals concentration in whole grains.
Keywords: Phytate; Phosphorus; Iron; Zinc; Durum wheat

Q. Fang, L. Ma, Q. Yu, L.R. Ahuja, R.W. Malone, G. Hoogenboom, Irrigation strategies to improve the water use efficiency of wheat-maize double cropping systems in North China Plain, Agricultural Water Management, In Press, Corrected Proof, Available online 2 April 2009, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.02.012.
(http://www.sciencedirect.com/science/article/B6T3X-4W0347J-1/2/36f29009fda6f7689d857993d36e99a5)
Abstract:
Water is the most important limiting factor of wheat (Triticum aestivum L.) and maize (Zea mays L.) double cropping systems in the North China Plain (NCP). A two-year experiment with four irrigation levels based on crop growth stages was used to calibrate and validate RZWQM2, a hybrid model that combines the Root Zone Water Quality Model (RZWQM) and DSSAT4.0. The calibrated model was then used to investigate various irrigation strategies for high yield and water use efficiency (WUE) using weather data from 1961 to 1999. The model simulated soil moisture, crop yield, above-ground biomass and WUE in responses to irrigation schedules well, with root mean square errors (RMSEs) of 0.029 cm3 cm-3, 0.59 Mg ha-1, 2.05 Mg ha-1, and 0.19 kg m-3, respectively, for wheat; and 0.027 cm3 cm-3, 0.71 Mg ha-1, 1.51 Mg ha-1 and 0.35 kg m-3, respectively, for maize. WUE increased with the amount of irrigation applied during the dry growing season of 2001-2002, but was less sensitive to irrigation during the wet season of 2002-2003. Long-term simulation using weather data from 1961 to 1999 showed that initial soil water at planting was adequate (at 82% of crop available water) for wheat establishment due to the high rainfall during the previous maize season. Preseason irrigation for wheat commonly practiced by local farmers should be postponed to the most sensitive growth stage (stem extension) for higher yield and WUE in the area. Preseason irrigation for maize is needed in 40% of the years. With limited irrigation available (100, 150, 200, or 250 mm per year), 80% of the water allocated to the critical wheat growth stages and 20% applied at maize planting achieved the highest WUE and the least water drainage overall for the two crops.
Keywords: RZWQM; DSSAT; Irrigation management; Agricultural system models; Water use efficiency

Peng QIN, Chuan-xi MA, Rong-lin WU, Zhi-you KONG, Bo-qiao ZHANG, Effect of Waxy Wheat Flour Blends on the Quality of Fresh and Stale Bread, Agricultural Sciences in China, Volume 8, Issue 4, April 2009, Pages 401-409, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60225-4.

(http://www.sciencedirect.com/science/article/B82XG-4W4TVWV-4/2/a100587f7357169ff2cd883ef2bd885d)
Abstract:
Starch is the major component in the wheat kernel, which is mainly composed of amylose and amylopectin. The wheat without amylose in its endosperm was called 'waxy wheat'. Waxy wheat can be used to adjust the amylose content and improve the wheat-based food quality by adding to non-waxy wheat flour. In order to investigate the effect of waxy wheat flour on the quality of fresh and stale bread, waxy wheat flour was added into the flour of Canadian Spring Wheat 2 at 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, and 35.0% to make breads. The physicochemical properties were adjusted to suitability by adding Yangmai 158 flour, and breads were evaluated for sensory quality, crumb firmness, loaf volume and weight loss over a period of 0, 2, 4, and 6 days. The result showed that the best total score of fresh bread was 82.9 by adding waxy flour at 7.0%, though no significant difference was found among blends with 0.0-15.0% of waxy flour. Breads with the addition of 22.0% waxy flour had lower firmness, and decreasing loss of weight. Waxy wheat flour blend at 15.0% was optimal in retarding staling without significant decreasing fresh bread quality in comparison to the control.
Keywords: waxy wheat; fresh bread; stale bread; quality

M Majdi, G Karimzadeh, S Mahfoozi, The Relationship Between Developmental Accumulation of Leaf Soluble Proteins and Vernalization Response of Wheat (Triticum aestivum L.em. Thell), Agricultural Sciences in China, Volume 8, Issue 4, April 2009, Pages 410-417, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60226-6.
(http://www.sciencedirect.com/science/article/B82XG-4W4TVWV-5/2/d46fc2599632c2368d38eabf5c2cf4a3)
Abstract:
The relationship between vernalization requirement and quantitative and qualitative changes in total leaf soluble proteins were determined in one spring (cv. Kohdasht) and two winter (cvs. Sardari and Norstar) cultivars of wheat (Triticum aestivum L.) exposed to 4[degree sign]C. Plants were sampled on days 2, 14, 21 and 35 of exposure to 4[degree sign]C. The final leaf number (FLN) was determined throughout the vernalization periods (0, 7, 14, 24, and 35 d) at 4[degree sign]C. The final leaf number decreased until days 24 and 35 in Sardari and Norstar cultivars, respectively, indicating the vernalization saturation at these times. No clear changes were detected in the final leaf number of Kohdash cultivar, verifying no vernalization requirement for this spring wheat cultivar. Comparing with control, clear cold-induced 2-fold increases in proteins quantity occurred after 48 h following the 4[degree sign]C-treatment in the leaves of the both winter wheat cultivars but, such response was not detected in the spring cultivar. However, the electrophoretic protein patterns showed between-cultivar and between-temperature treatment differences. With increasing exposure time to 4[degree sign]C, the winter cultivars tended to produce more HMW polypeptides than the spring cultivar. Similar proteins were induced in both Sardari and Norstar winter wheat cultivars, however, the long vernalization requirement in Norstar resulted in high level and longer duration of expression of cold-induced proteins compared to Sardari with a short vernalization requirement. These observations indicate that vernalization response regulates the expression of low temperature (LT) tolerance proteins and determines the duration of expression of LT-induced proteins.
Keywords: soluble proteins; wheat; Triticum aestivum L.; final leaf number; vernalization; cold

Fadi Karam, Rabih Kabalan, Joelle Breidi, Youssef Rouphael, Theib Oweis, Yield and water-production functions of two durum wheat cultivars grown under different irrigation and nitrogen regimes, Agricultural Water Management, Volume 96, Issue 4, April 2009, Pages 603-615, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.09.018.

(http://www.sciencedirect.com/science/article/B6T3X-4TVJ042-2/2/603c101f290e29642a24aac2e92a0d34)
Abstract:
Wheat (Triticum durum L.) yields in the semi-arid regions are limited by inadequate water supply late in the cropping season. Planning suitable irrigation strategy and nitrogen fertilization with the appropriate crop phenology will produce optimum grain yields. A 3-year experiment was conducted on deep, fairly drained clay soil, at Tal Amara Research Station in the central Bekaa Valley of Lebanon to investigate the response of durum wheat to supplemental irrigation (IRR) and nitrogen rate (NR). Three water supply levels (rainfed and two treatments irrigated at half and full soil water deficit) were coupled with three N fertilization rates (100, 150 and 200 kg N ha-1) and two cultivars (Waha and Haurani) under the same cropping practices (sowing date, seeding rate, row space and seeding depth). Averaged across N treatments and years, rainfed treatment yielded 3.49 Mg ha-1 and it was 25% and 28% less than half and full irrigation treatments, respectively, for Waha, while for Haurani the rainfed treatment yielded 3.21 Mg ha-1, and it was 18% and 22% less than half and full irrigation, respectively. On the other hand, N fertilization of 150 and 200 kg N ha-1 increased grain yield in Waha by 12% and 16%, respectively, in comparison with N fertilization of 100 kg N ha-1, while for cultivar Haurani the increases were 24% and 38%, respectively. Regardless of cultivar, results showed that supplemental irrigation significantly increased grain number per square meter and grain weight with respect to the rainfed treatment, while nitrogen fertilization was observed to have significant effects only on grain number per square meter. Moreover, results showed that grain yield for cultivar Haurani was less affected by supplemental irrigation and more affected by nitrogen fertilization than cultivar Waha in all years. However, cultivar effects were of lower magnitude compared with those of irrigation and nitrogen. We conclude that optimum yield was produced for both cultivars at 50% of soil water deficit as supplemental irrigation and N rate of 150 kg N ha-1. However, Harvest index (HI) and water use efficiency (WUE) in both cultivars were not significantly affected neither by supplemental irrigation nor by nitrogen rate. Evapotranspiration (ET) of rainfed wheat ranged from 300 to 400 mm, while irrigated wheat had seasonal ET ranging from 450 to 650 mm. On the other hand, irrigation treatments significantly affected ET after normalizing for vapor pressure deficit (ET/VPD) during the growing season. Supplemental irrigation at 50% and 100% of soil water deficit had approximately 26 and 52 mm mbar-1 more ET/VPD, respectively, than those grown under rainfed conditions.
Keywords: Irrigation strategy; Nitrogen rate; Supplemental irrigation; Triticum durum L.; Vapor pressure deficit; Water use efficiency

Jinsong Wang, Jianying Feng, Lanfang Yang, Jiangyong Guo, Zhaoxia Pu, Runoff-denoted drought index and its relationship to the yields of spring wheat in the arid area of Hexi corridor, Northwest China, Agricultural Water Management, Volume 96, Issue 4, April 2009, Pages 666-676, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.10.008.
(http://www.sciencedirect.com/science/article/B6T3X-4V3S525-4/2/82d4e85554a3930ea6c0669b03831f36)
Abstract:
A drought index is defined based on the inland river runoff from Hexi corridor, Gansu Province, Northwest China. The relationship between this drought index and yields of spring wheat is examined. The data used in this study include the following: monthly runoff data during 1959-2004 from the hydrological stations at Changmapu, Yingluoxia and Jiutiaoling on the three representative inland rivers in the Hexi corridor belt; the yields of spring wheat, monthly temperature and precipitation from three agro-meteorological stations in Jiuquan, Zhangye and Wuwei; and monthly precipitation data from three meteorological stations at Tole, Qilian and Menyuan.

The runoff, following the Pearson type III distribution, is normalized to translate into the standard normal distribution as function of Z. Z is the variable in normalizing process. According to the characteristic of standard normal distribution of Z, a runoff-denoted drought index (Zrd hereafter) is defined. The grades of Zrd are determined by the standard normal distribution theoretical frequencies of Z. In order to validate the drought grades, runoff drought indices are compared with the atmospheric dryness indices determined by the precipitation. Results indicate that the division of drought categories based on runoff is rational and thus reliable. The Zrd, as it considers both temperature and rainfall in upstream mountains, is close to reality.
Based on the relationship between the drought grade and water usage, suggestions are made for irrigation in the area. Five grades of Zrd are then translated into 4 grades of runoff irrigation drought index (Zir). The relationship between Zir and tendency-free yield (i.e. climate yield) of spring wheat from the Hexi Corridor irrigation zones at station Jiuquan, Zhangye and Wuwei is investigated. Results show that the Zir represents an anti-phase trend of the climate yields of the crops. As a conclusion, Zir can be utilized to qualitatively predict the trend of the wheat yield. An empirical yield model is created using a multi-variable regression method.
Keywords: Drought; Irrigation; Pearson distribution; Water usage; Regressive yield

S.K. Behera, R.K. Panda, Effect of fertilization and irrigation schedule on water and fertilizer solute transport for wheat crop in a sub-humid sub-tropical region, Agriculture, Ecosystems & Environment, Volume 130, Issues 3-4, April 2009, Pages 141-155, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.12.009.
(http://www.sciencedirect.com/science/article/B6T3Y-4VGVR3B-1/2/0960aadb37039ec1535fca33a4544a97)
Abstract:
In order to increase the water and fertilizer use efficiency and decrease the losses of water and fertilizer solutes (N and P), it is necessary to assess the influence of level of fertilization and irrigation schedule on movement and balance of water and fertilizers in the root zone. With this goal, the reported study was undertaken to determine the effect of fertilization and irrigation schedule on water movement and fertilizer solute transport in wheat crop field in a sub-tropical sub-humid region. Field experiments were conducted on wheat crop of cultivar Sonalika (Triticum aestivum L.) during the years 2002-2003, 2003-2004 and 2004-2005. Each experiment consisted of four fertilizer treatments and three irrigation treatments during the wheat growth period. During the experiment, the irrigation treatments were: I1 = 10% maximum allowable depletion (MAD) of available soil water (ASW); I2 = 40% MAD of ASW; I3 = 60% MAD of ASW. The fertilizer treatments during the experiment were: F1 = control treatment with N:P2O5:K2O as 0:0:0 kg ha-1; F2 = fertilizer application of N:P2O5:K2O as 80:40:40 kg ha-1; F3 = fertilizer application of N:P2O5:K2O as 120:60:60 kg ha-1 and F4 = fertilizer application of N:P2O5:K2O as 160:80:80 kg ha-1. The results of the investigation revealed that low volume high frequency irrigation results in higher deep percolation losses than the low frequency high volume irrigation with different levels of fertilization for wheat crop in coarse lateritic soil, whereas different levels of fertilization did not significantly affect soil water balance of the wheat crop root zone during all the irrigation schedules. Level of fertilization and irrigation schedule had significant effect on nitrogen leaching loss whereas irrigation schedules had no significant effect on nitrogen uptake under different levels of fertilization. On the other hand, the leaching loss of phosphorus was not significantly influenced by the irrigation schedule and level of fertilization of wheat crop. This indicated that PO4-P leaching loss was very low in the soil solution as compared to nitrogen due to fixation of phosphorus in soils. From the observed data of nitrogen and phosphorus use efficiency, it was revealed that irrigation schedule with 40% maximum allowable depletion of available soil water with F2 fertilizer treatment (N:P2O5:K2O as 80:40:40 kg ha-1) was the threshold limit for wheat crop with respect to nitrogen and phosphorus use, crop yield and environmental pollution.

Keywords: Irrigation schedule; Nitrogen use efficiency; Phosphorus use efficiency; Solute transport; Leaching loss; Wheat crop

Seedhabadee Ganeshan, Tyrel Denesik, D. Brian Fowler, Ravindra N. Chibbar, Quantitative expression analysis of selected low temperature-induced genes in autumn-seeded wheat (Triticum aestivum L.) reflects changes in soil temperature, Environmental and Experimental Botany, Volume 66, Issue 1, April 2009, Pages 46-53, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.12.013.
(http://www.sciencedirect.com/science/article/B6T66-4V74XNT-2/2/73b919989045b8f3166811e2d68acf82)
Abstract:
Exposure of winter wheat (Triticum aestivum L.) to low autumn temperatures allows it to cold acclimate and withstand sub-zero winter temperatures. Winter damage/kill can however occur. Studies on low temperature (LT)-induced genes have focused on growth chamber-grown plants at constant LT. Ideally a field experiment would be more representative and provide a better understanding of the role of LT-induced genes during cold acclimation. Therefore, the objective of this study was to investigate the expression patterns of selected LT-induced genes, TaCBF20, Wcs120, Wcor410 and Wcor14, in field-grown wheat (winter-hardy Norstar, tender spring Manitou and the near-isogenic lines, spring Norstar and winter Manitou) over 3 years at Saskatoon, Saskatchewan, Canada. Leaf samples were collected at different intervals during the autumn. Generally, cold acclimation of the four genotypes over the 3 years was in agreement with growth chamber studies. However, variability in LT-induced transcript accumulation in the field-grown plants was observed over the 3 years and it could be attributed to the soil temperature fluctuations. Trends in accumulation in early sampling dates indicated that differences among the genotypes could be delineated, depending on the year and LT-induced genes. This study highlights the importance of integrating field and growth chamber studies to obtain a more complete understanding of the critical roles of LT-induced genes in conferring LT tolerance.
Keywords: Cold regulated genes; Field low temperature acclimation; Near-isogenic lines; Quantitative real-time PCR; Winter survival

N.L. Morris, P.C.H. Miller, J.H. Orson, R.J. Froud-Williams, The effect of wheat straw residue on the emergence and early growth of sugar beet (Beta vulgaris) and oilseed rape (Brassica napus), European Journal of Agronomy, Volume 30, Issue 3, April 2009, Pages 151-162, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.09.002.
(http://www.sciencedirect.com/science/article/B6T67-4TPND7F-2/2/728101b7760c2dc0289ecda883292cb8)
Abstract:
The management of straw residue can be a concern in non-inversion tillage systems where straw tends to be incorporated at shallow depths or left on the soil surface. This can lead to poor crop establishment because straw residue can impede or hinder crop emergence and growth. Small container-based experiments were undertaken using varying amounts of wheat straw residue either incorporated or placed on the soil surface. The effects on days to seedling emergence, percentage emergence, seedling dry-weight and soil temperature using sugar beet and oilseed rape were investigated because these crops often follow wheat in a cropping sequence.
The position of the straw residue was found to be the primary factor in reducing crop emergence and growth. Increasing the amount of straw residue (from 3.3 t ha-1 to 6.7 t ha-1) did not show any consistent trends in reducing crop emergence or growth. However, in some instances, results indicated that an interaction between the position and the amount of straw residue occurred particularly when the straw and seed was placed on the soil surface. Straw placed on the soil surface significantly reduced mean day-time soil temperature by approximately 2.5 [degree sign]C compared to no residue. When the seed and straw was placed on the soil surface a lack of seed-

to-soil contact caused a reduction in emergence by approximately 30% because of the restriction in available moisture that limited the ability for seed imbibition. This trend was reversed when the seed was placed in the soil, but with straw residue still on the soil surface, because the surface straw was likely to reduce moisture evaporation and improved seed-to-soil contact that led to rapid emergence. In general, when straw was mixed in or placed on the soil surface along with the seed, sugar beet and oilseed rape emergence and early growth biomass was significantly restricted by approximately 50% compared to no residue.
The consequences of placing seed with or near to straw residue have been shown to cause a restriction in crop establishment. In both oilseed rape and sugar beet, this could lead to a reduction in final crop densities, poor, uneven growth and potentially lower yields that could lower financial margins. Therefore, if farmers are planning to use non-inversion tillage methods for crop establishment, the management and removal of straw residue from near or above the seed is considered important for successful crop establishment.
Keywords: Straw residue; Crop emergence and growth; Physical impedance; Seed-soil contact; Phytotoxicity

M.J. Florin, A.B. McBratney, B.M. Whelan, Quantification and comparison of wheat yield variation across space and time, European Journal of Agronomy, Volume 30, Issue 3, April 2009, Pages 212-219, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.10.003.
(http://www.sciencedirect.com/science/article/B6T67-4V34RR7-1/2/9ba68c6a6297645ca9941e0a876f51d8)
Abstract:
Research about spatio-temporal variation of crop yield does not abound. From a precision agriculture (PA) perspective and particularly considering site-specific crop management (SSCM), this is an aberration. There is a serious need to further question how temporal variation of crop yield impacts ones ability to manage spatial variation. The aim of this study is to consider and develop new and existing approaches to this question. Spatio-temporal analysis was undertaken for two wheat fields in South Australia with 3 and 4 years of wheat yield data. Temporal analysis included the calculation of semi-variance across each field between pairs of years for the creation of maps and the calculation of rank correlations between pairs of years. These analyses supported previous notions that the magnitude of temporal variation is large compared with spatial variation. However, some consistence of spatial patterns between years was also observed for each of the fields indicating that considering magnitudes of variation alone is not an exhaustive analysis. A long-term (100 years) temporal analysis using variograms was undertaken for a single point simulated using the Agricultural Production Simulator Model (APSIM). The long-term analysis overcame the fact that 3 or 4 years of yield data are an extremely small sample size for the time dimension. This analysis provided some useful insight into temporal variation such as a large nugget variance accounting for 75% of the temporal variation and the cyclical nature of temporal yield variation. A novel use of pseudo cross semi-variograms was applied to a spatio-temporal analysis of yield variation for the two fields. This analysis provides a preliminary insight into identifying space-time variance equivalents. With greater depth of temporal crop yield data this is a promising perspective from which to identify optimal spatial management strategies.
Keywords: Spatio-temporal variation; Crop yield; Precision agriculture; Pseudo cross-variograms

P. Campi, A.D. Palumbo, M. Mastrorilli, Effects of tree windbreak on microclimate and wheat productivity in a Mediterranean environment, European Journal of Agronomy, Volume 30, Issue 3, April 2009, Pages 220-227, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.10.004.
(http://www.sciencedirect.com/science/article/B6T67-4V34RR7-2/2/8cd09dc6608a7129a7bab581d110cfc2)
Abstract:

The presence of windbreaks is usually considered positive in mitigating the evapotranspiration (ET). For this reason, the windbreak barrier is included among the agro-techniques specific for the dry-farming systems. Objective of the study is to analyze the actual benefits of windbreaks on crop water requirements and yield.
The 3-year field study has been carried integrating agronomic and microclimatic approaches. Study concerned durum wheat growing in open field, in a typical Mediterranean environment. A Cupressus arizonica L. windbreak (3 m in height) bordered at North the experimental field.
The analysis of the microclimatic observations shows that, when wind blew from the North direction, the windbreak presence influenced the wind speed until the distance 12.7H (H is the windbreak height), and temperature increased in a distance of 4.7H from the barrier.
On the basis of the soil water content, continuously measured by TDR technique, evapotranspiration (ETd) was daily determined and season ET calculated. Windbreaks mitigated ET for a distance of 12.7 times the windbreak height. Out of this area, the ET was 16% higher than the ET measured near the windbreak belt (<4.7H).
Yield performances changed accordingly the distance from the windbreak. Within the distance of 18 times the windbreak height, wheat productions were higher than those obtained in the zone not influenced by the windbreaks.
Within the protected area, wheat water use efficiency (WUE, calculated as the ratio between yield and seasonal evapotranspiration) attained the maximum value of 1.15; out of the windbreak protection, WUE was 0.70 kg m-3.
Since windbreaks reduce ET, farms of the Mediterranean environments should be re-designed in order to consider the windbreaks as possible issue of sustainability.
Keywords: Agrometeorology; Dry-farming system; Evapotranspiration; Mediterranean region; Natural windbreak; Water use efficiency; Durum wheat

Chintan M. Bhatt, J. Nagaraju, Studies on glass transition and starch re-crystallization in wheat bread during staling using electrical impedance spectroscopy, Innovative Food Science & Emerging Technologies, Volume 10, Issue 2, April 2009, Pages 241-245, ISSN 1466-8564, DOI: 10.1016/j.ifset.2008.10.002.
(http://www.sciencedirect.com/science/article/B6W6D-4TSTY9C-1/2/63bc4b67c2c069025980a79bb7671f2b)
Abstract:
Bread staling is a very complex phenomenon that is not yet completely understood. The present work explains how the electrical impedance spectroscopy technique can be utilized to investigate the effect of staling on the physicochemical properties of wheat bread during storage. An instrument based on electrical impedance spectroscopy technique is developed to study the electrical properties of wheat bread both at its crumb and crust with the help of designed multi-channel ring electrodes. Electrical impedance behavior, mainly capacitance and resistance, of wheat bread at crust and crumb during storage (up to 120 h) is investigated. The variation in capacitance showed the glass transition phenomenon at room temperature in bread crust after 96 h of storage with 18% of moisture in it. The resistance changes at bread crumb showed the starch recrystallization during staling.Industrial relevance
Simultaneous measurement of moisture content, glass transition and starch recrystallization is possible with the designed instrument without disturbing the experimental set-up. Thus, the present work is going to help manufacturers and researchers to understand the bread staling phenomenon at crust and crumb without opting very complex instrumental procedures.
Keywords: Bread staling; Impedance spectroscopy; Glass transition temperature (Tg); Starch re-crystallization; Capacitance; Resistance

Min Zuo, Yihu Song, Qiang Zheng, Preparation and properties of wheat gluten/methylcellulose binary blend film casting from aqueous ammonia: A comparison with compression molded

composites, Journal of Food Engineering, Volume 91, Issue 3, April 2009, Pages 415-422, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.09.019.
(http://www.sciencedirect.com/science/article/B6T8J-4TKPV7J-7/2/a21e974e0a485419a56fc4b708393c00)
Abstract:
The present work focused on the preparation and properties of wheat gluten (WG)/methylcellulose (MC) blend films containing 25 wt% glycerol plasticizer. Morphology, tensile properties (Young's modulus E, tensile strength [sigma]b and elongation at break [epsilon]b), and water vapor permeability (WVP) were evaluated in relation to MC to total polymer ratio, xMC. Mechanical properties of compression molded WG/MC composites were also investigated for comparison. Experimental results reveal that the casting films are superior in mechanical properties to the molded composites. The casting blend films show tailored mechanical and moisture barrier properties. Increasing xMC can improve E, [sigma]b and [epsilon]b simultaneously but lower moisture barrier performance at low relative humidity.
Keywords: Wheat gluten; Methylcellulose; Blend film; Mechanical properties; Water vapor permeability (WVP)

A. Skendi, M. Papageorgiou, C.G. Biliaderis, Effect of barley [beta]-glucan molecular size and level on wheat dough rheological properties, Journal of Food Engineering, Volume 91, Issue 4, April 2009, Pages 594-601, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.10.009.
(http://www.sciencedirect.com/science/article/B6T8J-4TPPDV6-5/2/6081dcaca21082ed520938b42849ac1e)
Abstract:
The effect of adding low (105 Da) or high (2.03 x 105 Da) molecular weight barley [beta]-glucans in two wheat flours of different breadmaking quality were studied. Mechanical spectra and creep-recovery analysis data within (low stress) and out (high stress) of the linear viscoelastic region were obtained. The results revealed that the rheological behavior of [beta]-glucan-enriched doughs depend on concentration and molecular weight of the polysaccharide as well as on the flour type used. Addition of [beta]-glucan increased the G' values of the good breadmaking quality flour doughs, whereas decreased the G' of the poor quality wheat cultivar. Supplementation with [beta]-glucans increased the resistance to deformation, flowability and elasticity of the doughs under low stress. Significant correlations between frequency sweep and creep-recovery parameters of optimally developed doughs from both flours were found. The addition of [beta]-glucan in the dough recipe of the poor breadmaking wheat flour may result in similar rheological responses to those obtained from a non-fortified good breadmaking quality wheat flour.
Keywords: Dough rheology; [beta]-Glucan; Molecular weight; Creep-recovery; Flour quality; Dynamic oscillatory testing

M. Kashaninejad, A.A. Dehghani, M. Kashiri, Modeling of wheat soaking using two artificial neural networks (MLP and RBF), Journal of Food Engineering, Volume 91, Issue 4, April 2009, Pages 602-607, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.10.012.
(http://www.sciencedirect.com/science/article/B6T8J-4TRCY67-2/2/7167049863ba127f428eea2f5ba189b5)
Abstract:
In this study soaking characteristics of wheat kernel was studied at different temperatures (25, 35, 45, 55 and 65 [degree sign]C) by measuring an increase in the mass of wheat kernels with respect to time. Artificial neural network (ANN) is a technique with flexible mathematical structure which is capable of identifying complex non-linear relationship between input and output data. A multi layer perceptron (MLP) neural network and radial basis function (RBF) network were used to estimate the moisture ratio of wheat kernel during soaking. ANNs were used to model wheat kernel soaking at different temperatures and a comparison was also made with the results obtained from Page's

model. The soaking temperature and time were used as input parameters and the moisture ratio was used as output parameter. The results were compared with experimental data and it was found that the estimated moisture ratio by multi layer perceptron neural network is more accurate than radial basis function network and Page's model. It was also found that moisture ratio decreased with increasing of soaking time and increased with increasing of soaking temperature.
Keywords: Artificial neural networks; Hydration kinetics; Moisture ratio; Soaking; Wheat kernel

Jaromir Michalowicz, Malgorzata Posmyk, Wirgiliusz Duda, Chlorophenols induce lipid peroxidation and change antioxidant parameters in the leaves of wheat (Triticum aestivum L.), Journal of Plant Physiology, Volume 166, Issue 6, 1 April 2009, Pages 559-568, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.09.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4V05385-1/2/5112e438947dd2f8b172eb999b580ba2)
Abstract: Summary
In this work, changes in superoxide dismutase (SOD), catalase (CAT) and guaiacol peroxidase (POD) activity were determined in the leaves of wheat (Triticum aestivum L.) exposed to 2,4-dichlorophenol (2,4-DCP) and pentachlorophenol (PCP). We analyzed the content of free phenols, the level of lipid peroxidation, and also the oxidation of dihydrorhodamine 123 by 2,4-DCP and PCP. Chlorophenols were spiked to soil in concentrations of 0.5 and 5.0 mg kg-1. Plant seeds were raised in plastic pots containing soil at a temperature of 25 [degree sign]C with a 16-h photoperiod and irradiance of 250 [mu]mol m-2 s-1. The leaves were harvested on the third, sixth and twelfth days of the experiment.
The inhibition of SOD activity in the leaves of wheat was observed for 2,4-DCP and PCP. 2,4-DCP and PCP induced changes in CAT activity with a stronger effect for PCP. The compounds markedly increased guaiacol POD activity during 12 d of the exposition of wheat to their action. The increase in free phenol content was observed both for 2,4-DCP and PCP. Chlorophenols also induced a powerful lipid peroxidation process between the third and sixth days of the experiment. A higher concentration of chlorophenols used in our study induced greater changes in all of the investigated parameters. 2,4-DCP and PCP oxidized the fluorescent probe - dihydrorhodamine 123 - in the concentrations of 5 and 1 ppm, respectively, and the addition of magnesium ions enhanced the oxidative capacity of the examined xenobiotics.
Keywords: Antioxidative enzymes; Chlorophenols; Free phenols; Lipid peroxidation; Wheat

G. Daei, M.R. Ardekani, F. Rejali, S. Teimuri, M. Miransari, Alleviation of salinity stress on wheat yield, yield components, and nutrient uptake using arbuscular mycorrhizal fungi under field conditions, Journal of Plant Physiology, Volume 166, Issue 6, 1 April 2009, Pages 617-625, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.09.013.
(http://www.sciencedirect.com/science/article/B7GJ7-4V5NSSJ-1/2/5822a86b9f7dc5fdb38c72995ff0a4a5)
Abstract: Summary
We conducted this study because of the importance of salinity in many parts of the world, and because almost all research regarding the effects of arbuscular mycorrhiza (AM) on plant growth under salinity have been conducted under greenhouse conditions. The hypothesis was that, with respect to the great abilities of AM fungi under stress, they are able to alleviate salinity stress under field conditions. Hence, the objectives were to evaluate the effects of different species of arbuscular mycorrhizal fungi on: (1) the yield and yield components of different wheat cultivars, and (2) nutrient uptake of different wheat genotypes under field saline conditions. The soil salinity of 7.41 dS/m and three AM species including Glomus etunicatum, G. mosseae and G. intraradices and wheat genotypes of Roshan, Kavir and a mutated line of Tabasi were tested. The electrical conductivity of the irrigation water was 13.87 dS/m. Under salinity, AM species significantly increased the growth and nutrient uptake of the mutated Tabasi line compared with the other

genotypes, especially in comparison to the Kavir genotype. The mycorrhizal Tabasi genotype resulted in the lowest concentrations of Na+ and Cl-. The influence of different species of AM on enhancing plant growth under salinity was observed in the following order: Glomus etunicatum>G. mosseae>G. intraradices. The symbiosis of Glomus etunicatum and G. intraradices with the Tabasi mutated line resulted in the highest (42.08%) and the lowest (7.55%) increases in wheat dry weight, respectively. The highest (38.3%) and the lowest (4.5%) grain yield increases were related to the symbiosis of Tabasi mutated line with Glomus etunicatum and G. intraradices, respectively. Although different species of AM can be very beneficial to wheat plants under salinity stress, it is obvious from the results of this research that Glomus etunicatum can perform more efficiently under such conditions compared with other AM species. This indicates the great importance of selecting the right combination of AM species and host plant to make cultivation under salinity even more likely.
Keywords: Nutrient uptake; Salinity; Species of arbuscular mycorrhizal fungi; Stress alleviation; Wheat (Triticum aestivum L.)

Fuji Jian, Digvir S. Jayas, Noel D.G. White, Temperature fluctuations and moisture migration in wheat stored for 15 months in a metal silo in Canada, Journal of Stored Products Research, Volume 45, Issue 2, April 2009, Pages 82-90, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.09.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4V69JFM-1/2/4e7408cf99f34a1ba37913a6e395a04f)
Abstract:
Temperatures and moisture contents inside a metal silo filled with 20 t of wheat were monitored from August 2003 to October 2004 in Western Canada. In the summer and then repeated in the autumn of 2005, grain moisture contents inside small columns, inserted in the top of the grain bulk in the same metal silo, were measured after 4 and 8 weeks. The columns had the following configurations: 1) both the top and bottom of the column were open; 2) the top of the column was open and the bottom was sealed; and 3) the top of the column was sealed and the bottom was open.
During the 15-month period, headspace temperature averaged 2.9 +/- 0.2 [degree sign]C higher than that of the ambient air with a maximum of 18.3 [degree sign]C and a minimum of 0 [degree sign]C. There was larger temperature fluctuation in the headspace than inside the grain mass. The average temperature gradient was 5.09 +/- 1.24 [degree sign]C/m inside the grain mass. The highest temperature gradient was 32.4 [degree sign]C/m and it was located at the center of the bin at 1.6 m high. 'Inside' grain had a lower moisture change than the surface grain.
Grain in the top section of the column with the column configuration of Top End Open had the largest change of its moisture content, and grain in the middle section of the column with any of the configurations did not change. Grain inside the small columns at different locations in the silo had different moisture movement trends. These trends were consistent with the measured moisture migration in the entire silo. These results confirm that even in a small silo there were temperature gradients large enough to drive air movement and the induced convection currents could cause moisture migration.
Keywords: Moisture migration; Temperature gradients; Surface moisture; Wheat storage; Bulk storage

Jian-Min Zhou, Yong Weon Seo, Ragai K. Ibrahim, Biochemical characterization of a putative wheat caffeic acid O-methyltransferase, Plant Physiology and Biochemistry, Volume 47, Issue 4, April 2009, Pages 322-326, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.11.011.
(http://www.sciencedirect.com/science/article/B6VRD-4V3HF87-1/2/e8a2d4afe5a8b37a75031d84e4af5834)
Abstract:

A wheat (Triticum aestivum L., near isogenic line of Hamlet) O-methyltransferase (OMT) was previously reported as a putative caffeic acid OMT (TaCOMT1), involved in lignin biosynthesis, based on its high sequence similarity with a number of graminaceous COMTs. The fact that the putative TaCOMT1 exhibits a significantly high sequence homology to another recently characterized wheat flavone-specific OMT (TaOMT2), and that molecular modeling studies indicated several conserved amino acid residues involved in substrate binding and catalysis of both proteins, prompted an investigation of its appropriate substrate specificity. We report here that TaCOMT1 exhibits highest preference for the flavone tricetin, and lowest activity with the lignin precursors, caffeic acid/5-hydroxyferulic acid as the methyl acceptor molecules, indicating that it is not involved in lignin biosynthesis. We recommend its reannotation to a flavone-specific TaOMT1 that is distinct from TaOMT2.
Keywords: Flavone-specific O-methyltransferase; Biochemical characterization; Reannotation; Tricetin; Triticum aestivum L.; Wheat

Chunfang Zheng, Dong Jiang, Fulai Liu, Tingbo Dai, Qi Jing, Weixing Cao, Effects of salt and waterlogging stresses and their combination on leaf photosynthesis, chloroplast ATP synthesis, and antioxidant capacity in wheat, Plant Science, Volume 176, Issue 4, April 2009, Pages 575-582, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.01.015.
(http://www.sciencedirect.com/science/article/B6TBH-4VJ4WHT-3/2/13958ba92d64cc202398011448fe8f98)
Abstract:
The objective of this study was to investigate the effects of salt (ST) and waterlogging (WL) stresses and their combination (SW) on leaf photosynthesis, chloroplast ATP synthesis, and antioxidant capacity in wheat (Triticum aestivum L.). Two winter wheat cultivars, Huaimai 17 and Yangmai 12, differing in their tolerance to ST and WL stresses were used. The plants were grown in pots and were subjected to ST, WL, and SW from 7 days after anthesis (DAA). The WL and SW treatments lasted for 5 days, while the ST treatment was continuously imposed during the grain filling stage. Significant decrease in net photosynthetic rate (PN) of the flag leaf was observed under the ST and SW treatments from 10 DAA in Yangmai 12 and at 18 DAA in both cultivars, which could be stomatal closure related. At 18 DAA, clear reduction in PN under the ST and SW treatments was observed, which was associated with chlorosis, damages to the photosystem II (PSII), enhanced lipid peroxidation, and depressed ATP synthesis in the chloroplasts of the flag leaf. Whereas, WL treatment alone had slightly negative effect on PN, which was mainly attributed to leaf chlorosis and waste in harvested energy by the PSII reaction center dispersed via non-photochemical approaches.
Keywords: Ca2+-ATPase; Chlorophyll a fluorescence; Lipid peroxidation; Mg2+-ATPase; Reactive oxygen species (ROS)

Francis J. Larney, H. Henry Janzen, Barry M. Olson, Andrew F. Olson, Erosion-productivity-soil amendment relationships for wheat over 16 years, Soil and Tillage Research, Volume 103, Issue 1, April 2009, Pages 73-83, ISSN 0167-1987, DOI: 10.1016/j.still.2008.09.008.
(http://www.sciencedirect.com/science/article/B6TC6-4TX6VWH-2/2/a5e226e4dffd11b9be8d98b1b0a396d1)
Abstract:
Soil erosion remains a threat to our global soil resource. This study was conducted to ascertain the effects of simulated erosion on soil productivity and methods for its amendment. Incremental depths (0, 5, 10, 15, and 20 cm) of surface soil, or cuts, were mechanically removed to simulate erosion at two sites (one Dryland, one Irrigated) in southern Alberta in 1990. Three amendment treatments (nitrogen + phosphorus fertilizer, 5 cm of topsoil, or 75 Mg ha-1 of feedlot manure) and a check were superimposed on each of the cuts. The sites were cropped annually until 2006. Average grain yield reductions during 16 years were 10.0% for 5 cm, 19.5% for 10 cm, 29.0% for

15 cm, and 38.5% for 20 cm of topsoil removal. There was evidence that the restoration of productivity levelled off at a value less than the non-eroded treatment rather than gradually converging on it, within the timeline of the study. Average grain yield loss was 50 kg ha-1 cm-1 yr-1 at the Dryland site and 59 kg ha-1 cm-1 yr-1 at the Irrigated site. As the depth of cut increased, the average residual effect (1993-2006) of manure increased, e.g., on the 5 cm cut, the residual effect (over the equivalent cut check treatment) was 20.9%, climbing to 41.9% on the 20 cm cut. Amendments ranked manure > topsoil > fertilizer in terms of restoring productivity to the desurfaced soils. The average grain yield during 16 years on the check treatment fell 2.1% cm-1 depth of topsoil removal on the Dryland site and 1.7% cm-1 for the Irrigated site. In contrast, grain yield on the manure treatment fell by 0.8% cm-1 on the Dryland site and 0.9% cm-1 on the Irrigated site. The study reinforces the need to prevent erosion and indicates that application of livestock manure is an option for restoring soil productivity in the short term.
Keywords: Simulated erosion; Soil amendments; Topsoil removal; Wheat yield

M.J. Moloi, A.J. Van der Westhuizen, Involvement of nitric oxide during the Russian wheat aphid resistance, South African Journal of Botany, Volume 75, Issue 2, April 2009, Page 412, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.081.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-2K/2/fe71d7b3430ad124c873c893841b0006)

S.J. Pearse, E.J. Veneklaas, G.R. Cawthray, M.D.A. Bolland, H. Lambers, Carboxylates in the rhizosphere of canola, wheat, lupins and pulses: Their role in P acquisition from sparingly soluble forms, South African Journal of Botany, Volume 75, Issue 2, April 2009, Page 415, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.091.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-2Y/2/11f981a6d3a0c99115de51b4463c36a9)

M.E. Cawood, J.C. Pretorius, A.J. Van der Westhuizen, Induction of the defence responses and resistance to wheat leaf rust by plant extracts, South African Journal of Botany, Volume 75, Issue 2, April 2009, Page 431, ISSN 0254-6299, DOI: 10.1016/j.sajb.2009.02.139.
(http://www.sciencedirect.com/science/article/B7XN9-4W0WFVR-4N/2/de7e27617a54500e39173007d6f29f02)

M.L. Eastridge, P.B. Bucci, C.V.D.M. Ribeiro, Feeding equivalent concentrations of forage neutral detergent fiber from alfalfa hay, grass hay, wheat straw, and whole cottonseed in corn silage based diets to lactating cows, Animal Feed Science and Technology, Volume 150, Issues 1-2, 30 March 2009, Pages 86-94, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.08.008.
(http://www.sciencedirect.com/science/article/B6T42-4TN5MH4-1/2/79068d7e22e345e82083f042b93b402a)
Abstract:
Diets with similar concentrations of equivalent forage neutral detergent fiber (FNDF) and nonfiber carbohydrates in corn-silage based diets could result in similar responses in ruminal function and animal performance. Four ruminally cannulated multiparous Holstein cows in late lactation were fed corn silage based total mixed rations with equivalent FNDF provided from alfalfa hay, grass hay, straw, or whole linted cottonseed (WCS). Formulated diets consisted of corn silage providing about 130 g/kg FNDF with either alfalfa hay, grass hay or wheat straw that provided about 40 g/kg FNDF. The fourth diet was formulated to consist of about 130 g of FNDF/kg of dietary dry matter (DM) from corn silage and 52 g of neutral detergent fiber (NDF)/kg of dietary DM from WCS, which is equivalent to 174 g of FNDF/kg of DM in the diet if NDF from WCS is 0.84 as forage-like as alfalfa NDF. Treatment periods consisted of 21 d. The FaNDF was about 20-30 g/kg higher than anticipated at the onset of the study, primarily because the aNDF in corn silage was higher than

expected. However, FaNDF was similar among the alfalfa hay, grass hay and straw diets, and about 40 g/kg lower, as desired, for the cottonseed diet. The DM intake was similar among treatments, averaging 24.7 kg/d. Milk yield was higher ($P<0.05$) for the cottonseed and grass hay diets than for the straw diet. However, because of numerical differences in milk fat and protein concentrations, milk energy output was similar among diets. Ruminal pH and total volatile fatty acid concentrations also were similar among diets. The WCS diet resulted in the lowest proportion of acetate and highest proportion of propionate, resulting in the lowest acetate:propionate ratio ($P<0.05$). Measures of ruminal mat consistency were similar among diets. Organic matter digestibilities among diets were similar, but the straw diet resulted in the highest ($P<0.05$) digestibility of aNDF and N. Feeding these diets to cows in late lactation provided evidence that alfalfa hay, grass hay, straw (low inclusion level) and WCS can be added on an equivalent FNDF basis to corn-silage based diets.
Keywords: Forage NDF; Whole cottonseed; Wheat straw

O. Zimonja, B. Svihus, Effects of processing of wheat or oats starch on physical pellet quality and nutritional value for broilers, Animal Feed Science and Technology, Volume 149, Issues 3-4, 16 March 2009, Pages 287-297, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.06.010.
(http://www.sciencedirect.com/science/article/B6T42-4T5S4FR-2/2/b783673c9b20c579789be3749c66f818)
Abstract:
Two experiments were conducted to investigate the influence of cereal starch exposed to various processing techniques on physical pellet quality and nutritional value of the diets fed to broiler chickens. In experiment 1, diets with equal amounts of oat hulls, rapeseeds and fish meal were cold-pelleted or steam-conditioned and pelleted with or without inclusion of 200 g pure wheat starch/kg. Durability of the pellets was reduced ($p<0.05$) for the starch-containing diets compared to non-starch diets under both processing conditions. Despite a significant improvement ($p<0.05$) in pellet quality within starch containing-diets as a consequence of gelatinised starch addition, pellet durability was lower ($p<0.05$) for gelatinised starch-containing diets compared to non-starch diets. In experiment 2, wheat and de-hulled oat-based diets were cold-pelleted, steam-pelleted or extruded before being fed to broiler chickens. The extent of starch gelatinisation was higher for oat diets than for wheat diets under all processing conditions. Feed/gain was lower ($p<0.05$) and AMEn higher ($p<0.05$) for oat versus wheat diets. The increase in AMEn was also reflected in starch digestibility which was significantly higher for oats compared to wheat diets in all segments of the gastrointestinal tract. As a consequence of increased gelatinisation a significant improvement ($p<0.05$) in starch digestibility was observed for extruded wheat diets compared with either cold- or steam-pelleted wheat diets. An improved ($p<0.05$) starch digestibility due to extrusion processing was only observed at a duodenal level for oat diets.
Keywords: Gelatinisation; Cold-pelleting; Steam-pelleting; Extrusion; Starch digestibility

F. Porteaus, J. Hill, A.S. Ball, P.J. Pinter, B.A. Kimball, G.W. Wall, F.J. Adamsen, D.J. Hunsaker, R.L. LaMorte, S.W. Leavitt, T.L. Thompson, A.D. Matthias, T.J. Brooks, C.F. Morris, Effect of Free Air Carbon dioxide Enrichment (FACE) on the chemical composition and nutritive value of wheat grain and straw, Animal Feed Science and Technology, Volume 149, Issues 3-4, 16 March 2009, Pages 322-332, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.07.003.
(http://www.sciencedirect.com/science/article/B6T42-4TDBM9K-1/2/38d226a7b84f4f58ea2638aae012e8aa)
Abstract:
The global impact of an increased concentration of CO_2 in the atmosphere on plants has been studied extensively, but little information has been published on the effect of enrichment of atmospheric CO_2 on the nutritive value of grain and straw used as ruminant feeds. This paper reports the chemical composition and nutritive value of grain and straw harvested from the drought

tolerant hard red spring wheat (Triticum aestivum L.) variety Yecora Rojo managed with two carbon dioxide regimes (ambient, 350 [mu]l/l and elevated, 550 [mu]l/l), two rates of nitrogen application (low N: 53 kg N/ha and high N: 393 kg N/ha) grown under a water-fed (i.e., no deficit) regime. Accumulation of carbon in straw did not differ among crops grown under elevated CO2 and low N supplementation and crops grown under ambient CO2 with low levels of N supplementation. Increased N application increased sequestration of C ($P<0.05$) compared to straw from crops grown under ambient CO2 concentration. Low levels of N application and elevated CO2 led to straw containing similar concentrations of N to those grown under ambient CO2 conditions. Increasing N application to crops grown under ambient concentrations of CO2 elevated the concentration of N ($P<0.01$) whereas crops at elevated concentrations of CO2 did not accumulate N to the same extent. Differences in the non-structural carbohydrate and cell wall content reflected the patterns for total C. No effect of increasing the concentration of CO2 on WSC, aNDFom, ADFom, hemicellulose, cellulose and lignin (sa) occurred. There was a small decline (-26 g/kg; $P<0.05$) in the concentration of aNDFom in straw from crops that had received high N input. The ratio of lignin to total N was higher in straw harvested from plots with elevated CO2 (33.5:1) compared with ambient CO2 (24.6:1). No changes in the total C content occurred for grain samples in response to CO2 concentration or supplemental N fertiliser. No interaction between supply of N and CO2 concentration occurred. Changes in the total N content of grain in response to treatments were similar to the changes observed in the straw fraction. The increases in concentration of N incorporated into grain were higher from crops grown under enriched concentrations of CO2 (i.e., +8.6 g/kg; $P<0.01$) than for crops grown under ambient supply of CO2 (+3.5 g/kg; $P<0.05$). Differences in concentration of starch in the grain with increasing supply of N from fertiliser occurred under FACE conditions ($P<0.05$), but not for grain harvested from those grown under ambient CO2 levels. No effect of changing concentrations of CO2 were observed for ADFom, lignin (sa), cellulose and neutral detergent cellulose digestibility but concentrations of aNDFom ($P<0.05$) and hemicellulose ($P<0.05$) were higher in grain grown under ambient concentrations of CO2 irrespective of supply of N to the crop. Although effects of elevated concentrations of CO2 on grain and straw quality were expected, this poses concerns for livestock production in systems that use lower levels of agronomic inputs. Elevated concentrations of CO2 in the ambient environment were beneficial for development of above ground biomass and grain yield as measured by thousand-grain weight. However, straw and grain quality, in terms of crude protein and the crude protein to energy ratio will be affected by increasing concentrations of CO2 in the atmosphere, and this may lead to a reduction in the total supply of crude protein in crops used by livestock.

Keywords: FACE; Elevated CO2; Wheat; Grain; Straw; Nutritive value; Nitrogen

Yang Gao, Aiwang Duan, Jingsheng Sun, Fusheng Li, Zugui Liu, Hao Liu, Zhandong Liu, Crop coefficient and water-use efficiency of winter wheat/spring maize strip intercropping, Field Crops Research, Volume 111, Issues 1-2, 15 March 2009, Pages 65-73, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.10.007.
(http://www.sciencedirect.com/science/article/B6T6M-4V5NSXP-1/2/5a45233c9b1fc7a5b477078b70871411)

Abstract:

Winter wheat and spring maize strip intercropping system is widely practiced in northern China. In this study, a field experiment with typical winter wheat and spring maize strip intercropping systems was carried out in 2003-2004 and 2004-2005 seasons to investigate crop coefficient (Kc, defined as the ratio of actual crop evapotranspiration to reference crop evapotranspiration) and water-use efficiency (WUE, defined as the ratio of grain yield to total actual evapotranspiration) of intercropping systems in the Huang-Huai-Hai Plain of China.

Crop coefficient values of sole winter wheat varied in ranges of 0.26-0.36, 1.09-1.15 and 0.27-0.41 at initial, mid and late season in two seasons, respectively. Kc values of sole spring maize varied

in 0.36-0.37, 1.18-1.19 and 0.22-0.28 at initial, mid and late season in two seasons, respectively. Kc values of winter wheat/spring maize intercropping system varied in 0.31-0.35, 1.14-1.23 at initial and middle wheat growing season, in 0.65-0.70 at wheat-maize co-growing period, and in 1.24-1.25 and 0.21-0.27 at middle and late maize growing season in two seasons, respectively.
Compared to yields of spring maize and winter wheat in monoculture, total grain yield (wheat + maize) of winter wheat/spring maize intercropping system increased by 39% and 98%, respectively. Average WUE in the intercropping system was 21.72 kg ha-1 mm-1, which was 23% less than that of the sole maize, but 4% greater than that of the sole wheat (4%). Therefore, although winter wheat/spring maize intercropping system does not improve WUE, it may significantly raise yield, which is helpful to ensure food safety in northern China.
Keywords: Crop coefficient; Water-use efficiency; Winter wheat/spring maize intercropping system; Yield

Yuying Shen, Lingling Li, Wen Chen, Michael Robertson, Murray Unkovich, William Bellotti, Merv Probert, Soil water, soil nitrogen and productivity of lucerne-wheat sequences on deep silt loams in a summer dominant rainfall environment, Field Crops Research, Volume 111, Issues 1-2, 15 March 2009, Pages 97-108, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.11.005.
(http://www.sciencedirect.com/science/article/B6T6M-4V936MK-2/2/9fb057eea9ad628aeb298648a061c681)
Abstract:
The management of water and nutrients in farming systems that incorporate alternating phases of lucerne pasture with annual grain crops posses additional challenges to rotations with annual crops only. Strategies for balancing water and nutrient resources within and across rotations will be governed by local soil, climatic, skill and economic constraints. On the Loess Plateau in China, farmers have been encouraged to grow lucerne (Medicago sativa) to reduce soil erosion and improve soil fertility on cropping lands but with little supporting information on how to incorporate lucerne within subsistence cropping systems. Lucerne-wheat rotation experiments were established at two locations in Gansu Province and examined the yield of lucerne and wheat along with changes in soil water and nitrogen (N). Lucerne proved to be well adapted to the high water holding capacity soils and summer dominant rainfall environment of the region with annual production of around 12 t ha-1 at the higher rainfall site (Qingyang). An old (30 years), sparse stand of lucerne growing in the drier location (Dingxi) was much less productive, being dependent on incident rainfall. Apparent water use efficiency (WUE) of lucerne over individual harvest periods ranged from 4 to 56 kg ha-1 mm-1 at Qingyang. Lucerne was able to dry the soil to the crop lower limit (CLL) to depths of 3 m and there was clear evidence that lucerne roots were extracting water below this depth.
Wheat following lucerne is subject to low plant available soil water at sowing, unless substantial rainfall occurs, but climate variability in this region makes this difficult to predict. Rain which falls during short fallow periods after lucerne termination provides opportunity for N fertiliser responses, which may be greater after large rainfall events that lead to N leaching. In drier environments such as Dingxi, deep drainage and leaching appear unlikely under rotations which incorporate lucerne, and here evaporative water loss from the soil surface presents a more significant management challenge. The overall variability in seasonal rainfall at both sites, even within the short period of this study, indicates that an adaptive management strategy may be required, rather than fixed rotations. Systems modelling may shed further light on the most useful strategies to manage crop rotations within this variability.
Keywords: Dryland farming; Rotation; Water use; Water use efficiency; Soil nitrogen

Simona Bassu, Senthold Asseng, Rosella Motzo, Francesco Giunta, Optimising sowing date of durum wheat in a variable Mediterranean environment, Field Crops Research, Volume 111, Issues 1-2, 15 March 2009, Pages 109-118, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.11.002.

(http://www.sciencedirect.com/science/article/B6T6M-4V75HKG-1/2/0f86b2b0e133bb7d0e6c7e1d8247bbbe)
Abstract:
Sowing date and cultivar choice influence yield of wheat in Mediterranean climatic regions where crop production is constrained by waterlogging in winter on clay soils and terminal water deficit in spring. Because of the large seasonal variability in Mediterranean environments, a combination of experimental data and simulation results were used to investigate optimal sowing date and cultivar choice. The Agricultural Production Systems SIMulator (APSIM), which had been rigorously tested for bread wheat (Triticum aestivum L.) in Mediterranean-type environments, was further tested with measured durum wheat (Triticum turgidum L. var. durum) experimental data from the Mediterranean basin. The model reproduced most of the observed seasonal variability of grain yields but tended to overestimate, particularly some of the observed low grain yields. Comparing the model with detailed field experiments from two seasons and three durum wheat cultivars over a wide range of sowing dates highlighted the importance of reproducing the measured phenology and in particularly the observed anthesis dates for the general performance of the model. The use of a specific phyllochron for each sowing date instead of a single value per cultivar regardless of sowing date, as in APSIM, improved anthesis predictions and other aspects of the model.
Hence, the phyllochron was varied in the model through a simple relationship based on observed phyllochrons and sowing dates. The new phyllochron routine was then used to explore management options to increase yields by combining the model with 47 years of historical weather records from Oristano, Sardinia, Italy. The simulation results showed that sowing wheat before December can result in higher yields in the absence of waterlogging. However, the high frequency of waterlogging on the clay soils, even with the observed decline of rainfall in the last 20 years in winter, showed no average yield advantage of sowing before December. Early maturing cultivars outperformed late cultivars at standard and late sowing dates. Hence, sowing early cultivars as soon as rainfall has started from December onwards is currently proposed to give the best yields in this environment in most seasons. Increasing temperatures and declining rainfalls in all months of the year as a consequence of future climate change projections will substantially reduce grain yields. Under such conditions, sowing as early as October to avoid terminal water shortage and heat stress will minimise the negative impact from climate change.
Keywords: APSIM; Grain yield; Sowing date; Phyllochron; Waterlogging; Wheat

Olaf Erenstein, Specification effects in zero tillage survey data in South Asia's rice-wheat systems, Field Crops Research, Volume 111, Issues 1-2, 15 March 2009, Pages 166-172, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.12.003.
(http://www.sciencedirect.com/science/article/B6T6M-4VBM4CH-1/2/de32e64430f282eb6969931811366d33)
Abstract:
Specification effects in terms of how technology options are contrasted can introduce bias in impact assessment. In a companion paper we evaluated the on-farm impacts of zero tillage (ZT) wheat as a resource-conserving technology in the rice-wheat systems of India's Haryana State and Pakistan's Punjab province [Erenstein, O., Farooq, U., Malik, R.K., Sharif, M., 2008. On-farm impacts of zero tillage wheat in South Asia's rice-wheat systems. Field Crop Res. 105, 240-252]. The underlying field work surveyed plots of full adopters (only ZT plots), partial adopters (ZT and conventional tillage [CT] plots on same farm) and non-adopters (only CT plots). The companion paper assumes that the comparison between the ZT plots of full plus partial adopters and CT plots of partial adopters is the least-biased assessment of ZT's on-farm impact. Here we revisit this underlying assumption and draw on complementary farm survey findings to illustrate the extent of specification effects in the assessment of on-farm impacts of ZT wheat in the same study areas. The study thereby distinguishes between three contrasts between ZT and CT within the same dataset: (1) plain contrast (all plots of adopters and non-adopters); (2) adopter-only contrast (full

and partial adopters only, as used in Erenstein et al. [Erenstein, O., Farooq, U., Malik, R.K., Sharif, M., 2008. On-farm impacts of zero tillage wheat in South Asia's rice-wheat systems. Field Crop Res. 105, 240-252]); (3) pair-wise contrast (partial adopters only). Proceeding from type 1 to type 3 comparisons the number of observations decrease but this is compensated by an increasing ability to control for variation. The ability of type 3 comparisons to pick up relatively small but significant differences is an important consideration in farm survey impact assessment. However, there is also an increase in partial adoption bias and further follow-up studies are needed to understand the implications of this. The comparisons show that the ZT effects on savings for diesel, tractor time and cost for wheat cultivation are particularly robust. In Haryana ZT's positive implications for yield and the other financial indicators were also statistically robust, but in Punjab these were sensitive to specification effects. Particularly sensitive to specification effects were the ZT effects on the productivity of applied water in both sites.
Keywords: Impact survey; Specification effects; Zero tillage; Wheat; India; Pakistan; Indo-Gangetic Plains

Neil Roder, Catherine Gerard, Aliette Verel, Tatiana Y. Bogracheva, Cliff L. Hedley, Peter R. Ellis, Peter J. Butterworth, Factors affecting the action of [alpha]-amylase on wheat starch: Effects of water availability. An enzymic and structural study, Food Chemistry, Volume 113, Issue 2, 15 March 2009, Pages 471-478, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.07.106.
(http://www.sciencedirect.com/science/article/B6T6R-4T708F1-1/2/8a3930e8e43120effd229b4beb6bb255)
Abstract:
In seeking an explanation for biochemical factors that influence the postprandial glycaemic response of starch-containing foods, a study was made of the action of pancreatic [alpha]-amylase on wheat starch. Samples containing different amounts of water were processed at 100 [degree sign]C before use as substrates for amylase. Structural information on the starch samples was obtained by polarised light microscopy, differential scanning calorimetry (DSC) and X-ray diffraction (XRD), in parallel with the enzyme studies. The catalytic efficiency of [alpha]-amylase was relatively low until the water content reached 30%, whereupon it rose sharply. Surprisingly, the Km value was higher for samples processed at 20-30% water than at 12% water, suggesting that access of the substrate to [alpha]-amylase was less favourable at 20-30% compared with 12% water. Km values fell at higher water levels, indicating greater availability of starch to amylase, presumably as a consequence of increased disorder of starch structure. Using DSC, XRD and microscopy, the anomaly in kinetic behaviour of 20-30% water samples was shown to be due to annealing of starch during processing (heating at 100 [degree sign]C). The enzyme kinetic data proved to be a sensitive probe of changes in starch structure.
Keywords: Amylolysis; Starch processing; DSC; X-ray diffraction

Prakash C. Srivastava, Ajay P. Singh, Surendra Kumar, V. Ramachandran, Manoj Shrivastava, S.F. D'souza, Efficacy of phosphorus enriched post-methanation bio-sludge from molasses based distillery as P source to rice and wheat crops grown in a Mollisol: I. Laboratory and greenhouse evaluation with 32P-labeled sources, Geoderma, Volume 149, Issues 3-4, 15 March 2009, Pages 312-317, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.12.019.
(http://www.sciencedirect.com/science/article/B6V67-4VH8Y65-1/2/49f8cd9e335897367bb3b584b32bdd15)
Abstract:
Laboratory and greenhouse experiments were carried out with 32P labeled sources to compare the kinetics of desorption, chemical transformation and efficacy of P enriched post-methanation bio-sludges from molasses based distillery (PEMB 1 and PEMB 2) against single superphosphate (SSP), a conventional P fertilizer. Phosphorus enrichment of bio-sludge was done with either SSP (PEMB 1), or with an equimolar mixture of SSP and ortho-phosphoric acid (PEMB 2). Desorption

kinetics of added P (50 kg P2O5 ha- 1) showed a biphasic kinetics with an initial faster phase followed by a slower desorption phase. Desorption rate coefficient (K) for the initial faster desorption phase was the highest for PEMB 2 followed by PEMB 1 and the lowest for SSP. The K value for the slower desorption phase was also significantly higher for PEMB 2 than SSP. Sequential extraction of different chemical fractions of added P in the soil revealed that the P added as PEMB 1 or PEMB 2 was less transformed into occluded-P than SSP. In the greenhouse experiments, the dry matter yields (DMY) of rice with PEMB 2 at 37.5 kg P2O5 ha- 1 and with SSP at 50 kg P2O5 ha- 1 were statistically similar but the total P uptake with PEMB 2 at 37.5 kg P2O5 ha- 1 showed a significantly higher trend. The residual effect of PEMB 1 or PEMB 2 applied to rice at 37.5 kg P2O5 ha- 1 on DMY of subsequently grown wheat was significantly higher than that of SSP at 50 kg P2O5 ha- 1. The residual effect of PEMB 2 applied to rice at 37.5 kg P2O5 ha- 1 on the total P uptake by wheat grown after rice was significantly higher than that of SSP at 50 kg P2O5 ha- 1 or PEMB 1 at 37.5 kg P2O5 ha- 1. The residual effect of PEMB 2 applied to rice at 25.0 and 37.5 kg P2O5 ha- 1 on % P in plants derived from fertilizer (Pdff) was significantly higher than that of PEMB 1 at the corresponding application rates or SSP at 50 kg P2O5 ha- 1. The % utilization of residual P by the subsequently grown wheat after rice was the highest with PEMB 2 followed by PEMB 1 and the lowest with SSP. For the direct P fertilized wheat, the highest DMY was noted with PEMB 2 at 37.5 kg P ha- 1 which was significantly higher than the yields with PEMB 1 at 37.5 kg P ha- 1 or SSP at 50 kg P2O5 ha- 1. Total P uptake by wheat fertilized with PEMB 2 at 37.5 kg P2O5 ha- 1 was significantly higher than with PEMB 1 at 37.5 kg P2O5 ha- 1 but statistically similar with SSP at 50 kg P2O5 ha- 1. For both direct P fertilized rice and wheat, the values of Pdff were statistically similar with PEMB 2 at 37.5 kg P2O5 ha- 1 and with SSP at 50 kg P2O5 ha- 1. However, the % utilization of P by directly fertilized rice or wheat was significantly higher with PEMB 2 than with SSP or PEMB 1.
Keywords: Desorption of phosphorus; Chemical fractions; Phosphorus enriched bio-sludge; Single superphosphate; Rice; Wheat

Wei Gong, Xiaoyuan Yan, Jingyan Wang, Tingxing Hu, Yuanbo Gong, Long-term manure and fertilizer effects on soil organic matter fractions and microbes under a wheat-maize cropping system in northern China, Geoderma, Volume 149, Issues 3-4, 15 March 2009, Pages 318-324, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.12.010.
(http://www.sciencedirect.com/science/article/B6V67-4VFJSB1-1/2/bdbdf2d5656248d3acb0fd12ec166bf5)
Abstract:
As an essential indicator of soil quality, soil organic carbon (SOC) and its different labile fractions have an important role in determining soil chemical, physical, and biological properties. The objective of this study was to evaluate the soil carbon (C) and nitrogen (N) contents in different soil organic matter (SOM) pools (light and heavy fractions), the role of light- and heavy-fraction C in SOC sequestration, and culturable microbial counts in the surface (0-20 cm) of a fluvo-aquic soil after 18 years of fertilization treatments under a wheat-maize cropping system in the North China Plain. The experiment included seven treatments: (1) OM, organic manure; (2) 1/2OMN, half organic manure with mineral fertilizer NPK; (3) NPK, mineral fertilizer NPK; (4) NP, mineral fertilizer NP; (5) PK, mineral fertilizer PK; (6) NK, mineral fertilizer NK; and (7) CK, unfertilized control. Carbon and N contents of the light and heavy fractions were highest in the OM treatment, while the CK treatment showed the lowest value. Application of half organic manure with mineral fertilizer NPK (treatment 2) significantly increased C and N contents of the light and heavy fractions in soil in comparison with application of mineral fertilizer alone (treatments 3, 4, 5, and 6). For the mineral fertilizer treatments, a balanced application of NPK (treatment 3) showed higher C and N contents of the light and heavy fractions than an unbalanced use of fertilizers (treatments 4, 5, and 6). Heavy-fraction C dominated total SOC storage in all treatments. The total SOC increase under fertilization treatments is attributed to an increase in C content of both the light and the

heavy fraction. However, the SOC increase for the manure treatments was mainly due to an increase in the C content of the heavy fraction, whereas that for mineral fertilizer treatments was mainly due to an increase in the C content of the light fraction. The total soil culturable microbial counts (including bacteria, fungi, and actinomycetes) was observed to be highest for the OM treatment, while the control plot showed the lowest value. Application of half organic manure with mineral fertilizer NPK was found to produce a higher culturable microbial counts than application of mineral fertilizers alone, and the NPK treatment gave a higher culturable microbial counts than other mineral fertilizer treatments (NP, PK or NK). Light-fraction C is probably the better predictor of microbial abundance, as it correlated more strongly with culturable microbial counts than total SOC did.
Keywords: Long-term fertilization; Light fraction; Heavy fraction; Soil organic carbon and nitrogen; Microbial counts; North China Plain

M. Aubinet, C. Moureaux, B. Bodson, D. Dufranne, B. Heinesch, M. Suleau, F. Vancutsem, A. Vilret, Carbon sequestration by a crop over a 4-year sugar beet/winter wheat/seed potato/winter wheat rotation cycle, Agricultural and Forest Meteorology, Volume 149, Issues 3-4, 11 March 2009, Pages 407-418, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.09.003.
(http://www.sciencedirect.com/science/article/B6V8W-4TVY58B-1/2/94f39877f4a46ff909c510f71534ead8)
Abstract:
A crop managed in a traditional way was monitored over a complete sugar beet/winter wheat/potato/winter wheat rotation cycle from 2004 to 2008. Eddy covariance, automatic and manual soil chamber, leaf diffusion and biomass measurements were performed continuously in order to obtain the daily and seasonal Net Ecosystem Exchange (NEE), Gross Primary Productivity (GPP), Total Ecosystem Respiration (TER), Net Primary Productivity (NPP), autotrophic respiration, heterotrophic respiration and Net Biome Production (NBP). The results showed that GPP and TER were subjected to important inter-annual variability due to differences between crops and to climate variability. A significant impact of intercrop assimilation and of some farmer interventions was also detected and quantified. Notably, the impact of ploughing was found to be limited in intensity (1-2 [mu]mol m-2 s-1) and duration (not more than 1 day). Seasonal budgets showed that, during cropping periods, the TER/GPP ratio varied between 40 and 60% and that TER was dominated mainly by the autotrophic component (65% of TER and more). Autotrophic respiration was closely related to GPP during the growth period. The whole cycle budget showed that NEE was negative and the rotation behaved as a sink of 1.59 kgC m-2 over the 4-year rotation. However, if exports are deducted from the budget, the crop became a small source of 0.22 (+/-0.14) kgC m-2. The main causes of uncertainty with these results were due to biomass samplings and eddy covariance measurements (mainly, uncertainties about the u* threshold determination). The positive NBP also suggested that the crop soil carbon content decreased. This could be explained by the crop management, as neither farmyard manure nor slurry had been applied to the crop for more than 10 years and because cereal straw had been systematically exported for livestock. The results were also strongly influenced by the particular climatic conditions in 2007 (mild winter, and dry spring) that increased the fraction of biomass returned to the soil at the expense of harvested biomass, and therefore mitigated the source intensity. If 2007 had been a `normal' year, this intensity would have been twice as great. This suggests that, in general, the rotation behaved as a small carbon source, which accords with similar studies based on multi-year eddy covariance measurements and export assessment and with modelling or inventory studies analysing the evolution of crop soil organic carbon (SOC) on a decennial scale.
Keywords: Crop rotational cycle; Net Primary Productivity; Gross Primary Productivity; Total Ecosystem Respiration

Yue ZHANG, Zhi-Shan LIN, Bao-Jiu CAO, Yi-Qiang GUO, Mei-Jiao WANG, Xing-Guo YE, Zhi-Yong XIN, Qiong-Fang XU, Shi-Hua GUO, Genetic Behavior of 2Ai-2 Chromosome in Thinopyrum intermedium-Wheat Substitution Lines, Acta Agronomica Sinica, Volume 35, Issue 3, March 2009, Pages 424-431, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60067-X.
(http://www.sciencedirect.com/science/article/B94TW-4X3127B-3/2/7a7ac8589931496a51eb6c2ced176273)
Abstract:
The aim of this study was to provide cytogenetical evidence on the behavior of chromosome 2Ai-2 from Thinopyrum intermedium in different wheat (Triticum aestivum L.) chromosome substitution backgrounds. Five wheat-alien disomic or ditelosomic substitution lines were crossed with the common wheat variety Chinese Spring to produce the BC1 and F2 populations, which were tested with expressed sequence target (EST)-PCR markers specific to chromosome 2Ai-2 and genomic in situ hybridization (GISH) analysis. In the 2Ai-2(2B) substitution background, the alien chromosome or its fragment was transferred to offspring with higher ratio than the expected ratio, whereas the transmission ratios were much lower than the expectation in the 2Ai-2(2D) background. The 2Ai-2 chromosome was transferred preferentially through heterozygosis in the 2Ai-2(2B) background. Structural changes of 2Ai-2 occurred frequently in progenies, most of which were near the centromere. Compared with the short arm, the long arm of the alien chromosome was lost more frequently in the next generations. The F2 plants with 2AS-substitution background were rare when detected with 2Ai-2S-specific EST-PCR marker(s), suggesting that the alien telosome might be lost frequently. Structural variation of the telosomic chromosome 2Ai-2S was also observed in the offspring with 2AS-substitution background. The GISH results confirmed that the EST-PCR markers can be applied in tracing the alien chromosome in wheat background.
Keywords: disomic substitution lines; EST-PCR markers; chromosome; transmission ratio; structural variation

Shou-fen DAI, Ze-hong YAN, Deng-cai LIU, Lian-quan ZHANG, Yu-ming WEI, You-liang ZHENG, Evaluation on Chinese Bread Wheat Landraces for Low pH and Aluminum Tolerance Using Hydroponic Screening, Agricultural Sciences in China, Volume 8, Issue 3, March 2009, Pages 285-292, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60211-4.
(http://www.sciencedirect.com/science/article/B82XG-4VXDRCH-5/2/ac04b741f8aae89c83898661c2f4c4db)
Abstract:
Aluminum (Al) toxicity often takes place in acidic soils with a pH of 5.5 or lower. Breeding and cultivation of Al tolerance wheat can partially protect wheat escaping from Al toxicity. The scarcity of the tolerant sources impedes the wheat breeding. In order to find new Al tolerance sources, we screened 173 bread wheat landraces from Tibet of China using hydroponic screening. It was indicated that: (1) There were diversities on the root regenerate length (RRL). The RRL of a large of landraces were longer than 7.00 cm in pH 7 (58.38%) and pH 4.5 (66.47%), but shorter than 5.00 cm in pH 4.5 + 50 [mu]M Al3+(80.93%). The low pH showed either promotion or restraining effects depend on landraces, but Al toxicity under low pH only showed restraining effects on the root elongation. (2) There were also diversities on root tolerance index of low pH (RTI1) or root aluminum tolerance index (RTI2) among cultivars. The RTI1 varied from a narrow range but with relatively high value (0.8722-1.2953) in comparison with that of RTI2 (0.3829-1.0058), and the RTI1 of approximately 60% landraces was higher than 1.0000, the RTI2 of only 19.07% landraces was higher than 0.7000, suggesting that Al toxicity acted as an important factor for the reduction of the root elongation under acidic soils. (3) The RTI1 of many wheats was higher than 1.0000, and As2256 and As2295 were the most tolerant for low pH, with RTI1 1.2953 and 1.2925, respectively. (4) Based on RTI2, seven wheats showed similar or higher tolerance to Al toxicity than Chinese Spring (CS), a known tolerance wheat. Much better tolerance existed in landraces of As1543 and As1242, which can be used as the new parents for Al tolerant breeding.

Keywords: bread wheat; root regenerate length; tolerance index; aluminum tolerance; hydroponic screening

J.W. Gowing, D.A. Rose, H. Ghamarnia, The effect of salinity on water productivity of wheat under deficit irrigation above shallow groundwater, Agricultural Water Management, Volume 96, Issue 3, March 2009, Pages 517-524, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.09.024.
(http://www.sciencedirect.com/science/article/B6T3X-4TY8W82-1/2/ebf89c75917d871b0cd8e1e30b7e50b2)
Abstract:
Saline groundwater is often found at shallow depth in irrigated areas of arid and semi-arid regions and is associated with problems of soil salinisation and land degradation. The conventional solution is to maintain a deeper water-table through provision of engineered drainage disposal systems, but the sustainability of such systems is disputed. This shallow groundwater should, however, be seen as a valuable resource, which can be utilised via capillary rise (i.e. sub-irrigation). In this way, it is possible to meet part of the crop water requirement, even where the groundwater is saline, thus decreasing the need for irrigation water and simultaneously alleviating the problem of disposing of saline drainage effluent. Management of conditions within the root zone can be achieved by means of a controlled drainage system.
A series of lysimeter experiments have permitted a detailed investigation of capillary upward flow from a water-table controlled at shallow depth (1.0 m) under conditions of moderately high (5 mm/day) evaporative demand and with different levels of salinity. Experiments were conducted on a wheat crop grown in a sandy loam soil. Groundwater salinity was held at values from 2 to 8 dS/m while supplementary (deficit) irrigation was applied at the surface with salinity in the range 1-4 dS/m.
Our experiments show that increased salinity decreased total water uptake by the crop, but in most treatments wheat still extracted 40% of its requirement from the groundwater, similar to the proportion reported for non-saline conditions. Yield depression was limited to 30% of maximum when the irrigation water was of relatively good quality (1 and 2 dS/m) even with saline groundwater (up to 6 dS/m). Crop water productivity (grain yield basis) was around 0.35 kg/m3 over a wide range of salinity conditions when calculated conventionally on the basis of total water use, but was generally above 1.0 kg/m3 if calculated on the basis of irrigation input only.
Keywords: Deficit irrigation; Groundwater; Salinity; Controlled drainage; Water productivity

C. Cote-Beaulieu, F. Chain, J.G. Menzies, S.D. Kinrade, R.R. Belanger, Absorption of aqueous inorganic and organic silicon compounds by wheat and their effect on growth and powdery mildew control, Environmental and Experimental Botany, Volume 65, Issues 2-3, March 2009, Pages 155-161, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.09.003.
(http://www.sciencedirect.com/science/article/B6T66-4TG9HVP-1/2/941d401ffbf171c17047ae0ae86c0425)
Abstract:
Soluble silicon, absorbed in the form of silicic acid by plant roots, confers efficient protection against many diseases. However, owing to its low solubility, there is a practical limit to increasing silicic acid availability to plants in the field. For this reason, methyl silanols - mono-, di- and trimethyl silicic acid - the water-soluble degradation products of silicone polymer, were evaluated for their ability to protect against powdery mildew in wheat grown under peat-based and hydroponic conditions. X-ray microanalysis indicated that only the monomethyl derivative was absorbed and deposited by wheat plants. Inductively coupled plasma-optical emission spectrometry measurements of total plant Si content confirmed this observation and indicated that monomethyl silicic acid remained mostly in its soluble monomeric form in planta. Mono- and trimethyl silicic acid offered no protection against powdery mildew and, indeed, yielded higher levels of infection than the control. Unexpectedly, dimethyl silicic acid induced severe symptoms of

phytotoxicity early into the experiments at nutrient solution concentrations as low as 0.1 mM. For their part, both mono- and trimethyl silicic acid also caused symptoms of phytotoxicity by the end of the experiments. Our findings would suggest that silanols cannot be considered as substitutes for silicic acid in plants. Moreover, application of silicone-contaminated waste or sewage sludge to agricultural land needs to be evaluated with considerable care.
Keywords: Silicon; Silanols; Silicone; Wheat; Blumeria graminis

Andras Ferenc Balint, Fruzsina Szira, Marion S. Roder, Gabor Galiba, Andreas Borner, Mapping of loci affecting copper tolerance in wheat--The possible impact of the vernalization gene Vrn-A1, Environmental and Experimental Botany, Volume 65, Issues 2-3, March 2009, Pages 369-375, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.11.004.
(http://www.sciencedirect.com/science/article/B6T66-4TY9MRJ-1/2/a4f2d9bed2b2d555a939110d879675c6)
Abstract:
Pot experiments with copper-treated soil and a control were performed in a greenhouse to determine QTLs for copper tolerance in wheat, using deletion, introgression and single chromosome recombinant lines. Genetic and physical mapping identified loci for copper tolerance on the long arm of chromosomes 5A and 5D, while loci with minor effects were found on the long and short arms of chromosome 5B. Tests on `Chinese Spring'-Aegilops tauschii introgression lines revealed a locus influencing copper tolerance on chromosome 3DS. QTLs for copper tolerance on chromosome 5A were mapped genetically and physically to exactly the same position as the gene for vernalization requirement (Vrn-A1). It is therefore suggested that Vrn-A1 may have a pleiotropic effect on copper tolerance may be due to the control of Cbf genes.
Keywords: Copper tolerance; Cbf genes; Deletion lines; Introgression lines; QTL mapping; Single chromosome recombinant lines; Vrn gene; Wheat

Hanene Cherif, Fathia Ayari, Hadda Ouzari, Massimo Marzorati, Lorenzo Brusetti, Naceur Jedidi, Abdennaceur Hassen, Daniele Daffonchio, Effects of municipal solid waste compost, farmyard manure and chemical fertilizers on wheat growth, soil composition and soil bacterial characteristics under Tunisian arid climate, European Journal of Soil Biology, Volume 45, Issue 2, March-April 2009, Pages 138-145, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.11.003.
(http://www.sciencedirect.com/science/article/B6VR7-4V1MDB7-1/2/3151c0472a873aec153e95f4e49d9a04)
Abstract:
The use of municipal solid waste compost (MSWC) as soil organic amendment is of an economic and environmental interest. However, little is known about the effectiveness of MSWC application on agricultural soil in northern Africa arid climate. We assessed the impact of five years' applications of different organic and mineral fertilizers on wheat grain yields and soil chemical and microbial characteristics. Soils were treated with MSWC at rates of 40 (C1) and 80 (C2) Mg ha-1, farmyard manure at a rate of 40 Mg ha-1 (M), chemical fertilizers (Cf) and the combinations (C1Cf, C2Cf, MCf). Wheat grain yield was enhanced with all amendments. Parallel increases of heavy metal levels and faecal coliform were also recorded except for Cf treatments. Based on wheat grain yield, heavy metal and faecal coliform data, we determined the treatment effectiveness index (Exx), calculated by dividing the pollutant increase ratio by the grain yield increase ratio. The treatment effectiveness index EC1 indicated lower faecal and heavy metal pollution with positive gains in wheat yields. Despite polluting effects on soil determined by the different treatments, no significant differences between treatments were observed in total bacterial count and soil bacterial community structure, as shown by 16S rRNA gene PCR-denaturing gradient gel electrophoresis banding patterns and 16S rRNA gene Length Heterogeneity-PCR analysis. According to the collected data, the use of MSWC at a rate of 40 Mg ha-1 might be recommended.

Keywords: Municipal solid waste compost; Wheat grain yields; Heavy metals; Agricultural soil; Bacterial community structure

P.C. Abhilash, Vandana Singh, Nandita Singh, Simplified determination of combined residues of lindane and other HCH isomers in vegetables, fruits, wheat, pulses and medicinal plants by matrix solid-phase dispersion (MSPD) followed by GC-ECD, Food Chemistry, Volume 113, Issue 1, 1 March 2009, Pages 267-271, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.07.004.
(http://www.sciencedirect.com/science/article/B6T6R-4SYCR00-3/2/b614baaf8a70ee6d2474964e2f561a1f)
Abstract:
A fast, simple and inexpensive sample preparation method based on matrix solid-phase dispersion (MSPD) technique is proposed for the isolation of combined residues of hexachlorocyclohexane isomers from fruits, vegetables, grains, pulses and medicinal plants. Both extraction and clean-up were carried out in a single step and target compounds were determined by gas chromatography coupled with electron capture detection (GC-Ni63 ECD). The major factors affecting extraction yield and sensitivity, such as type of dispersant material and extraction solvent, were evaluated and optimised. Under optimised conditions, 5 g of sample matrix was dispersed with 500 mg of Florisil and blended with 1 g of anhydrous magnesium sulphate and 500 mg of sodium chloride, and transferred into a glass column containing neutral alumina (2 g) and anhydrous sodium sulphate (500 mg). The dispersed sample matrix was then eluted with 10 ml of n-hexane-ethyl acetate mixture (70:30, v/v) and repeated with another 10 ml of same solvent mixture. Recoveries of the proposed method for the spiked samples ranged from 93% to 103% and the day-to-day variability remained between 5% and 10%. The limit of detection (LOD) of [alpha]-, [beta]-, [gamma]- and [delta]- HCH was 3, 6, 4 and 5 ng g-1, respectively. Satisfactory results were obtained in the routine analysis of real samples, confirming the reliability and efficacy of this method for the analysis of HCH residues in food matrices and medicinal plants.
Keywords: Hexachlorocyclohexane; Matrix solid-phase dispersion; Food matrices; Gas chromatography

Soren Halvarsson, Hakan Edlund, Magnus Norgren, Manufacture of non-resin wheat straw fibreboards, Industrial Crops and Products, Volume 29, Issues 2-3, March 2009, Pages 437-445, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.08.007.
(http://www.sciencedirect.com/science/article/B6T77-4TSSYGK-1/2/84b7f7556139100275e829c233df9760)
Abstract:
Wheat straw was used as raw material in the production of fibreboards. The size-reduced straw was pretreated with steam, hot water and sulphuric acid before the defibration process to loosen its physical structure and reduce the pH. No synthetic binder was added. Adhesive bonding between fibres was initiated by activation of the fibre surfaces by an oxidative treatment during the defibration process. Fenton's reagent (ferrous chloride and hydrogen peroxide) was added. Two different levels of hydrogen peroxide (H2O2), 2.5% or 4.0% were used. The resulting fibres were characterized in terms of fibre length distribution, shive content, pH and pH-buffering capacity. The properties of finished fibreboards were compared with medium-density fibreboard (MDF) with density above 800 kg/m3 produced from straw and melamine modified UF resin. The modulus of rupture (MOR), modulus of elasticity (MOE) and internal bond (IB) were lower than those of conventional manufactured wheat straw fibreboards but close to the requirements of the MDF standard (EN 622-5: 2006). The water absorption properties for the H2O2 activated straw fibreboards were relatively high, but were reduced by 25% with the addition of CaCl2 into the defibrator system as a water-repelling agent. Increased levels of hydrogen peroxide improved the mechanical and physical properties of the straw fibreboard.

Keywords: Wheat straw; Non-resin; Non-wood fibres; Peroxide; MDF; HDF; UF-resin; MUF-resin; Refining; Mechanical properties

Yihu Song, Qiang Zheng, Structure and properties of methylcellulose microfiber reinforced wheat gluten based green composites, Industrial Crops and Products, Volume 29, Issues 2-3, March 2009, Pages 446-454, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.09.002.
(http://www.sciencedirect.com/science/article/B6T77-4TRHC3M-2/2/a694f45ccd8c7a4c6b63a6ffffc78861)
Abstract:
Environmentally friendly green composites were prepared by conventional blending wheat gluten (WG) as matrix, methylcellulose (MC) microfibers as filler and glycerol as plasticizer followed by compression molding of the mixture at 127 [degree sign]C to crosslink the matrix. Morphology, dynamic mechanical analysis (DMA), tensile properties (Young's modulus E, tensile strength [sigma]b and elongation at break [var epsilon]b), and moisture absorption (MA) and weight loss (WL) in water as well as thermogravimetric analysis (TGA) were evaluated in relation to MC content. It was found that addition of MC microfibers can significantly improve E and [sigma]b of the composite, which is accompanied by rises in glass transition temperatures of the WG matrix. Influences of MC content on the thermal decomposition and gluten solubility (GS) in water are also discussed.
Keywords: Wheat gluten; Methylcellulose; Composite

M.T. Labuschagne, O. Elago, E. Koen, The influence of temperature extremes on some quality and starch characteristics in bread, biscuit and durum wheat, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 184-189, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.09.001.
(http://www.sciencedirect.com/science/article/B6WHK-4TPF4F1-1/2/0ce1c9233fb17b03935cee2a86cdd0bf)
Abstract:
Environmental conditions during grain-fill can affect the duration of protein accumulation and starch deposition, and thus play an important role in grain yield and flour quality of wheat. Two bread-, one durum- and one biscuit wheat were exposed to extreme low (-5.5 [degree sign]C for 3 h) and high (32 [degree sign]C/15 [degree sign]C day/night for three days) temperatures during grain filling under controlled conditions for two consecutive seasons. Flour protein content was increased significantly in one bread wheat, Kariega, under heat stress. Cold stress significantly reduced SDS sedimentation in both bread wheats. Kernel weight and diameter were significantly decreased at both stress treatments for the two bread wheats. Kernel characteristics of the biscuit wheat were thermo stable. Kernel hardness was reduced in the durum wheat for the heat treatment. Durum wheat had consistently low SDS sedimentation values and the bread wheat high values. Across the two seasons, the starch content in one bread wheat was significantly reduced by both high and low temperatures, as is reflected in the reduction of weight and diameter of these kernels. In the durum wheat, only heat caused a significant reduction in starch content, which is again reflected in the reduction of kernel weight and diameter.
Keywords: Quality; Starch; Temperature stress; Wheat

Donatella Peressini, Alessandro Sensidoni, Effect of soluble dietary fibre addition on rheological and breadmaking properties of wheat doughs, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 190-201, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.09.007.
(http://www.sciencedirect.com/science/article/B6WHK-4TTMJRV-4/2/c2ea9e16aeed41a36326fb00eb5b63c0)
Abstract:
The aim of this experimental work was to evaluate the effect of inulin addition on the rheological properties of common wheat doughs and bread quality. Three commercial fructan products of

different number average degree of polymerisation (DPn) were used (DPn = 10 for inulin ST; DPn = 23 for inulin HP and HP-gel). Inulin contents from 2.5 to 7.5% on dry matter (wheat flour plus inulin) were used. Dough rheological properties were investigated using farinograph and dynamic rheological measurements. Upon addition of dietary fibre (DF), significant increase in mixing time and stability, and decrease in water absorption were recorded. Inulin ST exerted greater effect on water absorption than HP products.
Inulin with high DP determined large changes in linear viscoelastic properties of dough. The storage modulus (G') gradually increased and tan [delta] decreased with increasing levels of inulin HP and HP-gel, which contribute to the overall dough elasticity and strength. The increase in solid-like behaviour with DF content prevented expansion of wheat dough during the fermentation stage. No significant differences were observed between sample HP and HP-gel. Enrichment with inulin ST led to lower changes in linear viscoelastic properties of dough at farinograph water absorption than inulin HP. Bread volume was significantly reduced and crumb hardness was enhanced by inulin HP level in the range 5-7.5%. When inulin ST was added to a flour suitable for breadmaking, a trend of increasing bread volume with the increase of DF content was found.
Keywords: Dietary fibre; Inulin; Fructan; Wheat dough; Rheology; Breadmaking quality

Hua-Neng Xu, Weining Huang, Chunli Jia, Yangsoo Kim, Huiping Liu, Evaluation of water holding capacity and breadmaking properties for frozen dough containing ice structuring proteins from winter wheat, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 250-253, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.10.009.
(http://www.sciencedirect.com/science/article/B6WHK-4TYJTYB-1/2/8f9b222d61b88c24f551aea425f77c28)
Abstract:
The effects of ice structuring proteins (ISPs) from white wheat and storage conditions on the water holding capacity (WHC) and breadmaking properties of frozen dough were investigated. The WHC of frozen dough was measured by centrifugation and the breadmaking properties were assessed as proofing time and bread specific volume. It was found that the prolonged frozen storage and freeze-thaw cycles decreased the WHC and breadmaking properties of dough. ISPs were highly effective in increasing the WHC of frozen dough and improving the breadmaking properties. There was a strong correlation between WHC and breadmaking properties (proofing time and bread specific volume) of frozen dough.
Keywords: Ice structuring proteins; Water holding capacity; Frozen dough; Freeze-thaw cycle

M.-J. Appelbee, G.T. Mekuria, V. Nagasandra, J.P. Bonneau, H.A. Eagles, R.F. Eastwood, D.E. Mather, Novel allelic variants encoded at the Glu-D3 locus in bread wheat, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 254-261, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.10.011.
(http://www.sciencedirect.com/science/article/B6WHK-4V34D6T-1/2/5364acf3d15da51f46bf1a8c64033c51)
Abstract:
Low-molecular weight glutenin subunits (LWM-GS) are important components of wheat (Triticum aestivum L.) gluten, with important effects on end-use quality. The LMW-GS are encoded at Glu-3 loci (Glu-A3, Glu-B3 and Glu-D3, on the short arms of chromosomes 1A, 1B and 1D), each of which exhibits extensive allelic variation. Each locus encodes numerous LMW-GS, some of which have similar electrophoretic mobilities, making it difficult to distinguish among Glu-3 loci. Alleles of the Glu-D3 locus of bread wheat are considered the most problematic to assign. To date, six Glu-D3 alleles, designated a, b, c, d, e and f, have been reported. We report five previously undescribed alleles (g, h, i, j and k), and describe a method for characterizing them using a combination of SDS-PAGE and multiplexed PCR-based DNA markers. This method could be used for accurate identification of Glu-D3 alleles, permitting the estimation of the effects of these alleles

on end-use quality and the selection of desirable alleles and allelic combinations in wheat breeding.
Keywords: Glu-3; Glu-D3; Low-molecular weight glutenin; Protein; Wheat

Jacques Lefebvre, Nonlinear, time-dependent shear flow behaviour, and shear-induced effects in wheat flour dough rheology, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 262-271, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.10.010.
(http://www.sciencedirect.com/science/article/B6WHK-4V17CP1-1/2/8e0c790de2d5a315ab180bac73f89e50)
Abstract:
Retardation test, step-shear rate experiments, low-amplitude and large-amplitude dynamic measurements have been combined to study the nonlinear and time-dependent viscosity of dough and shear-induced effects of flow on dough structure. Despite large quantitative differences in linear viscoelastic constants, doughs from different flours or with different water contents display the same type of flow behaviour. Shear-induced structural changes cause flow to shift from a high viscosity steady-state regime to a low viscosity one. The process, irreversible, is responsible for the time-dependent character of dough viscosity and seems to be controlled by the mechanical energy absorbed. Nevertheless, the two steady-state viscosities follow the same shear-thinning flow curve, fitted by a Cross equation with an exponent close to 1; the Newtonian plateau is approached at very low shear rate values. Viscosity data obtained on different doughs yield a unique flow master curve in reduced coordinates. Shear-induced structural changes cause also the linear viscoelastic plateau modulus of dough to decrease; this progressive weakening of the network structure is irreversible and seems governed by the accumulated strain. These characteristics of dough rheology are discussed with reference to the behaviour of concentrated suspensions.
Keywords: Dough; Nonlinear rheology; Flow behaviour; Shear-induced effects

F.J. Zhao, Y.H. Su, S.J. Dunham, M. Rakszegi, Z. Bedo, S.P. McGrath, P.R. Shewry, Variation in mineral micronutrient concentrations in grain of wheat lines of diverse origin, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 290-295, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.11.007.
(http://www.sciencedirect.com/science/article/B6WHK-4V7MSGC-1/2/d236959bf1d955585e399b6cb4370a91)
Abstract:
150 lines of bread wheat representing diverse origin and 25 lines of durum, spelt, einkorn and emmer wheat species were analysed for variation in micronutrient concentrations in grain. A subset of 26 bread wheat lines was grown at six sites or seasons to identify genetically determined differences in micronutrient concentrations. Substantial variation among the 175 lines existed in grain Fe, Zn and Se concentrations. Spelt, einkorn and emmer wheats appeared to contain higher Se concentration in grain than bread and durum wheats. Significant differences between bread wheat genotypes were found for grain Fe and Zn, but not Se concentration; the latter was influenced more by the soil supply. Grain Zn, but not Fe, concentration correlated negatively with grain yield, and there was a significant decreasing trend in grain Zn concentration with the date of variety release, suggesting that genetic improvement in yield has resulted in a dilution of Zn concentration in grain. Both grain Zn and Fe concentrations also correlated positively and significantly with grain protein content and P concentration, but the correlations with kernel size, kernel weight or bran yield were weak. The results from this study are useful for developing micronutrient biofortification strategies.
Keywords: Wheat; Micronutrients; Iron; Zinc; Selenium

Romina Beleggia, Cristiano Platani, Giuseppe Spano, Massimo Monteleone, Luigi Cattivelli, Metabolic profiling and analysis of volatile composition of durum wheat semolina and pasta, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 301-309, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.12.002.
(http://www.sciencedirect.com/science/article/B6WHK-4VBDKF8-1/2/214fce49f2fdfe99650b933c2b260b2c)
Abstract:
Although pasta is generally not considered for its aromatic properties, some evidence proves that cereal flours release volatile compounds and they might have an effect on the aroma of the transformed products. This work reports on the characterization of the volatile components of semolina and pasta obtained from four durum wheat cultivars (Triticum durum Desf., cvs. PR22D89, Creso, Cappelli, Trinakria). Semolina samples were characterized through polar metabolite profiling and fatty acid analysis to identify potential precursors of the volatile components. The results show significant differences among the samples tested with cv. Trinakria characterized by the highest content of sugars and fatty acids. Volatile composition was investigated both in semolina and in cooked pasta using headspace solid-phase micro-extraction (HS-SPME) and identified by GC-MS. Thirty-five volatile compounds including aldehydes, ketones, alcohols, terpenes, esters, hydrocarbons and a furan were identified. Significant differences were observed between semolina and pasta samples in terms of composition and amount of the volatile compounds. During cooking an increase in aldehyde content, the appearance of ketones and a decrease in alcohol content were observed. Correlations between metabolites and volatiles demonstrate that the flavour of cooked pasta may differ significantly depending on the durum wheat cultivar employed.
Keywords: Metabolite profiling; Volatile compounds; Durum wheat; Pasta

Imad Eujayl, Craig Morris, Identification of differentially expressed UniGenes in developing wheat seed using Digital Differential Display, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Pages 316-318, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.11.003.
(http://www.sciencedirect.com/science/article/B6WHK-4V17CP1-2/2/b2bf7902483a14999e1b8c3dd09b84ea)
Abstract:
The wheat UniGene sets, derived from over one million Expressed Sequence Tags (ESTs) in the NCBI GenBank, offer a platform for identifying differentially expressed genes in wheat seeds. This report illustrates a means to efficiently utilize this public database for gene expression (transcriptome) profiling of developing wheat seed. Using a data mining tool known as Digital Differential Display (DDD), thirteen pair-wise comparisons were performed on seven seed cDNA libraries from five varieties at various seed development stages. DDD identified 46 seed-specific UniGene sets, excluding the well characterized 'housekeeping' and seed storage protein genes. Additionally, seed- and developmentally-specific UniGenes were identified. Some of these genes encode for proteins such as purothionins, serpins, [alpha]-amylase inhibitors, lipid transfer proteins, and other unknown but novel gene sequences. Specifically, the wheat serpin and [beta]-purothionin precursor were found to be expressed at higher levels in hard varieties than soft varieties. This study supports the starting premise that by implementing in-silico analysis of the wheat UniGene database, it is possible to rapidly create transcriptional profiles of known and novel genes in developing seeds.
Keywords: Gene expression; Kernel hardness

Indra K. Vasil, High molecular weight glutenin subunits and breadmaking in wheat, Journal of Cereal Science, Volume 49, Issue 2, March 2009, Page 322, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.11.002.

(http://www.sciencedirect.com/science/article/B6WHK-4TW6HR3-3/2/8d2ec4dc3bc77fa003c206a2d9d4b0b7)

Maria Garnica, Fabrice Houdusse, Jean Claude Yvin, Jose M. Garcia-Mina, Nitrate supply induces changes in polyamine content and ethylene production in wheat plants grown with ammonium, Journal of Plant Physiology, Volume 166, Issue 4, 1 March 2009, Pages 363-374, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.06.008.
(http://www.sciencedirect.com/science/article/B7GJ7-4TFDXXB-1/2/bee9afaba61fb03c82afe9e3dbef30b8)
Abstract: Summary
In order to explore the mechanisms of nitrate's beneficial effect on ammonium-grown plants, we investigated the effects of nitrate on free and conjugated polyamine plant content and ethylene biosynthesis in wheat (Triticum aestivum L.) plants grown with ammonium nutrition. Two different doses of nitrate (100 [mu]M and 5 mM) were supplied to ammonium-fed plants, in order to determine whether the effects of nitrate require significant doses (nutritional character), or can be promoted by very low doses (pseudo-hormonal character).
Our results showed that nitrate's effects on putrescine, spermidine and spermine contents of ammonium-grown plants tended to follow the pattern associated with strict nitrate nutrition. Both low (100 [mu]M) and high (5 mM) nitrate doses caused a rapid and significant increase in free spermidine content in roots and shoots, which was well correlated with reduced root ethylene production. In shoots, this increase in free spermidine was correlated with changes in the conjugation pattern, while in roots these changes appear to be due to alternative mechanisms. On the other hand, no clear relationship between the supply of a lower dose of nitrate (100 [mu]M) and a reduction of free putrescine content was observed. With higher doses of nitrate (5 mM) we observed a reduction of free putrescine content that was well correlated with increases in its conjugated forms. In conclusion, nitrate's effects on putrescine, spermidine and spermine contents of ammonium-fed plants tended to follow the pattern associated with strict nitrate nutrition, corroborating its beneficial effect.
Keywords: Nitrate; Ammonium; Polyamines; Ethylene; Wheat

M. Siddiq, M. Nasir, R. Ravi, M.S. Butt, K.D. Dolan, J.B. Harte, Effect of defatted maize germ flour addition on the physical and sensory quality of wheat bread, LWT - Food Science and Technology, Volume 42, Issue 2, March 2009, Pages 464-470, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.09.005.
(http://www.sciencedirect.com/science/article/B6WMV-4THJGSH-2/2/ff00ac30d6ad763c31d851298c737065)
Abstract:
Maize (Zea mays L.) processing produces large quantities of defatted maize germ (DMG) that is being used mainly for animal feed. The objective of this study was to exploit use of this nutrient-rich by-product in bread by replacing wheat flour at 5-20 g/100 g levels. Breads prepared with wheat-DMG flour blends were analyzed for loaf volume, density, instrumental dough hardness and bread firmness, Hunter color ('L', 'a', 'b', chroma, and hue angle), and selected sensory attributes. Loaf volumes decreased significantly, from 318.8 ml to 216.3 ml, as the DMG flour supplementation was increased from 0 to 20 g/100 g; a similar effect was observed for bread specific volume. Increase in dough hardness (7.56-71.32 N) was directly related to increase in DMG flour levels. Instrumental firmness values were significantly higher for breads containing DMG flours, 61.58 N in 20 g/100 g DMG bread versus 32.84 N for the control bread, made with wheat flour only. The control bread was lighter in color, as shown by higher 'L' values, than those having DMG flour, with chroma and hue angle values significantly higher in treatment breads. In general, no differences were observed for the sensory attributes of crumb color, cells uniformity, aroma, firmness, mouthfeel, and off-flavor in breads with up to 15 g/100 g DMG flour, while the

overall acceptability scores showed a mixed pattern. The results of this study demonstrated that acceptable quality bread could be made with DMG flour addition at <=15 g/100 g.
Keywords: Defatted maize germ; Dough texture; Bread firmness; Hunter color

Huimei Wu, Emma Wensley, Mrinal Bhave, Identification and analysis of genes encoding a novel ER-localised Cyclophilin B in wheat potentially involved in storage protein folding, Plant Science, Volume 176, Issue 3, March 2009, Pages 420-432, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.12.009.
(http://www.sciencedirect.com/science/article/B6TBH-4V88FJH-4/2/16bd0980a00a280032597aa67f6be1e9)
Abstract:
The storage protein deposition processes in cereal endosperm follow a strict script involving protein folding and refolding, assortment and protein body deposition by two distinct pathways. The endoplasmic reticulum-localised enzymes called peptidyl prolyl cis-trans isomerases (PPIases) are expected to play crucial `foldase' and chaperone roles in the deposition of wheat prolamins due to their proline-rich nature. The storage protein quality of wheat is important for nutritional and food technological purposes; however, little information exists on genetic control of protein sorting and deposition processes. In this study, CypB genes encoding an ER-localised cyclophilin (a PPIase) have been characterised from common wheat (Triticum aestivum L. AABBDD) and its progenitors for the first time. The full-length genes contain seven exons and six introns, the exons being significantly more conserved. The putative CypB protein contains all PPIase signature sites including the putative active site and cyclosporin-binding residues, but an atypical ER localisation signal. Using the sequence variations, the common wheat genes were localized to chromosomes 7AL, 7BL and 7DL. The promoters of wheat genes were identified by inverse-PCR and show a number of potential tissue specific regulatory elements. The wheat genes are similar in structure to rice CypB and the putative proteins are 83% identical. Further, certain QTLs related to protein quality occur at the rice and wheat CypB loci. The results support this enzyme being a strong candidate for regulating storage protein quality in wheat.
Keywords: Storage proteins; Protein folding; Cyclophilins; Peptidyl prolyl cis-trans isomerases

Tjeerd jan Stomph, Wen Jiang, Paul C. Struik, Zinc biofortification of cereals: rice differs from wheat and barley, Trends in Plant Science, Volume 14, Issue 3, March 2009, Pages 123-124, ISSN 1360-1385, DOI: 10.1016/j.tplants.2009.01.001.
(http://www.sciencedirect.com/science/article/B6TD1-4VM464W-1/2/1621728cb56d11fcce6cda18b83feda0)

Yibing Ma, Jumei Li, Xiuying Li, Xu Tang, Yongchao Liang, Shaomin Huang, Boren Wang, Hua Liu, Xueyun Yang, Phosphorus accumulation and depletion in soils in wheat-maize cropping systems: Modeling and validation, Field Crops Research, Volume 110, Issue 3, 28 February 2009, Pages 207-212, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.08.007.
(http://www.sciencedirect.com/science/article/B6T6M-4TKXD7Y-1/2/9e7388117fc070066285d8e3a0b3c30d)
Abstract:
Long-term (over 15 years) winter wheat (Triticum aestivum L.)-maize (Zea mays L.) crop rotation experiments were conducted to investigate the accumulation of phosphorus (P) at five sites differing geographically and climatically in China. The results showed that, in soils without P added, the concentration of soil P extracted by 0.5 mol L-1 NaHCO3 at pH 8.5 (Olsen-P) decreased with cultivation time until about 3 mg kg-1, afterwards it remained constant. The trend of decrease in Olsen-P in soils without P added could be described by an exponential function of time. The concentration of Olsen-P in soils with P fertilizers increased with cultivation time and the model of accumulation of Olsen-P in soils could be described using P application rate, crop yield

and soil pH. The accumulation rate of Olsen-P in the long-term wheat-maize crop rotation experiments was 1.21 mg kg-1 year-1 on average. If the target yield of wheat and maize is 10 ton ha-1 in the soil with pH 8, the increasing rates of Olsen-P in soils as estimated by the model will be 0.06, 0.36, 0.66, 0.95, 1.25 and 1.55 mg kg-1 year-1 when P application rates are 30, 40, 50, 60, 70 and 80 kg P ha-1 year-1, respectively. The models of accumulation of Olsen-P in soils were validated independently and could be used for the accurate prediction of accumulation rate of Olsen-P in soils with wheat-maize rotation systems. Also the application of the model was discussed for best management of soil P in agricultural production and environment protection.
Keywords: Phosphorus; Accumulation; Long-term; Soil

V.O. Sadras, M.P. Reynolds, A.J. de la Vega, P.R. Petrie, R. Robinson, Phenotypic plasticity of yield and phenology in wheat, sunflower and grapevine, Field Crops Research, Volume 110, Issue 3, 28 February 2009, Pages 242-250, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.09.004.
(http://www.sciencedirect.com/science/article/B6T6M-4TX184K-1/2/5b6987c91249583ea44df07dd408ab51)
Abstract:
This paper focuses on the interaction between genotype and environment, a critical aspect of plant breeding, from a physiological perspective. We present a theoretical framework largely based on Bradshaw's principles of phenotypic plasticity (Adv. Gen. 13: 115) updated to account for recent developments in physiology and genetics. Against this framework we discuss associations between plasticity of yield and plasticity of phenological development. Plasticity was quantified using linear models of phenotype vs environment for 169 wheat lines grown in 6 environments in Mexico, 32 sunflower hybrids grown in at least 15 environments in Argentina and 7 grapevine varieties grown in at least 14 environments in Australia.
In wheat, yield ranged from 0.6 to 7.8 t ha-1 and the range of plasticity was 0.74-1.27 for yield and 0.85-1.17 for time to anthesis. The duration of the post-anthesis period as a fraction of the season was the trait with the largest range of plasticity, i.e. 0.47-1.80. High yield plasticity was an undesirable trait as it was associated with low yield in low-yielding environments. Low yield plasticity and high yield in low-yielding environments were associated with three phenological traits: early anthesis, long duration and low plasticity of post-anthesis development.
In sunflower, yield ranged from 0.5 to 4.9 t ha-1 and the range of plasticity was 0.72-1.29 for yield and 0.72-1.22 for time to anthesis. High yield plasticity was a desirable trait as it was primarily associated with high yield in high-yielding environments. High yield plasticity and high yield in high-yielding environments were associated with two phenological traits: late anthesis and high plasticity of time to anthesis.
In grapevine, yield ranged from 1.2 to 18.7 t ha-1 and the range of plasticity was 0.79-1.29 for yield, 0.86-1.30 for time of budburst, 0.84-1.18 for flowering, and 0.78-1.16 for veraison. High plasticity of yield was a desirable trait as it was primarily associated with high yield in high-yielding environments. High yield plasticity was associated with two phenological traits: plasticity of budburst and plasticity of anthesis.
We report for the first time positive associations between plasticities of yield and phenology in crop species. It is concluded that in addition to phenology per se (i.e. mean time to a phenostage), plasticity of phenological development merits consideration as a distinct trait influencing crop adaptation and yield.
Keywords: Genotype; Environment; Anthesis; Post-anthesis; Adaptation; Yield; Budburst; Veraison; Evolution

Jaroslav Blazek, Hayfa Salman, Amparo Lopez Rubio, Elliot Gilbert, Tracey Hanley, Les Copeland, Structural characterization of wheat starch granules differing in amylose content and functional characteristics, Carbohydrate Polymers, Volume 75, Issue 4, 24 February 2009, Pages 705-711, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.09.017.

(http://www.sciencedirect.com/science/article/B6TFD-4THC1DR-3/2/ea616c4d7bc2008fa7c1c6f055abc54a)
Abstract:
Small-angle X-ray scattering (SAXS) together with several complementary techniques, such as differential scanning calorimetry and X-ray diffraction, have been employed to investigate the structural features that give diverse functional properties to wheat starches (Triticum aestivum L.) within a narrow range of enriched amylose content (36-43%). For these starches, which come from a heterogeneous genetic background, SAXS analysis of duplicate samples enabled structural information to be obtained about their lamellar architecture where differences in lamellar spacing among samples were only several tenths of nanometer. The SAXS analysis of these wheat starches with increased amylose content has shown that amylose accumulates in both crystalline and amorphous parts of the lamella. Using waxy starch as a distinctive comparison with the other samples confirmed a general trend of increasing amylose content being linked with the accumulation of defects within crystalline lamellae. We conclude that amylose content directly influences the architecture of semi-crystalline lamellae, whereas thermodynamic and functional properties are brought about by the interplay of amylose content and amylopectin architecture.
Keywords: Wheat starch; Triticum aestivum; Amylose; Amylopectin; Small-angle X-ray scattering; Granule structure; X-ray diffraction; Differential scanning calorimetry

Fan Zhu, Yi-Zhong Cai, Mei Sun, Harold Corke, Effect of phytochemical extracts on the pasting, thermal, and gelling properties of wheat starch, Food Chemistry, Volume 112, Issue 4, 15 February 2009, Pages 919-923, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.06.079.
(http://www.sciencedirect.com/science/article/B6T6R-4SX9G22-G/2/aaadc2262eab612676b5f0974bc233c3)
Abstract:
Pasting, thermal and gel textural properties of wheat starch were studied in the presence of phytochemical extracts from pomegranate peel (C18), green tea (C53), Chinese hawthorn (C54), and Chinese gall (C46). All the four extracts increased the breakdown values and reduced the final viscosity. C18, C46, and C53 increased the peak viscosity. C18 and C46 reduced peak time and hot paste viscosity. All the four extracts reduced gel hardness. C46 increased gel adhesiveness. C46 facilitated the gelatinization of starch with earlier onset of To, Tp and Tc and a higher melting enthalpy whereas C18 and C54 prolonged the To, Tp and Tc and decreased the melting enthalpy. All phytochemical extracts caused earlier onset of To and Tp of amylose inclusion complex melting without altering the enthalpy. Scanning electron microscopy revealed that phytochemical extracts could cause looser gel matrices of dried wheat starch gels. Colour observation showed phytochemical extracts imparted different colours to wheat starch gels.
Keywords: Wheat starch; Phytochemicals; Pasting; Texture; Gelatinization; Colour

Li-Yun Lin, Hsiu-Man Liu, Ya-Wen Yu, Sheng-Dun Lin, Jeng-Leun Mau, Quality and antioxidant property of buckwheat enhanced wheat bread, Food Chemistry, Volume 112, Issue 4, 15 February 2009, Pages 987-991, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.07.022.
(http://www.sciencedirect.com/science/article/B6T6R-4T0WK0W-5/2/5a500f200028f72d340c06fbf9bd1596)
Abstract:
Common buckwheat (Fagopyrium esculentum Moench) was used to substitute 15% of wheat flour to make buckwheat enhanced wheat breads. Proximate composition, physical quality, functional components and antioxidant properties of buckwheat enhanced wheat breads were analysed and compared with those of white bread. Specific volumes of three breads were 6.10-6.75 cm3/g. Buckwheat enhanced wheat bread showed lower lightness and whiteness index values and higher redness and yellowness values. On a seven-point hedonic scale, all sensory results were 5.33-5.91, indicating that three breads were moderately acceptable. No differences were found in

appearance, colour and overall sensory attributes for three breads, whereas both buckwheat enhanced wheat breads were rated higher in flavour and mouth feel. Buckwheat enhanced wheat bread contained more rutin and quercetin as expected. Buckwheat enhanced wheat bread was good in antioxidant activity, reducing power and 1,1-diphenyl-2-picrylhydrazyl radical scavenging ability with unhusked buckwheat enhanced wheat bread being the most effective. Overall, buckwheat enhanced wheat bread could be developed as a food with more effective antioxidant properties.
Keywords: Buckwheat; Fagopyrium esculentum; Bread; Rutin; Antioxidant activity; Reducing power; Scavenging ability

Hayfa Salman, Jaroslav Blazek, Amparo Lopez-Rubio, Elliot P. Gilbert, Tracey Hanley, Les Copeland, Structure-function relationships in A and B granules from wheat starches of similar amylose content, Carbohydrate Polymers, Volume 75, Issue 3, 11 February 2009, Pages 420-427, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.08.001.
(http://www.sciencedirect.com/science/article/B6TFD-4T6CTNH-1/2/46edc29990479c022c6ace6cb72d537b)
Abstract:
Five wheat (Triticum aestivum L.) starches, from the varieties Sunco, Sunsoft, SM1118, and SM1028, with similar amylose content, and a waxy wheat were separated into large (A) and small (B) granules. The unfractionated starches, and isolated A and B granules, were characterized structurally and evaluated for their functional properties. The amylopectin chain length distribution revealed that A granules had a lower proportion of short chains with degree of polymerization (DP) 6-12 and a higher proportion of chains with DP 25-36 than B granules. X-ray diffraction (XRD) patterns showed predominantly A-type crystallinity for all of the starches. No differences in the crystallinity were found between unfractionated, A and B granules. Small-angle X-ray scattering (SAXS) patterns of the starches at 55% hydration showed that the lamellar repeat distance in A granules was larger than that of B granules for all the starches examined. However, the lamellar distances of both A and B granules from the waxy wheat were smaller than those of Sunco, Sunsoft, SM1118 and SM1028 starches. The swelling power of the B granules was greater than that of A granules from all five starches. The kinetics of digestion of A and B granules with [alpha]-amylase in vitro were complex, with B granules initially digested to a greater extent than A granules. After 4 h of incubation, A granules showed greater digestibility than B granules, except in the case of waxy starch where unfractionated and fractionated granules had similar in vitro digestibility. Correlations between structural and functional parameters were more significant for the isolated A and B granules than for the unfractionated starches. This study demonstrates that A and B granules differ in structure and functionality, and that some correlations between these properties could be masked in unfractionated starches with bimodal granule size distribution.
Keywords: Wheat starch; A granules; B granules; SAXS; XRD; Swelling power; Starch functionality; In vitro digestibility of starch

Martin M. Acreche, Guillermo Briceno-Felix, Juan A. Martin Sanchez, Gustavo A. Slafer, Radiation interception and use efficiency as affected by breeding in Mediterranean wheat, Field Crops Research, Volume 110, Issue 2, 10 February 2009, Pages 91-97, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.005.
(http://www.sciencedirect.com/science/article/B6T6M-4T72JY8-1/2/093247886ddf1cf5b33e5f68ae452d1d)
Abstract:
Past breeding achievements in grain yield were mainly related to increases in harvest index (HI) without major changes in biomass production. As modern cultivars have already high HI, future breeding to improve grain yield will necessarily focus on increased biomass. Improved biomass would depend on our capacity to improve the amount of photosynthetically active radiation

intercepted by the crop (IPAR%) or the efficiency with which the canopy converts that radiation into new biomass (radiation use efficiency, RUE). Four field experiments with a set of wheat cultivars selected, bred and introduced in the Mediterranean area of Spain and that represent important steps in wheat breeding in Spain were conducted in order to identify whether and how wheat breeding in this area affected the amount of IPAR% and RUE both before and after anthesis. Although there was genotypic variability, cultivars did not show any consistent trend with the year of release of the cultivars for their biomass, pre and post-anthesis IPAR%, Crop growth rate (CGR) or RUE but, the post-anthesis CGR and RUE of the two oldest genotypes were lower than that of the other cultivars. As the oldest genotypes have lower number of grains per m2 than their modern counterparts, it is suggested that post-anthesis RUE in these cultivars was reduced by lack of sinks and therefore further increases in grains per unit area in modern cultivars could permit to improve biomass via increases in post-anthesis RUE.
Keywords: Radiation interception; Radiation use efficiency; Wheat; Mediterranean area

Martin M. Acreche, Gustavo A. Slafer, Grain weight, radiation interception and use efficiency as affected by sink-strength in Mediterranean wheats released from 1940 to 2005, Field Crops Research, Volume 110, Issue 2, 10 February 2009, Pages 98-105, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.006.
(http://www.sciencedirect.com/science/article/B6T6M-4T6CF2N-1/2/085a97124c4bb9d5145d1038e18981d0)
Abstract:
Bread wheat has been frequently characterised as sink-limited during grain filling but the degree of sink-limitation could vary with the contribution of breeding in increasing the number of grains per unit land area. This hypothetical change in the level of sink-limitation due to breeding has been insufficiently documented. Two source-sink manipulation experiments under field conditions with three released cultivars and an advanced breeding line representing important steps in wheat breeding in the Mediterranean area of Spain were conducted in order to quantify whether genetic improvement of grain yield in Mediterranean wheat modified the source-sink balance during grain filling, and how it affected grain weight and post-anthesis photosynthetically active radiation intercepted by the crop (IPAR) and radiation use efficiency (RUE). Average grain weight of control and trimmed spikes during grain filling was not significantly affected by halving the number of growing grains in the two oldest cultivars, but it was significantly increased in the most modern line, and had an intermediate response in the intermediate cultivar. In those cases in which a certain degree of source-limitation during grain growth occurred the magnitude of the response reflected a co-rather than a source-limitation. Considering grains from different positions within the spikes the smaller (distal) grains responded more markedly than the larger (proximal) grains. No differences in post-anthesis IPAR were found between the trimmed and control sub-plots for any of the genotypes. However, trimming the spikes reduced post-anthesis RUE, a fact corroborated by a simultaneous reduction in leaf net photosynthetic rate at noon. It seems that bread wheat breeding has tended to reduce the strength of the sink-limitation during post-anthesis even under Mediterranean conditions, and consequently the most modern line presented a sort of co-limitation.
Keywords: Grain weight; Radiation use efficiency; Sink-strength; Wheat; Mediterranean area

Xue-Li FU, Ming ZHAO, Bao-Yuan ZHOU, Guo-Mei CUI, Zai-Song DING, Optimal Model for Dynamic Characteristics of Grain Weight Commonly Used in Wheat and Maize, Acta Agronomica Sinica, Volume 35, Issue 2, February 2009, Pages 309-316, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60063-2.
(http://www.sciencedirect.com/science/article/B94TW-4WTJYVC-5/2/1e80ce354f6cf8b227c2d8dc206bf8ae)
Abstract:

To establish a common model of grain weight (GW) for at least 2 crops with wider application under different conditions, 3 cultivars of winter wheat (Triticum aestivum L.) and 4 cultivars of summer maize (Zea mays L.) were used in field experiments in 4 environments during 2006-2008. A common GW model, y= a/(1+be-cx), was proposed with normalized GW and grain filling duration for both crops. Based on the results from this study, the parameters of a, b, and c were 1.0624, 52.8653, and 6.7609 ($r = 0.9916$, $P < 0.01$), respectively. For different crop species, cultivars, and planting densities, the GW dynamic model remained a relative stable a value, which was around 1. However, the b and c values varied in different conditions. The b value changed slightly with density and shifted from 45.3379 to 66.9306 in different cultivars; whereas, the c value had small differences among different cultivars and densities. This normalized GW dynamic model could eliminate the variance of the model parameters caused by location, year, cultivar, and planting density, thus, predict GW increase reliably and easily when the GWmax, grain filling duration, and b value were determined.
Keywords: Triticum aestivum L; Zea mays L; grain weight dynamic; common characters; model selection

S. Lenka, A.K. Singh, N.K. Lenka, Water and nitrogen interaction on soil profile water extraction and ET in maize-wheat cropping system, Agricultural Water Management, Volume 96, Issue 2, February 2009, Pages 195-207, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.06.014.
(http://www.sciencedirect.com/science/article/B6T3X-4TW9WFB-1/2/8a70614aecab01303adfafc9e4983507)
Abstract:
In the present study, water and nitrogen interaction on soil profile water extraction and evapo-transpiration (ET) was investigated taking a field experiment on a clay loam soil (Typic Haplustept) at the Indian Agricultural Research Institute, New Delhi with four consecutive crops (maize-wheat-maize-wheat) taken from July 2002 to April 2004. Three levels of water regime, namely W1, W2 and W3 referring to limited, medium and maximum irrigation were applied to each crop depending on the seasonal rainfall and the critical crop growth stage. The three water regimes were used with five nitrogen levels from T1 to T5, (T1, 0% N; T2, 75% N; T3, 100% N; T4, 150% N; T5, 100% N from organic source) in a split plot design for the four crops grown in sequence.
Significant water and nitrogen interaction was observed for ET and soil profile water extraction pattern. Averaged across nitrogen treatments, ET in W2 and W3 were higher by 17 and 26%, respectively than W1 in maize 2002 and by 12 and 19% in maize 2003. In case of wheat, ET in W2 and W3 were higher by 27 and 58% than W1 in 1st crop and by 37 and 70% in 2nd crop. The effect of nitrogen regime, however, was prominent in both crops of maize and wheat, with significantly higher profile soil moisture depletion in T4 of each water regime. In all cases, lowest water depletion was observed in control plots receiving 0% N.
In both crops, water extraction from surface 60 cm was highest in W3 followed by W2 and W1. In maize, the % extraction from 0 to 60 cm layer varied from 71 to 76% (W1), 70-79% (W2) and 75-82% (W3), whereas the values for wheat were 70-77, 72-79 and 75-83% for W1, W2 and W3, respectively. The 90-120 cm layer contributed only 3-14% to total water extraction in both the crops. From 90 to 120 cm layer, higher extraction was observed in W1 as compared to W3. The extraction values in W1, W2 and W3 in maize were 9-13, 7-14 and 3-9, respectively, whereas the corresponding values in wheat were 8-14, 5-12 and 3-7% for the three water regimes. Effect of nitrogen treatments on water extraction from deeper layer was observed with higher extraction in highest fertilized treatment (T4) as compared to other treatments.
Keywords: Maize; Wheat; Evapo-transpiration; Water extraction; Water; Nitrogen

Huimin Yan, Yuling Fu, Xiangming Xiao, He Qing Huang, Honglin He, Laura Ediger, Modeling gross primary productivity for winter wheat-maize double cropping system using MODIS time

series and CO2 eddy flux tower data, Agriculture, Ecosystems & Environment, Volume 129, Issue 4, February 2009, Pages 391-400, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.10.017.
(http://www.sciencedirect.com/science/article/B6T3Y-4V2X6GF-1/2/dee5be320ec361ccf7c634cd801e56a9)
Abstract:
Accurate and spatially explicit monitoring of gross primary productivity of agricultural ecosystems at a large scale is of great significance to assessment of crop conditions and agricultural production, and is necessary for understanding the carbon balance of the terrestrial biosphere. Identifying crop intensity (including multiple cropping and crop calendar) dynamics and assigning appropriate light use efficiency to C3 and C4 crops could substantially improve our ability to model and evaluate the seasonal dynamics of carbon flux in intensified agricultural ecosystems. In this paper, we have analyzed temporal dynamics of vegetation indices and phenological characteristics in the winter-wheat and maize double cropping system using multi-year satellite images from the moderate resolution imaging spectral radiometer (MODIS) and in situ observation of key crop phenological transition dates. The multiple cropping and crop calendar information were incorporated into simulations of the satellite-based vegetation photosynthesis model (VPM). Canopy-level maximum light use efficiency, a key parameter in the satellite-based VPM model, was estimated for both winter wheat (C3) and maize (C4) based on the observed CO2 flux data from an eddy flux tower site in a winter wheat-maize double cropping agro-ecosystem in the Huang-Huai-Hai plain, China. The seasonal dynamics of GPP predicted by the VPM model agreed well with estimated GPP from eddy flux tower data. These results demonstrate the potential of the satellite-driven VPM model for scaling-up GPP estimation of intensified agricultural ecosystems, which is relevant to food production and security.
Keywords: Crop intensity; Vegetation index; Vegetation photosynthesis model; Multiple cropping

Jeffrey W. White, Comments on a report of regression-based evidence for impact of recent climate change on winter wheat yields, Agriculture, Ecosystems & Environment, Volume 129, Issue 4, February 2009, Pages 547-548, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.10.025.
(http://www.sciencedirect.com/science/article/B6T3Y-4V46210-3/2/63795a3acad84cf65b5f4c80bec6be34)
Abstract:
In their 2008 paper entitled 'Impact of recent climatic change ...', Xiao et al. [Xiao, G., Zhang, Q., Yao, Y., Zhao, H., Wang, R., Bai, H., Zhang, F., 2008. Impact of recent climatic change on the yield of winter wheat at low and high altitudes in semi-arid northwestern China. Agric. Ecosyst. Environ. 127, 37-42] presented evidence for increasing grain yield of winter wheat (Triticum aestivum L.) from 1981 to 2005 at two locations in China, as well as for non-linear effects of rainfall and mean temperature on yield. Inspection of their graphs suggested that the responses were overstated. Reanalysis of five graphs indicated that yield had increased at just one site, that there was no effect of rainfall, and that mean temperature only affected yield at the higher site. This temperature effect was described with an exponential function (r2 = 0.32), but the response could equally be considered linear (r2 = 0.27). Overall, the reanalyses suggest that four described relations were incorrect due to errors in analysis or reporting. The results highlight the difficulties with using regression with historic data to detect effects of climatic change on agriculture.
Keywords: Climate change; Grain yield; Regression; Statistics; Wheat

M Teresa Garcia-Cubero, Gerardo Gonzalez-Benito, Irune Indacoechea, Monica Coca, Silvia Bolado, Effect of ozonolysis pretreatment on enzymatic digestibility of wheat and rye straw, Bioresource Technology, Volume 100, Issue 4, February 2009, Pages 1608-1613, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.09.012.
(http://www.sciencedirect.com/science/article/B6V24-4TTM31B-2/2/59caa088ba55536555e7f3fb7632c629)

Abstract:
Wheat and rye straws were pretreated with ozone to increase the enzymatic hydrolysis extent of potentially fermentable sugars. Through a 25-1 factorial design, this work studies the influence of five operating parameters (moisture content, particle size, ozone concentration, type of biomass and air/ozone flow rate) on ozonization pretreatment of straw in a fixed bed reactor under room conditions. The acid insoluble lignin content of the biomass was reduced in all experiments involving hemicellulose degradation. Near negligible losses of cellulose were observed. Enzymatic hydrolysis yields of up to 88.6% and 57% were obtained compared to 29% and 16% in non-ozonated wheat and rye straw respectively. Moisture content and type of biomass showed the most significant effects on ozonolysis. Additionally, ozonolysis experiments in basic medium with sodium hydroxide evidenced a reduction in solubilization and/or degradation of lignin and reliable cellulose and hemicellulose degradation.
Keywords: Lignocellulose; Pretreatment; Ozone; Enzymatic hydrolysis; Straw

Jose E. Sanchez, Daniel J. Royse, Scytalidium thermophilum-colonized grain, corncobs and chopped wheat straw substrates for the production of Agaricus bisporus, Bioresource Technology, Volume 100, Issue 4, February 2009, Pages 1670-1674, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.08.047.
(http://www.sciencedirect.com/science/article/B6V24-4TSC3W1-6/2/9cfaedc3b194c80b2e6d2c262f21dc98)
Abstract:
We examined the possibility of cultivating Agaricus bisporus (Ab) on various grains and agricultural by-products, with the objective of improving yield capacity of substrate pre-colonized by Scytalidium thermophilum (St). Radial growth rate (RGR) of St at 45 [degree sign]C ranged from no growth on sterile wheat grain to 14.9 mm/d on whole oats. The linear extension rate (LER) of Ab, grown on St-colonized substrate (4 days at 45 [degree sign]C), ranged from a low of 2.7 mm/d on 100% corncobs to 4.7 mm/d on a 50/50 mixture of ground corncobs/millet grain. Several other substrates containing wheat straw + ground corncobs + boiled millet and pre-colonized by St (4 days at 42 +/- 3 [degree sign]C), were evaluated for production of Ab. The biological efficiency (BE) of production increased linearly with the addition of millet to the formula. However, substrates with millet levels [greater-or-equal, slanted]84% often were contaminated before mushroom harvest. Maximum BE (99%) and yield (21.6 kg/m2) were obtained on St-colonized wheat straw + 2% hydrated lime supplemented with 9% commercial supplement added both at spawning and at casing.
Keywords: Mushroom compost; Mushroom production; Thermophilic fungi

R. Choudhary, S. Mahesh, J. Paliwal, D.S. Jayas, Identification of wheat classes using wavelet features from near infrared hyperspectral images of bulk samples, Biosystems Engineering, Volume 102, Issue 2, February 2009, Pages 115-127, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.09.028.
(http://www.sciencedirect.com/science/article/B6WXV-4V1V4TP-1/2/1d6af60399110e1b88324ca59b5fef2b)
Abstract:
Wavelet texture analysis was used for classification of eight Western Canadian wheat classes using near infrared hyperspectral imaging of bulk samples. Hyperspectral images (slices) at 10 nm interval were acquired in the wavelength range 960-1700 nm. From each slice of hyperspectral data, central 256 x 256 pixels were analyzed using a wavelet transformation at five levels (resolutions) employing Daubechies-4 wavelets. Energy and entropy features were computed at each level in the horizontal, vertical, and diagonal orientations. Additionally, rotational invariant features were obtained by adding features from all three orientations. Based on a stepwise linear discriminant analysis, top 100 features were selected and used for classification of wheat classes.

Linear and quadratic statistical classifiers and a standard back propagation neural network (BPNN) classifier were used for classification using top 10-100 features. In another approach, principal component (PC) score images obtained from hypercubes were used for wavelet analysis and classification.
The wavelet energy features contributed more than the entropy features in class discrimination. The rotational invariant features were more important than the features at any individual orientation. The wavelet texture features at finer resolutions were more important than those at the coarser resolutions.
The highest average classification accuracy of eight classes was 99.1% when top 90 features were used for classification in a linear discriminant classifier. The BPNN had the highest average classification accuracy of 92.1% using the top 70 features. Using wavelet features from score images, the PC2 features gave the highest classification accuracy (79.9%). The wavelet texture features of hyperspectral images can be used effectively for classification of wheat classes of Western Canada.

Lubomir Vechet, Lenka Burketova, Milada Sindelarova, A comparative study of the efficiency of several sources of induced resistance to powdery mildew (Blumeria graminis f. sp. tritici) in wheat under field conditions, Crop Protection, Volume 28, Issue 2, February 2009, Pages 151-154, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.09.009.
(http://www.sciencedirect.com/science/article/B6T5T-4TYXKX1-1/2/ba8294a0cef49ead2f46917b47a3661c)
Abstract:
In comparison with untreated controls, both synthetic and biologically sourced inducers of resistance significantly decreased the severity of powdery mildew in a 3-year, small-plot experiment which included other cultivars with varying resistance to powdery mildew as reference, on the susceptible winter wheat cultivar, Kanzler. The most prominent effects were observed following treatments with benzothiadiazole, extracts made of ginger (Zingiber officinale Roscoe) and curcuma (Curcuma longa L.) rhizomes, and giant knotweed (Reynoutria sacchaliensis L.) leaves, which were highly efficient in all 3 years of the experiment. Other inducers such as oak bark (Quercus robur L.) extract, salicylic acid as well as a solution of glycine betaine were also effective. All inducers under study had halted disease progress by 27 d after application. The induced resistance was long-lasting and the severity of the disease, when compared with the untreated control, was decreased to between 2% and 53%, depending upon the year.
Keywords: Winter wheat; Powdery mildew; Induced resistance

R. Alvarez, Predicting average regional yield and production of wheat in the Argentine Pampas by an artificial neural network approach, European Journal of Agronomy, Volume 30, Issue 2, February 2009, Pages 70-77, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.07.005.
(http://www.sciencedirect.com/science/article/B6T67-4TC2S2V-1/2/d148958e28f0ae3a4e291e99093ad7e6)
Abstract:
A regional analysis of the effects of soil and climate factors on wheat yield was performed in the Argentine Pampas in order to obtain models suitable for yield estimation and regional grain production prediction. Soil data from soil surveys and climate data from meteorological records were employed. Grain production information from statistics at county level was integrated at a geomorphological level. The Pampas was divided into 10 geographical units and data from 10 growing season were used (1995-2004). Surface regression and artificial neural networks (ANN) methodologies were tested for analyzing the data. Wheat yield was correlated to soil available water holding capacity (SAWHC) in the upper 100 cm of the profiles ($r^2 = 0.39$) and soil organic carbon (SOC) content ($r^2 = 0.26$). The climate factor with stronger effect on yield was the rainfall/crop potential evapotranspiration ratio (R/CPET) during the fallow and vegetative crop

growing cycle periods summed (r2 = 0.31). The phototermal quotient (PQ) during the pre-anthesis period had also a significant effect on yield (r2 = 0.05). A surface regression response model was developed that account for 64% of spatial and interannual yield variance, but this model could not perform a better yield prediction than the blind guess technique. An ANN was fitted to the data that accounted for 76% of yield variability. Comparing predicted versus observed yield a lower RMSE (P = 0.05) was obtained using the ANN than using the regression or the blind guess methods. Regional production estimations performed by the ANN showed a good agreement with observed data with a RMSE equivalent to 7% of the whole surveyed area production. As variables used for the ANN development may be available around 40-60 days before wheat harvest, the methodology may be used for wheat production forecasting in the Pampas.
Keywords: Wheat; Yield estimation; Argentine Pampas

Budong Qian, Reinder De Jong, Samuel Gameda, Multivariate analysis of water-related agroclimatic factors limiting spring wheat yields on the Canadian prairies, European Journal of Agronomy, Volume 30, Issue 2, February 2009, Pages 140-150, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.09.003.
(http://www.sciencedirect.com/science/article/B6T67-4TTM389-1/2/ce7888e411370acd193e5038bda9bb19)
Abstract:
Water use by spring wheat and soil water contents at meteorological stations on the Canadian prairies were simulated with the Versatile Soil Moisture Budget model for different crop growth stages. Six water-related agroclimatic indices at five growth stages (seeding-emergence, emergence-jointing, jointing-heading, heading-soft dough and soft dough-harvest) and previous non-growing season were correlated to spring wheat yields in the three prairies provinces and in the entire prairie region for the years 1976-2006. Principal component analysis was applied to explore major modes of joint variability in the regional water-related agroclimatic indices. Canonical correlation analysis was employed to further identify joint variability patterns of the water-related indices associated with regional spring wheat yields. Results showed some common features of the effects of the water-related factors at different growth stages: lower-than-normal moisture stress at the jointing-heading stage favoured spring wheat yields in all three provinces. Regional differences were also seen, for example, a slight moisture stress at the heading-soft dough stage could be beneficial to spring wheat yields in Manitoba because of its relatively wetter climate compared to the other two provinces. The results can be used for a better understanding of the effects of water-related agroclimatic conditions at different growth stages on final spring wheat yields on the Canadian prairies, leading to the improvement of crop management. The results can also be used in regional yield forecasting and in the projection of climate change impacts on crop production. This study provided an example of how to quantify crop-climate relationships by the use of statistical multivariate analysis tools.
Keywords: Spring wheat yield; Agroclimatology; Versatile Soil Moisture Budget; Principal component analysis; Canonical correlation analysis

Lucia Brindzova, Maria Mikulasova, Maria Takacsova, Silvia Mosovska, Alena Opattova, Evaluation of the mutagenicity and antimutagenicity of extracts from oat, buckwheat and wheat bran in the Salmonella/microsome assay, Journal of Food Composition and Analysis, Volume 22, Issue 1, February 2009, Pages 87-90, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.07.009.
(http://www.sciencedirect.com/science/article/B6WJH-4TCYCFM-1/2/da0159f22806755de76ef7c81ed10c96)
Abstract:
This study examined the mutagenic and antimutagenic activities of the DMSO extracts from the oat, buckwheat and wheat bran, which are good sources of polyphenols with antioxidant and anticarcinogenic properties. Extracts from buckwheat and wheat bran showed no mutagenic

activity. Oat extract showed slight mutagenic effect in Salmonella typhimurium TA102. The antimutagenic activities against direct-acting (3-(5-nitro-2-furyl)acrylic acid, 2-nitrofluorene, hydrogen peroxide) and indirect-acting (aflatoxin B1) mutagens were also investigated using Ames test with S. typhimurium TA98, TA100 and TA102. Cereal extracts exhibit concentration-dependent protective antigenotoxic activity against all used mutagens. The total phenolic content in studied cereal extracts expressed as gallic acid equivalent increases in the order: buckwheat < wheat bran < oat. Total flavonoid content expressed as rutin equivalent increases in the order: oat < wheat bran < buckwheat.
Keywords: Cereals; Pseudocereals; Antimutagenic activity; Phenolic compounds; Food composition

S.G. Haddad, M.A. Ata, Growth performance of lambs fed on diets varying in concentrate and wheat straw, Small Ruminant Research, Volume 81, Issues 2-3, February 2009, Pages 96-99, ISSN 0921-4488, DOI: 10.1016/j.smallrumres.2008.11.015.
(http://www.sciencedirect.com/science/article/B6TC5-4VGMP72-1/2/7337034d0b20a0c8fc61ae0b6977aaef)
Abstract:
The objective of this study was to investigate the effects of wheat straw level on growth performance and carcass parameter of lambs fed high concentrate diets. Thirty-six Awassi lambs (17.9 +/- 1 kg) were randomly assigned to four experimental high concentrate diets with various wheat straw levels in a completely randomized design for 58 days. The experimental diets were isonitrogenous (16% CP) and contained 0, 5, 10 and 15% wheat straw. Results gained indicated that intake of dry matter; crude protein and metabolizable energy of the high wheat straw diets (10 and 15%) were similar ($P > 0.05$) and significantly higher ($P < 0.05$) than low wheat straw diets (0 and 5%). Final body weight, total weight gain, daily weight gain and feed efficiency of the high wheat straw diets were significantly ($P < 0.05$) better than low wheat straw diets. Furthermore, the carcass parameters of the high wheat straw diets were significantly ($P < 0.05$) superior to low wheat straw diets. In conclusion therefore, it may be recommended that high concentrate diets for Awassi lambs should contain at least 10% wheat straw for good growth performance and carcass quality.
Keywords: Awassi lambs; High concentrate diets; Wheat straw; Growth

Fabiola Bastian, Lamia Bouziri, Bernard Nicolardot, Lionel Ranjard, Impact of wheat straw decomposition on successional patterns of soil microbial community structure, Soil Biology and Biochemistry, Volume 41, Issue 2, February 2009, Pages 262-275, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.10.024.
(http://www.sciencedirect.com/science/article/B6TC7-4V0MXXF-1/2/523edc7d7c16e91305cad9b7715b8f74)
Abstract:
The dynamics of indigenous bacterial and fungal soil communities were followed throughout the decomposition of wheat straw residue. More precisely, such dynamics were investigated in the different soil zones under the influence of decomposing wheat straw residue (i.e. residues, soil adjacent to residue = detritusphere, and bulk soil). The genetic structures of bacterial and fungal communities were compared throughout the decomposition process long by applying B- and F-ARISA (for bacterial and fungal-automated ribosomal intergenic spacer analysis) to DNA extracts from these different zones. Residue decomposition induced significant changes in bacterial and fungal community dynamics with a magnitude of changes between the different soil zones ordered as followed: residue > detritusphere > bulk soil, confirming the spatial structuration of the sphere of residue influence to the 4-6 mm soil zone in contact with residue. Furthermore, significant differences in the structure of bacterial and fungal communities were apparent between the early (14 and 28 days) and late (from 56 to 168 days) stages of decomposition. These could be related

to ecological attributes such as the succession of r- (copiotrophs) and K- (oligotrophs) strategists. Microbial diversity at the early (28 days) and late (168 days) stages of degradation was further analysed by a molecular inventory of 16S and 18S rDNA in DNA extracts from the residue zone. This confirmed the succession of different populations during residue decomposition. Fluorescent Pseudomonas spp. and Neurospora sp. were dominant in the early stage with subsequent stimulation of Actinobacteria and Deltaproteobacteria taxa, as well as Basidiomycota fungal taxa and Madurella spp. According to the ecological attributes of these populations, microbial succession on fresh organic residue incorporated in soil would be dominated by copiotrophs and r-strategists in the early stages, with oligotrophs (K-strategists) increasing in relative abundance as substrate quantity and/or quality declines over time.
Keywords: Plant residue; Community dynamics; Bacterial diversity; Fungal diversity; Detritusphere; Soil microcosms

K. Walsh, P. O'Kiely, H.Z. Taweel, M. McGee, A.P. Moloney, T.M. Boland, Intake, digestibility and rumen characteristics in cattle offered whole-crop wheat or barley silages of contrasting grain to straw ratios, Animal Feed Science and Technology, Volume 148, Issues 2-4, 16 January 2009, Pages 192-213, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.03.013.
(http://www.sciencedirect.com/science/article/B6T42-4SDNK89-1/2/90bde9e888afb7ec91a20d2e31a0aee6)
Abstract:
The effects of varying the grain (G) to straw (S) ratio (G:S) of whole-crop wheat and barley silages on intake and digestibility and whole-crop barley silage on rumen fermentation characteristics were examined in two parallel studies. For the intake and digestibility study, eight Aberdeen Angus cross-bred steers (mean bodyweight 407 kg (S.D. 24.2)) were used in two (barley and wheat) 4 x 4 Latin Square designed experiments. The dietary treatments were four G:S ratios: 0:100, 30:70, 60:40 and 90:10. Intake of grain linearly increased ($P<0.001$) while that of straw decreased ($P<0.001$) as the ratio of G:S increased for both cereals. No effect ($P>0.05$) was observed in total dry matter (DM) intake (DMI) or in DMI per kg liveweight. There was a positive linear ($P<0.001$) effect on the digestibility of the DM and organic matter (OM) and a negative linear effect on neutral detergent fibre (aNDFom) digestibility ($P<0.01$) as the G:S ratio increased for both cereals. Both a positive linear ($P<0.05$) and quadratic ($P<0.01$) effect were observed for the G:S ratio on nitrogen (N) digestibility of barley and a corresponding positive linear increase ($P<0.01$) for wheat. A negative linear effect was found for digestibility of starch ($P<0.01$) and a positive linear effect for faecal grain content ($P<0.01$) with increasing G:S ratio. Four Holstein-Friesian steers (mean bodyweight 659 kg (S.D. 56.9)) fitted with rumen cannulae were used in the rumen study. A negative linear effect of G:S ratio was found on rumen pH ($P<0.001$) while a positive linear effect was found on rumen ammonia ($P<0.001$) and total volatile fatty acid (VFA) concentration ($P<0.01$) with increasing G:S ratio. A negative linear effect ($P<0.01$) was found on the molar proportion of acetic acid. However, this decrease was offset by linear increases in the molar proportions of iso- and n-butyric acid, iso- ($P<0.01$) and n- ($P<0.05$) valeric acid, and to a lesser extent in propionic acid ($P<0.01$). No effect of treatment was found on rumen pool sizes of DM or its constituents. A positive linear effect ($P<0.01$) was found on the effective degradability (ED) of the DM, OM, N and starch while it was found to be negative in aNDFom ($P<0.05$). No effect ($P>0.05$) was found on the fractional clearance rates of DM, OM, aNDFom or starch or on liquid passage rate. It is concluded that increasing the G:S ratio in whole-crop wheat or barley silage linearly increased the intake of digestible nutrients for both wheat and barley and increasing the G:S ratio for whole-crop barley increased the concentration of fermentation products (total VFA, ammonia and the molar proportions of the VFAs, except acetic acid) in the rumen.
Keywords: Cattle; Digestibility; Grain to straw ratio; Intake; Rumen characteristics

Jing Wang, Baoguo Sun, Yanping Cao, Yuan Tian, Protein glycation inhibitory activity of wheat bran feruloyl oligosaccharides, Food Chemistry, Volume 112, Issue 2, 15 January 2009, Pages 350-353, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.072.
(http://www.sciencedirect.com/science/article/B6T6R-4SMWFKC-B/2/66917e1d7e18a32f730980fab849d625)
Abstract:
Protein glycation is believed to play an important role in the development of long-term disorders associated with diabetes. Water-soluble feruloyl oligosaccharides (FOs) from wheat bran, the ferulic acid esters of oligosaccharides, have been reported as natural antioxidants. The present work assesses the chelating activity of FOs and their inhibition of protein glycation in a bovine serum albumin (BSA)/glucose system, using fluorescence spectroscopy and sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE). FOs exhibited an effective ferrous ion chelating activity, and quenched the fluorescence intensity of glycated BSA in a dose-dependent manner with 64.0% of inhibition at 1.0 mg/ml. Further, the formation of advanced glycation end products in the tested system was significantly decreased by FOs, as shown by SDS-PAGE. These data indicate that FOs might be beneficial as glycation inhibitors under specified conditions.
Keywords: Feruloyl oligosaccharides; Glycation; Protein; Wheat bran

Honglin Zhao, Zhinguang Zhao, Lizhe An, Tuo Chen, Xunling Wang, Huyuan Feng, The effects of enhanced ultraviolet-B radiation and soil drought on water use efficiency of spring wheat, Journal of Photochemistry and Photobiology B: Biology, Volume 94, Issue 1, 9 January 2009, Pages 54-58, ISSN 1011-1344, DOI: 10.1016/j.jphotobiol.2008.09.005.
(http://www.sciencedirect.com/science/article/B6TH0-4TK47BT-1/2/5a1e1d213f9ac10e99240345c73235fd)
Abstract:
The effect of enhanced ultraviolet-B radiation (280-315 nm) and water stress on water consumption, instantaneous water use efficiency (WUEi), season-long water use efficiency (WUEs) and leaf stable carbon isotope composition ([delta]13C) of three spring wheat cultivars (Triticum aestivum L.) was investigated under field conditions. The relationship between WUEi and WUEs with [delta]13C was analyzed. Compared with the control, enhanced UV-B or water stress alone or in combination led to lower water use, and soil drought had a stronger influence on water use than supplementary UV-B irradiance. Soil drought increased the instantaneous water use efficiency (WUEi) and UV-B radiation decreased it significantly in comparison to the control. The combination of UV-B and water stress resulted in increased/reduced or no changed WUEi, different with change. Season-long water use efficiency (WUEs) showed the same trend as observed with WUEi under the conditions of UV-B radiation and water stress, except that no significant difference between control and drought in cv. Heshangtou. WUEs under the combined conditions of UV-B and water stress, was clearly increased in every cultivar. Enhanced UV-B radiation and the combination with drought led to negative foliar stable carbon isotope composition ([delta]13C) and drought alone resulted in a positive value for [delta]13C. The relationship between foliar stable carbon isotope composition and instantaneous water use efficiency was not significant. Nevertheless, a positive correlation with [delta]13C against season-long water use efficiency was observed. The results indicated that [delta]13C can be a useable parameter for selecting a crop genotype having higher water use efficiency.
Keywords: Triticum aestivum L.; [delta]13C; Water use efficiency; Ultraviolet-B radiation; Drought

Yadvinder Singh, E. Humphreys, S.S. Kukal, B. Singh, Amanpreet Kaur, S. Thaman, A. Prashar, S. Yadav, J. Timsina, S.S. Dhillon, N. Kaur, D.J. Smith, P.R. Gajri, Crop performance in permanent raised bed rice-wheat cropping system in Punjab, India, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 1-20, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.06.009.

(http://www.sciencedirect.com/science/article/B6T6M-4T2RYV5-2/2/9eb2910fcb1ca09658a8fc8451576058)
Abstract:
Raised beds are widely used in agriculture in developed countries and have proven to be an excellent option for wheat. Permanent raised beds may also offer benefits for rice-wheat (RW) systems in South Asia, in terms of both production and the possibility that furrow-irrigation may be more efficient than flood irrigation. The performance of a RW system on permanent raised beds (37 cm wide, 15 cm high, furrow width 30 cm) was compared with conventional cultivation on the flat on sandy loam and loam soils in replicated experiments in central Punjab, India. The experiments commenced with wheat sown in November 2002, and were continued for 8 crops.
Yields of conventionally tilled wheat (CTW) ranged from 3.6 to 4.9 t ha-1 and tended to be higher on the loam than on the sandy loam. Yields of wheat on fresh and permanent beds (WB and DDWB, respectively) were similar to yields on CTW and direct-drilled wheat on the flat (DDW) except when establishment was sub-optimal on the beds on both soils in 2004-2005. It was also lower on the beds on the sandy loam in 2002-2003 when tillering did not compensate for the lower sowing rate on the beds. In each case, the poorer performance on beds appeared to be associated with the more rapid drying of the beds than the flats, and thus the need for greater precision in irrigation and sowing management with beds on sandy loam and loam soils. Yield on beds relative to flats did not change as the beds aged.
Yields of transplanted rice on permanent beds (TRB) were depressed relative to yields of puddled transplanted rice (PTR) with the same alternate wetting and drying water management, regardless of age of the bed (from 1st to 8th crop) and soil type. Yields of TRB relative to PTR declined as the beds aged, over the first 2-3 years, from about 80 to 90% to less than 50% of PTR. Biomass production in TRB was always significantly less than in PTR, starting from 35 d after transplanting. Performance of direct-seeded rice on beds (DSRB) was even poorer. Serious root knot nematode infestation was also a serious problem in transplanted rice on the sandy loam in the absence of continuous flooding, on both TRB and PTR. The DSRB suffered from severe iron deficiency each year on both soils despite several iron sprays beginning as early as 15 days after transplanting, and yields declined from about 60% of PTR with the same irrigation scheduling in the first rice crop to less than 25% of PTR in the third rice crop.
Total annual system productivity was highest using puddled transplanted rice (PTR) in rotation with fresh beds (WB) for wheat, CTW or DDW on the flat. Average productivity of these systems over the first 4 years was 9.5 t ha-1 y-1 on a sandy loam soil and 10.3 t ha-1 y-1 on a loam soil. Productivity of RW on permanent raised beds with transplanted rice declined as the beds aged, and averaged 77-79% of the productivity of the best systems mainly due to declining yield of TRB relative to PTR. Averaged over the first 3 years, productivity of permanent beds with direct-seeded rice (DSRB) was even lower (only 62-68% of the best systems) due to much lower yields of DSRB. Permanent bed RW systems seem to have limited potential under the prevailing soil and climatic conditions of Punjab, India, with current varieties and management. Further research on permanent raised beds for RW systems should focus on the selection of suitable rice and wheat cultivars, soil health issues such as nematodes and iron deficiency, weed control, irrigation scheduling, N management and soil compaction.
Keywords: Rice-wheat; Tillage; Wheat yield; Direct-seeded rice; Transplanted rice; Permanent raised beds; Direct-drilled wheat

Cedric Naud, David Makowski, Marie-Helene Jeuffroy, Leaf transmittance measurements can improve predictions of the nitrogen status for winter wheat crop, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 27-34, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.06.012.
(http://www.sciencedirect.com/science/article/B6T6M-4TG2902-1/2/f840791b861b76c342c8868072cb7828)
Abstract:

Dynamic crop models can be used to predict the occurrence of nitrogen deficiency during crop growth and optimize nitrogen fertilisation. However, prediction errors can be large and may lead to wrong recommendations. The objective of our work is to study the value of correcting the dynamic model Azodyn using transmittance measurements made with the N-Tester(R) (Yara) to predict the nitrogen status of a winter wheat crop. Our approach is to use a Bayesian method called the 'interacting particle filter' to fit the model's state variables to measurements obtained over the course of the season. This approach was assessed on 44 experimental plots. Predictions of crop biomass, nitrogen uptake and nitrogen nutrition index were first performed for each plot by using the model without any correction. A second series of predictions was then performed for the same variables by correcting the model with N-Tester measurements at GS 7 on Feekes' scale. The results showed that the second series of predictions were more accurate. Depending on the prediction dates, model corrections reduced the root mean squared error by 18.1-53.2% for nitrogen nutrition index, by 9.1-10.1% for biomass, and by 17.1-45.0% for nitrogen uptake. The predictions were improved up to 52 days after the measurement but the degree of improvement was higher when the prediction date was close to the measurement date. The results also showed that, when corrected, model predictions were very sensitive to values of N-Tester measurements. It is therefore necessary to use N-Tester measurements which are as precise as possible.
Keywords: Bayesian method; Crop model; Data assimilation; Filter; N-Tester; Nitrogen deficiency; Prediction error

Pierre Bancal, Early development and enlargement of wheat floret primordia suggest a role of partitioning within spike to grain set, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 44-53, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.06.014.
(http://www.sciencedirect.com/science/article/B6T6M-4T53HKR-1/2/e8e178293a774f008c84ffe259b09e47)
Abstract:
Spike grain number, a major component in the yield of wheat, is suspected of being determined by the sudden death of most of the initiated floret primordia, which occurs at around booting. By counting twice weekly the number of floret primordia in the middle and top spikelets, the onset time for the death of floret primordia (Td) was assessed in six genotypes of differing earliness and fertility subjected to three treatments that were applied during stem elongation. The variation in Td was positively correlated with overall earliness, as well as with spike fertility. Ovary development and enlargement were quantified in eight specified positions within the spikes, but Td could not be assigned to a developmental stage attained by any ovary. Development and enlargement were very strongly correlated with each other throughout the floret lifetime, yet with significant effects of genotype, treatment and position within spikes. In each position within a spike, the proportion of florets that set a grain correlated to the initial delay of development as compared to the most advanced floret ($r^2 = 0.64$), but this correlation was severely biased by genotype and the floret position effect. Better correlations were obtained with either the development or width of each ovary at Td, thus highlighting the role of the preceding phase. The best prediction ($r^2 = 0.93$) was obtained from the ratio of ovary width to that of the most advanced floret at Td. The importance of this width ratio emphasized the role of partitioning in grain set: only florets able to divert nutrients survived after Td and eventually set a grain. This relationship was no longer biased by floret position, while some remaining variability due to genotype suggested potential for plant breeding: width ratios at Td were generally related to the growth duration of various primordia, as well as to their relative growth rate.
Keywords: Grain number; Spike partitioning; Floret survival; Grain setting

N. Ahmad, F.U. Hassan, R.K. Belford, Effect of soil compaction in the sub-humid cropping environment in Pakistan on uptake of NPK and grain yield in wheat (Triticum aestivum): I.

Compaction, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 54-60, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.001.
(http://www.sciencedirect.com/science/article/B6T6M-4TCPN3P-1/2/8da482300a2f75af8360a10624ac1c7d)
Abstract:
Soil compaction is a major cause of decrease in crop yield. The most serious cause of soil compaction is continuous ploughing at the same depth which affects bulk density, porosity and root proliferation, consequently affecting concentration and uptake of nutrients by plants. The effects of soil compaction on concentration and uptake of Nitrogen, Phosphorus and Potassium (NPK) by wheat were studied at the Agriculture Research Institute, Mingora, Pakistan in two separate experiments, conducted during 2002-2003 and repeated in 2003-2004. The treatments in each experiment consisted of four compaction levels arranged in a randomized complete block design replicated four times. Subsoil compaction affected soil bulk density and total porosity. With increasing compaction, bulk density increased in the range of 15-26% while total porosity decreased in the range of 15-27%. Compaction treatments significantly and progressively decreased concentration and uptake of NPK in both years of the experiments. Higher nutrient concentration and uptake was recorded during the second year as compared to first year, probably as a result of higher seasonal rainfall. Concentration of NPK showed reductions of 5-20%, 10-53% and 9-21%, respectively, due to the compaction treatments over control. The uptake of NPK decreased due to the compaction treatments in the range of 7-26%, 11-54% and 11-28%, respectively, over control. Compaction treatments decreased the dry matter accumulation in the range of 2-9% whereas grain yield showed a reduction of 5-48%. Inverse relationships between bulk density, and concentration and uptake of NPK, dry matter accumulation and grain yield were recorded. The implications of these findings for intensive agricultural systems in Pakistan and similar environments are discussed.
Keywords: Compaction; Nutrient uptake; Bulk density; Total porosity; NPK; Grain yield

N. Ahmad, F.U. Hassan, R.K. Belford, Effects of soil compaction in the sub-humid cropping environment in Pakistan on uptake of NPK and grain yield in wheat (Triticum aestivum): II: Alleviation, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 61-68, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.002.
(http://www.sciencedirect.com/science/article/B6T6M-4TCXGD3-1/2/c97c044b6873bfe052e930bfceb44c56)
Abstract:
Alleviation of soil compaction can be achieved through application of appropriate measures which will vary from soil to soil and with the socio-economic factors of the farmers. The effects of alleviation measures applied to artificially compacted soil on yield components, grain yield, dry matter and nutrient uptake by wheat was studied at the Agriculture Research Institute, Mingora, Pakistan, in two separate experiments in 2002-2003 and 2003-2004. The improvement measures included deep ploughing (DP), farmyard manure (FYM) and gypsum (GYP), and comprised a compacted control and four treatments T1 (control), T2 (DP), T3 (DP + FYM), T4 (DP + gypsum) and T5 (DP + FYM + GYP), arranged in completely randomized block design replicated four times. Improvement measures applied to compacted soil significantly decreased soil bulk density and increased total porosity. Bulk density decreased in the range of 12-15% while total porosity showed an increase of 16-23% over the control. Improvement measures significantly increased concentration and uptake of NPK in both years. Higher concentration and uptake was recorded during the second year as compared to the first year, probably as a result of higher seasonal rainfall in the second year. The uptake of NPK by wheat plants increased in the range of 43-51, 25-94 and 11-28%, respectively, over plants in the compacted control. Similarly, improvement treatments increased grains spike-1, thousand grain weight, dry matter accumulation and grain yield in the range of 14-21, 5-14, 3-10 and 21-37% respectively, over the control. This work

demonstrates that it is possible to overcome the deleterious effects of compaction induced by wheeled traffic, and improve crop yields and nutrient uptake in intensive cropping systems in rainfed environments in Pakistan and similar environments.
Keywords: Soil compaction; Soil improvement; Nutrient uptake; Yield components; Yield; Dry matter

Simonetta Fois, Rosella Motzo, Francesco Giunta, The effect of nitrogenous fertiliser application on leaf traits in durum wheat in relation to grain yield and development, Field Crops Research, Volume 110, Issue 1, 5 January 2009, Pages 69-75, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.07.004.
(http://www.sciencedirect.com/science/article/B6T6M-4TBVPSV-1/2/2d8839f93a5b66f2b24d1c3896593a25)
Abstract:
Nitrogen (N) fertilisation boosts the grain yield of wheat through its influence on yield components, phenology and leaf traits. Both crop growth and senescence are dependent on N supply, as are the number of kernels set per unit area and per ear, and the mean kernel size. A two-season trial of four semi-dwarf durum wheat cultivars, grown at two levels of N, was used to illustrate the effects of N on canopy temperature, leaf resistance and flag leaf senescence pattern under irrigated conditions in a Mediterranean climate, and to explore the consequences of these effects on the crop phenology, its yield and its yield components. The well-fertilised crop developed a larger leaf area index at anthesis and a lower leaf resistance, thus generating a lower canopy temperature and delayed anthesis. Its grain fill duration was shorter, in spite of its lower canopy temperature, presumably because the increased N availability resulted in the development of a stronger sink (more kernels per unit area and per ear), which was associated with earlier senescence, thereby shortening the duration of grain fill, and led to reduced kernel weight.
Keywords: Canopy temperature; Leaf resistance; SPAD readings; Nitrogen; Development; Durum wheat

Zhi-guo XIANG, Lian-quan ZHANG, Shun-zong NING, You-Liang ZHENG, Deng-cai LIU, Evaluation of Aegilops tauschii for Heading Date and Its Gene Location in a Re-synthesized Hexaploid Wheat, Agricultural Sciences in China, Volume 8, Issue 1, January 2009, Pages 1-7, ISSN 1671-2927, DOI: 10.1016/S1671-2927(09)60002-X.
(http://www.sciencedirect.com/science/article/B82XG-4VFMC51-2/2/5ef255d357ffbbfffd3a8f0f738175d9)
Abstract:
The successful worldwide cultivation of hexaploid wheat in a diverse range of environments is because of, in part, breeding and selection for appropriate heading date. To adjust and fine-tune the heading time of hexaploid wheat to particular geographical regions and specific environment within these, there is an urgent need to evaluate and use alternative alleles for heading time. Aegilops tauschii, the donor species of D-genome of hexaploid wheat, has a wide geographic distribution. The present study revealed a wide variation for heading time among 56 Ae. tauschii accessions. All the accessions with short heading dates belonged to the ssp. tauschii, whereas most of ssp. strangulata accessions showed very long heading date. The heading date was also related to distribution of this species. The monotelosomic and monosomic analysis of a synthetic hexaploid wheat showed that chromosome 2D derived from ssp. tauschii accession AS60 had a major effect on promoting heading time with a reduction of more than 5 days. It is postulated that this Ae. tauschii genotype possess the allele Ppd-Dt1 responsible for the insensitivity to photoperiod. This allele is probably different from Ppd-D1 existing in hexaploid wheat. The new allele Ppd-Dt1 derived from Ae. tauschii might be used as a source for hexaploid wheat breeding on photoperiod response.

Keywords: genetic diversity; monosomic analysis; photoperiod response; synthetic wheat; wheat breeding

Shujiang Kang, William A. Payne, Steven R. Evett, Clay A. Robinson, Bobby A. Stewart, Simulation of winter wheat evapotranspiration in Texas and Henan using three models of differing complexity, Agricultural Water Management, Volume 96, Issue 1, January 2009, Pages 167-178, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.07.006.
(http://www.sciencedirect.com/science/article/B6T3X-4T8TW40-1/2/23312f25b30deae8ef79caa404c5767c)
Abstract:
Crop evapotranspiration (ET) is an important component of simulation models with many practical applications related to the efficient management of crop water supply. The algorithms used by models to calculate ET are of various complexity and robustness, and often have to be modified for particular environments. We chose three crop models with different ET calculation strategies: CROPWAT with simple data inputs and no calibrations, MODWht for intensive inputs and limited calibrations, and CERES-Wheat with intensive inputs and more calibrations for parameters. The three crop models were used to calculate ET of winter wheat (Triticum aestivum L.) grown at two experimental sites of China and US during multiple growing seasons in which ET was measured using lysimeter or soil water balance techniques. None of the models calculated daily ET well at either Bushland or Zhengzhou as indicated by high mean absolute differences (MAD > 1.1 mm) and root mean squared errors (RMSE > 2.0 mm). The three models tended to overestimate daily ET when measured ET was small, and to underestimate daily ET when measured ET was large. The fitted values of daily crop coefficients (Kc), calculated from daily ET and reference ET (ETo), were very similar to those of Allen et al. (1998) [Allen, R.G., Pereira, S.L., Raes, D., Smith, M., 1998. Crop evapotranspiration guidelines for computing crop water requirements. Irrigation and drainage paper 56, Rome] although some Kc were overestimated (>=1.0). Leaf area index (LAI) was poorly calculated by MODWht and CERES-Wheat, especially when using the Priestley-Taylor method to estimate potential ET (PET). Poor overall ET calculation of three models was associated with poorly estimated values of PET or ETo, Kc and LAI as well as their interactions. Therefore, this suggested that considerable revisions and calibrations of ET algorithms of the three models are needed for the improvement of ET calculation.
Keywords: Evapotranspiration; Crop model; Winter wheat

Qunying Luo, William Bellotti, Martin Williams, Enli Wang, Adaptation to climate change of wheat growing in South Australia: Analysis of management and breeding strategies, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 261-267, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.09.010.
(http://www.sciencedirect.com/science/article/B6T3Y-4TVFW3D-1/2/60bdb4f6ed2dd30f4276dc290bd70a73)
Abstract:
Evaluation of adaptive management options is very crucial for successfully dealing with negative climate change impacts. Research objectives of this study were (1) to determine the proper N application rate for current practice, (2) to select a range of synthetic wheat (Triticum aestivum L.) cultivars to expand the existing wheat cultivar pool for adaptation purpose, (3) to quantify the potential impacts of climate change on wheat grain yield and (4) to evaluate the effectiveness of three common management options such as early sowing, changing N application rate and use of different wheat cultivars derived in (2) and given in the APSIM-Wheat model package in dealing with the projected negative impacts for Keith, South Australia. The APSIM-Wheat model was used to achieve these objectives. It was found that 75 kg ha-1 N application at sowing for current situation is appropriate for the study location. This provided a non-limiting N supply condition for climate change impact and adaptation evaluation. Negative impacts of climate change on wheat

grain yield were projected under both high (-15%) and low (-10%) plant available water capacity conditions. Neither changes in N application level nor in wheat cultivar alone nor their synergistic effects could offset the negative climate change impact. It was found that early sowing is an effective adaptation strategy when initial soil water was reset at 25 mm at sowing but this may be hard to realise especially since a drier environment is projected.
Keywords: Wheat grain yield; Climate change; Impact assessment; Adaptation evaluation; Early sowing; Cultivars choices; N application level

K.A. Barbarick, J.A. Ippolito, Continuous biosolids application affects grain elemental concentrations in a dryland-wheat agroecosystem, Agriculture, Ecosystems & Environment, Volume 129, Issues 1-3, January 2009, Pages 340-343, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.09.005.
(http://www.sciencedirect.com/science/article/B6T3Y-4TTM2YJ-1/2/bc5829d95d38df16e3ee7b0488080a93)
Abstract:
Continuous land application of biosolids in a beneficial-use program changes trace-element availability to plants over time. Consequently, what regression model, if any, could best predict wheat (Triticum aestivum L.) grain concentrations in a biosolids-amended dryland agroecosystem? We calculated paraboloid, linear, quadratic, and exponential-rise-to-a maximum equations for grain Ba, Cd, Cu, Mn, Mo, Ni, P, and Zn concentration versus number of biosolids applications and/or soil NH4HCO3-dithethylenetriaminepentaacetic acid (AB-DTPA) extract concentrations for two sites that had each received six applications of Littleton/Englewood, CO, USA Wastewater Treatment Facility biosolids. The paraboloid-regression models were superior (higher R2 values, lower S.E. of the estimate) to other models. Soils classified the same as the Weld soil (used in this study) at the family level (fine, smectitic, mesic Aridic Argiustolls) encompass 25 soil series in 10 US states with an aerial extent of 2.3 x 106 ha. The paraboloid-regression model approach probably would be applicable to these similarly classified soils.
Keywords: Paraboloid regression; Diethylenetriaminepentaacetic acid; Winter-wheat summer fallow; Argiustoll

Mojibur R. Khan, Fiona M. Doohan, Bacterium-mediated control of Fusarium head blight disease of wheat and barley and associated mycotoxin contamination of grain, Biological Control, Volume 48, Issue 1, January 2009, Pages 42-47, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.08.015.
(http://www.sciencedirect.com/science/article/B6WBP-4T8YTD2-2/2/e993f3cee88d3fe95aa8c971af9b6f6f)
Abstract:
Fusarium culmorum causes Fusarium head blight (FHB) disease of cereals, resulting in yield loss and contamination of grain with the trichothecene mycotoxin, deoxynivalenol (DON). In a test for potential disease control organisms, Pseudomonas fluorescens strains MKB 158 and MKB 249 and Pseudomonas frederiksbergensis strain 202 significantly reduced both the severity of FHB disease symptoms caused by F. culmorum on wheat and barley ([greater-or-equal, slanted]23%; P [less-than-or-equals, slant] 0.050) and the disease-associated loss in 1000-grain weight ([greater-or-equal, slanted]16%; P [less-than-or-equals, slant] 0.050) under both glasshouse and field conditions when applied 24 h pre-pathogen inoculation. Glasshouse studies showed that these bacteria were more effective in controlling disease when applied 24 h pre- as opposed to 24 h post-pathogen inoculation. The most striking finding was that, in the F. culmorum-inoculated field trials, treatment with either of the two P. fluorescens strains (MKB 158 or MKB 249) also significantly reduced the DON levels in wheat and barley grain (74-78%; P [less-than-or-equals, slant] 0.050). This is the first report detailing the ability of fluorescent pseudomonad bacteria to control FHB disease and simultaneously reduce mycotoxin contamination of wheat and barley under field conditions.

Keywords: Fusarium culmorum; Pseudomonas fluorescens; Pseudomonas frederiksbergensis; Acinetobacter sp.; Chryseobacterium sp.; Deoxynivalenol; Biological control; Cereals

Cuiping Wang, Fengyin Wang, Qirong Yang, Ruiguang Liang, Thermogravimetric studies of the behavior of wheat straw with added coal during combustion, Biomass and Bioenergy, Volume 33, Issue 1, January 2009, Pages 50-56, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2008.04.013.
(http://www.sciencedirect.com/science/article/B6V22-4SNPPYT-1/2/4f6ba0461d97dd4f3590a99c670a14d7)
Abstract:
The combustion behavior of biomass and biomass-coal blends under typical heating conditions was investigated. Thermogravimetric analyses were performed on bituminite coal, aspen strawdust and wheat straw used alone and blended with different coal weight ratios. The behavior of biomass fuels in the burning process (different rates of volatilization, char burning and heat production) was analyzed, and the effects of a cold molding procedure for wheat straw on the burning properties were investigated. In addition, the kinetic parameters for the thermal conversion of each fuel were determined. Cold molding led to easier firing, and 5% coal was identified as the ideal ratio to achieve similar heat release characteristics to strawdust. Such a mixed pellet fuel with burning characteristics similar to aspen wood can be produced to take advantage of the wide design basis for wood-fired boilers.
Keywords: Wheat straw; Aspen sawdust; Biomass-coal blends; Combustion behavior; Thermogravimetry

Isabelle Bertrand, Maxime Prevot, Brigitte Chabbert, Soil decomposition of wheat internodes of different maturity stages: Relative impact of the soluble and structural fractions, Bioresource Technology, Volume 100, Issue 1, January 2009, Pages 155-163, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.06.019.
(http://www.sciencedirect.com/science/article/B6V24-4T32DYJ-3/2/c6d7a62ccd7149e80a4eebce43cd2008)
Abstract:
The aim of this study was to clarify the importance of the soluble fraction on cell wall decomposition. Wheat plant was chosen as a model and was harvested at three stages of maturity: anthesis (A stage), 20 days after anthesis (B stage) and physiological maturity (PM stage). Wheat third internode (numbered down from the ear) were selected for this study. Internode age influenced the cumulative CO2 kinetics with internodes from wheat stem harvested at anthesis mineralizing 62.1% +/- 2.2 of added residue C whereas those harvested at the B and PM stages mineralized 58.8% +/- 1.4 and 51.6% +/- 1.7, respectively of the added C. Chemical analyses revealed that maturation of the selected internodes mainly altered residue quality by modifying the proportion of soluble to cell wall fractions rather than the quality of these fractions. The hexose to pentose ratios were good biomarkers of microbial sugars for both soluble and cell wall fractions, as were the uronic acids, which are not commonly determined in soil decomposition studies. This study clearly demonstrated that the contents of the internode soluble fraction did not affect the extent of cell wall C mineralization. Therefore, the soluble content of crop residues would not regulate the soil microbial populations able to mineralize cell wall C. However, this needs to be validated on a broader range of residue types with different nature of cell wall C or soluble compounds.
Keywords: Soil; Carbon mineralization; Wheat internode; Soluble fraction; Cell walls

V.B.H. Dang, H.D. Doan, T. Dang-Vu, A. Lohi, Equilibrium and kinetics of biosorption of cadmium(II) and copper(II) ions by wheat straw, Bioresource Technology, Volume 100, Issue 1, January 2009, Pages 211-219, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.05.031.

(http://www.sciencedirect.com/science/article/B6V24-4SWP1V2-7/2/464660f8d05777c72bb1cb23bdaf7b45)
Abstract:
Biosorption equilibrium and kinetics of Cd2+ and Cu2+ ions on wheat straw, Triticum aestivum, in an aqueous system were investigated. Among the models tested, namely the Langmuir, Freundlich, Temkin, and Dubinin-Radushkevich isotherms, the biosorption equilibrium for both Cd2+ and Cu2+ was best described by the Langmuir model. The Langmuir biosorption capacity for Cd2+ was about 27% higher than that for Cu2+. It was also found that biosorption of Cd2+ and Cu2+ by wheat straw followed second-order kinetics. The equilibrium amount of metal ions adsorbed onto the wheat straw increased with increasing of pH from 4.0 to 7.0, and the effect was more pronounced for Cd2+ than for Cu2+. The equilibrium adsorbed amount also increased with the initial concentration of the metal ions, as expected. On the other hand, an increase of temperature from 25 to 30 [degree sign]C only enhanced the biosorption of Cd2+ and Cu2+ slightly. The apparent temperature independence and the strong pH dependence of the amount of metal ions adsorbed along with moderate mean free energies of biosorption (between 8.0 and 12.9 kJ mol-1) altogether indicate that biosorption of Cd2+ and Cu2+ by wheat straw might follow a chemisorption mechanism.
Keywords: Biosorption; Kinetics; Cadmium(II); Copper(II); Wheat straw

Issam Smaali, Caroline Remond, Yousr Skhiri, Michael J. O'Donohue, Biocatalytic conversion of wheat bran hydrolysate using an immobilized GH43 [beta]-xylosidase, Bioresource Technology, Volume 100, Issue 1, January 2009, Pages 338-344, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.06.041.
(http://www.sciencedirect.com/science/article/B6V24-4T3TPTT-2/2/5d9f430932d9660d5aad07ae2d17e5f0)
Abstract:
To investigate the concept of a xylosidase-based process for the continuous production of xylose from arabinoxylan-containing feedstocks, a [beta]-xylosidase from Bacillus halodurans C-125 was immobilized and deployed in packed bed reactor (PBR). Among the several immobilization methods tested, glutaraldehyde-mediated immobilization on chitosan was the best both in terms of immobilization and activity yields (91% and 72.9%, respectively). In batch experiments the immobilized enzyme hydrolyzed wheat bran hydrolysates quite efficiently, consuming nearly all xylobiose and xylotriose after 6 h. Its reusability showed only a 50% decrease of its activity after 92 h. Using the chitosan-immobilized [beta]-xylosidase in a PBR, xylose productivity was 7.2 g xylose l-1 h-1 and the conversion factor was 0.55 (derived from initial xylose in the substrate). The operational stability of the PBR was good, because only 25% of productivity was lost after the treatment of three batches of substrate over a 72-h period.
Keywords: [beta]-Xylosidase; Immobilization; Packed bed reactor; Arabinoxylan; Biorefining

Lars Wiik, Yield and disease control in winter wheat in southern Sweden during 1977-2005, Crop Protection, Volume 28, Issue 1, January 2009, Pages 82-89, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.09.002.
(http://www.sciencedirect.com/science/article/B6T5T-4TT1FYM-1/2/e41abaf04126e84c2f10fb6356c008ad)
Abstract:
Fungicides are routinely used to prevent yield losses in winter wheat in southern Sweden. Yield and 1000 grain weight (TGW) data from 432 trials in farmers' fields were evaluated to review long-term yields (1977-2005) and control of eyespot and Leaf Blotch Diseases (LBDs, including Septoria tritici blotch, Stagonospora nodorum blotch and tan spot), powdery mildew, brown rust and yellow rust. Regression analyses revealed that control of LBDs explained 74% of the yield increase achieved by fungicide treatment at GS 45-61, followed by powdery mildew (20%), brown

rust (5%) and yellow rust (1%). Yield of both untreated and fungicide-treated plots increased from approx. 6000 to 12[punctuation space]000 kg ha-1 over the period 1983-2005. Single eyespot treatment improved yield by ~320 kg ha-1 yr-1 during the period 1977-2002, mainly due to occasional years with severe eyespot. Single leaf disease treatment at GS 45-61 increased mean yield by 10.3% or 810 kg ha-1 yr-1 (9.9% or 660 kg ha-1 yr-1 for 1983-1994 and 10.7% or 970 kg ha-1 yr-1 for 1995-2005) due to increased TGW and grain numbers, especially in high-yielding stands. Additional extra early treatment at GS 30-40 against LBDs increased yield by ~250 kg ha-1 yr-1. Estimated variance in yield and TGW was higher between years than within years, while that in yield increase and plant diseases was lower between years than within. The results confirm potential and limits of fungicides and the need for supervised control strategies including factors affecting disease, yield and interactions.
Keywords: 1000 Grain weight; Yield components; Plant disease; Septoria tritici; Fungicides

Martin Diaz-Zorita, Maria Virginia Fernandez-Canigia, Field performance of a liquid formulation of Azospirillum brasilense on dryland wheat productivity, European Journal of Soil Biology, Volume 45, Issue 1, Ecology and application of Azospirillum and other plant growth promoting bacteria (PGPB), January-February 2009, Pages 3-11, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.07.001.
(http://www.sciencedirect.com/science/article/B6VR7-4T2RSTC-1/2/83aff4373e31cc8f4358fc6f9bbb69f2)
Abstract:
The beneficial effects of inoculating with Azospirillum brasilense on crop productivity have been widely described, but extensive use in typical agricultural field environments is scarcely documented. The objective of this study was to quantify the productivity of wheat (Triticum aestivum L.) whose seed was inoculated with a liquid formulation containing Azospirillum brasilense INTA Az-39 strain under typical dryland farming conditions. The study was performed in the 2002-2006 growing seasons, evaluating inoculated and non-inoculated seed at 297 experimental locations in the Pampas region of Argentina. The inoculated crops exhibited more vigorous vegetative growth, with both greater shoot and root dry matter accumulation (12.9 and 22.0%, respectively). The inoculation increased the number of harvested grains by 6.1%, and grain yield by 260 kg ha-1 (8.0%). Positive responses were determined in about 70% of the sites, depending mostly on the attainable yield and independently of fertilization and other crop and soil management practices. In general, more response to inoculation was observed in the absence of major crop growth limitations, suggesting the complementary contribution of the Azospirillum brasilense treatment to more efficiently developing higher yielding wheat.
Keywords: Biofertilizer; Subhumid and Semiarid regions; Mollisols; Grain yield components

M. Alejandra Pereyra, Florencia M. Ballesteros, Cecilia M. Creus, Rolando J. Sueldo, Carlos A. Barassi, Seedlings growth promotion by Azospirillum brasilense under normal and drought conditions remains unaltered in Tebuconazole-treated wheat seeds, European Journal of Soil Biology, Volume 45, Issue 1, Ecology and application of Azospirillum and other plant growth promoting bacteria (PGPB), January-February 2009, Pages 20-27, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.09.015.
(http://www.sciencedirect.com/science/article/B6VR7-4TSSXK1-1/2/2cbe1ae3c7456dd3b15e926a997f4310)
Abstract:
The wide use of pesticides in modern agriculture may cause side effects on the non-target microflora. Data on the fungicide Tebuconazole effects on Azospirillum-wheat association are scarce. We analyzed the effects of Tebuconazole on: (a) Azospirillum brasilense Sp245 growth in pure culture, (b) A. brasilense Sp245 colonization of Triticum aestivum cv ProINTA Oasis roots, (c) A. brasilense Sp245-inoculated seedlings growth under normal and water stress conditions in the

presence of 20% polyethylene glycol 8000. Seeds were separated in Tebuconazole-free and Tebuconazole-treated lots. Inoculated and non-inoculated seedlings were grown in hydroponics in the dark at 20 [degree sign]C for 72 h. Root surface, coleoptile length, fresh and dry (DW) weights in both tissues and diazotrophic bacterial most probable number in roots were determined. Water contents and shoot-to-roots DW ratio were calculated. Neither Azospirillum growth nor root colonization was affected by Tebuconazole. Under normal growth conditions most of the growth parameters analyzed, revealed a clear positive effect of A. brasilense on wheat seedlings up to 72 h treatments. The characteristic Azospirillum enhancing effects observed on roots remained unaltered by Tebuconazole. The present study shows that Tebuconazole is compatible with A. brasilense Sp245-wheat inoculation.
Keywords: Azospirillum; Wheat; Seedlings; Growth promotion; Tebuconazole; Water stress

Andres D. Naiman, Alejandra Latronico, Ines E. Garcia de Salamone, Inoculation of wheat with Azospirillum brasilense and Pseudomonas fluorescens: Impact on the production and culturable rhizosphere microflora, European Journal of Soil Biology, Volume 45, Issue 1, Ecology and application of Azospirillum and other plant growth promoting bacteria (PGPB), January-February 2009, Pages 44-51, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.11.001.
(http://www.sciencedirect.com/science/article/B6VR7-4TY8N1P-1/2/716e12fdcfd2772d0f76be6afb7a1a42)
Abstract:
Scientific evidence recognizes that the operation of a terrestrial ecosystem depends on soil microbial activity. Some Azospirillum strains produce plant growth regulators, increase the development of roots, and fix atmospheric nitrogen (N2). Some Pseudomonas strains are capable of producing cytokinins and solubilizing organic phosphorus. A sustainability analysis requires a detailed knowledge of the interrelationships between the microorganisms added to the system and those present in the soil. This study examines the effect of three commercial inoculants Azospirillum brasilense Az1 and Az2 as well as Pseudomonas fluorescens Pf on biomass production, grain yield and rhizosphere colonization of wheat, combined with two levels of N-addition. Plate counts of rhizosphere soil showed that the inoculation and N-addition did not affect the number of P. fluorescens, whereas it significantly affected the number of Azospirillum. N-addition and inoculation did not change the communities of actinomycetes and bacteria but they changed the number of fungi at the rhizosphere of wheat plants. Community-level physiological profiles of carbon-source utilization of rhizosphere soil microbial communities were changed after inoculation with Az1, Az2 and Pf depending on the phenological stage of the crop. Although no significant responses were observed, in average, PGPB inoculation increased aerial biomass by 12%, root biomass by 40% and grain yield by 16%. These increases represent important earnings for the farmer and they may help to obtain a greater sustainability of the agroecosystems.
Keywords: Wheat; PGPR; Inoculants; Microbial communities; Rhizosphere

Ignacio Sanchez-Gonzalez, Arantxa Rodriguez-Casado, Mercedes Careche, Pedro Carmona, Raman analysis of surimi gelation by addition of wheat dietary fibre, Food Chemistry, Volume 112, Issue 1, 1 January 2009, Pages 162-168, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.054.
(http://www.sciencedirect.com/science/article/B6T6R-4SK631P-1/2/3c0ca315d22d582ab6252639c8bd2ba3)
Abstract:
Raman analysis has been carried out to study the effects of Vitacel(R) wheat dietary fibre (WDF) during gelation of surimi. The main results reveal the following: (a) Vitacel(R) comprises natural cellulose I as major component; (b) hydration of WDF leads to [nu]CH frequency upshifting and decreasing intensity. On the basis of these spectral features it is suggested that water transfer from protein to WDF can occur in surimi gels. WDF hydration can be interpreted in the sense that

this fibre either takes water that is delivered from the gel protein upon heat-mediated formation of [beta]-sheets and hydrophobic contacts and/or or acts as an active dehydrating agent. An increase of solvent-exposed hydrophobic side chains is observed in the sol phase, upon the addition of WDF, which may cause breaking of intermolecular protein hydrophobic contacts; a subsequent change upon WDF-containing gel formation is the reduction in the [nu]CH intensity, which may be indicative of increasing hydrophobic WDF-protein contacts. Interestingly, these results constitute molecular data, to be considered when designing restructured fish products with these fibre ingredients.
Keywords: Surimi; Surimi gels; Dietary fibre; Protein structure; Raman spectroscopy; Interactions

Kingsley K. Agyare, Kwaku Addo, Youling L. Xiong, Emulsifying and foaming properties of transglutaminase-treated wheat gluten hydrolysate as influenced by pH, temperature and salt, Food Hydrocolloids, Volume 23, Issue 1, January 2009, Pages 72-81, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.11.012.
(http://www.sciencedirect.com/science/article/B6VP9-4R7J661-1/2/abd99b82293dca7e8aade715f592265c)
Abstract:
Hydrolyzed wheat gluten (GH, 77-85% protein) was prepared by limited hydrolysis with chymotrypsin at 37 [degree sign]C for 4 h (degree of hydrolysis=6.4%) and 15 h (degree of hydrolysis=10.3%). The effect of microbial transglutaminase (MTGase) treatment (55 [degree sign]C for 1 h, or 5 [degree sign]C for 18 h) on the emulsifying and foaming properties of GH was evaluated under selected food processing conditions (pH 4.0 and 6.5, 0 and 0.6 M NaCl, and temperature 20 and 5 [degree sign]C). At pH 4.0 and 0 M NaCl the MTGase treatment substantially increased foaming capacity (FC) of GH compared with their respective control GH samples, as a result of enhanced peptide adsorption to the air-water interface, but FC was similar for both control and MTGase-treated GH at pH 6.5. In contrast, foam drainage stability (FS) of MTGase-treated GH decreased at pH 4.0, but increased significantly ($P<0.05$) at pH 6.5 when compared with their respective control GH samples. The FC and FS were affected by 0.6 M NaCl in a pH-dependent manner. The MTGase treatments increased emulsion activity index up to 15-fold at pH 6.5, while emulsion stability index was influenced by emulsion temperature and ionic strength conditions. The MTGase-induced changes in functional properties of GH were attributed to pH-dependent solubility changes, the amphiphilic nature of gluten peptides and increased electrostatic repulsion resulting from deamidation.
Keywords: Hydrolyzed wheat gluten; Emulsifying properties; Foaming properties; Microbial transglutaminase

Pedro Leman, Hans Goesaert, Jan A. Delcour, Residual amylopectin structures of amylase-treated wheat starch slurries reflect amylase mode of action, Food Hydrocolloids, Volume 23, Issue 1, January 2009, Pages 153-164, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.12.007.
(http://www.sciencedirect.com/science/article/B6VP9-4RFJ4NB-1/2/9a607e6c7628fcb82aa121a059a66ab8)
Abstract:
Some amylases can delay bread staling and/or starch (amylopectin) retrogradation, but the molecular basis of this effect remains little understood. In order to increase our insight in these aspects of amylase functionality, several amylases were added in a pure wheat-starch-containing model system and subjected to a heating step corresponding to that in the baking phase in bread making. Next, the effects of the limited amylolytic degradation on the rapid visco analyser (RVA) rheological properties of starch were studied and the accompanying changes in the amylopectin molecular properties (such as chain length distribution) investigated. The different amylases clearly affected the molecular structure of amylopectin to a different extent, which could be related to their mode of action and the enzyme activity levels added. Bacillus subtilis and Aspergillus

oryzae [alpha]-amylases had only a limited impact on the side chain distribution of the amylopectin molecules, presumably due to their preferential hydrolysis of internal chain segments and the low enzyme activity added in the RVA. In contrast, porcine pancreatic [alpha]-amylase and Bacillus stearothermophilus maltogenic [alpha]-amylase, both with higher degree of multiple attack and used at higher enzyme activity levels, had a marked influence on the amylopectin molecular structure. More in particular, under the test conditions, the maltogenic [alpha]-amylase reduced the average chain length of the outer chains by 50%. Presumably, this will affect amylopectin retrogradation to a large extent. The results contribute to a better understanding of amylase functionality in starchy foods.
Keywords: Amylase; Amylopectin; Partial hydrolysis; RVA; Molecular properties

Pham Van Hung, Tomoko Maeda, Kazutaka Miyatake, Naofumi Morita, Total phenolic compounds and antioxidant capacity of wheat graded flours by polishing method, Food Research International, Volume 42, Issue 1, January 2009, Pages 185-190, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.10.005.
(http://www.sciencedirect.com/science/article/B6T6V-4TT33RD-1/2/3a30a5f62f8723a145384214bd4c158b)
Abstract:
The graded flour fractions, which were milled from whole wheat grain from outer to inner parts without removal of germ and bran, are rich in dietary fibers and minerals, the sources of nutrition for human beings. In this study, the whole waxy wheat was milled into five fractions using the gradual milling method and the phenolic contents and antioxidant capacity of these flours were investigated. The total phenolic and flavonoid contents of free and bound phenolic extracts gradually increased in the order from the inner to the outer fractions. The flours milled from the outer parts of grain contained significantly higher amount of phenolics and exhibited significantly higher antioxidant capacity than did the whole grain. Likewise, the inner flour fractions milled from mostly endosperm part had significantly higher amount of phenolics and exhibited significantly higher antioxidant capacity than did the white flour, which was milled by a conventional milling method. Thus, the graded flours from whole waxy wheat should be encouraged to be used for processing whole-grain foods to improve both qualities of end-use products and health benefits.
Keywords: Waxy wheat; Phenolic compound; Antioxidant activity; Gradual milling

Sahab Hedjazi, Othar Kordsachia, Rudolf Patt, Ahmad Jahan Latibari, Ulrike Tschirner, Alkaline sulfite-anthraquinone (AS/AQ) pulping of wheat straw and totally chlorine free (TCF) bleaching of pulps, Industrial Crops and Products, Volume 29, Issue 1, January 2009, Pages 27-36, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.03.013.
(http://www.sciencedirect.com/science/article/B6T77-4SM206V-1/2/d5eac73a54133bb29c61d7788c7020ec)
Abstract:
Alkaline sulfite-anthraquinone (AS/AQ) pulping of wheat straw and totally chlorine free (TCF) bleaching of resulting pulps was investigated. Wheat straw was supplied by the Ferdosii University Experimental Station in Northeastern Iran, cleaned and chopped into about 3-5 cm long pieces. In the AS/AQ pulping experiments, the active alkali charge on oven dry wheat straw, heating time to maximum cooking temperature, AQ dose and liquor to straw ratio were kept constant at 16%, 60 min, 0.1% and 4/1, respectively. The alkali ratio, Na2SO3/NaOH, calculated as NaOH, was varied from 20/80 to 80/20. Cooking time at maximum temperature was varied from 30 to 90 min and maximum cooking temperature was adjusted between 152 and 160 [degree sign]C. Reference soda and soda/AQ pulps were produced.
AS/AQ and soda/AQ pulps with kappa numbers below 15 were produced easily. Cooking of corresponding soda pulps under comparable conditions stopped at a kappa number of 25. The characteristics of unbleached AS/AQ, soda/AQ and soda pulps were compared. AS/AQ and

soda/AQ pulps had similar tensile strength but tear was in favor to AS/AQ. The latter had much higher yield and brightness.
TCF bleaching of AS/AQ pulp was performed in O Q (OP) or O Q (OP) P sequences. Oxygen delignification (O) resulted in a delignification degree of approximately one third. Followed by a chelating treatment (Q) and a subsequent (OP) stage under drastic conditions a brightness of 82.7% ISO was achieved in an O Q (OP) sequence. The sequence O Q (OP) P, with 2% H2O2 in the final P stage, improved brightness from 77.2% ISO after the OP stage to 83.6% ISO. Bleaching led to only small losses in tensile and burst strength but enhanced tear strength. Short beating in a Jokro mill was sufficient to attain good pulp strength. The results of this study indicate that AS/AQ pulping and TCF bleaching is a convincing alternative to produce high-quality pulp from wheat straw for writing and printing paper.
Keywords: AS/AQ; Soda/AQ and soda pulping; Pulp properties; TCF bleaching; Wheat straw

R. Saiah, P.A. Sreekumar, N. Leblanc, J.-M. Saiter, Structure and thermal stability of thermoplastic films based on wheat flour modified by monoglyceride, Industrial Crops and Products, Volume 29, Issue 1, January 2009, Pages 241-247, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.05.006.
(http://www.sciencedirect.com/science/article/B6T77-4SWXDF2-1/2/937256e52ac0fcbc3409e15e8df9d513)
Abstract:
The effects of the incorporation of monoglyceride on the structure and thermal stability of extruded thermoplastic films based on modified wheat flour have been investigated using X-ray diffraction (XRD) and thermogravimetric method (TGA). Addition of the monoglyceride reduced the intensity and widened the peaks obtained by XRD indicating a reduction in crystal size. A significant decrease of apparent length of the crystals have been noticed when the quantity of monoglyceride increases. The thermal analysis proved that the thermal stability of the polymeric material decreases as a function of the monoglyceride content. Finally an attempt is made to correlate the thermal stability of the polymeric materials, with the degree of crystallinity.
Keywords: Cereal flours; Biodegradable material; Thermoplastics; Thermogravimetric analysis; X-ray diffraction

William J. Hurkman, William H. Vensel, Charlene K. Tanaka, Linda Whitehand, Susan B. Altenbach, Effect of high temperature on albumin and globulin accumulation in the endosperm proteome of the developing wheat grain, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 12-23, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.014.
(http://www.sciencedirect.com/science/article/B6WHK-4TDVMC8-1/2/412c970c8b4c6c862adbeeab9f0b2bd9)
Abstract:
The accumulation of KCl-soluble/methanol-insoluble albumins and globulins was investigated in the endosperm of developing wheat (Triticum aestivum, L. cv. Butte 86) grain produced under a moderate (24 [degree sign]C/17 [degree sign]C, day/night) or a high temperature regimen (37 [degree sign]C/28 [degree sign]C) imposed from 10 or 20 days post-anthesis (dpa) until maturity. Proteins were separated by 2-DE and developmental profiles for nearly 200 proteins were analyzed by hierarchical clustering. Comparison of protein profiles across physiologically equivalent stages of grain fill revealed that high temperature shortened, but did not substantially alter, the developmental program. Accumulation of proteins shifted from those active in biosynthesis and metabolism to those with roles in storage and protection against biotic and abiotic stresses. Few proteins responded transiently when plants were transferred to the high temperature regimens, but levels of a number of proteins were altered during late stages of grain development. Specific protein responses depended on whether the high temperature regimens were initiated early or mid development. Some of the heat responsive proteins have been implicated in gas bubble stabilization in bread dough and others are suspected food allergens.

Keywords: Albumins; Globulins; Grain fill; High temperature

Susan B. Altenbach, Charlene K. Tanaka, William J. Hurkman, William H. Vensel, Expression of globulin-2, a member of the cupin superfamily of proteins with similarity to known food allergens, is increased under high temperature regimens during wheat grain development, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 47-54, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.005.
(http://www.sciencedirect.com/science/article/B6WHK-4T5TPK6-4/2/e9130c6f95de9e6192d03f1bc5979b70)
Abstract:
Twenty-three expressed sequence tags (ESTs) from the US spring wheat Butte 86 were identified that encode proteins similar to a globulin-2 protein from maize embryos. The ESTs assembled into three contigs, two of which include the entire coding region for the mature protein. The encoded proteins contain two cupin domains and show significant identities with 7S seed proteins from other species that are known or putative food allergens. Quantitative reverse-transcriptase polymerase chain reaction (qRT-PCR) with primers specific for two of the sequences demonstrated that the globulin-2 genes are expressed late in grain development and that transcript levels increase when grain is produced under high temperature conditions. Transcripts were detected in both whole grain and endosperm, but levels were significantly higher in whole grain and highest in embryo. In wheat flour, at least 17 protein spots that differ in both size and pI were identified as globulin-2 by 2-DE/MS. Seven of the spots increased more than 2-fold in relative proportion when grain was produced under high temperature regimens. The data suggest that both transcriptional and post-translational mechanisms are involved in the response of globulin-2 to high temperatures.
Keywords: Flour quality; Gene expression; Proteomics; Quantitative RT-PCR

Youna Hemery, Valerie Lullien-Pellerin, Xavier Rouau, Joel Abecassis, Marie-Francoise Samson, Per Aman, Walter von Reding, Cacilia Spoerndli, Cecile Barron, Biochemical markers: Efficient tools for the assessment of wheat grain tissue proportions in milling fractions, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 55-64, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.006.
(http://www.sciencedirect.com/science/article/B6WHK-4T5TPK6-2/2/e53b8d1a24aa8727ad59eb4f20d5d2e3)
Abstract:
To produce safe and healthy whole wheat food products, various grain or bran dry fractionation processes have been developed recently. In order to control the quality of the products and to adapt these processes, it is important to be able to monitor the grain tissue proportions in the different milling fractions produced. Accordingly, a quantitative method based on biochemical markers has been developed for the assessment of grain tissue proportions in grain fractions. Grain tissues that were quantified were the outer pericarp, an intermediate layer (including the outer pericarp, the testa and the hyaline layer), the aleurone cell walls, the aleurone cell contents, the endosperm and the germ, for two grain cultivars (Tiger and Crousty). Grain tissues were dissected by hand and analysed. Biochemical markers chosen were ferulic acid trimer, alkylresorcinols, para-coumaric acid, phytic acid, starch and wheat germ agglutinin, for outer pericarp, intermediate layer, aleurone cell walls, aleurone cell contents, endosperm and germ respectively. The results of tissue quantification by hand dissection and by calculation were compared and the sensitivity of the method was regarded as good (mean relative errors of 4% and 8% for Crousty and Tiger outer layers respectively). The impact of the analytical variability (maximum 13% relative error on coarse bran) was also regarded as acceptable. Wheat germ agglutinin seems to be a promising marker of wheat germ: even if the quantification method was not able to quantify the germ proportions in milling fractions, it was able to classify these fractions

according to their germ content. The efficiency of this method was tested, by assessing the grain tissue proportions of fractions exhibiting very different compositions such as flour, bran and aleurone-rich fractions obtained from three different grain or bran dry fractionation processes (conventional milling, debranning process, production of aleurone-rich fractions from coarse bran). By calculation of the composition of the different products generated, it was possible to study the distribution of the different tissues among fractions resulting from the different fractionation processes. This quantitative method is thus a useful tool for the monitoring and improvement of processes, and allows the effects of these processes to be understood and their adaption to reach the objectives.
Keywords: Wheat; Grain; Bran; Aleurone; Outer layers; Fractionation; Milling; Processes

Amy Penner, Leaelaf Hailemariam, Martin Okos, Osvaldo Campanella, Lateral growth of a wheat dough disk under various growth conditions, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 65-72, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.007.
(http://www.sciencedirect.com/science/article/B6WHK-4T70883-3/2/48249eae96b1fda58d76c11bbfd37f1d)
Abstract:
Numerous studies have tried to understand and model bubble growth inside dough. Experimental studies are inconvenienced by the methods' inability to capture the dynamic phenomena. In this paper, a versatile experimental method was developed to allow for macroscopic expansion of wheat dough. The study evaluates expansion of a dough disk under varying: moisture content (40, 41, 42, 43, and 44% wb), leavening acid concentration (30, 40, and 50% db), pressure schemas, pressurizing gas (compressed air and CO2), and lubrication (Teflon(R) film coating and Pam(R) aerosol lubricant). Dough expansion increased 22.6% by increasing moisture content from 40 to 44%. Increased baking powder formulation (40% db) was used to enhance initial growth conditions and CO2 production. `Pressure pulse' and `pressure vacuum methods' added pressurization alternatively with full vacuum. The former method included a rest period before vacuum application, and increased expansion by 10.8%. Teflon(R) and Pam(R) reduced friction between the dough and acrylic plate and increased the final expansion by 14.7% compared to no lubricant following the `standard pressurization method'. `Pressure pulse' and `pressure vacuum' experiments decreased expansion by 28.4 and 38.2%, respectively compared to `standard pressurization' while using Teflon(R) and Pam(R).
Keywords: Viscoelasticity; Dough; Pressure release; Expansion

Francesco Cubadda, Federica Aureli, Andrea Raggi, Marina Carcea, Effect of milling, pasta making and cooking on minerals in durum wheat, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 92-97, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.008.
(http://www.sciencedirect.com/science/article/B6WHK-4T70883-4/2/2c951f4f24d4891042478a4e7e66a457)
Abstract:
The effect of technological processing on the contents of eight minerals - i.e., calcium, copper, iron, magnesium, phosphorous, potassium, selenium, and zinc - was investigated in pasta making. Milling of durum wheat as well as pasta making were carried out in a pilot plant by using three different grain samples. Pasta samples purchased on the market were also surveyed to gain information on the mineral content of commercial products. The effect of cooking was also investigated in order to determine the retention of the selected elements in the final `ready-to-eat' product. Analyte concentrations in whole grains, semolina, pasta and cooked pasta were determined by inductively coupled plasma-mass spectrometry.
Conventional roller milling significantly reduced the content of each mineral in durum wheat grains. However concentration losses as a consequence of milling widely differed among elements, from 16% for Se to 66% for Mg and Zn on a dry weight basis. Retention of elements after milling

followed the order Se > Ca > Cu > P [approximate] K > Fe > Mg [approximate] Zn. Pasta making had little effect on element concentrations in semolina. Cooking caused an increase in the calcium content of pasta whereas the concentrations of the other elements were either unchanged or slightly reduced (0-18% on a dry weight basis) except potassium, which showed a decrease of 74%.
Commercial pasta samples showed concentrations of minerals similar to those of the experimental samples, except selenium which was higher due to the use of imported wheat with higher levels of selenium in industrial semolina production. Overall, pasta appears to be a valuable source of several minerals, especially selenium, copper, magnesium, and zinc.
Keywords: Durum wheat; Pasta; Minerals; Trace elements; Milling; Processing; Cooking

Seok-Ho Park, Jeff D. Wilson, Bradford W. Seabourn, Starch granule size distribution of hard red winter and hard red spring wheat: Its effects on mixing and breadmaking quality, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 98-105, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.011.
(http://www.sciencedirect.com/science/article/B6WHK-4T8HHDH-3/2/ded86897decdb1fcbb4996eb3d97c91f)
Abstract:
Starch was isolated from 98 hard red winter (HRW) wheat and 99 hard red spring (HRS) wheats. Granule size/volume distributions of the isolated starches were analyzed using a laser diffraction particle size analyzer. There were significant differences in the size distribution between HRW and HRS wheats. The B-granules (<10 [mu]m in diameter) occupied volumes in the range 28.5-49.1% (mean, 39.9%) for HRW wheat, while HRS wheat B-granules occupied volumes in the range 37.1-56.2% (mean, 47.3%). The mean granule sizes of the distribution peaks less than 10 [mu]m in diameter also showed a significant difference (HRW, 4.32 vs. HRS, 4.49 [mu]m), but the mean sizes of the distribution peaks larger than 10 [mu]m were not significantly different (21.54 vs. 21.47 [mu]m). Numerous wheat and flour quality traits also showed significant correlation to starch granule size distributions. Most notably, protein content was inversely correlated with parameters of B-granules. Crumb grain score appeared to be affected by starch granule size distribution, showing significant inverse correlations with B-granules. Furthermore, the linear correlations were improved when the ratio of B-granules to protein content was used, and the polynomial relation was applied. There also appeared to be an optimum range of B-granules for different protein content flour to produce bread with better crumb grain.
Keywords: Starch granule size distribution; HRW; HRS; Mixing property; Breadmaking quality; Crumb grain score; Optimum range of B-granules

M. Mohamad Saad, C. Gaiani, J. Scher, B. Cuq, J.J. Ehrhardt, S. Desobry, Impact of re-grinding on hydration properties and surface composition of wheat flour, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 134-140, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.08.001.
(http://www.sciencedirect.com/science/article/B6WHK-4TF2J2C-1/2/cbccc92b3d823f085b25f1a7a22c4139)
Abstract:
The combination of two analytical methodologies (water vapor sorption isotherm by using the DVS and chemical surface composition by using the XPS) has been used to enhance the understanding of the impact of re-grinding on the wheat flour hydration mechanism. A controlled atmosphere microbalance was used to construct water sorption isotherms at 25 [degree sign]C of different samples of wheat flours obtained by successive re-grinding of native wheat flour.
Experimental water adsorption isotherms were modeled using different complementary models, based on two-parameter (BET), three-parameter (GAB), and four-parameter (TSS) models. A slight increase in water sorption capacity of wheat flour due to the re-grinding process was observed. The most affected parameters of the sorption isotherm models were C (the energy

constant) and Xm (the monolayer water content capacity). The X-ray photoelectron spectroscopy (XPS) analysis showed changes in chemical bonds on wheat particle surfaces due to re-grinding process and particularly a significant increase in hydrophilic and decrease in hydrophobic bonds.
Keywords: DVS; Sorption isotherm; Wheat flour; XPS

Elena Leon, Santiago Marin, Maria J. Gimenez, Fernando Piston, Marta Rodriguez-Quijano, Peter R. Shewry, Francisco Barro, Mixing properties and dough functionality of transgenic lines of a commercial wheat cultivar expressing the 1Ax1, 1Dx5 and 1Dy10 HMW glutenin subunit genes, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 148-156, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.08.002.
(http://www.sciencedirect.com/science/article/B6WHK-4TGS7DW-1/2/6dae23342e621ec1700f0d3651efec51)
Abstract:
In this work we report the effects of the HMW-GS 1Ax1, 1Dx5 and 1Dy10 on the breadmaking quality of the bread wheat cultivar Anza that contains the HMW-GS pairs 1Dx2 + 1Dy12 and 1Bx7* + 1By8, and is null for the Glu-A1 locus. This allows the characterization of individual subunits 1Dx5 and 1Dy10 in the absence of subunit 1Dx5, and the interactions between these subunits and subunits 1Dx2 and 1Dy12 to be determined. Three transgenic lines termed T580, T581 and T590, containing, respectively, the HMW-GS 1Ax1, 1Dx5 and 1Dy10 were characterized over 3 years using a range of widely-used grain and dough testing methods. The transgenic subunits 1Ax1, 1Dx5 and 1Dy10 accounted for 25.2%, 20.3% and 17.9%, respectively, of the total HMW-GS in the three transgenic lines. Although lines T581 and T590 expressed similar levels of subunits 1Dx5 and 1Dy10 they had different effects on other aspects of protein composition, including changes in the ratios of glutenin/gliadin, of HMW/LMW-GS, the 1Dx2/1Dy12, the x-type/y-type HMW-GS and the proportions of high molecular mass glutenin polymers. In contrast, lines transformed to express subunits 1Ax1 and 1Dx5 showed similar changes in protein composition, with higher protein contents and decreased ratios of glutenin/gliadin and 1Dx2/1Dy12. In addition, both transgenic lines showed similar increases in the ratio of x-type/y-type subunits compared to the control line. The transgenic lines were analysed using Farinograph, Mixograph and Alveograph. This confirmed that the expression of all three subunits resulted in increased dough strength (and hence breadmaking quality) of the cultivar Anza. A beneficial effect of subunit 1Dx5 has not been reported previously, transgenic wheat lines expressing this subunit giving overstrong dough unsuitable for breadmaking. However, the expression of subunit 1Dy10 had a greater effect on breadmaking quality than subunits 1Ax1 and 1Dx5. The Farinograph parameters such as dough stability and peak time were increased by 9.2-fold and 2.4-fold, respectively, in line T590 (expressing 1Dy10) with respect to the control line. Similarly, the Mixograph mixing time was increased by four-fold and the resistance breakdown decreased by two-fold in line T590 compared with the control line. The Alveograph W value was also increased by 2.7-fold in line T590 compared to the control line. These transgenic lines are of value for studying the contribution of specific HMW-GS to wheat flour functional properties.
Keywords: 1Ax1; 1Dx5; 1Dy10; Anza; GM wheat

Sarah H. Mackintosh, Susie J. Meade, Jackie P. Healy, Kevin H. Sutton, Nigel G. Larsen, Adam M. Squires, Juliet A. Gerrard, Wheat glutenin proteins assemble into a nanostructure with unusual structural features, Journal of Cereal Science, Volume 49, Issue 1, January 2009, Pages 157-162, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.08.003.
(http://www.sciencedirect.com/science/article/B6WHK-4THSX3C-2/2/b4a2ed7e6b75e4601a9f13416093679c)
Abstract:
The proteins of wheat have a known propensity to aggregate into a variety of forms. We report here a novel nanostructure from wheat proteins, derived from a crude extract of high molecular

weight glutenins. The structure was characterised by a significant thioflavin T (ThT) fluorescence and a fibrillar morphology by transmission electron microscopy (TEM). The ThT fluorescence and TEM data are suggestive of an amyloid structure, but the X-ray fibre diffraction data show a reflection pattern (4.02, 4.2-4.3, 4.6, 12.9, 19.3 and 38.7 A) inconsistent with both the classic amyloid form and the previously described [beta]-helix structure. The 4.6 A reflection is consistent with that predicted for the amyloid inter-[beta]-strand, and the absence of the inter-[beta]-sheet distance at [approximate]10-11 A is not unprecedented in amyloid-like structures. However, our observed X-ray reflection pattern has not been previously reported and suggests a novel wheat glutenin nanostructure.
Keywords: Glutenins; X-ray fibre diffraction; Wheat protein; Protein nanostructure

Shaomin Sun, Yihu Song, Qiang Zheng, Rheological behavior of wheat gliadins in 50% (v/v) aqueous propanol, Journal of Food Engineering, Volume 90, Issue 2, January 2009, Pages 207-211, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.06.024.
(http://www.sciencedirect.com/science/article/B6T8J-4SVKSJ2-7/2/e2c8bf145c31e226615047fbad662ef0)
Abstract:
Rheological properties of wheat gliadins in 50% (v/v) aqueous propanol were carried out as functions of gliadin concentration C and temperature. The solutions at 20 g L-1 to 200 g L-1 behave as Newtonian fluids with flow activation energy Ea of 23.5-27.3 kJ mol-1. Intrinsic viscosity [[eta]] and Huggins constant kH are determined according to Huggins plot at C [less-than-or-equals, slant] 120 g L-1. The results reveal that gliadins are not spherical shaped in 50% (v/v) aqueous propanol and the molecular size tends to increase with temperature due to improved solvation.
Keywords: Gliadin; Rheological properties; Intrinsic viscosity

P. Fustier, F. Castaigne, S.L. Turgeon, C.G. Biliaderis, Impact of commercial soft wheat flour streams on dough rheology and quality attributes of cookies, Journal of Food Engineering, Volume 90, Issue 2, January 2009, Pages 228-237, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.06.026.
(http://www.sciencedirect.com/science/article/B6T8J-4SW1439-3/2/cfebb11d9448fb93f648dbe1743748d1)
Abstract:
Commercial patent (P1), middle-cut (P2) and clear (CLR) mill stream fractions, exhibiting a wide range of compositional and physico-chemical characteristics, were incorporated alone or in combination into three cookie recipes (wire-cut, rotary and laminated processes) at various flour:sugar:fat:water ratios. Cookies prepared with the clear fraction had higher dough consistency and were notably denser and harder with smaller surface area than those made with the patent and middle-cut fractions. Varying the ratios of the P1, P2 and CLR flour fractions produced cookies that exhibited superior or inferior dough consistencies and end-product quality attributes than commercial soft wheat flour. The influence of the flour fractions and their interactions (main, square and interaction effect) on the dough rheology and cookie characteristics was studied by the partial least square (PLS) regression analysis. Dough consistency, cookie's density and hardness were all positively correlated to the CLR and CLR2 variables, and to a lower extent to P1 * P2 and P2 * CLR for the three recipes. The P alveograph, granulometry and protein content parameters allowed the prediction of the dough consistency (R2 [greater-or-equal, slanted] 0.75). Moreover, the viscoelastic properties of the flour/water doughs could complement the physico-chemical parameters in predicting the consistency of the laminated biscuit recipe (R2 [greater-or-equal, slanted] 0.82).
Keywords: Flour mill streams; Physico-chemical properties; Dough rheology; Stress relaxation; Cookies

Toshihiro Kiyosaki, Tomiko Asakura, Ichiro Matsumoto, Tomoko Tamura, Kaede Terauchi, Junko Funaki, Masaharu Kuroda, Takumi Misaka, Keiko Abe, Wheat cysteine proteases triticain [alpha], [beta] and [gamma] exhibit mutually distinct responses to gibberellin in germinating seeds, Journal of Plant Physiology, Volume 166, Issue 1, 1 January 2009, Pages 101-106, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.02.006.
(http://www.sciencedirect.com/science/article/B7GJ7-4SD1KH6-1/2/e2ab46c5bd2cb12cf1ca647e37ab4508)
Abstract: Summary
We cloned three novel papain-type cysteine proteases (CPs), triticain [alpha], [beta] and [gamma], from 1-d-germinating wheat seeds. Triticain [alpha], [beta] and [gamma] were constituted with 461, 472 and 365 amino acid residues, respectively, and had Cys-His-Asn catalytic triads as well as signal and propeptide sequences. Triticain [gamma] contained a putative vacuole-sorting sequence. Phylogenetic analysis showed that these CPs were divided into mutually different clusters. Triticain [alpha] and [gamma] mRNAs were expressed in seeds at an early stage of maturation and at the stage of germination 2 d after imbibition, while triticain [beta] mRNA appeared shortly after imbibition. The expression of mRNAs for triticain [alpha] and [gamma] was suppressed by uniconazol, a gibberellin synthesis inhibitor. All the three CP mRNAs were strongly expressed in both embryo and aleurone layers. These results suggest that triticain [alpha], [beta] and [gamma] play differential roles in seed maturation as well as in digestion of storage proteins during germination.
Keywords: Cysteine protease; Gibberellin; Uniconazol; Wheat seed

L.E. Collins, S.T. Conyers, Moisture content gradient and ventilation in stored wheat affect movement and distribution of Oryzaephilus surinamensis and have implications for pest monitoring, Journal of Stored Products Research, Volume 45, Issue 1, 2009, Pages 32-39, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.07.003.
(http://www.sciencedirect.com/science/article/B6T8Y-4TN8BVR-2/2/6dd8f4fe9f4e63f47c489ea2477efa38)
Abstract:
This study was carried out primarily to ascertain whether the movement of Oryzaephilus surinamensis and Sitophilus granarius from low to high humidity zones occurs in bins of wheat and whether aeration of the grain (10 m3/h/t) affects this movement. The second aim was to ascertain the best placement of insect detection traps under the different conditions. Insects were introduced into the lower half of the grain in the bins and their movement was monitored using traps placed at various depths in the grain. Sitophilus granarius did not move through the grain into the top layer regardless of the moisture content, temperature or aeration status of the grain. More O. surinamensis were caught in unventilated bins than in ventilated bins. More insects were caught in the ventilated bins containing layers of both dry and wet grain than in the bins containing only dry grain. The spatio-temporal distribution of O. surinamensis varied significantly. The depth at which insects were trapped varied between treatments: in ventilated dry grain, most insects were trapped at the surface; in ventilated wet and dry grain, most insects were trapped at 10 cm and 0.75 m; in unventilated wet and dry grain, the vast majority of the insects were trapped at 0.75 m. Very few insects were trapped at 1.75 m regardless of the treatment. The proportions of the initial population of O. surinamensis which were recaptured in the top layer of grain varied between treatments. Most were recaptured in the unventilated bins containing wet and dry grain followed by ventilated bins containing wet and dry grain. The smallest proportion of the population was recaptured in the ventilated bins containing only dry grain. Immediate practical implications for pest monitoring based on physical control measures in use are discussed.
Keywords: Monitoring; Spatial distribution; Oryzaephilus surinamensis; Sitophilus granarius; Stored wheat; Aeration

Petar Kljajic, Ilija Peric, Residual effects of deltamethrin and malathion on different populations of Sitophilus granarius (L.) on treated wheat grains, Journal of Stored Products Research, Volume 45, Issue 1, 2009, Pages 45-48, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.07.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4TN8BVR-4/2/fdd70025ae0ff37e209fe18f56a3b272)
Abstract:
The impact of 2-, 7-, 14-, 30-, 90-, 150- and 720-day-old deposits of deltamethrin, applied with or without the synergist piperonyl butoxide (PBO), and of malathion, on adults of different populations of granary weevil Sitophilus granarius on wheat was investigated in the laboratory. The insecticides used were commercial formulations and their application rates were as recommended: deltamethrin (dustable powder) 0.5 mg a.i./kg, deltamethrin + PBO (1:10) (emulsifiable concentrate) 0.25 mg a.i./kg, and malathion (dustable powder) 10 mg a.i./kg. The weevil populations examined were: (a) a laboratory population, (b) field populations with different susceptibility to some insecticides as established previously, and (c) populations selected in the laboratory with deltamethrin or pirimiphos-methyl.
The 2-day-old deposit of malathion caused complete mortality of all weevil populations after 7 and 14 days. The corresponding deposit of deltamethrin was 100% effective only against the laboratory weevils after 7-14 days, while deltamethrin at the lower level formulated with PBO caused about 90% mortality of laboratory weevils and much lower levels of kill among field and selected weevils.
Deposits of deltamethrin and malathion up to 90 days old killed all field weevils after 14 days of exposure. The 150-day-old deposit of deltamethrin was also 100% effective against field weevils exposed for 14 days, while the effectiveness against selected populations was around 50%. Malathion deposits of the same age gave 40-50% mortality of field weevils, and 4-68% mortality of selected weevils. The 720-day-old deposits of malathion were ineffective against all weevil populations, while the mortality of laboratory weevils after 14 days contact with deltamethrin deposits of the same age was 76%, and that of field and selected weevils about 50%.
Keywords: Sitophilus granarius; Populations; Wheat; Deltamethrin; Malathion; Residual effects

Urszula Gawlik-Dziki, Dariusz Dziki, Barbara Baraniak, Rufa Lin, The effect of simulated digestion in vitro on bioactivity of wheat bread with Tartary buckwheat flavones addition, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 137-143, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.06.009.
(http://www.sciencedirect.com/science/article/B6WMV-4STYV5N-3/2/deff708115ed5f5dcc1861814078d0cb)
Abstract:
The antioxidant activity of bread enriched in an extract from the green parts of buckwheat plant (TBF - Tartary buckwheat flavones) was determined. The bread's quality was slightly decreased when 2.5% TBF was added; however, with an addition of 5% TBF caused a high decrease in the bread's quality. Despite the digestion stage, the content of total phenolic compounds were the lowest in the case of the samples from the control bread (without buckwheat addition). Despite the kinds of bread, the lowest content of total phenolics and flavonoids and the highest phenolic acids content were detected in the fluids after simulated saliva digestion. Despite the digestion stage, the highest antiradical activity, reducing power and ability to inhibition of lipid peroxidation was observed in the samples with a 5% TBF addition. The free radical scavenging activity grew along with the increase of buckwheat preparate addition and in the progress of the in vitro digestion. The maximum of reducing and chelating power in the control sample were observed after simulated saliva digestion, whereas in the case of bread with the TBF addition the highest reducing power was observed after simulated gastric digestion, and maximum of chelating power - after simulated intestinal digestion.

Keywords: buckwheat; Bread; Simulated digestion; Antioxidant activity

Paola Roccia, Pablo D. Ribotta, Gabriela T. Perez, Alberto Edel Leon, Influence of soy protein on rheological properties and water retention capacity of wheat gluten, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 358-362, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.03.002.
(http://www.sciencedirect.com/science/article/B6WMV-4S1S6RH-1/2/145a07a3722aa510e174540accb0d33f)
Abstract:
A better understanding of the physicochemical and rheological changes in soy/wheat composite dough may lead to overcome the problems caused by the incorporation of high levels of soy products on bread formulation. The effects of commercial soy protein isolate (SPI) on uniaxial extension and creep behavior, microstructure and free water of hydrated gluten were studied. Different solid:moisture ratios were used. Results showed that the substitution of wheat protein by soy protein negatively affected the gluten-SPI mixture rheological properties due to network weakening. It was demonstrated that gluten was weakened as a consequence of the interference effect of soy proteins on their structure, and the smaller availability of water to the build-up of the gluten network. A greater amount of moisture could partially improve the rheological performance of the gluten-SPI mixture.
Keywords: Soybean; Gluten; Protein

P. Fustier, F. Castaigne, S.L. Turgeon, C.G. Biliaderis, Impact of endogenous constituents from different flour milling streams on dough rheology and semi-sweet biscuit making potential by partial substitution of a commercial soft wheat flour, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 363-371, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.03.014.
(http://www.sciencedirect.com/science/article/B6WMV-4S85DVC-2/2/fc0c1308cbbf71491e026035be98b028)
Abstract:
A flour fractionation-reconstitution procedure was used to study the substitution of a commercial soft wheat flour with gluten, water extractables, prime starch and starch tailing fractions isolated from patent and clear flour streams on dough rheology and semi-sweet biscuit characteristics. Substitution of soft wheat flour with increasing levels of the native patent and clear flour streams raised the dough consistency, hardness and elastic properties as well as the biscuit textural attributes (density, hardness). The dough stickiness of the base flour was also reduced and the biscuits were free of cracks. Gluten isolated from the patent flour had a greater impact on dough consistency, hardness and elastic properties than gluten obtained from the clear flour, likely due to the superior protein quality of the former. Additionally, with increasing gluten levels in the fortified flour there were moderate increases in biscuit density, hardness, and lower crunchiness. The addition of starch tailings produced the largest impact on consistency and hardness of the dough. This fraction also exerted a pronounced effect on biscuit density and hardness, while it lowered crunchiness, presumably due to its higher pentosan content. Overall, the dough rheological properties and biscuit characteristics were controlled by the amount-nature of the fractions added; i.e., besides gluten (amount and quality), other constituents such as pentosans and the overall composition of the flour blends can largely affect the quality of the semi-sweet biscuits.
Keywords: Soft wheat flour; Milling streams; Flour fortification; Dough rheology; Semi-sweet biscuit; Mechanical properties

Imran Pasha, Faqir M. Anjum, M.S. Butt, Genotypic variation of spring wheats for solvent retention capacities in relation to end-use quality, LWT - Food Science and Technology, Volume 42, Issue 1, 2009, Pages 418-423, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.03.005.

(http://www.sciencedirect.com/science/article/B6WMV-4S266BV-1/2/cd780d1e0c895605e31ed0bfc3741122)
Abstract:
The solvent retention capacity (SRC) test is useful to measure flour components contributing to end-use functionality especially where the sample number is large and grain quantities are limited. The water, sodium carbonate, lactic acid, and sucrose SRC values ranged 78.0-98.0, 95.0-127.5, 101.5-139.0, and 125.0-163.0 g/100 g, respectively in 50 spring wheat varieties. Water SRC positively correlated with cookie spread ratio (r = 0.29) while Lactic acid SRC and Sucrose SRC positively correlated with cookie thickness (r = 0.31) and (r = 0.23). Negative correlation coefficients were observed in water SRC and cookie thickness (r = -0.27). Lactic acid SRC also negatively correlated with cookie spread ratio (r = -0.34). Sodium carbonate SRC was found to be negatively correlated with cookie diameter (r = -0.19) and cookie spread ratio (r = -0.16). The SRC test is a promising method for the evaluation of soft wheat varieties on the basis of their biochemical characteristics.
Keywords: Wheat, Solvent retention capacity; Cookie quality; Cluster analysis

Miroslav Tratnik, Ramona Franic, Kristina Svrznjak, Ferdo Basic, Land rents as a criterion for regionalization--The case of wheat growing in Croatia, Land Use Policy, Volume 26, Issue 1, Formalisation of Land Rights in the South, January 2009, Pages 104-111, ISSN 0264-8377, DOI: 10.1016/j.landusepol.2008.01.012.
(http://www.sciencedirect.com/science/article/B6VB0-4SJR2JX-1/2/138b274d30e669644af6cd9830f18ef5)
Abstract:
The paper explores and tests one of the contemporary principles of economic regionalization of agriculture by using differential land rents in wheat production as a model. The analysis is based upon the assumption that differential rents could serve as a valid principle for regional planning, particularly differential rent I. On the basis of the food self-sufficiency principle declared by the Rome Declaration on World Food Security, the model assesses the economic justification of the Croatian wheat incentives system in relation to wheat production potentials in the counties, starting from those with high potential (the most favourable agroecological conditions for wheat production) towards the counties with low potential, to the level of self-sufficiency as a long-term Croatian strategic vision.
The model shows that Croatia can meet its requirements for industrial wheat processing at the level of cumulative farmland areas of three counties, while total consumption can be covered by production of eight counties. This model compromises the fundamental principle of regional economics of wheat production, because up to 2003 incentives were given for 78,000 ha more than what was economically justified for wheat production intended for industrial processing, i.e. for 19,000 ha for total wheat demand. But, wheat production is practised all over Croatia--in all agricultural regions because of tradition on the one side and crop rotation requirements on the other side. This conclusion points to an uneconomic allocation of budget funds for wheat incentives to the counties, whose output results do not justify the incentives. The current subsidy model stimulates production by applying the criterion of a minimum three-hectare area required for wheat incentives. Consequently, a part of wheat production is excluded from the incentive system in the counties with high potential farmland, i.e. in the counties collecting a differential land rent for wheat production, which is uneconomical in terms of macroeconomics.
Even though the model featured in this paper exemplifies wheat production in this particular situation, it can be easily used to evaluate the efficiency of incentives for all the crops included in the incentive system, while applying the standards of economics and agricultural regionalization. It can also be used to determine subsequent, more economical distribution of production incentives by channelling uneconomically allocated budget funds into implementation of other agricultural policies and measures.

Keywords: Land rents; Wheat production; Agricultural regionalization; Croatia

Hongbo Yan, Huawu Jiang, Xiaoxue Pan, Meiru Li, Yaping Chen, Guojiang Wu, The gene encoding starch synthase IIc exists in maize and wheat, Plant Science, Volume 176, Issue 1, January 2009, Pages 51-57, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.09.003.
(http://www.sciencedirect.com/science/article/B6TBH-4TFW95N-1/2/d17d630b9931570ad5d7491b39bba014)
Abstract:
Two starch synthase II (SSII) cDNAs, ZmSSIIc and TaSSIIc, each containing an open reading frame of 2328 and 2229 bp in length, were cloned from maize and wheat, respectively. Both ZmSSIIc and TaSSIIc contain the putative ADP-Glc binding motif of KXGGL, but lack the conserved motif of PLAGXNVMNX that was detected in other SSIIa and SSIIb proteins. The deduced amino acid sequences of the ZmSSIIc and TaSSIIc shared 49.8-88.9% identity with those of other SSIIs. Phylogenetic analysis indicated that genes encoding SSIIc were classified into a new SSII gene subfamily in higher plants, which is different from dicot SSII subfamily and monocot SSIIa and SSIIb subfamily. The C-terminal catalytic domain of both ZmSSIIc and TaSSIIc expressed in Escherichia coli, and the activity of their starch synthase was confirmed. RT-PCR revealed that ZmSSIIc and TaSSIIc were expressed in leaves, roots and endosperm, and their transcripts reached maximum level at the middle developmental age of endosperm after pollination, while declined gradually over time. The role of SSIIc in transitory and storage starch synthesis in Gramineae will be discussed.
Keywords: Starch synthase; Gene duplication; Gene expression

Shulan Zhang, Lars Lovdahl, Harald Grip, Yanan Tong, Xueyun Yang, Quanjiu Wang, Effects of mulching and catch cropping on soil temperature, soil moisture and wheat yield on the Loess Plateau of China, Soil and Tillage Research, Volume 102, Issue 1, January 2009, Pages 78-86, ISSN 0167-1987, DOI: 10.1016/j.still.2008.07.019.
(http://www.sciencedirect.com/science/article/B6TC6-4TDBM65-2/2/8c83d88bc3d7c7de4f11c461792e91eb)
Abstract:
Soil management can notably influence crop production under dryland farming in semiarid areas. Field experiments were conducted, from October 2001 to September 2004, with an attempt to evaluate the effects of field management regimes on thermal status at an upland site; and soil water and wheat production in a winter wheat (Triticum aestivum L.) system at upland, terrace land and bottom land sites on the Loess Plateau, China. The field management regimes tested were: (i) the conventional practice (winter wheat followed by a ploughed summer bare fallow); (ii) conventional management, but a catch crop growing for certain time during fallow period used as green manure (after the wheat harvest, a catch crop were directly sown, instead of ploughing, and then incorporated into the soil roughly one month before wheat sowing); and (iii) wheat straw mulch (0.8 kg m-2), covering the soil throughout the year during the experimental period (no summer ploughing, straw was removed during wheat sowing). Soil temperature under catch cropping was lower during certain period of its growing by about 2 [degree sign]C, slightly higher for short spells after incorporation and before wheat harvest, no observed effects during the rest time of a year relative to conventional practice at the upland site. Moreover, soil water storage levels under catch cropping were comparable with those of the conventional practice for all three years, but wheat yield substantially declined in the last year. Mulching showed different responses for the three land sites. At the upland site, daily mean soil temperatures under mulching at 10 cm depth were decreased in the warmer period by 0-4 [degree sign]C, and increased in the colder period by 0-2 [degree sign]C when compared to those of non-mulched soil. At upland and bottom land sites, mulching conserved an average of 28 and 20 mm more water in the upper 100 cm soil layer at the time of wheat sowing, respectively, than conventional practice. However, at the

terrace, mulching had little effect on soil water storage, nor on wheat grain yield, relative to conventional practice. Therefore, considering the limited availability of mulch material in this region and the economic benefits, it is recommended that mulching may be beneficial to upland or bottom land, but not to terraced land. In addition, the application of catch cropping in this study did not show positive effects, the more comprehensive evaluation of this approach would be further needed.
Keywords: Soil water storage; Upland; Terrace land; Bottom land

S.S. Kukal, Rehana-Rasool, D.K. Benbi, Soil organic carbon sequestration in relation to organic and inorganic fertilization in rice-wheat and maize-wheat systems, Soil and Tillage Research, Volume 102, Issue 1, January 2009, Pages 87-92, ISSN 0167-1987, DOI: 10.1016/j.still.2008.07.017.
(http://www.sciencedirect.com/science/article/B6TC6-4TCPN08-1/2/70af19034e27fea01361321482686148)
Abstract:
Soil organic carbon (SOC) pool is the largest among the terrestrial pools. The restoration of SOC pool in arable lands represents a potential sink for atmospheric CO2. The management and enhancement of SOC is important for sustainable agriculture. The cropping system and soil type influence crop biomass under different fertilization. Data from two long-term field experiments on rice-wheat and maize-wheat systems in progress since 1971, were analyzed to assess the impact of fertilization practices on SOC stocks in sandy loam soils (typic ustipsament). The treatments in rice-wheat included (i) farmyard manure (FYM alone @ 20 t ha-1, applied at the time of pre-puddling tillage), (ii) N120P30K30 (120 kg N, 30 kg P2O5 and 30 kg K2O ha-1), (iii) N120P30 (same as in (ii) except that K application was omitted), (iv) N120 (same as in (ii) except that P and K application was omitted) and (v) control (without any FYM or inorganic fertilizer). Similar treatments were studied in maize-wheat except that the amounts of N, P2O5 and K2O were 100, 50 and 50 kg ha-1, respectively. In rice-wheat system, the SOC concentration at different depths in 0-60 cm soil profile was higher (1.8-6.2 g kg-1) in FYM-treated plots followed by 1.7-5.3 g kg-1 in NPK plots, compared to 0.9-3.0 g kg-1 in unfertilized plots. Balanced fertilization improved the SOC concentration. Similar trend was found in maize-wheat system. In the 60-cm soil profile the total SOC stocks in both the cropping systems were highest in FYM (31.3 and 23.3 Mg ha-1 in rice-wheat and maize-wheat system) followed by balanced fertilization (29.6 and 21.3 Mg ha-1) and lowest in unfertilized control (21.4 and 18.7 Mg ha-1). The SOC concentration in rice-wheat soils was 54 and 30% higher in FYM and NPK plots than in maize-wheat system. Improved SOC content enhances soil quality, reduces soil erosion and degradation, and increases soil. The soils under rice-wheat sequestered 55% higher SOC in FYM plots and 70% higher in NPK plots than in maize-wheat. These results document the capacity of optimally fertilized rice-wheat system to sequester higher C as compared to maize-wheat system.
Keywords: C sequestration; Farmyard manure; Inorganic fertilizers; Maize-wheat; Rice-wheat

A.M. Amerah, V. Ravindran, Influence of method of whole-wheat feeding on the performance, digestive tract development and carcass traits of broiler chickens, Animal Feed Science and Technology, Volume 147, Issue 4, 15 December 2008, Pages 326-339, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2008.01.014.
(http://www.sciencedirect.com/science/article/B6T42-4S2VRJ2-1/2/bd04b56c6cd9b2f03f6cbd2091a8b91a)
Abstract:
The present study was conducted to investigate the effects of feeding whole wheat either through a mixed feeding (MF) or free choice feeding (FCF) system on the performance, digestive tract development and carcass traits of broiler chickens. The following three treatments, based on wheat and soybean meal, were employed: GW, ground-wheat diet with 600-690 g wheat kg-1; MF,

GW diet with 490-500 g wheat kg-1 and 100-200 g whole wheat kg-1; and FCF, whole wheat and a protein concentrate offered in separate feeders. Each diet was fed to six pens of 36 birds each from day 7 to 35 post-hatch. Over the 7-35-day trial period, no differences (P>0.05) were observed between the weight gain, feed intake and feed per gain of broilers receiving the GW and MF treatments. Birds receiving the FCF treatment had the lowest (P<0.05) weight gain and feed intake, and the highest (P<0.05) feed per gain. During week 1 of the trial, the protein concentrate was consumed more than the whole wheat (0.69 vs. 0.31) in the FCF treatment, resulting in the amount of concentrate offered being restricted during subsequent weeks. Over the trial period, the average consumption of protein concentrate remained high (0.56 of the total intake). Both whole-wheat treatments increased (P<0.05) the relative gizzard weights. Factors that affect diet selection such as learning and previous experience, visual differences between the foods, texture and flavour of the food, and palatability may explain the lower whole-wheat intake in the FCF treatment. In this study, whole wheat was introduced only on day 7 and it is possible that the birds may have to be trained to experience choice feeding from the first week of life. However, the present results suggest that FCF may not be an appropriate feeding system for fast growing modern broilers.
Keywords: Whole wheat; Free choice; Carcass characteristics; Gizzard; Broiler chickens

Song-wu ZHANG, Chang-fa WANG, Research Status Quo and Future of Low Temperature Wheat Genotypes, Agricultural Sciences in China, Volume 7, Issue 12, December 2008, Pages 1413-1422, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60397-1.
(http://www.sciencedirect.com/science/article/B82XG-4V74K46-2/2/62921b082d4e90ec4b26724a537e5965)
Abstract:
Low temperature wheat genotypes are a group of wheat with a slightly low canopy (plant) temperature, and the research on their biological characters and utilization in wheat breeding has been done at home and abroad for more than 20 years, and has made great progress. The research contents and advances include the following respects: Wheat genotypes with slightly low canopy temperature have been verified to exist in nature; these wheat genotypes, which present cold temperature, are superior to conventional wheat materials in some important biological characters and particularly prominently in metabolic function and cellular structure; when they suffer stresses such as drought, high temperature and overcast and rainy weather, they still retain their superiority in some of their important biological characters and therefore have a wide range of ecological adaptability; slightly low canopy temperatures of these genotypes are closely correlated with low temperatures of their second heat sources and their vigorous plants; since their low canopy temperatures can be inherited, they can exert favorable influence on the temperatures of their offspring while crossing with other wheat materials, and in particular, the discovery of cold-source wheat as a contributor to low temperature, has further formed good conditions for breeding high and stable quality low temperature wheat varieties with a high and stable yield. Thus, low temperature wheat genotypes are of great research importance and have great prospects.
Keywords: wheat; low temperature genotype; research advance; future

Wenqi Ma, Jianhui Li, Lin Ma, Fanghao Wang, Istvan Sisak, Gregory Cushman, Fusuo Zhang, Nitrogen flow and use efficiency in production and utilization of wheat, rice, and maize in China, Agricultural Systems, Volume 99, Issue 1, December 2008, Pages 53-63, ISSN 0308-521X, DOI: 10.1016/j.agsy.2008.10.001.
(http://www.sciencedirect.com/science/article/B6T3W-4TXDXP7-1/2/f81e9617474627e136313f05e61e5f73)
Abstract:
China has long been the world's most populous nation and faced the double challenge of ensuring its food security without causing catastrophic damage to the environment. Since the early 1960s,

Chinese agricultural development has been premised on large domestic increases in nitrogen (N) fertilizer production and consumption. However, current utilization of fertilizer is far beyond optimum, with the fate of excess N largely unknown. Here, we report on N flows, losses, and use efficiency in the production and utilization of three major grain crops using data from 2004. We also use a scenario analysis to explore strategies for improving N use efficiency. Our calculations show that N use efficiency in food production and utilization is much lower than previously published estimates. Mean N surpluses of crop fields were 144 kg/ha for wheat, 184 kg/ha for rice, and 120 kg/ha for maize. We estimate that between 50% and 85% of N harvested as grain is lost for utilization by humans and animals. Fertilizer N use efficiency (FNUE) values in crop-animal system for wheat, rice, and maize were 13.4%, 11.3%, and 3.7%, respectively. This means 7.5, 8.9 and 27.1 kg of N fertilizer were required to produce 1 kg of N in food via fertilization for these three grains. Major room exists for improving the efficiency of N flow in Chinese crop systems. Our scenario analyses shows that increases in N use efficiency of fertilizer applied to cropland (RE), decreasing ratios of grain N headed to plant food processing (GUP), and increasing efficiency in animal production (ANU) would result in a marked decrease in N loss from these three crops amounting to one million ton of N, which accounted for 6% of total chemical fertilizer input. Improved N management in Chinese food production has major ramifications for global estimations of N use efficiency and environmental pollution by reactive N, particularly nitrous oxide emissions, a major anthropogenic contributor to global climate change.
Keywords: China; Fertilizer; Food supply; Nitrogen; Nutrient management

Debashis Chakraborty, Shantha Nagarajan, Pramila Aggarwal, V.K. Gupta, R.K. Tomar, R.N. Garg, R.N. Sahoo, A. Sarkar, U.K. Chopra, K.S. Sundara Sarma, N. Kalra, Effect of mulching on soil and plant water status, and the growth and yield of wheat (Triticum aestivum L.) in a semi-arid environment, Agricultural Water Management, Volume 95, Issue 12, December 2008, Pages 1323-1334, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.06.001.
(http://www.sciencedirect.com/science/article/B6T3X-4SY5WYG-2/2/f1394863263a20722182845dbcf72001)
Abstract:
Mulching is one of the important agronomic practices in conserving the soil moisture and modifying the soil physical environment. Wheat, the second most important cereal crop in India, is sensitive to soil moisture stress. Field experiments were conducted during winter seasons of 2004-2005 and 2005-2006 in a sandy loam soil to evaluate the soil and plant water status in wheat under synthetic (transparent and black polyethylene) and organic (rice husk) mulches with limited irrigation and compared with adequate irrigation with no mulch (conventional practices by the farmers). Though all the mulch treatments improved the soil moisture status, rice husk was found to be superior in maintaining optimum soil moisture condition for crop use. The residual soil moisture was also minimum, indicating effective utilization of moisture by the crop under RH. The plant water status, as evaluated by relative water content and leaf water potential were favourable under RH. Specific leaf weight, root length density and dry biomass were also greater in this treatment. Optimum soil and canopy thermal environment of wheat with limited fluctuations were observed under RH, even during dry periods. This produced comparable yield with less water use, enhancing the water use efficiency. Therefore, it may be concluded that under limited irrigation condition, RH mulching will be beneficial for wheat as it is able to maintain better soil and plant water status, leading to higher grain yield and enhanced water use efficiency.
Keywords: Mulch; Wheat; Soil temperature; Canopy air temperature difference; Root length density; Water use efficiency

Nasib Qureshi, Badal C. Saha, Ronald E. Hector, Michael A. Cotta, Removal of fermentation inhibitors from alkaline peroxide pretreated and enzymatically hydrolyzed wheat straw: Production of butanol from hydrolysate using Clostridium beijerinckii in batch reactors, Biomass and

Bioenergy, Volume 32, Issue 12, December 2008, Pages 1353-1358, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2008.04.009.
(http://www.sciencedirect.com/science/article/B6V22-4SNGRH6-1/2/046bc75f984442df7904f763acd2bbc7)
Abstract:
In these studies, alkaline peroxide pretreatment of wheat straw was investigated. Pretreated wheat straw was hydrolyzed using cellulolytic and xylanolytic enzymes, and the hydrolysate was used to produce butanol using Clostridium beijerinckii P260. The culture produced less than 2.59 g L-1 acetone-butanol-ethanol (ABE) from alkaline peroxide wheat straw hydrolysate (APWSH) that had not been treated to reduce salt concentration (a neutralization product). However, fermentation was successful after inhibitors (salts) were removed from the hydrolysate by electrodialysis. A control glucose fermentation resulted in the production of 21.37 g L-1 ABE, while salt removed APWSH resulted in the production of 22.17 g L-1 ABE. In the two fermentations, reactor productivities were 0.30 and 0.55 g L-1 h-1, respectively. A comparison of use of different substrates (corn fiber, wheat straw) and different pretreatment techniques (dilute sulfuric acid, alkaline peroxide) suggests that generation of inhibitors is substrate and pretreatment specific.
Keywords: Butanol; Clostridium beijerinckii P260; Acetone-butanol-ethanol (ABE); Wheat straw; Alkaline peroxide pretreatment; Fermentation

Peter H. Sikkema, Christy Shropshire, Nader Soltani, Tolerance of spring barley (Hordeum vulgare L.), oats (Avena sativa L.) and wheat (Triticum aestivum L.) to saflufenacil, Crop Protection, Volume 27, Issue 12, December 2008, Pages 1495-1497, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.07.009.
(http://www.sciencedirect.com/science/article/B6T5T-4TFDXWX-1/2/48541e753bb0ea9ce811e2b85d826ba8)
Abstract:
Saflufenacil is a new herbicide being developed by BASF for pre-emergence application for broadleaved weed control in maize and other crops. Three field studies were conducted in Ontario, Canada over a 2-year period (2006 and 2007) to evaluate the tolerance of spring cereals (barley, oats, and wheat) to pre-emergence and post-emergence applications of saflufenacil at 50 and 100 g ai ha-1. Saflufenacil pre-emergence caused minimal visible injury (1% or less) at 3, 7, 14 and 28 days after emergence and had no adverse effect on plant height or yield of barley, oats, and wheat. Saflufenacil plus the surfactant Merge (1% v/v) applied post-emergence caused as much as 76, 60, 52 and 35% visible injury in spring cereals at 3, 7, 14 and 28 DAT, respectively. Injury with saflufenacil plus Merge applied post-emergence decreased over time and was generally greater as dose increased. Saflufenacil plus Merge applied post-emergence reduced plant height by as much as 16% and reduced yield of spring barley and wheat by 24 and 13%, respectively, but had no effect on the yield of spring oats. Based on these results, saflufenacil applied pre-emergence at the proposed dose can be safely used in spring planted barley, oats and wheat; however, the post-emergence application of saflufenacil results in unacceptable injury and yield loss. These results are consistent with the proposed pre-emergence use pattern for saflufenacil.
Keywords: Barley; Height; Herbicide sensitivity; Oats; Tolerance; Yield; Wheat

Timothy S. George, Peter J. Gregory, Peter Hocking, Alan E. Richardson, Variation in root-associated phosphatase activities in wheat contributes to the utilization of organic P substrates in vitro, but does not explain differences in the P-nutrition of plants when grown in soils, Environmental and Experimental Botany, Volume 64, Issue 3, December 2008, Pages 239-249, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.05.002.
(http://www.sciencedirect.com/science/article/B6T66-4SG4HM8-1/2/1b900d65bd5cba35dea75e03c7ffc421)
Abstract:

To understand whether genotypic variation in root-associated phosphatase activities in wheat impacts on its ability to acquire phosphorus (P), various phosphatase activities of roots were measured in relation to the utilization of organic P substrates in agar, and the P-nutrition of plants was investigated in a range of soils. Root-associated phosphatase activities of plants grown in hydroponics were measured against different organic P substrates. Representative genotypes were then grown in both agar culture and in soils with differing organic P contents and plant biomass and P uptake were determined. Differences in the activities of both root-associated and exuded phosphodiesterase and phosphomonoesterase were observed, and were related to the P content of plants supplied with either ribonucleic acid or glucose 6-phosphate, respectively, as the sole form of P. When the cereal lines were grown in different soils, however, there was little relationship between any root-associated phosphatase activity and plant P uptake. This indicates that despite differences in phosphatase activities of cereal roots, such variability appears to play no significant role in the P-nutrition of the plant grown in soil, and that any benefit derived from the hydrolysis of soil organic P is common to all genotypes.
Keywords: Glucose-6-phosphate; myo-Inositol hexakisphosphate; RNA; Phytate; Phosphomonoester; Phosphodiester; Rhizosphere; Root exudates

Yongchao Liang, Jia Zhu, Zhaojun Li, Guixin Chu, Yanfang Ding, Jie Zhang, Wanchun Sun, Role of silicon in enhancing resistance to freezing stress in two contrasting winter wheat cultivars, Environmental and Experimental Botany, Volume 64, Issue 3, December 2008, Pages 286-294, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.06.005.
(http://www.sciencedirect.com/science/article/B6T66-4SVV8J7-1/2/d3c3d9f3210bb966ec0e216f0d6a522c)
Abstract:
The main objective of this study was to elucidate the roles of silicon (Si) in enhancing tolerance to freezing stress (-5 [degree sign]C) in two contrasting wheat (Triticum aestivum L.) cultivars: i.e. cv. Yangmai No. 5, a freezing-susceptible cultivar and cv. Linmai No. 2, a freezing-tolerant cultivar. Shoot dry weight of the freezing-susceptible wheat was significantly lower under freezing stress than in controls, but increased significantly with Si amendment. The freezing treatment did not affect shoot dry weight of the freezing-tolerant cultivar. The leaf water content was considerably decreased by freezing stress in the freezing-susceptible cultivar, but was significantly increased by Si amendment. In contrast, freezing treatment did not significantly reduce leaf water content in the freezing-tolerant cultivar and Si played no role in water retention in this cultivar. The concentrations of H2O2 and free proline along with malondialdehyde (MDA) were progressively enhanced by freezing stress in the two wheat cultivars used, but were significantly suppressed by amendment with Si. The major antioxidant enzyme activities and non-enzymatic antioxidants (i.e. glutathione and ascorbic acid) in the leaves of freezing-stressed plants were decreased, but were stimulated significantly by the exogenous Si. The possible mechanisms for Si-enhanced freezing stress may be attributed to the higher antioxidant defense activity and lower lipid peroxidation through water retention in leaf tissues.
Keywords: Freezing stress; Lipid peroxidiation; Oxidative stress; Silicon; Wheat

H. Lan, R. Hoover, L. Jayakody, Q. Liu, E. Donner, M. Baga, E.K. Asare, P. Hucl, R.N. Chibbar, Impact of annealing on the molecular structure and physicochemical properties of normal, waxy and high amylose bread wheat starches, Food Chemistry, Volume 111, Issue 3, 1 December 2008, Pages 663-675, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.04.055.
(http://www.sciencedirect.com/science/article/B6T6R-4SD6SPP-1/2/6b12007a372e24b4136fa4efd8b8f634)
Abstract:
Starch from normal (CDC teal), high amylose (line 11132) and waxy (99 WAX 27) bread wheat cultivars was isolated and its morphology, composition, structure and properties were studied

before and after annealing. Granule diameters, total phosphorus, total amylose, lipid complexed amylose chains, crystallinity, gelatinization temperature range, gelatinization enthalpy, swelling factor (at 90 [degree sign]C), and amylose leaching (at 90 [degree sign]C), in the above starches ranged from 2-38 [mu]m, 0.007-0.058%, 26.9-32.3%, 13.4-18.7%, 28.6-42.8%, 12.7-14.3 [degree sign]C, 11.3-13.3 J/g, 27.6-72.2 and 22.2-26.2%, respectively. Peak viscosity, thermal stability, set-back and susceptibility towards acid hydrolysis followed the order: 99WAX27 > CDC teal > 11132, 11132 > CDC teal > 99WAX27, CDC teal > 99 WAX 27 > 11132, and 99WAX27 > 11132 > CDC teal, respectively. Susceptibility towards [alpha]-amylase hydrolysis followed the order: 99 WAX 27 > 11132 > CDC teal (<24 h) and 11132 > CDC teal > 99WAX27 (>24 h). The extent of retrogradation measured by spectroscopy and differential scanning calorimetry followed the order: 11132 > CDC teal > 99WAX27 and 99WAX27 > CDC teal > 11132, respectively. In all starches, concentration of amylose, lipid complexed amylose chains, gelatinization temperature range, swelling factor, amylose leaching, peak viscosity, final viscosity, set-back, light transmission, susceptibility towards [alpha]-amylase and acid hydrolysis and the proportion of small (2-8 [mu]m) B-type granules decreased on annealing. Thermal stability and crystallinity increased on annealing. In all starches, gelatinization, enthalpy, retrogradation rate and amylopectin chain length distribution remained unchanged on annealing. Pores and indentations were formed on the granule surfaces of CDC teal and 99WAX27 starches on annealing.
Keywords: Starch; Annealing; Wheat; Structure; Properties

Marco Beyer, Jens Aumann, Effects of Fusarium infection on the amino acid composition of winter wheat grain, Food Chemistry, Volume 111, Issue 3, 1 December 2008, Pages 750-754, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.04.047.
(http://www.sciencedirect.com/science/article/B6T6R-4SC78WK-4/2/5091af7cf2d9100a631aa4debea7c9dc)
Abstract:
Winter wheat (susceptible cultivar Ritmo) was grown in 2006 near Kiel and in 2007 near Heide in northern Germany. Plants were inoculated at anthesis using a Fusarium graminearum macroconidial suspension. The percentage of Fusarium-damaged kernels (FDK) ranged from 0 +/- 2% to 28 +/- 2%. The contents of the Fusarium mycotoxin deoxynivalenol (DON) and wheat amino acids were determined in the grain. Levels of the amino acids alanine, lysine, and tyrosine increased with the percentage of FDK or DON contents whereas glutamic acid contents decreased. Aspartic acid and threonine were not related to the percentage of FDK or DON contents. Effects of Fusarium infection on other amino acids were significant only at the sampling site with the higher degree of Fusarium-damage. Interestingly, those amino acids that increased consistently and significantly with the degree of Fusarium-damage are derived from phosphoenolpyruvate or pyruvate, suggesting that pathogen-induced changes in the glycolytic input for amino acid biosynthesis play a significant role for the amino acid composition of Fusarium-damaged winter wheat grain. On average, amino acid contents decreased by 0.13% compared to the amino acid content of sound kernels upon an increase of 1% of FDK.
Keywords: Glycolysis; Host-pathogen interaction; Pathophysiology; Trichothecene; Triticum aestivum

Takahiro Funami, Makoto Nakauma, Sakie Noda, Sayaka Ishihara, Iwao Asai, Naoyoshi Inouchi, Katsuyoshi Nishinari, Effects of some anionic polysaccharides on the gelatinization and retrogradation behaviors of wheat starch: Soybean-soluble polysaccharide and gum arabic, Food Hydrocolloids, Volume 22, Issue 8, December 2008, Pages 1528-1540, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.10.008.
(http://www.sciencedirect.com/science/article/B6VP9-4R335FN-1/2/7c96e15285e388d2e73fbbadfddfe27b)
Abstract:

Gelatinization and retrogradation behaviors of wheat starch were investigated in an aqueous system in the presence or absence of some anionic polysaccharides, soybean-soluble polysaccharide (SSPS), and gum arabic (GA). Weight-average molecular weight was almost equivalent between SSPS and GA, while z-average root-mean-square radius of gyration of GA was ca. twice as large as that of SSPS. The addition of each polysaccharide (0.1-1 w/v%) decreased the peak viscosity of the composite system (starch concentration: 5% or 13%) during gelatinization, and this effect of SSPS was greater than that of GA at the higher starch concentration. It also shifted the onset of viscosity increase to lower temperatures at the higher starch concentration, but no difference was seen in this effect between SSPS and GA. The addition of each polysaccharide (0.1-1%) decreased the amount of amylose leached during gelatinization, and this effect of SSPS was generally greater than that of GA. It hardly altered, on the other hand, the average particle diameter of the starch granules after gelatinization. 'Starch ghosts' were less frequently observed microscopically in the presence of each polysaccharide, which appeared to exist around the surface of the starch granules to inhibit amylose leaching. The addition of each polysaccharide (0.5%) increased the rate constants, representing short-term (~24 h) retrogradation of starch (5%). It also decreased the saturated dynamic storage modulus of the composite system after storage at 4 [degree sign]C for 24 h, and this effect of SSPS was greater than that of GA with larger amount of syneresis generated. The results were discussed mainly in relation to the phase arrangement between starch components and each polysaccharide.
Keywords: Wheat starch; Soybean-soluble polysaccharide; Gum arabic; Gelatinization; Retrogradation

K. Venkatesh Murthy, R. Ravi, K. Keshava Bhat, K.S.M.S. Raghavarao, Studies on roasting of wheat using fluidized bed roaster, Journal of Food Engineering, Volume 89, Issue 3, December 2008, Pages 336-342, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.05.014.
(http://www.sciencedirect.com/science/article/B6T8J-4SHVSPP-2/2/2105f61cb039a61df6888eecb546ddfa)
Abstract:
Roasting is normally done to enhance the flavour and to improve organoleptic properties of the food grains. Roasting is a high temperature short time (HTST) heat treatment process and the temperatures used are normally in the range of 280-350 [degree sign]C. In the present study a continuous fluidized bed roaster (FBR) using flue has been designed and used to roast wheat grain. The product obtained thus has been compared to that obtained by using a traditional method, i.e., roasting in a bed of hot sand. Parameters such as moisture content, bulk density, product colour, crispness, microstructure, and total and acid insoluble ash, are considered in the study. Sand contamination in traditionally roasted wheat has been shown by the presence of acid insoluble ash (0.12%). The bulk density decreased from 833 kg/m3 for raw wheat to 526 and 555 kg/m3 for sand and fluidized bed roasted wheat, respectively. The moisture content decreased from 10% to 3% for sand as well as fluidized bed roasted wheat. Colour (expressed as Chroma) of the sand roasted wheat was in the range of 18-32 and that of the fluidized bed roasted wheat 23-32. Textural measurements in terms of compressive strength was between 222-331 N and 129-299 N for sand and fluidized bed roasted wheat, respectively. It is noted that the optimally roasted wheat using FBR has peak force of 30 N with colour (Chroma) value of about 31, total ash of 1.2% and acid insoluble ash of 0.04%. SEM images of the microstructure have indicated FB roasted wheat to have greater porosity which will result in this wheat requiring lower energy for size reduction.
Keywords: Continuous fluidized bed roaster; Roasting; Moisture; Wheat

Ajebu Nurfeta, Adugna Tolera, Lars O. Eik, Frik Sundstol, The supplementary value of different parts of enset (Ensete ventricosum) to sheep fed wheat straw and Desmodium intortum hay,

Livestock Science, Volume 119, Issues 1-3, December 2008, Pages 22-30, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.02.010.
(http://www.sciencedirect.com/science/article/B7XNX-4S62CSS-1/2/b22c56ef47f1c0744c3a51104de19008)
Abstract:
A study which included growth and digestibility experiments was conducted to evaluate the feeding value of a) enset pseudostem, b) enset corm or c) enset mixture (containing equal amounts of pseudostem, corm and enset leaf on a DM basis) as a supplement to a basal diet of wheat straw fed ad libitum and restricted amounts of Desmodium intortum (Desmodium) hay to sheep. During the 71-day growth experiment, 18 one-year-old male sheep of indigenous breed with mean body weight (BW) of 20.2 (+/- 0.43) kg were randomly assigned to the three treatments. In the digestibility experiment, three male sheep with mean BW of 19.5 (+/- 1.06) kg were assigned to each treatment. Sheep supplemented with enset mixture consumed more ($P < 0.001$) wheat straw DM (335 g/day) than those supplemented with pseudostem (295 g/day). No differences were found in total dry matter (DM) and organic matter (OM) intake between diets supplemented with pseudostem, corm and enset mixture. Total nitrogen (N) intake (g/day) was higher ($P = 0.0073$) in sheep fed the diet with enset mixture (12.2) followed by corm (11.3) and pseudostem (10.7). The apparent digestibility of DM was higher ($P < 0.001$) in pseudostem (0.53) followed by corm (0.46) and enset mixture (0.41) supplemented sheep. Organic matter, neutral detergent fiber and N digestibility were similar among treatments. The amount of N lost in urine and faeces and the N-retention was similar among treatments. There were no differences in gain/day in sheep fed diets with pseudostem (29.3 g), corm (27.0 g) and enset mixture (36.5 g). It is concluded that supplementation of a wheat straw/Desmodium diet with enset fractions could be used equally at least to maintain body weight during the dry season.
Keywords: Enset fractions; Sheep; Dry season feeding; Nitrogen-retention; Digestibility

Katarzyna Waszkowiak, Krystyna Szymandera-Buszka, The application of wheat fibre and soy isolate impregnated with iodine salts to fortify processed meats, Meat Science, Volume 80, Issue 4, December 2008, Pages 1340-1344, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2008.06.011.
(http://www.sciencedirect.com/science/article/B6T9G-4STYV3T-3/2/b3447a3ca62b4e2c40704c852866b7da)
Abstract:
The aim was to use wheat dietary fibre and soy protein isolate as carriers of KI and KIO3 for fortification of processed meat with iodine. Products from minced pork were prepared with addition of iodised wheat fibre and soy isolate, and iodised table salt for comparison and the effects of thermal processing and storage on changes in iodine content were determined. It was shown that both alternative carriers limited the iodine changes in meat products compared with iodised table salt. However, wheat fibre was more effective in limiting iodine losses during thermal processing and soy protein during storage of the products. The greatest effect of the carriers was found in meat products fortified with the less stable KI.
Keywords: Iodine carriers; Wheat dietary fibre; Soy protein isolate; Iodine retention; Food fortification; Meat product

Elisabeth Oldenburg, Susanne Kramer, Stefan Schrader, Joachim Weinert, Impact of the earthworm Lumbricus terrestris on the degradation of Fusarium-infected and deoxynivalenol-contaminated wheat straw, Soil Biology and Biochemistry, Volume 40, Issue 12, December 2008, Pages 3049-3053, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.09.004.
(http://www.sciencedirect.com/science/article/B6TC7-4TMYG27-1/2/f255d306c793279dadd651c25015ee4b)
Abstract:

When conservation tillage is practised in agriculture, plant residues remain on the soil surface for soil protection purposes. These residues should be widely decomposed within the following vegetation period as microbial plant pathogens surviving on plant litter may endanger the currently cultivated crop. Important soil-borne fungal pathogens that preferably infect small grain cereals belong to the genus Fusarium. These pathogens produce the mycotoxin deoxynivalenol (DON), a cytotoxic agent, in infected cereal organs. This toxin frequently occurs in cereal residues like straw. So far it is unclear if DON degradation is affected by members of the soil food web within decomposing processes in the soil system. For this purpose, a microcosm study was conducted under controlled laboratory conditions to investigate the degradation activity of the earthworm species Lumbricus terrestris when exposed to Fusarium-infected wheat straw being contaminated with DON.
Highly Fusarium-infected and DON-contaminated straw seemed to be more attractive to L. terrestris because it was incorporated faster into the soil compared with straw infected and contaminated at low levels. This is supported by a greater body weight gain (exposure time 5 weeks) and smaller body weight loss (exposure time 11 weeks) of L. terrestris, respectively, when highly contaminated straw was offered for different time periods.
Furthermore, L. terrestris takes part in the efficient degradation of both Fusarium biomass and DON occurring in straw in close interaction with soil microorganisms. Consequently, earthworm activity contributes to the elimination of potentially infectious plant material from the soil surface.
Keywords: Degradation; Fusarium-infected straw; Deoxynivalenol; DON-contamination; Earthworm activity

H. Ben Salem, I.-A. Znaidi, Partial replacement of concentrate with tomato pulp and olive cake-based feed blocks as supplements for lambs fed wheat straw, Animal Feed Science and Technology, Volume 147, Issues 1-3, Shrubby vegetation and agro-industrial by-products as alternative feed resources for sheep and goats, 14 November 2008, Pages 206-222, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.019.
(http://www.sciencedirect.com/science/article/B6T42-4PYR4C2-3/2/64cf9bf5d62c2e1f5447799a9605dc7f)
Abstract:
The replacement value of feed blocks tomato pulp (TP-FB) or olive cake (OC-FB) for a concentrate (wheat bran and processed barley, 1:2) was evaluated using 25 Barbarine lambs, fed wheat straw (WS) based diet, in a 75-day feeding trial followed by a total collection period (4 days adaptation and 6 days collection). Wheat straw was fed ad libitum and supplemented with (1) 500 g concentrate (control, C); (2) 250 g C and TP-FB (TP-FB + 0.5C); (3) 250 g C and OC-FB (OC-FB + 0.5C); (4) 125 g C and TP-FB (TP-FB + 0.25C); or (5) 125 g C and OC-FB (OC-FB + 0.25C), in a randomised block design. Except control-animals, lambs had free access to feed blocks. Metabolisable energy (ME, MJ/kg dry matter [DM]) and crude protein (g/kg DM) contents of the concentrate, TP-FB and OC-FB were 13.8 and 122, 11.2 and 154, and 11.0 and 147, respectively. Type of feed block had no effect on WS intake but increased total intake. Estimated ME intakes were 7.2, 8.5, 8.3, 8.3, and 7.3 MJ/day, respectively. Diets including FB exhibited higher digestible CP intakes than the control diet ($P<0.01$). Nitrogen balance ranged between 2.7 and 3.9 g/day. N retention and the efficiency of microbial nitrogen supply tended to increase with FB provision ($P>0.05$ and $P=0.057$, respectively). Compared to the control diet, FB supply had no effect on the growth rate of lambs ($P>0.05$). The response of lambs was in general better with diets containing OC-FB than those supplemented with TP-FB. The absence of urea and rapeseed meal in TP-FB could be among the reasons why sheep responded better to OC-FB. Feed conversion rates were higher with TP-FB diets than with OC-FB diets. Although results obtained with TP-FB were similar to those observed on lambs receiving OC-FB, the economic evaluation calls for revision of the formula of tomato-pulp-based feed blocks. Energy enrichment of OC-FB and TP-FB seems necessary for efficient utilisation of high levels of N in these feed blocks. It is concluded that OC-

FB are cost-effective alternative supplements and allow farmers to reduce by 0.75 the amount of local concentrate used, while TP-FB allow a 0.5 reduction.
Keywords: Concentrate; Tomato pulp; Olive cake; Feed blocks; Intake; Digestion; Growth; Lambs

Xiang-Zheng LIAO, Jin WANG, Rong-Hua ZHOU, Zheng-Long REN, Ji-Zeng JIA, Mining Favorable Alleles of QTLs Conferring Thousand-Grain Weight from Synthetic Wheat, Acta Agronomica Sinica, Volume 34, Issue 11, November 2008, Pages 1877-1884, ISSN 1875-2780, DOI: 10.1016/S1875-2780(09)60012-2.
(http://www.sciencedirect.com/science/article/B94TW-4W04GHT-2/2/577e0e45fb744b34c42303b0555f0f68)
Abstract:
The aim of this study was to mine favorable alleles of QTLs conferring thousand-grain weight (TGW) from synthetic wheat using advanced backcross QTL analysis. A BC5 F2:3 population consisting of 85 lines were generated from a cross between Laizhou 953, a Chinese commercial wheat variety, and Am3, a synthetic hexaploid wheat, followed by backcrossing with Laizhou 953 as recurrent parent and then by selfing. A total of 348 polymorphic SSR markers were employed for genotyping. Using composite interval mapping (CIM), 3 major QTLs, QGw.caas-1A, QGw.caas-3D, and QGw.caas-4B, with alleles increasing TGW from Am3, were detected in at least 2 environments, explaining phenotypic variation ranging from 10.9% to 33.79%. The Am3 alleles at the 3 loci increased TGW by 2.3-4.8 g without decreasing grain number and spike number and, 2 of them, without increasing plant height. Using mixed-model composite interval mapping (MCIM), QTL QGw.caas-3D was detected and the QTL-by-environment interaction was not significant, indicating that QGw.caas-3D was insensitive to environmental factors. QGw.caas-3D might be a stable and major QTL for TGW.
Keywords: wheat; microsatellite marker; quantitative trait locus; thousand-grain weight; yield component

L. Li, D.C. Nielsen, Q. Yu, L. Ma, L.R. Ahuja, Evaluating the Crop Water Stress Index and its correlation with latent heat and CO2 fluxes over winter wheat and maize in the North China plain, Agricultural Water Management, In Press, Corrected Proof, Available online 1 November 2008, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.09.015.
(http://www.sciencedirect.com/science/article/B6T3X-4TTNCDR-2/2/e1516d9bc4e3453bd3fe9d9f82d31d44)
Abstract:
Plant water status is a key factor impacting crop growth and agricultural water management. Crop water stress may alter canopy temperature, the energy balance, transpiration, photosynthesis, canopy water use efficiency, and crop yield. The objective of this study was to calculate the Crop Water Stress Index (CWSI) from canopy temperature and energy balance measurements and evaluate the utility of CWSI to quantify water stress by comparing CWSI to latent heat and carbon dioxide (CO2) flux measurements over canopies of winter wheat (Triticum aestivum L.) and summer maize (Zea mays L.). The experiment was conducted at the Yucheng Integrated Agricultural Experimental Station of the Chinese Academy of Sciences from 2003 to 2005. Latent heat and CO2 fluxes (by eddy covariance), canopy and air temperature, relative humidity, net radiation, wind speed, and soil heat flux were averaged at half-hour intervals. Leaf area index and crop height were measured every 7 days. CWSI was calculated from measured canopy-air temperature differences using the Jackson method. Under high net radiation conditions (greater than 500 W m-2), calculated values of minimum canopy-air temperature differences were similar to previously published empirically determined non-water-stressed baselines. Valid measures of CWSI were only obtained when canopy closure minimized the influence of viewed soil on infrared canopy temperature measurements (leaf area index was greater than 2.5 m2 m-2). Wheat and maize latent heat flux and canopy CO2 flux generally decreased linearly with increases in CWSI

when net radiation levels were greater than 300 W m-2. The responses of latent heat flux and CO2 flux to CWSI did not demonstrate a consistent relationship in wheat that would recommend it as a reliable water stress quantification tool. The responses of latent heat flux and CO2 flux to CWSI were more consistent in maize, suggesting that CWSI could be useful in identifying and quantifying water stress conditions when net radiation was greater than 300 W m-2. The results suggest that CWSI calculated by the Jackson method under varying solar radiation and wind speed conditions may be used for irrigation scheduling and agricultural water management of maize in irrigated agricultural regions, such as the North China Plain.
Keywords: Maize; Wheat; Water stress; Latent heat flux; CO2 flux; Infrared thermometry; Canopy temperature

Hongjun Li, Li Zheng, Yuping Lei, Chunqiang Li, Zhijun Liu, Shengwei Zhang, Estimation of water consumption and crop water productivity of winter wheat in North China Plain using remote sensing technology, Agricultural Water Management, Volume 95, Issue 11, November 2008, Pages 1271-1278, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.05.003.
(http://www.sciencedirect.com/science/article/B6T3X-4SXRYC7-1/2/ab06d4c43791bac3ce959520d31edc4a)
Abstract:
The North China Plain (NCP) is one of the most water stressed areas in the world. The water consumption of winter wheat accounts for more than 50% of the total water consumption in this region. An accurate estimate of the evapotranspiration (ET) and crop water productivity (CWP) at regional scale is therefore key to the practice of water-saving agriculture in NCP. In this research, the ET and CWP of winter wheat in 83 counties during October 2003 to June 2004 in NCP were estimated using the remote sensing data. The daily ET was calculated using SEBAL model with NOAA remote sensing data in 17 non-cloud days whereas the reference daily crop ET was estimated using meteorological data based on Hargreaves approach. The daily ET and the total ET over the entire growing season of winter wheat were obtained using crop coefficient interpolation approach. The calculated average and maximum water consumption of winter wheat in these 83 counties were 424 and 475 mm, respectively. The calculated daily ET from SEBAL model showed good match with the observed data collected in a Lysimeter. The error of ET estimation over the entire growing stage of winter wheat was approximately 4.3%. The highest CWP across this region was 1.67 kg m-3, and the lowest was less than 0.5 kg m-3. We observed a close linear relationship between CWP and yield. We also observed that the continuing increase of ET leads to a peaking and subsequent decline of CWP, which suggests that the higher water consumption does not necessarily lead to a higher yield.
Keywords: Winter wheat; Crop water productivity; Evapotranspiration; SEBAL; Crop coefficient; North China Plain

Hanane Hamdali, Mohamed Hafidi, Marie Joelle Virolle, Yedir Ouhdouch, Growth promotion and protection against damping-off of wheat by two rock phosphate solubilizing actinomycetes in a P-deficient soil under greenhouse conditions, Applied Soil Ecology, Volume 40, Issue 3, November 2008, Pages 510-517, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2008.08.001.
(http://www.sciencedirect.com/science/article/B6T4B-4TFDY0W-1/2/0c3ba582b614513c0f9fcf0584688f7d)
Abstract:
Micromonospora aurantiaca- and Streptomyces griseus-related strains isolated from Moroccan phosphate mines (MAMPM and SGMPM) were previously selected for their rock phosphate (RP) solubilizing abilities and their multiple plant growth promoting properties demonstrated in laboratory conditions. In order to assess whether these interesting properties could have a direct effect on plant growth and fitness, seeds of the wheat plant (Triticum durum L. cv. Vitron) coated or not with mycelium of these strains and of the reference strain S. griseus M1323, were grown in

a sterile soil deficient in soluble phosphate supplemented or not with soluble phosphate or with the insoluble RP, under greenhouse conditions. These studies revealed that the presence of the actinomycete strains in the soil supplemented with RP significantly promoted the growth of the wheat plants. MAMPM and SGMPM had the greatest stimulatory effect on plant growth with 50-47% and 80-78% weight increase of shoots and roots, respectively, in comparison with the sterile control. This increase correlated with a significant increase in the N and P content of plant tissues. The MAMPM- and SGMPM-dependent growth promotion in the RP supplemented soil was on average 10-13% lower than that achieved by the soluble phosphate supplement. Furthermore, in a soil infested with Pythium ultimum, the mediator of damping-off disease, the coating of wheat seeds with the mycelium of MAMPM strain resulted in a clear protection of the plant. The level of protection achieved by MAMPM was 14% lower than that conferred by the commercial bio-fungicide agent (Mycostop(R)). This study demonstrated that MAMPM in association with pulverized RP could constitute a novel and non-polluting bio-fertilizer/biocontrol product useful for the development of sustainable agriculture.
Keywords: Rock phosphate solubilizing actinomycetes; P-deficient soil; Wheat growth; Biocontrol; Damping-off

Yu Zhaosheng, Ma Xiaoqian, Liu Ao, Kinetic studies on catalytic combustion of rice and wheat straw under air- and oxygen-enriched atmospheres, by using thermogravimetric analysis, Biomass and Bioenergy, Volume 32, Issue 11, November 2008, Pages 1046-1055, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2008.02.001.
(http://www.sciencedirect.com/science/article/B6V22-4S1BWYK-1/2/3b273e11425405c5365eeee48e69723d)
Abstract:
By thermogravimetric analysis (TGA) and kinetic study, the influences of different catalysts on the ignition and combustion of rice and wheat straw in air- and oxygen-enriched atmospheres have been investigated in this paper. According to the index of ignition and burn off, the action of these catalysts on rice and wheat straw ignition and combustion in air- and oxygen-enriched atmosphere is effective except for the oxygen-enriched catalytic combustion of rice straw fixed carbon. According to the activation energy of combustion, the catalytic importance of metal oxides for the first combustion process is remarkable; there is no obvious as important decrease for the second combustion of rice and wheat straw except for CuO and CaO catalytic rice combustion under oxygen-enriched atmosphere. Compared with air atmosphere, the activation energy of rice and wheat straw catalyst oxygen-enriched combustion increases usually at the first process except for CuO catalytic rice combustion, but it decreases at the second process except for MgO catalytic rice combustion, and CaO and CuO catalytic wheat combustions.
Keywords: Catalyst; Combustion; Straw; Oxygen enriched; Thermogravimetric analysis; Kinetic study

Gursharan Singh, Naveen Ahuja, Mona Batish, Neena Capalash, Prince Sharma, Biobleaching of wheat straw-rich soda pulp with alkalophilic laccase from [gamma]-proteobacterium JB: Optimization of process parameters using response surface methodology, Bioresource Technology, Volume 99, Issue 16, November 2008, Pages 7472-7479, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.02.023.
(http://www.sciencedirect.com/science/article/B6V24-4S69H48-1/2/a8d13379e089b987ce9081bd0143fed3)
Abstract:
An alkalophilic laccase from [gamma]-proteobacterium JB was applied to wheat straw-rich soda pulp to check its bleaching potential by using response surface methodology based on central composite design. The design was employed by selecting laccase units, ABTS (2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid)) concentration and pH as model factors. The results of

second order factorial design experiments showed that all three independent variables had significant effect on brightness and kappa number of laccase-treated pulp. Optimum conditions for biobleaching of pulp with laccase preparation (specific activity, 65 nkat mg-1 protein) were 20 nkat g-1 of pulp, 2 mM ABTS and pH 8.0 which enhanced brightness by 5.89% and reduced kappa number by 21.1% within 4 h of incubation at 55 [degree sign]C, without further alkaline extraction of pulp. Tear index (8%) and burst index (18%) also improved for laccase-treated pulp as compared to control raw pulp. Treatment of chemically (CEH1H2) bleached pulp with laccase showed significant effect on release of chromophores, hydrophobic and reducing compounds. Laccase-prebleaching of raw pulp reduced the use of hypochlorite by 10% to achieve brightness of resultant hand sheets similar to the fully chemically bleached pulp.
Keywords: Biobleaching; Pulp; Alkalophilic laccase; ABTS; Response surface methodology

Chenyu Du, Sze Ki Carol Lin, Apostolis Koutinas, Ruohang Wang, Pilar Dorado, Colin Webb, A wheat biorefining strategy based on solid-state fermentation for fermentative production of succinic acid, Bioresource Technology, Volume 99, Issue 17, November 2008, Pages 8310-8315, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.03.019.
(http://www.sciencedirect.com/science/article/B6V24-4SBHDK8-1/2/6dca27180cd93fc13635cc9e307c2241)
Abstract:
In this study, a novel generic feedstock production strategy based on solid-state fermentation (SSF) has been developed and applied to the fermentative production of succinic acid. Wheat was fractionated into bran, gluten and gluten-free flour by milling and gluten extraction processes. The bran, which would normally be a waste product of the wheat milling industry, was used to produce glucoamylase and protease enzymes via SSF using Aspergillus awamori and Aspergillus oryzae, respectively. The resulting solutions were separately utilised for the hydrolysis of gluten-free flour and gluten to generate a glucose-rich stream of over 140 g l-1 glucose and a nitrogen-rich stream of more than 3.5 g l-1 free amino nitrogen. A microbial feedstock consisting of these two streams contained all the essential nutrients required for succinic acid fermentations using Actinobacillus succinogenes. In a fermentation using only the combined hydrolysate streams, around 22 g l-1 succinic acid was produced. The addition of MgCO3 into the wheat-derived medium improved the succinic acid production further to more than 64 g l-1. These results demonstrate the SSF-based strategy is a successful approach for the production of a generic feedstock from wheat, and that this feedstock can be efficiently utilised for succinic acid production.
Keywords: Succinic acid; Solid-state fermentation (SSF); Wheat-based biorefinery; Actinobacillus succinogenes; Fungal fermentations

Lian-hui Zhang, Dong Li, Li-jun Wang, Ti-peng Wang, Lu Zhang, Xiao Dong Chen, Zhi-huai Mao, Effect of steam explosion on biodegradation of lignin in wheat straw, Bioresource Technology, Volume 99, Issue 17, November 2008, Pages 8512-8515, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.03.028.
(http://www.sciencedirect.com/science/article/B6V24-4SD1KKJ-4/2/290fc805dee06f5be0fc9a11231a2600)
Abstract:
The effect of steam explosion pretreatment on biodegradation of lignin in wheat straw was studied in this paper. Through experiments and analysis, 0.8 MPa operation pressure and 1:20 wheat straw to water ratio are optimum for destroying lignin and the maximum of lignin loss rate is 19.94%. After steam explosion pretreatment, the wheat straw was retted by Trametes versicolor for 40 days. Biodegradation rate of lignin was tested and the maximum of 55.40% lignin loss rate was found on day 30. During the whole process of both steam explosion pretreatment and biodegradation, 75.34% lignin was degraded, without steam explosion the biodegradation of raw

material the degradation rate of lignin was 31.23% only. FT-IR spectroscopy, TGA and SEM were used for further validating the results of biodegradation.
Keywords: Wheat straw; Biodegradation; Steam explosion; Trametes versicolor

Zhao Hui, Zhang ZhengBin, Shao HongBo, Xu Ping, M.J. Foulkes, Genetic correlation and path analysis of transpiration efficiency for wheat flag leaves, Environmental and Experimental Botany, Volume 64, Issue 2, November 2008, Pages 128-134, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.11.001.
(http://www.sciencedirect.com/science/article/B6T66-4R3C06Y-2/2/7364e18d572cebce9192239658f4184b)
Abstract:
A 4 x 4 complete diallel cross was set up with four different types of drought-resistant winter wheat varieties to define mutual relations among main quantitative traits and the contribution of each trait to the flag leaf transpiration efficiency (TE) in the grain filling phase. Through genetic correlative and path analysis, the influence of five physiological traits, net photosynthesis rate (Pn), stomatal conductance (Gs), intercellular CO2 concentration (Ci), transpiration rate (Tr), and leaf temperature (Tl), on flag leaf TE was observed. The results of variance analysis showed that there were very significant differences between TE and the related five traits, as well as between these five traits. The results of genetic correlation analysis showed also that the absolute values of the correlation coefficients of corresponding traits to TE should be ordered as Pn > Gs > Tl > Tr > Ci in the early grain filling stage, Ci > Tr > Pn > Gs > Tl in the middle grain filling stage, and Pn > Ci > Tl > Tr > Gs in the late grain filling stage, respectively. The results of the combined analysis of genetic correlation and path analysis showed that at the early filling stage, there existed a strong positive genetic correlation between Pn and TE, and at the same time Pn had a direct positive contribution to TE. With the progression of grain filling, the stress of high temperature and drought strengthened and the function of flag leaves weakened, so that at the late grain filling phase Ci, Tr and Tl were strongly negatively correlated with TE and all these traits conferred direct negative contributions to TE. The results of this research showed that the selection of wheat genetic materials with slow-ageing, high-photosynthesis, low-transpiration and low leaf temperature should assist breeding of wheat with more efficient use of water in north western China.
Keywords: Winter wheat; Flag leaf; WUE; Path analysis; TE; Pn; Diallel cross; Drought-resistant breeding

Aude Barbottin, David Makowski, Marianne Le Bail, Marie-Helene Jeuffroy, Christine Bouchard, Cyrille Barrier, Comparison of models and indicators for categorizing soft wheat fields according to their grain protein contents, European Journal of Agronomy, Volume 29, Issue 4, November 2008, Pages 175-183, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.05.004.
(http://www.sciencedirect.com/science/article/B6T67-4T0NGJG-1/2/030c336314421d4389706fd374006bbb)
Abstract:
The ability to deliver wheat grain with a specific protein content is a major determinant of the profitability of wheat grain production. Various crop models have been developed to predict yield and grain protein content on a field scale. They can be used to predict each year, before harvest, the yields and grain protein contents of the different fields in a collecting area, leading to an optimization of the grading process into low and high protein standards. Indicators have been developed for nitrogen management at the field scale. They can be used to predict grain quality because grain protein content depends strongly on the crop nitrogen uptake during the vegetative growth of the wheat crop. The aim of this study was to evaluate the accuracy of two indicators, nitrogen nutrition index and chlorophyll content of leaves (in SPAD units), and of two models for categorizing fields according to their grain protein contents. A data set including field measurements over 3 years was used to estimate the sensitivity and specificity of the models and

indicators using the receiver operating characteristic evaluation procedure. High values of sensitivity and specificity were obtained for the two indicators, and decision thresholds leading to low false negative and false positive proportions were identified. Nitrogen nutrition index showed the best results for the three grain protein content thresholds considered. Conversely, sensitivity and specificity values obtained for the two models were low. Combining model predictions and indicator values did not give better discrimination than the use of a single indicator.
Keywords: Prediction; Receiver operating characteristics (ROC); Sensitivity; Specificity; Wheat

Xueju (Sherry) Xie, Steve W. Cui, Wei Li, Rong Tsao, Isolation and characterization of wheat bran starch, Food Research International, Volume 41, Issue 9, Cereal Foods, November 2008, Pages 882-887, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.07.016.
(http://www.sciencedirect.com/science/article/B6T6V-4T4Y5SR-1/2/37a6ee2a185deb91e81609721fb60b8c)
Abstract:
A small-scale (100 g) wet-milling process was used to isolate starch from commercial wheat bran at a recovery of 90%. Chemical analysis revealed that wheat bran starch contained a lower amount of protein contamination (0.15%) and damaged starch (0.15% and 1%, respectively) than commercial wheat starch (0.35% and 1.5%, respectively). Wheat bran starch contained 45% small granules compared to 15% in commercial wheat starch. Wheat bran starch also exhibited higher amylose content, higher crystallinity, and swelling power compared to commercial wheat starch. The pasting and thermo analysis revealed that wheat bran starch exhibited lower pasting peak and final viscosities, lower onset and peak gelatinization temperatures, and a lower retrogradation rate compared to those of commercial wheat starch. A positive correlation was observed between small-granule content and starch crystallinity, enthalpy, and swelling power. The enzyme digestibility experiment found that the digestibility of wheat bran starch was similar to that of commercial wheat starch, however, the resistant starch content in wheat bran starch (9.5%) was significantly higher than that in commercial wheat starch (4.3%). The unique thermo and physicochemical properties demonstrated by wheat bran starch may lead to broader applications of this novel material.
Keywords: Wheat bran starch; Isolation; Granule size; Retrogradation

Javier Gil-Humanes, Fernando Piston, Alberto Hernando, Juan B. Alvarez, Peter R. Shewry, Francisco Barro, Silencing of [gamma]-gliadins by RNA interference (RNAi) in bread wheat, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 565-568, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.03.005.
(http://www.sciencedirect.com/science/article/B6WHK-4S7SV3C-1/2/e71507d2036a94bafc305ebed2a849b3)
Abstract:
RNA silencing is a sequence-specific RNA degradation system that is conserved in a wide range of organisms. The elucidation of the mechanism of RNA silencing has stimulated its use as a reverse genetics tool, because RNA silencing strongly down-regulates the expression of the target gene in a sequence-specific manner. The major protein fraction of wheat grain is gluten which is largely responsible for the functional properties of dough. Gliadins contribute mainly to the extensibility and viscosity of gluten and dough, with the polymeric glutenins being responsible for elasticity. The aim of this work was therefore to silence the expression of specific [gamma]-gliadins by RNA interference, to demonstrate the feasibility of systematically silencing specific groups of gluten proteins. The sequence of a [gamma]-gliadin gene was used to construct the pghp8.1 plasmid. The hpRNA silencing fragment was designed on the basis of 169 base pairs (bp) in sense and antisense orientation with the sequence of the Ubi1 intron as spacer region between the repeats. Two lines of bread wheat were transformed by particle bombardment. Gliadins were extracted from 30 mg of flour, separated by acid-PAGE and determined by matrix-assisted laser

desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). Seven transgenic lines were obtained and all of them showed reduced levels of [gamma]-gliadins. All seven transgenic plants were fully fertile and their grain morphology and seed weight were comparable to the control lines. MALDI-TOF MS showed that six peaks, present in the untransformed line, were missing in transgenic lines of the BW208 genotype whereas three peaks were missing in the BW2003 genotypes. The proportion of [gamma]-gliadins was reduced, by about 55-80% in the BW208 lines and by about 33-43% in the BW2003 lines. The ELISA assay based on the R5 antibody showed reductions in total gliadins ([mu]g/mg flour) in three of the BW208 lines and in one BW2003 line, but an increase in one BW208 line (C613).
Keywords: RNA interference; Gliadins; Wheat

J. Bordes, G. Branlard, F.X. Oury, G. Charmet, F. Balfourier, Agronomic characteristics, grain quality and flour rheology of 372 bread wheats in a worldwide core collection, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 569-579, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.05.005.
(http://www.sciencedirect.com/science/article/B6WHK-4SRW137-1/2/f687b34a2756b439e59520214f8b44b8)
Abstract:
A core collection of 372 accessions representative of worldwide hexaploid bread wheat diversity [Balfourier, F., Roussel, V., Strelchenko, P., Exbrayat-Vinson, F., Sourdille, P., Boutet, G., Koenig, J., Ravel, C., Mitrofanova, O., Beckert, M., Charmet, G., 2007. A worldwide bread wheat core collection arrayed in a 384-well plate. Theoretical and Applied Genetics 114, 1265-1275] was used to evaluate the available genetic diversity of agronomic and quality characteristics. The traits assessed during the vegetative period were date of ear-emergence, date of flowering, lodging, disease susceptibility and pre-harvest sprouting. Thousand kernel weight, test weight, grain hardness, grain protein content, pentosan viscosity and grain colour were also measured. The rheological properties of the derived white flours were estimated using mixograph and alveograph tests. For most of the traits, a wide phenotypic variation was observed across all the accessions. Several parameters (mixograph width parameters before and after peak time, alveograph dough tenacity and extensibility, near infrared measurements, like those for protein content, and absorbance measurements of palmitic acid and linoleic acid content) made it easier to discriminate between the cultivars. The largest ranges of variation were found in landraces and old cultivars rather than in more recent varieties. This is evidence that there is sufficient variability available for rare alleles, which have been eliminated in breeding modern varieties to be detected. Such a core collection will therefore be a useful resource for future genetic studies on wheat quality.
Keywords: Bread wheat; Genetic resources; Diversity; Core collection

Petra Hogy, Andreas Fangmeier, Effects of elevated atmospheric CO2 on grain quality of wheat, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 580-591, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.01.006.
(http://www.sciencedirect.com/science/article/B6WHK-4S1S6HX-2/2/465f1b6b983168e6383977189180547d)
Abstract:
Wheat (Triticum aestivum L.) is one of the most important agricultural crops worldwide. Due to its high content of starch and unique gluten proteins, wheat grain is used for many food and non-food applications. Although grain quality is an important topic for food and feed as well as industrial processing, the consequences of future increases in atmospheric carbon dioxide (CO2) concentrations on quality parameters such as nutritional and bread-making rheological properties are still unclear. Wheat productivity increases under CO2 enrichment. Concomitantly, the chemical composition of vegetative plant parts is often changed and grain quality is altered. In particular, the decrease in grain protein concentration and changes in protein composition may have serious

economic and health implications. Additionally, CO2 enrichment affects amino acid composition and the concentrations of macro- and micro-elements. However, experimental results are often inconsistent. The present review summarises the results from numerous CO2 enrichment experiments using different exposure techniques in order to quantify the potential impacts of projected atmospheric CO2 levels on wheat grain yield and on aspects of grain composition relevant to processing and human nutrition.
Keywords: CO2 enrichment; Wheat; Grain yield; Grain quality

Samy Gobaa, Cecile Brabant, Geert Kleijer, Peter Stamp, Effect of the 1BL.1RS translocation and of the Glu-B3 variation on fifteen quality tests in a doubled haploid population of wheat (Triticum aestivum L.), Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 598-603, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.12.006.
(http://www.sciencedirect.com/science/article/B6WHK-4S0JN06-1/2/6e8782fa82c8f9c5aeff230742ec1433)
Abstract:
To investigate the impact of 1BL.1RS translocation on protein content, starch quality, dough rheology, RMT volumes and other quality traits, a doubled haploid population was created and sown in a two-year field experiment. Translocated genotypes accumulated more proteins in the endosperm than non-translocated genotypes. Decrease in the gelatinization of starch was associated with the 1BL.1RS translocation. As for rheological parameters, adapted to bread types not requiring high mixing energy, the 1BL.1RS translocation significantly reduced the elasticity, tenacity and strength of the dough compared to allele c of Glu-B3. Tolerance to over-mixing was also significantly lower in translocated DH lines. In contrast to previously published work, the presence of allele Glu-D3 c resulted in significantly higher tenacity, and thus strength, compared with the allele Glu-D3 b in the present DH population. The final baking test performed on the DH lines of the population, combining favourable alleles for dough rheology and high protein content, demonstrated that in some cases lower tenacity induced by the 1BL.1RS translocation or by Glu-B3 b increases the volume of the loaves.
Keywords: Wheat; Gluten; Prolamins; Rheology of dough; Quality tests; 1BL.1RS translocation; Glu-D3; Bread-making quality

Shaomin Sun, Yihu Song, Qiang Zheng, Morphology and mechanical properties of thermo-molded bioplastics based on glycerol-plasticized wheat gliadins, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 613-618, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.01.005.
(http://www.sciencedirect.com/science/article/B6WHK-4S33N5D-1/2/11143a1bc7b0c5bdc335f1b375fdd02e)
Abstract:
Glycerol-plasticized wheat gliadin bioplastics were prepared through thermo-molding method. The effect of glycerol content on the morphology and the mechanical properties of wheat gliadin bioplastics was studied. Morphology, tensile properties (tensile strength and elongation at break), dynamic mechanical properties and rheological properties were evaluated in relation to glycerol content. Experimental results reveal that the morphology, the glass transition temperatures (Tg) of both the gliadin-rich and the glycerol-rich domains and the tensile properties are closely linked to the glycerol content. The time-temperature superposition (TTS) fails to be applied to the dynamic loss modulus G" (all temperatures) and the dynamic storage modulus G' (above 80 [degree sign]C) of wheat gliadin bioplastics.
Keywords: Wheat gliadin; Morphology; Glass transition; Time-temperature superposition

Shane R. McIntosh, Robert J. Henry, Genes of folate biosynthesis in wheat, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 632-638, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.02.007.

(http://www.sciencedirect.com/science/article/B6WHK-4S3S2FV-1/2/e1b3710f6af00c229f2b008a05ec28f7)
Abstract:
Micronutrient deficiency is preventing an estimated one-third of the world's population from reaching their physical and intellectual potential. This results in reduced education attainment and work productivity which negatively impacts on regional development and economies. Contributing to the aetiology of these deficiencies is the over-refining and over consumption of basic food groups (cereals and tubers) which provide limited amounts of micronutrients. Folate deficiencies result from unbalanced diets and are responsible for an estimated 250,000 birth defects annually. Engineering plants like cereals to deliver daily requirements of folates (biofortification) is an attractive approach to address malnutrition in developing countries. We have isolated key folate genes including: 6-hydroxymethyl-7,8-dihydropterin pyrophosphokinase/7,8-dihydropteroate synthase, 4-amino-4-deoxychorismate synthase and folypolyglutamate synthetase from wheat seeds. Furthermore, we have identified homologous genes in the rice genome. Characterisation of sequences identified key functional and targeting regions. Analysis of the temporal and spatial patterns of gene expression supports de novo synthesis of folates in the developing wheat seed and uniquely in the mature seed transcriptome. The seed appears to have a unique potential to replenish its own pool of required glutamated folates at all stages in its life cycle.
Keywords: Differential expression; Folate biosynthesis; Gene isolation; Wheat

B. Laubin, V. Lullien-Pellerin, I. Nadaud, B. Gaillard-Martinie, C. Chambon, G. Branlard, Isolation of the wheat aleurone layer for 2D electrophoresis and proteomics analysis, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 709-714, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.03.004.
(http://www.sciencedirect.com/science/article/B6WHK-4S7BDF6-1/2/4046a3c8be5ebbbf4690a36d53c0c48e)
Abstract:
Whereas the endosperm of bread wheat has been studied for many years for obvious ecoomic reasons, studies of the aleurone layer of the seed only started recently after the discovery of its nutritional and health benefits. In this paper, we describe two different techniques to isolate either the peripheral layers including the aleurone layer or only the aleurone layer (AL) which can be used for 2D electrophoresis and proteomic analysis. The two techniques provided similar 2D electrophoresis profiles although the time needed for dissection of the kernel and isolation of the cell layer was different. The two 2D protein profiles shared more than 80% identity and enabled us to observe approximately 700 spots in the aleurone layer. Two bread wheat cultivars, Chinese Spring and Recital, were used and the two techniques revealed that their AL shared at least 70% of common spots. Several spots not present in AL and coming from peripheral layers were identified using mass spectrometry and database interrogation. These dissection techniques will enable proteomic analysis of AL which can be used for genetic analysis of its components, for investigating the AL response to fungi attack and helpful for improving nutritional and health value of wheat.
Keywords: Wheat; Bran; Aleurone layer; Peripheral layer

J.M. Sanz Penella, C. Collar, M. Haros, Effect of wheat bran and enzyme addition on dough functional performance and phytic acid levels in bread, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 715-721, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.03.006.
(http://www.sciencedirect.com/science/article/B6WHK-4S7SV3C-2/2/3d572c948a558f55075d0321aeec4707)
Abstract:
Effects of bran concentration, bran particle size distribution, and enzyme addition - fungal phytase, fungal alpha-amylase - on the mixing and fermentative behaviour of wheat dough and on the

amount of phytic acid remaining in bread have been investigated using a factorial design of samples 24. Bran concentration and bran particle size significantly affected all Farinograph parameters, whereas enzyme effects were particularly observed on both the water absorption of the flour and the parameters characterizing the overmixing. Water absorption was maximized in doughs with higher fine bran addition and/or in doughs with no enzymes, and was minimized in blends containing coarse added bran and alpha-amylase and/or alpha-amylase and phytase. alpha-Amylase addition had a significant positive effect on dough development and gassing power parameters during proofing. At low bran addition, phytate hydrolysis takes place to a greater extent than at high bran addition levels. Combination of bran with amylolytic and phytate-degrading enzymes could be advisable for overcoming the detrimental effect of bran on the mineral availability (phytase) or on the technological performance of doughs (alpha-amylase).
Keywords: Mixing dough properties; Rheological behaviour; Fermentation parameters; Wheat bran; alpha-Amylase; Fungal phytase

Mark Wilkinson, Yongfang Wan, Paola Tosi, Michelle Leverington, John Snape, Rowan A.C. Mitchell, Peter R. Shewry, Identification and genetic mapping of variant forms of puroindoline b expressed in developing wheat grain, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 722-728, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.03.007.
(http://www.sciencedirect.com/science/article/B6WHK-4SD6SJC-1/2/4c9317d3f64513995983a6f9982106fb)
Abstract:
Transcripts encoding three novel variant forms of puroindoline b have been identified in developing seeds of wheat. These show 57-60% sequence identity with the wild type form of Pin b but all lack one of the three tryptophan residues present in the 'tryptophan loop' region of the wild type protein. Counts of ESTs and array analysis indicate that the transcripts encoding variant forms of Pin b are about an order of magnitude less abundant than those encoding wild type Pin b while array analysis also shows that expression of the variant form 1 declines more rapidly than that of the wild type form during the later stages of grain development. The gene(s) encoding variant form 1, named Pinb-A2, were mapped to the long arm of chromosome 7A of bread wheat where they show linkage to novel QTLs for hardness which have been identified in two doubled haploid populations derived from crosses between hard parental cultivars (Shamrock x Shango, Malacca x Charger).
Keywords: Wheat; Grain hardness; Puroindolines; Grain development; Genetic mapping

Peng Chen, Changdong Wang, Kexiu Li, Junli Chang, Yuesheng Wang, Guangxiao Yang, Peter R. Shewry, Guangyuan He, Cloning, expression and characterization of novel avenin-like genes in wheat and related species, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 734-740, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.04.002.
(http://www.sciencedirect.com/science/article/B6WHK-4SCDB13-2/2/b521d7986e91818d92d866abd9dac20e)
Abstract:
B-Type avenin-like genes and proteins were characterized in 23 species of Triticeae. Southern blot analysis showed that the avenin-like genes belong to a multigene family. RT-PCR showed expression only in developing endosperms of wheat and related species, between 3 and 22 DPA (days post anthesis) with a peak between 11 and 15 DPA in wheat. The encoded proteins are cysteine-rich, containing 18-19 cysteine residues. An avenin-like protein from wheat was expressed in Escherichia coli, purified and used to raise polyclonal antibodies. These antibodies were used to detect b-type avenin-like proteins in endosperms of wheat and related species by western blotting.
Keywords: Wheat; Aegilops; Avenin-like; Seed storage protein

L. Haska, M. Nyman, R. Andersson, Distribution and characterisation of fructan in wheat milling fractions, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 768-774, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.05.002.
(http://www.sciencedirect.com/science/article/B6WHK-4SPC0NV-1/2/030a775ff1e7d443d440f507ad17c27f)
Abstract:
Structure and health effects of inulin-type fructans have been extensively studied, while less is known about the properties of the graminan-type fructans in wheat. Arabinoxylan (AX) is another important indigestible component in cereal grains, which may have beneficial health effects. In this study, the fructan content in milling fractions of two wheat cultivars was determined and related to ash, dietary fibre and AX contents. The molecular weight distribution of the fructans was analysed with HPAEC-PAD and MALDI-TOF MS using 1H NMR and enzymatic hydrolysis for identification of fructans. The fructan content (g/100 g) ranged from 1.5 +/- 0.2 in flour to 3.6 +/- 0.5 in shorts and 3.7 +/- 0.3 in bran. A correlation was found between fructan content and dietary fibre content ($r = 0.93$, $P < 0.001$), but with a smaller variation in fructan content between inner and outer parts of the grain. About 50% of the dietary fibre consisted of AX in all fractions. The fructans were found to have a DP of up to 19 with a similar molecular weight distribution in the different fractions.
Keywords: Fructan; Arabinoxylan; Wheat; Molecular weight

A. Colombo, G.T. Perez, P.D. Ribotta, A.E. Leon, A comparative study of physicochemical tests for quality prediction of Argentine wheat flours used as corrector flours and for cookie production, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 775-780, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.05.003.
(http://www.sciencedirect.com/science/article/B6WHK-4SRKMH6-1/2/70f3ed25b3975285a877e96f9b04bef5)
Abstract:
Several physicochemical tests are employed in quality evaluation of wheat. Most of the exported Argentinean wheat flour is used as corrector flour in breadmaking. A small percentage is actually used in cookie production. No study has determined which predictive tests are most suitable for the quality prediction of bread (using flour as corrector) and cookies made from Argentinean wheat. The objectives of this study were to compare the suitability of predictive tests in the assessment of wheat flour attributes in the production of bread and cookies and to establish the relationship between the tests and flour components. Several expected associations were found between the SRC test and the composition parameters. Moreover, various flour components influencing the SDS sedimentation index (SDS-SI), the Zeleny index and the alkaline water retention capacity (AWRC) were established. The cookie factor (CF) was negatively correlated with sucrose, carbonate and water SRC and with AWRC. In addition, the bread loaf specific volume (LV) was correlated with the SDS-SI, the Zeleny index and the lactic acid SRC. In conclusion, several components of Argentine wheat affecting predictive tests were found. The SRC test allowed straight assessment of the bread and cookie quality of Argentinean wheat.
Keywords: Wheat flour; Bread; Cookie; Predictive tests

Zuo Min, Yihu Song, Qiang Zheng, Influence of reducing agents on properties of thermo-molded wheat gluten bioplastics, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 794-799, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.003.
(http://www.sciencedirect.com/science/article/B6WHK-4T2S8R2-1/2/9cb8e1a7ce0e61d8c39dbf0f2c8a6580)
Abstract:
The present work aims to study the influence of reducing agents of sodium bisulfite, sodium sulfite and thioglycolic acid on the equibiaxial extensional deformation of glycerol plasticized wheat gluten and the properties of gluten bioplastics thermo-molded at 125 [degree sign]C. Moisture absorption,

weight loss and water uptake, uniaxial tensile properties (Young's modulus, tensile strength, elongation at break and tensile set), and morphology observations were performed to characterize the physical properties of the thermo-molded gluten bioplastics. The results showed that reducing agents facilitated the viscous flow and restrained the elastic recovery of the plasticized gluten while not hindering the crosslinking reaction of gluten proteins during thermo-molding. On the contrary, reducing agents do not significantly influence moisture absorption, Young's modulus, tensile strength and the morphology of the gluten bioplastics thermo-molded at 125 [degree sign]C. It is shown that reducing agents are highly effective for tailoring the flow viscosity of the plasticized gluten dough and the mechanical properties of thermo-molded gluten bioplastics.
Keywords: Wheat gluten; Bioplastic; Reducing agent; Properties

John M. Martin, Brian Beecher, Michael J. Giroux, White salted noodle characteristics from transgenic isolines of wheat over expressing puroindolines, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 800-807, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.001.
(http://www.sciencedirect.com/science/article/B6WHK-4T2M5WK-1/2/b48a49d603bb187f1289021d10854d22)
Abstract:
The closely linked genes puroindoline a (Pina) and puroindoline b (Pinb) control most of the variation in wheat (Triticum aestivum) grain texture. Mutations in either Pina or Pinb result in hard grain with wild type forms of both genes giving soft grain. Asian noodles are prepared from both hard and soft classes of wheat. Our objective was to examine color and texture characteristics of white salted noodles processed from flours of transgenic isolines of Hi-Line hard red spring wheat over expressing Pina-D1a, Pinb-D1a or both and a control giving a range in grain texture from very soft to hard. White salted noodles were prepared and color and texture characteristics were measured. The three softer textured transgenic isolines showed greater change in L* with time than Hi-Line. The noodles were more adhesive (more negative value), firmer, and chewier as the grain texture became successively softer when cooked at 5 min. These texture differences were not as apparent when noodles were cooked for an optimum time. Starch pasting properties did not explain the noodle textural differences. A possible explanation for the noodle texture differences may be related to starch damage which ranged from 2.2% for HGAB to 6.7% for Hi-Line, flour particle size differences and subsequent water absorption differences among the four genotypes. Over expression of puroindolines did not enhance quality of white salted noodles when prepared under these conditions.
Keywords: Puroindoline; Noodle quality; Wheat; Grain texture

Jianwei Tang, Chunqin Zou, Zhonghu He, Rongli Shi, Ivan Ortiz-Monasterio, Yanying Qu, Yong Zhang, Mineral element distributions in milling fractions of Chinese wheats, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 821-828, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.008.
(http://www.sciencedirect.com/science/article/B6WHK-4T5CGS6-1/2/03c4c21470ff2ec01b02830603c9aae1)
Abstract:
Malnutrition related to micronutrient deficiency can create immense economic and societal problems. The objective of this study was to quantify the mineral element concentration distribution in milled fractions, using 43 common wheat (Triticum aestivum L.) cultivars sown in Jinan, China during the 2005-2006 crop season. All 43 cultivars had low Fe (average 28.2 mg Kg-1) and Zn (28.6 mg Kg-1) concentrations, and wide ranges of variation for mineral element concentrations. Highly significant effects among milling fractions and cultivars on all traits were observed, with fraction effect being the larger. There was an uneven distribution of mineral element concentrations in wheat grain. Shorts and bran fractions had the highest mineral element concentrations, whereas flours from break and reduction had low concentrations. Compared with

those in the central endosperm, the concentration of inorganic phosphorus (Pi) decreased the most with decreasing flour yield, whereas the concentration of phytic acid P (PAP), phytase activity, and Ca decreased the least. Pi was the most concentrated element in the aleurone, whereas PAP, phytase activity, and Ca were the least, compared to those in the central endosperm. Milling technique through adjusting flour yield can be used to improve the element composition of flour.
Keywords: Common wheat; Mineral element; Fe; Zn; Phosphorus; Milling fraction

Xiao-Hong Sun, Ke-Xue Zhu, Hui-Ming Zhou, Protein extraction from defatted wheat germ by reverse micelles: Optimization of the forward extraction, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 829-835, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.006.
(http://www.sciencedirect.com/science/article/B6WHK-4T4Y5V1-2/2/b2bafa66e6be726ee944b93726f55e7b)
Abstract:
In this work, the forward extraction of defatted wheat germ protein (DWGP) by reverse micelles was studied. The reverse micellar systems were formed by sulphosuccinic acid bis (2-ethylhexyl) ester sodium salt (AOT), isooctane and KCl solution. The effects of AOT concentration, pH, KCl concentration, extraction time, the amounts of defatted wheat germ flour (DWGF), W0 (the molar ratio of water to surfactant, i.e. W0 = [H2O]/[AOT]) and temperature on the forward extraction efficiency of DWGP were tested. On the basis of single-factor experiments, the optimum extraction was achieved by response surface methodology (RSM). The experimental results lead to the conclusion that the highest forward extraction efficiency of DWGP was reached at the AOT concentration 0.06 g/mL, pH 8, KCl concentration 0.1 mol/L, time 30 min, the amounts of DWGF 0.500 g, W0 25 and temperature 36 [degree sign]C. Under these conditions, the forward extraction efficiency of DWGP achieved 37%.
Keywords: Reverse micelles; Defatted wheat germ protein; Forward extraction; Optimization

Jing Wang, Jiazhu Sun, Dongcheng Liu, Wenlong Yang, Daowen Wang, Yiping Tong, Aimin Zhang, Analysis of Pina and Pinb alleles in the micro-core collections of Chinese wheat germplasm by Ecotilling and identification of a novel Pinb allele, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 836-842, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.005.
(http://www.sciencedirect.com/science/article/B6WHK-4T4Y5V1-1/2/55c15fa00365e8ac922d5c323b34a3c6)
Abstract:
Kernel hardness is mainly conditioned by allelic variations of Pina-D1 and Pinb-D1 genes located on the short arm of chromosome 5D. In this work, the Ecotilling approach was optimized to investigate Pina and Pinb alleles in the micro-core collections of Chinese wheat germplasm, and three Pina and eight Pinb alleles were found. Generally, more Pinb alleles were detected in the accessions coming from the regions that grow winter or a mixture of spring and winter wheats. This was particularly evident for the Southwestern winter wheat, Xinjiang winter-spring wheat and Yellow and Huai River Valley winter wheat regions. A novel variant (designated as Pinb-D1x) was discovered in one of the accessions from the Xinjiang winter-spring wheat region. Compared to wild type (WT) allele Pinb-D1a, two nucleotide substitutions occurred in the coding region of Pinb-D1x, one (at nucleotide position 257) resulting in the replacement of a WT cysteine residue by tyrosine and the other (at nucleotide position 382) creating a premature stop codon. The implications of our data to understanding the diversity of Pina and Pinb alleles in wheat and to future molecular breeding of wheat kernel hardness are discussed.
Keywords: Kernel hardness; Puroindoline allele; Ecotilling; Chinese wheat germplasm

D.W. Hatcher, J.E. Dexter, B.X. Fu, Investigation of amber durum wheat for production of yellow alkaline noodles, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 848-856, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.06.009.
(http://www.sciencedirect.com/science/article/B6WHK-4T5CGS6-2/2/7e09c8ef1f18e7d0aa72b3a7069972df)
Abstract:
Samples of Canadian amber durum wheat varieties, of various protein content and a composite of export cargo samples, were milled to yield straight-grade and patent flours by reducing semolina and processed into yellow alkaline noodles (YAN). Samples of Canada Hard White Spring (CWHWS) and Canada Western Red Spring (CWRS) were included for comparative purposes. YAN from durum wheat displayed a colour advantage over CWRS and CWHWS YAN. The durum YAN displayed an approximate 9-20 unit greater b* (yellowness) value than CWRS and CWHWS at 2 and 24 h after preparation. This relates to greater yellow pigment and flavonoid contents in the durum flours. All durum wheat YAN exhibited excellent noodle brightness, which was retained over time due to lower levels of the enzymes polyphenol oxidase (PPO) and peroxidase (POD). Durum noodles displayed significantly fewer specks than CWRS and were comparable to CWHWS. Durum wheat YAN cooking quality was equal to or slightly superior to CWRS and CWHWS. Durum wheat flour refinement imparted no significant effects on cooked noodle texture (maximum cutting stress, recovery, resistance to compression). However, the various texture parameters improved with durum wheat protein content and gluten strength.
Keywords: Colour; Cooking quality; Durum wheat; Flavonoids; Peroxidase; Polyphenol oxidase; Yellow alkaline noodles; Texture

T.W.J.M. van Herpen, J.H.G. Cordewener, H.J. Klok, J. Freeman, A.H.P. America, D. Bosch, M.J.M. Smulders, L.J.W.J. Gilissen, P.R. Shewry, R.J. Hamer, The origin and early development of wheat glutenin particles, Journal of Cereal Science, Volume 48, Issue 3, November 2008, Pages 870-877, ISSN 0733-5210, DOI: 10.1016/j.jcs.2008.07.002.
(http://www.sciencedirect.com/science/article/B6WHK-4T5CGS6-4/2/cc754360ee2b62c3491d852882ec20ce)
Abstract:
Breadmaking quality is strongly related to the glutenin macropolymer (GMP) fraction. Don and co-workers [Don, C., Lichtendonk, W.J., Plijter, J.J., Hamer, R.J., 2003a. Glutenin macropolymer: a gel formed by particles. Journal of Cereal Science 37, 1-7] showed that GMP consists of spherical glutenin particles and suggested that these originate from the protein bodies (PBs) observed in developing grain. We have tested this hypothesis by systematically comparing SDS-soluble and SDS-insoluble protein fractions from both PBs and flour. These preparations were analysed at the molecular, oligomer, particle and microscopic levels. Comparison of PBs isolated from immature seeds with glutenin particles isolated from mature seeds revealed strong similarities in protein composition and the presence of large glutenin oligomers. However, the glutenin particles from mature wheat were significantly larger than PBs. We suggest that PBs are the building blocks for the formation of much larger glutenin particles which are formed during the desiccation phase of kernel development.
Keywords: GMP; Protein bodies; Wheat; Origin

Chang-chun Hao, Li-jun Wang, Dong Li, Necati Ozkan, De-cheng Wang, Xiao Dong Chen, Zhi-huai Mao, Influence of alfalfa powder concentration and granularity on rheological properties of alfalfa-wheat dough, Journal of Food Engineering, Volume 89, Issue 2, November 2008, Pages 137-141, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.04.011.
(http://www.sciencedirect.com/science/article/B6T8J-4S9G8YS-1/2/1d674e220f8a991222dea4696a2ed871)
Abstract:

Influences of alfalfa powder concentration and granularity on the dynamic rheological properties of alfalfa-wheat dough was studied. Frequency sweep tests at 25 [degree sign]C and 80 [degree sign]C and temperature sweep tests from 25 [degree sign]C to 80 [degree sign]C were applied to wheat dough samples. Elastic moduli (G') and viscous moduli (G") of the alfalfa-wheat dough at 80 [degree sign]C were higher than those of the alfalfa-wheat dough at 25 [degree sign]C. The viscoelastic moduli (G' and G") of the alfalfa-wheat dough at 80 [degree sign]C showed less frequency dependence compared to those of the samples at 25 [degree sign]C. The viscoelastic moduli (G' and G") of alfalfa-wheat dough increased with the increasing of alfalfa powder concentration from 0% to 10% and decreased with further increase in alfalfa powder concentration from 10% to 20% at 25 [degree sign]C. All the alfalfa-added samples showed a delay in the dough gelatinization temperature comparing with the control sample. On the other hand, the viscoelastic moduli (G' and G") increased with the increase of alfalfa powder granularity distributed from 80-100 to 40-60 mesh.
Keywords: Rheological properties; Viscoelastic moduli; Dough; Alfalfa powder concentration; Alfalfa powder granularity

Manuel Gomez, Bonastre Oliete, Cristina M. Rosell, Valentin Pando, Encarnacion Fernandez, Studies on cake quality made of wheat-chickpea flour blends, LWT - Food Science and Technology, Volume 41, Issue 9, November 2008, Pages 1701-1709, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.11.024.
(http://www.sciencedirect.com/science/article/B6WMV-4RDR1KM-H/2/34200e4af43625230312d3538a3a3f37)
Abstract:
Legume flours, due to their amino acid composition and fibre content are ideal ingredients for improving the nutritional value of bread and bakery products. In this study, the influence of the total or partial replacement of wheat flour by chickpea flour on the quality characteristics of two kinds of cake was analyzed. The effects of the chickpea variety and the kind of flour used (white or whole) were also considered. Volume, symmetry, chroma, and crust and crumb L* diminished when increasing the amount of chickpea flour. The replacement of wheat flour by chickpea flour also induced an increase in the initial firmness but cohesiveness and resilience diminished, increasing the tendency to hardening. Among the studied varieties, Pedrosillano and Sinaloa produced cakes with the highest volume. Those varieties also gave layer cakes with the lowest firmness, gumminess and chewiness. White flours produced sponge cakes with higher volume and symmetry than whole flours. No significant differences, however, were observed in layer cakes between white and whole flours. In both layer and sponge cakes, white flour produced cakes with lower firmness, gumminess and chewiness than whole flours.
Keywords: Composite flours; Chickpea; Cake quality; Texture properties; Staling

Li Zheng, Junbin Huang, Dazhao Yu, Isolation of genes expressed during compatible interactions between powdery mildew (Blumeria graminis) and wheat, Physiological and Molecular Plant Pathology, Volume 73, Issues 4-5, November 2008, Pages 61-66, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2009.01.001.
(http://www.sciencedirect.com/science/article/B6WPC-4VGWYTC-1/2/e3c5e0cd14b6a332a9225c6b6b26efa3)
Abstract:
Powdery mildew of wheat is an important disease caused by the obligately biotrophic fungus Blumeria graminis. In compatible interactions, the powdery mildew fungus undergoes a series of developmental stages to form haustoria within host cells through which nutrients are obtained. In this study, we utilized the cDNA-AFLP technique to isolate wheat genes expressed at 5 days' post-inoculation. The expression patterns of several sequences identified in the cDNA-AFLP profiling were further investigated by Northern hybridization and RT-PCR analyses. Genes with sequence

similarity to GenBank accessions AAR91119, P20076, BT009372, ABA99697, BAD81963 or AAO72574 showed greater expression in susceptible rather than resistant or mock-inoculated leaves. In addition, several sequences with similarity to CAD27894, XM_466672, AAT79487 or AAM64566 were expressed only in the compatible interactions. Possible involvement of these genes in susceptibility of host wheat upon powdery mildew infection is further discussed.
Keywords: cDNA-AFLP; Powdery mildew; Wheat; Compatibility

Yi Zhang, Gang Zhang, Ning Xia, Xiao-Jie Wang, Li-Li Huang, Zhen-Sheng Kang, Cloning and characterization of a bZIP transcription factor gene in wheat and its expression in response to stripe rust pathogen infection and abiotic stresses, Physiological and Molecular Plant Pathology, Volume 73, Issues 4-5, November 2008, Pages 88-94, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2009.02.002.
(http://www.sciencedirect.com/science/article/B6WPC-4VT5TK5-1/2/25c4361c419ec1deba215f0a5dd1eaf3)
Abstract:
In plant, basic leucine zipper (bZIP) transcription factors play various roles in response to biotic and abiotic stimuli, as well as in developmental processes. In the present study, a novel bZIP gene, designated as TabZIP1, was isolated from wheat leaves infected by Puccinia striiformis f. sp. tritici using in silico cloning and reverse transcription PCR (RT-PCR) approaches. TabZIP1 was predicted to encode a 388 amino acid protein that contained a bZIP transcription factor basic domain signature and a leucine zipper motif. In transient assays with a TabZIP1-GFP construct, green fluorescent signals were specifically localized to the nucleus. Quantitative real-time PCR (qRT-PCR) analyses revealed that the transcription level of TabZIP1 was relatively higher in root than that in stem and leaf tissues. TabZIP1 transcripts were rapidly and highly induced during incompatible interactions, and by exogenously applied methyl jasmonate (MeJA) and ethylene (ET). However, salicylic acid (SA) treatment had no obvious effect on TabZIP1 expression. The transcription level of TabZIP1 was also induced by wounding and environmental stimuli, including low temperature and high salinity. These results suggested that the transcription factor encoded by the TabZIP1 gene may be involved in stress tolerance and defense response to stripe rust pathogen infection through the ET/MeJA-dependent signal transduction pathways.
Keywords: bZIP; Wheat; Stripe rust fungus; Transcription factor; Abiotic stresses

Pavel Vitamvas, Ilja Tom Prasil, WCS120 protein family and frost tolerance during cold acclimation, deacclimation and reacclimation of winter wheat, Plant Physiology and Biochemistry, Volume 46, Issue 11, November 2008, Pages 970-976, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.06.006.
(http://www.sciencedirect.com/science/article/B6VRD-4ST3YDJ-2/2/0e82e630de575180dcb37919d4b1e50d)
Abstract:
We studied how long-term cold acclimation of winter wheat (variety Mironovskaya 808), interrupted by deacclimation and then followed by reacclimation, affected the levels of cold-induced WCS120 proteins, dry-weight content, and frost tolerance in leaves. Two experiments were performed: (1) plants undergoing long-term cold acclimation (up to 112 days) were quickly deacclimated (for 5 days), and then reacclimated again to cold; (2) plants vernalized for varying periods of time in an early stage of their development were, after a longer deacclimation of about 14 days, exposed for the same time period to cold. Five members of the WCS120 protein family were detected and quantified by image analysis in protein gel blots (in the first experiment); as well as in two-dimensional electrophoresis gels (in the second experiment). In both experiments, partially vernalized plants, after reacclimation, re-established their frost tolerance to levels similar to plants having had the same duration of cold treatment, but without deacclimation. On the other hand, these partially and fully vernalized plants reaccumulated WCS120 proteins to lower levels than

plants that were not deacclimated. Further, using a mathematical model (the peak four-parameter Weibull equation), the same type of response curve was observed during plant cold treatment not only for the level of frost tolerance, but also for dry-weight content and accumulation of WCS120 proteins, with the maximum values reached at about the same time as vernalization saturation.
Keywords: Cold acclimation; Dry-weight content; Frost tolerance; Reacclimation; Triticum aestivum; Vernalization; WCS120 proteins

J. Bauer, M.U.F. Kirschbaum, L. Weihermuller, J.A. Huisman, M. Herbst, H. Vereecken, Temperature response of wheat decomposition is more complex than the common approaches of most multi-pool models, Soil Biology and Biochemistry, Volume 40, Issue 11, November 2008, Pages 2780-2786, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.07.024.
(http://www.sciencedirect.com/science/article/B6TC7-4T8YVC7-2/2/1db2bc14e8e45e491c244c105ba03c61)
Abstract:
The temperature response of heterotrophic soil respiration is crucial for a reliable prediction of carbon dynamics in response to climatic changes. Most multi-pool models describe the temperature dependence of carbon decomposition by a response function which uniformly scales the decomposition constants of all carbon pools. However, it is not clear whether the temperature response does, indeed, conform to such a simple formulation. In this study, we analysed measured CO2 efflux from wheat decomposition experiments under six different temperatures (5, 9, 15, 25, 35 and 45 [degree sign]C). Data were interpreted by assuming that litter could be sub-divided into two pools, a labile and a more recalcitrant one, that would each decay exponentially. We found that the observed patterns of carbon loss were poorly described if we used the same relative temperature response functions for the decomposition of both pools and assumed the same chemical recalcitrance (expressed as the ratio of labile and recalcitrant pool sizes) at all temperatures. Data prediction could be significantly improved by using different temperature response functions for the decomposition of the two different organic matter fractions. Even better data prediction could be achieved by assuming that chemical recalcitrance varied with temperature. The data could also be well described by the more sophisticated carbon-dynamic models RothC and CenW/CENTURY, again, provided that the ratio of litter fractions in the initial input material was modified with temperature. Our findings thus suggest that the temperature dependence of organic matter decomposition cannot be fully described with the simple approaches usually employed but that there is a more complicated interplay between the temperature dependence of decomposition rates and temperature effects on the chemical recalcitrance of different organic matter fractions.
Keywords: CENTURY; CenW; Decomposition; Exponential decay; RothC; Soil carbon; Temperature; Temperature dependence; 14C-carbon

L. Ma, E. Zhou, L. Gao, X. Mao, R. Zhou, J. Jia, Isolation, expression analysis and chromosomal location of P5CR gene in common wheat (Triticum aestivum L.), South African Journal of Botany, Volume 74, Issue 4, November 2008, Pages 705-712, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.05.003.
(http://www.sciencedirect.com/science/article/B7XN9-4SXRTWN-1/2/6618346a48eb7a374529113c82cf4ddf)
Abstract:
Many organisms, including higher plants, accumulate free proline under osmotic stress. P5CR is the last enzyme in the cascade for proline synthesis. We isolated TaP5CR in wheat with a homologous sequence method. It is 1025 bp in length and contains a complete open reading frame of 864 bp that encodes a polypeptide of 288 amino acids. A Southern blot showed that TaP5CR had more than two copies in wheat. The TaP5CR gene which we isolated was located on chromosome 3D and expressed at much higher levels in radicles, flowers and leaves than other

organs. Its expression was upregulated by salt, PEG, ABA and heat stress. TaP5CR overexpression in Arabidopsis can enhance root growth under salt stress and increase proline content and decrease MDA content under NaCl, PEG and ABA stress. The results showed the possibility to use TaP5CR to enhance transgenic Arabidopsis stress tolerance.
Keywords: P5CR; Stress tolerance; Wheat

C. Juan, A. Pena, C. Lino, J.C. Molto, J. Manes, Levels of ochratoxin A in wheat and maize bread from the central zone of Portugal, International Journal of Food Microbiology, Volume 127, Issue 3, 31 October 2008, Pages 284-289, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.07.018.
(http://www.sciencedirect.com/science/article/B6T7K-4T262XM-1/2/394b2187d106b97612253e90911e94b8)
Abstract:
Ochratoxigenic fungi are natural contaminants of cereal and the produced toxins are harmful to humans and animals. Ochratoxin A (OTA) is among the most important mycotoxins, and the International Agency for Research on Cancer (IARC) classifies it as possibly carcinogenic to humans (group 2B). A total of 61 samples of bread from the central zone of Portugal were analysed for OTA by liquid chromatography (LC) with fluorescence detection (FD). For confirmation two procedures were applied, methyl ester derivatization with boron trifluoride-methanol and liquid chromatography/electrospray ionization tandem mass spectrometry (LC/ESI/MS/MS). As far as we know, this is the first report where on-line LC/electrospray ionization (ESI) tandem mass spectrometry (MS/MS) was used for OTA analysis in bread.
Limits of detection (LOD) and quantification (LOQ) were 0.015 and 0.03 ng/g, using LC-FD, and 0.03 and 0.09 ng/g by LC-MS/MS.
The incidence of OTA was 12.9% and 70.0% for wheat and maize bread, respectively. The highest OTA levels were obtained for maize bread, having one sample exceeded the European maximum limit established for OTA in cereal products.
The estimate daily intake (EDI) was below the tolerable daily intake.
Keywords: Ochratoxin A; Maize bread; Wheat bread; LC-FD; LC-MS-MS

Vladimir Kreslavski, Nikolai Tatarinzev, Nadezhda Shabnova, Galina Semenova, Anatoli Kosobryukhov, Characterization of the nature of photosynthetic recovery of wheat seedlings from short-term dark heat exposures and analysis of the mode of acclimation to different light intensities, Journal of Plant Physiology, Volume 165, Issue 15, 9 October 2008, Pages 1592-1600, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.12.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4S0353W-3/2/51c39b4518b6a20d4def81d818993d27)
Abstract: Summary
The nature of photosynthetic recovery was investigated in 10-d-old wheat (Triticum aestivum L., cv. Moskovskaya-35) seedlings exposed to temperatures of 40 and 42 [degree sign]C for 20 min and to temperature 42 [degree sign]C for 40 min in the dark. The aftereffect of heat treatment was monitored by growing the heat-treated plants in low/moderate/high light at 20 [degree sign]C for 72 h. The net photosynthetic rates (PN) and the fluorescence ratios Fv/Fm were evaluated in intact primary leaves and the rates of cyclic and non-cyclic photophosphorylation were measured in the isolated thylakoids. At least two temporally separated steps were identified in the path of recovery from heat stress at 40 and 42 [degree sign]C in the plants growing in high and moderate/high light, respectively. Both photochemical activity of the photosystem II (PSII) and the activity of CO2 assimilation system were lowered during the first step in comparison with the corresponding activities immediately after heat treatment. During the second step, the photosynthetic activities completely or partly recovered. Recovery from heat stress at 40 [degree sign]C was accompanied by an appreciably higher rate of cyclic photophosphorylation in comparison with control non-heated seedlings. In pre-heated seedlings, the tolerance of the PSII to photoinhibition was higher

than in non-treated ones. The mode of acclimation to different light intensities after heat exposures is analyzed.
Keywords: Chlorophyll a fluorescence; Heat stress; Photosynthetic apparatus; Recovery; Wheat

Yong-lu TANG, Wu-yun YANG, Ji-chun TIAN, Jun LI, Fang CHEN, Effect of HMW-GS 6 + 8 and 1.5 + 10 from Synthetic Hexaploid Wheat on Wheat Quality Traits, Agricultural Sciences in China, Volume 7, Issue 10, October 2008, Pages 1161-1171, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60160-1.
(http://www.sciencedirect.com/science/article/B82XG-4TSKFY5-1/2/7236fc948d99a086fd677617222f330b)
Abstract:
To determine the effect of 6 + 8 and 1.5 + 10 HMW-GS of synthetic hexaploid wheat (SHW) on main quality parameters of wheat, a set of recombinant inbred lines (RILs) derived from the cross between a SHW with N, 6 + 8, 1.5 + 10 HMW-GS and a cultivar Chuanyu 12-1 (CY12-1) with 1, 7 + 8, 2 +12 were planted in three environments in 2005 and 2006 and totally 16 quality parameters were tested for each line. Significant differences in all tested quality parameters but flour yield were observed between the two parents. The mean values of the RILs were intermediate to the parents for grain and protein parameters and some farinograph parameters, flour water absorption (FWA), and farinograph softening (SOF) but beyond parents at dough stability time (DST), breakdown time (BRT), quality number (QN), noodle score (NS), and loaf volume (LOV). All of the quality traits, especially in grain hardness (GH), zeleny sedimentation volume (SED), and most of farinograph parameters had significant difference between the different HMW-GS components. The effects of different alleles of HMW-GS at same locus (Glu-A1 or Glu-B1 or Glu-D1) on the different quality parameters were also different and affected by the other two loci. For most of parameters tested, 6 + 8 was better than 7 + 8 and there was no difference between 1.5 + 10 and 2 + 12. End-use quality was greatly influenced by components of HMW-GS. The components of 1, 6 + 8, 1.5 + 10 had the highest LOV and bread score (BS) values, whereas the components of 1, 7 + 8 and 1.5 + 10 had the highest NS values. Noodle score performed a positive linear relationship with falling number (FN) and its relationships to other quality parameters were affected by environments. Loaf volume had a significant negative relationship to SOF and positive associations with most of quality parameters. It could be concluded that HMW-GS 6 + 8 from SHW had better overall quality characteristics than 7 + 8, whereas the effects of 1.5 + 10 on quality was different in respect to quality parameters and the HMW-GS components. Synthetic hexaploid wheat with subunits 6 + 8 and 1.5 + 10 had the potentials to improve the end-use quality of wheat cultivars.
Keywords: synthetic hexaploid wheat; recombinant inbred lines; 6 + 8; 1.5 + 10; HMW-GS; HMW-GS component; quality traits

N.K. Gontia, K.N. Tiwari, Development of crop water stress index of wheat crop for scheduling irrigation using infrared thermometry, Agricultural Water Management, Volume 95, Issue 10, October 2008, Pages 1144-1152, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.04.017.
(http://www.sciencedirect.com/science/article/B6T3X-4SV0STF-1/2/791305453585a0a25eb47cb3fd9909c3)
Abstract:
This study was conducted to develop the relationship between canopy-air temperature difference and vapour pressure deficit for no stress condition of wheat crop (baseline equations), which was used to quantify crop water stress index (CWSI) to schedule irrigation in winter wheat crop (Triticum aestivum L.). The randomized block design (RBD) was used to design the experimental layout with five levels of irrigation treatments based on the percentage depletion of available soil water (ASW) in the root zone. The maximum allowable depletion (MAD) of the available soil water (ASW) of 10, 40 and 60 per cent, fully wetted (no stress) and no irrigation (fully stressed) were

maintained in the crop experiments. The lower (non-stressed) and upper (fully stressed) baselines were determined empirically from the canopy and ambient air temperature data obtained using infrared thermometry and vapour pressure deficit (VPD) under fully watered and maximum water stress crop, respectively. The canopy-air temperature difference and VPD resulted linear relationships and the slope (m) and intercept (c) for lower baseline of pre-heading and post-heading stages of wheat crop were found m = -1.7466, c = -1.2646 and m = -1.1141, c = -2.0827, respectively. The CWSI was determined by using the developed empirical equations for three irrigation schedules of different MAD of ASW. The established CWSI values can be used for monitoring plant water status and planning irrigation scheduling for wheat crop.
Keywords: Canopy-air temperature difference; Infrared thermometry; Crop water stress index (CWSI); Irrigation scheduling

Guo Yu Qiu, Liming Wang, Xinhua He, Xiying Zhang, Suying Chen, Jin Chen, Yonghui Yang, Water use efficiency and evapotranspiration of winter wheat and its response to irrigation regime in the north China plain, Agricultural and Forest Meteorology, Volume 148, Issue 11, October 2008, Pages 1848-1859, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.06.010.
(http://www.sciencedirect.com/science/article/B6V8W-4T41PB8-2/2/5a032277e1a8631fdb025c5291baa831)
Abstract:
Improvement of water use efficiency (WUE) in crops is important for almost all agricultural practices around the world. Numerous studies have addressed WUE on a grain yield basis, but few on a photosynthesis basis and a biomass basis. Based on a 2-year field experiment (2002-2004), we analyzed wheat WUE not only on grain yield basis, but also on photosynthesis basis and biomass basis, and then discussed the effects of irrigation regimes on wheat WUE. We found that: (1) irrigation regimes had considerable effects on wheat transpiration, total evapotranspiration, and canopy temperature; (2) wheat WUE ranged 2.1-3.3 [mu]mol CO2/mmol H2O on a photosynthesis basis, 1.0-2.6 kg m-3 and 1.1-2.1 kg m-3 on a biomass and a grain yield basis, respectively. The maximum WUE appeared during the jointing and the milking stage, when suitable water management could be crucial to improve wheat WUE; (3) it was hypothesized by farmers and local water managers that more water supply over the conventional irrigation regime during the growing season could significantly increase both WUE and grain yield of the winter wheat in the north China plain (NCP). However, our results showed that with the increase of irrigation times and amount of irrigation water per growing season, wheat WUE was generally decreased and grain yield was not increased, although the evapotranspiration was significantly increased. Reduction in irrigation times and amount of irrigation water could be considered for saving water in the NCP; (4) WUE of winter wheat at photosynthesis and biomass levels were positively related with WUE at grain yield level.
Keywords: Evapotranspiration; Wheat biomass and grain yield; Irrigation regime; The north China plain (NCP); Water use efficiency (WUE)

Stephen Hobbs, Database of individual wheat plant motion in wind: Application to radar imaging of vegetation, Agricultural and Forest Meteorology, Volume 148, Issue 11, October 2008, Pages 1860-1868, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.06.009.
(http://www.sciencedirect.com/science/article/B6V8W-4T4HJ9J-1/2/f9d5b909fc391b40c7d623dca08ddc77)
Abstract:
This article presents a database of wheat motion in wind based on videogrammetric measurements of plant motion coupled with high-resolution anemometry. The database is described along with a summary of the experiments performed. Results are then derived from the database to quantify key processes relevant to radar imaging of vegetation. The database

provides a significant resource for studies requiring quantitative data on the motion of vegetation in wind, and can be applied to several applications in addition to radar imaging.
Keywords: Wheat; Vegetation motion; Wind; Radar; Interferometric coherence

Steven Kildea, Vanessa Ransbotyn, Mojibur R. Khan, Brian Fagan, Gerald Leonard, Ewen Mullins, Fiona M. Doohan, Bacillus megaterium shows potential for the biocontrol of septoria tritici blotch of wheat, Biological Control, Volume 47, Issue 1, October 2008, Pages 37-45, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.07.001.
(http://www.sciencedirect.com/science/article/B6WBP-4T0MMHV-1/2/ac821f66662050802a7ba2a69177cb6c)
Abstract:
Control of septoria tritici blotch (STB) of wheat caused by the fungal pathogen Mycosphaerella graminicola is heavily reliant on fungicide application. Rapid emergence of fungal isolates resistant to Quoine outside Inhibitors (QoI) and with reduced sensitivity to triazole-based fungicides necessitates the development and adoption of alternative control strategies. A collection of bacteria originating from barley leaves and grain, oat chaff and wheat rhizospheres and leaves were screened for their ability to control STB. A total of seven bacteria were further assessed under controlled environmental conditions and these inhibited STB development by up to 92%. Three of these bacteria [Pseudomonas fluorescens (strains MKB21 and MKB91) and a Bacillus megaterium (strain MKB135)] were assessed for their abilities to control STB on adult wheat plants in small-scale field trials, conducted both in 2004 and 2006. In these trials only B. megaterium (strain MKB135) consistently retarded STB development (by up to 80%). Additional in vitro seedling studies showed that both B. megaterium cell wall components and its culture filtrate and P. fluorescens strain MKB91 culture filtrate were capable of inhibiting disease development (by 62, 36 and 52%, respectively). While none of the three bacteria directly inhibited fungal growth in dual culture plate assays, in dual liquid culture assays volatiles produced by these bacteria reduced fungal biomass production by [greater-or-equal, slanted]43%. Thus the ability of the most promising bacterium, B. megaterium strain MKB135, to reduce STB severity may be the result of a combination of different mechanisms.
Keywords: Biocontrol; Mycosphaerella graminicola; Bacilli; Bacillus megaterium; Fluorescent pseudomonads; Diseased leaf area

Ankur Bhatnagar, Sanjay Kumar, James Gomes, Operating conditions of a 200 l staged vertical reactor for bioconversion of wheat straw by Phanerochaete chrysosporium, Bioresource Technology, Volume 99, Issue 15, October 2008, Pages 6917-6927, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.01.031.
(http://www.sciencedirect.com/science/article/B6V24-4S0R6MX-2/2/8dda9d5e59d84c528c0e54c201a47734)
Abstract:
Bioconversion of wheat straw using Phanerochaete chrysosporium was carried out in a 200 l staged vertical reactor. The bioconversion process was characterized by measuring the percentage degradation of lignin and cellulose, and increment in crude protein content. The effect of airflow rate, inoculum amount and wheat straw loading on bioconversion was investigated using a statistical experimental design. An analysis of variance was performed to determine response surfaces. The quality of bioconversion indicated by an optimization index called the desirability coefficient had the highest value of 0.75 for the fifth day of cultivation. This corresponded to an operating condition of 1.5 kg wheat straw per stage using an inoculum amount of 0.38 g (100 g dry wheat straw)-1 and an airflow rate of 15 l min-1. The lignin and cellulose degradation achieved at this operating condition was 27% and 29%, respectively. A ratio of 3 for the weight of wheat straw to inoculum amount gave the highest crude protein of 5.9% on dry weight basis. Among the variables investigated, the airflow rate exhibited a significant effect on the quality of bioconversion.

Our results indicate that the quality of bioconversion may be controlled by implementing a predetermined airflow rate schedule.
Keywords: Staged vertical reactor; Airflow rate; Lignin degradation; Cellulose degradation; Desirability coefficient

Marnyye Velazquez-Cedeno, Anne Marie Farnet, Gerardo Mata, Jean-Michel Savoie, Role of Bacillus spp. in antagonism between Pleurotus ostreatus and Trichoderma harzianum in heat-treated wheat-straw substrates, Bioresource Technology, Volume 99, Issue 15, October 2008, Pages 6966-6973, ISSN 0960-8524, DOI: 10.1016/j.biortech.2008.01.022.
(http://www.sciencedirect.com/science/article/B6V24-4S02D5K-3/2/7833314edc54a615783a745a263c9734)
Abstract:
This study aimed to identify bacteria involved in Trichoderma harzianum inhibition while promoting Pleurotus ostreatus defences in order to favour cultivation-substrate selectivity for mushroom production. PCR-DGGE profiles of total DNA from wheat-straw substrate showed weak differences between bacterial communities from substrate inoculated with P. ostreatus with or without T. harzianum. The major cultivable bacteria were isolated from three batches of wheat-straw-based cultivation substrates showing an efficient selectivity. They were screened for their ability to inhibit T. harzianum. By using specific media for bacterial isolation and by sequencing certain 16S-rDNA, we observed that Bacillus spp. were the main inhibitors. Among them, a dominant species was identified as Paenibacillus polymyxa. This species was co-cultivated on agar media with P. ostreatus. The measurement of laccase activities from culture plugs indicated that P. polymyxa induced increases in enzyme activities. Bacillus spp. and specifically P. polymyxa from cultivation substrates are implicated in their selectivity by both inhibiting the growth of T. harzianum and stimulating defences of the mushroom P. ostreatus through the induction of laccases. The management of microbial communities during P. ostreatus cultivation-substrate preparation in order to favour P. polymyxa and other Bacillus spp. growth, can be a way to optimize the development of P. ostreatus for mushroom production or other environmental uses of this fungus.
Keywords: Antagonism; Mushroom cultivation; Pleurotus; Selective substrate; Trichoderma

S. Neethirajan, D.S. Jayas, N.D.G. White, H. Zhang, Investigation of 3D geometry of bulk wheat and pea pores using X-ray computed tomography images, Computers and Electronics in Agriculture, Volume 63, Issue 2, October 2008, Pages 104-111, ISSN 0168-1699, DOI: 10.1016/j.compag.2008.01.019.
(http://www.sciencedirect.com/science/article/B6T5M-4S3G9HG-1/2/d049b6dffe29b343c16245e13770a3cb)
Abstract:
Quantitative characterization of pore topology inside grain bulks is necessary to predict the air traverse time and the cooling or fumigation pattern for the design of storage management strategies. Quantification of 3D microarchitecture of the inter-granular airspace in the grain bulks can also contribute to the development of predictive models of insect movement and for designing acoustic systems for insect infestation detection. In this study, inter-connected 3D array of void spaces was characterized by geometrical quantities such as specific surface area, pore throat size and nodal pore volume. These features were obtained from a 13.1 cm x 13.1 cm x 5 cm volume of wheat and pea bulks. The grain bulks were imaged using a high resolution X-ray computed tomography system at 200 [mu]m resolution. The spatial distributions were computed based on 3D medial axis analysis of the void space in the images using 3DMA-Rock software and a high performance Polaris computer. The other features calculated were medial axis tortuosity, throat surface area and porosity from the 3D images. Characterization of pore throat network provides reliable observation for facilitating realistic prediction of permeability and the nature of air and gas distribution inside grain bulks.

Keywords: X-ray CT images; 3D image analysis; Pore shape; Pore connectivity; Pore volume; Tortuosity; Pore throat

A. Manickavasagan, G. Sathya, D.S. Jayas, Comparison of illuminations to identify wheat classes using monochrome images, Computers and Electronics in Agriculture, Volume 63, Issue 2, October 2008, Pages 237-244, ISSN 0168-1699, DOI: 10.1016/j.compag.2008.03.002.
(http://www.sciencedirect.com/science/article/B6T5M-4SBHD5R-2/2/1726c29f26e4a96e277f5027dd5dc6ba)
Abstract:
Wheat class identification using machine vision is an objective method which can be used for online testing to automate handling, binning and shipping operations in grain industry. The efficiencies of a monochrome camera-based vision system with three different illuminations (incandescent light (IL), fluorescent ring light (FRL), fluorescent tube light (FTL)) were determined to identify eight western Canadian wheat classes at four moisture levels (11%, 14%, 17% and 20%). The monochrome images of the bulk wheat samples were acquired at each moisture level (3 illuminations x 8 classes x 4 moisture contents x 100 replications = 9600 images). A linear discriminant function was used for the classification of wheat samples using 32 gray level textural features extracted from the monochrome images. The mean gray values of the wheat classes were in the ranges of 75-103, 73-115, and 107-143 for IL, FRL and FTL, respectively. The mean gray values of wheat classes were significantly different within each illumination and between different illuminations ([alpha] = 0.05). Mean gray value was the highest for FTL and the lowest for IL illumination. The moisture content of the wheat samples had significant effect on the mean gray values. The overall classification accuracies were 90%, 81% and 96% for IL, FRL and FTL, respectively, when all the wheat classes were at the same moisture levels. It was 66%, 53% and 85% for IL, FRL and FTL, respectively, when the wheat classes were at different moisture levels. The classification accuracies of a 2-stage classification system for the classes with different moisture levels were 68%, 56% and 90% for IL, FRL and FTL, respectively.
Keywords: Wheat classes; Monochrome images; Machine vision; Illumination; Linear discriminant analysis

Longhui Li, Gregory S. McMaster, Qiang Yu, Jun Du, Simulating winter wheat development response to temperature: Modifying Malo's exponential sine equation, Computers and Electronics in Agriculture, Volume 63, Issue 2, October 2008, Pages 274-281, ISSN 0168-1699, DOI: 10.1016/j.compag.2008.03.006.
(http://www.sciencedirect.com/science/article/B6T5M-4SG017V-1/2/05939122acd57e6574b25aba080f91f5)
Abstract:
Predicting crop developmental events is fundamental to simulation models and crop management decisions. Many approaches to predict developmental events have been developed, however, most only simulate the mean time for reaching a developmental event. An exponential sine equation developed by Malo [Malo, J.E., 2002. Modelling unimodal flowering phenology with exponential sine equation. Funct. Ecol. 16, 413-418] to predict flower number over time was modified to incorporate the response of crop development rate to temperature. The revised model (ExpSine model) uses the base, optimum, and maximum cardinal temperatures specific to a crop or genotype. Most model parameters were estimated from the literature, and four of the five model parameters have physiological significance. Model evaluation for winter wheat (Triticum aestivum L.) was based on two controlled environment studies from the literature and two field experiments conducted in the North China Plain (NCP) and the Tibet Plateau (TPC). The r2 for the modified temperature response function was 0.74 and 0.91 for two different experiments and compared very well (identical mean r2's) to an existing function (Beta model) [Yin, X., Kropff, M.J., McLaren, G., Visperas, R.M., 1995. A nonlinear model for crop development rate as a function of

temperature. Agric. Forest Meteorol. 77, 1-16]. Differences between observed and predicted flowering dates ranged from -2 to 3 days in the NCP and from -7 to 4 days on the TPC, with the mean percent error in both sites less than 1% and no apparent bias observed in the model. This modification of Malo's exponential sine equation expanded the predictive ability of the original equation to simulate phenology across a broader range of environments. The ExpSine model developed can be used as a phenological module in various crop or ecological simulation models.
Keywords: Cardinal temperatures; Flowering date; Phenological model; Winter wheat

Christos G. Athanassiou, Nickolas G. Kavallieratos, Basileios J. Vayias, Johanna B. Tsakiri, Nickoleta H. Mikeli, Constantin M. Meletsis, Zeljko Tomanovic, Persistence and efficacy of Metarhizium anisopliae (Metschnikoff) Sorokin (Deuteromycotina: Hyphomycetes) and diatomaceous earth against Sitophilus oryzae (L.) (Coleoptera: Curculionidae) and Rhyzopertha dominica (F.) (Coleoptera: Bostrychidae) on wheat and maize, Crop Protection, Volume 27, Issue 10, October 2008, Pages 1303-1311, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.03.004.
(http://www.sciencedirect.com/science/article/B6T5T-4T07YRG-1/2/3602ac1d7f265d9347f9d66ef2b105d8)
Abstract:
Wheat and maize were treated with 8x106 and 8x108 conidia/kg of the entomopathogenic fungus Metarhizium anisopliae (Metschnikoff) Sorokin, alone and in combination with 250 ppm Diatomaceous Earth (DE). Bioassays were conducted after application and monthly for 5 months using adult Sitophilus oryzae (L) and Rhyzopertha dominica (F.). Both treated grains and the bioassay samples were held at 27+/-1 [degree sign]C and 65+/-5% r.h. Mortality assessments were made at 7 and 14 d, and after the 14 d counts all adults were removed and the samples incubated at the same environmental conditions for 60 d to record progeny production. Mortality of S. oryzae exposed for 7 d on both grains decreased during the 5-month period, however, maximum mortality usually occurred in the combination of the highest fungal rate with the DE. Mortality of S. oryzae was generally lower in maize than in wheat. Mortality of R. dominica in both grains was generally greater than mortality observed for S. oryzae. Progeny production of S. oryzae increased gradually during the 5 months, but this increase varied depending on the treatment. Similar results were noted for R. dominica with generally lower progeny production compared with S. oryzae.
Keywords: Metarhizium anisopliae; Diatomaceous earth; Sitophilus oryzae; Rhyzopertha dominica; Wheat; Maize

William F. Schillinger, Steven E. Schofstoll, J. Richard Alldredge, Available water and wheat grain yield relations in a Mediterranean climate, Field Crops Research, Volume 109, Issues 1-3, October-December 2008, Pages 45-49, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.06.008.
(http://www.sciencedirect.com/science/article/B6T6M-4T24FR7-2/2/4c369fef0fe0bf8196ce18575b9dd1da)
Abstract:
Wheat (Triticum aestivum L.) is the principle crop grown in many Mediterranean climate zones around the world, including the 3.35 million hectare dryland cropping region of the Inland Pacific Northwest (PNW) of the United States. Farmers in the low- and intermediate-precipitation areas of the region are often reluctant to plant spring wheat (SW) because grain yields are highly variable compared to winter wheat (WW) after summer fallow (SF). Our objectives were to: (i) assess available water and wheat grain yield relations from well-fertilized dryland field experiments conducted from 1953 to 1957 versus related studies from 1993 to 2005, (ii) compare and compartmentalize available water-use efficiency of WW compared to SW during the 1993-2005 period, and (iii) provide a tool to allow farmers to predict SW grain yield based on stored soil water at time of planting plus expected spring (April, May, June) rainfall. Simple linear regression showed that 10.1 cm of available water was required just for vegetative growth (before wheat

reproductive development begins) in the 1953-1957 study (n = 90 replicated treatments), whereas only 5.9 cm of available water was needed in the 1993-2005 experiment (n = 175 replicated treatments). In addition to water required for vegetative growth, multiple regression analysis showed that from 1953 to 1957 each centimeter of available stored soil water and spring rainfall (SR) produced 140 and 183 kg grain ha-1, respectively, compared to 150 and 174 kg grain ha-1, respectively, for the 1993-2005 study. Multiple regression further demonstrated in the 1993-2005 studies that April rainfall contributed much less to grain yield than rainfall in May and June for both SW and WW. Winter wheat always produced more grain per unit of available water compared to SW. Data reveal that modern semi-dwarf wheat cultivars begin grain production with 4.2 cm less available water than standard-height cultivars of the 1950s. This, along with improved agronomic management, is a major contributor to ever increasing wheat grain yields during the past 50 years.
Keywords: Annual cropping; Drought; Economic risk; Increased cropping intensity; Mediterranean climate; Spring rainfall; Spring wheat; Summer fallow; Wind erosion; Winter wheat

A. Woldeamlak, S. Grando, M. Maatougui, S. Ceccarelli, Hanfets, a barley and wheat mixture in Eritrea: Yield, stability and farmer preferences, Field Crops Research, Volume 109, Issues 1-3, October-December 2008, Pages 50-56, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.06.007.
(http://www.sciencedirect.com/science/article/B6T6M-4T3CR13-1/2/f435d60d7f26a3653c84cea31590d04f)
Abstract:
Hanfets is a popular mixture of wheat and barley grown in the highlands of Eritrea and Tigray (Northern Ethiopia). In this study, we tested 16 experimental hanfets constituting all possible combinations of four barley landraces and four wheat (two landraces and two varieties) at three locations in Eritrea for 3 years during which farmers (both men and women) made selections of suitable hanfets. Across locations and years, the grain yield of hanfets on average was similar to that of the pure barley but significantly higher than that of wheat. The analysis of the land equivalent ratio did not reveal differences between the hanfets but showed an average advantage of 50% by growing hanfets as compared to the pure crops. The stability analysis showed that the most stable entries always included some hanfets but that not all hanfets were necessarily more stable than the pure crops. The interactions of the hanfets with locations and years within locations were never significant while they were significant for some of the characters in the case of pure barley and pure wheat. We did not find major differences in selection between men and women: they both selected for high grain yield, earliness, short heads, low kernel weight and short plants. They appear to prefer those hanfets in which both components are early heading and maturing. We argue that because of possible differences in root architecture, the hanfets may exploit more efficiently water resources than pure crops.
Keywords: Yield; Yield stability; GE interaction; LER; Farmer's preference; Barley and wheat mixtures

Masakuni Tako, Yukihiro Tamaki, Teruko Konishi, Kiyoshi Shibanuma, Isao Hanashiro, Yasuhito Takeda, Gelatinization and retrogradation characteristics of wheat (Rosella) starch, Food Research International, Volume 41, Issue 8, October 2008, Pages 797-802, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.07.002.
(http://www.sciencedirect.com/science/article/B6T6V-4SY6W3J-2/2/1c71c307b9345fe74d2e4201d64386c0)
Abstract:
The non-Newtonian behavior and elastic modulus of wheat (Rosella) starch solutions after preparation, and storage at 25 [degree sign]C and 4 [degree sign]C for 24 h were measured with a rheogoniometer. The flow curves of wheat starch showed plastic behavior above 4.0% solution. After storage at 4 [degree sign]C in 4.0% solution, elastic modulus increased at low temperature and showed a constant value with increase in temperature. Elastic modulus increased upon

addition of urea (4.0 M) at low temperature and remained constant up to 60 [degree sign]C. Elastic modulus of Rosella also increased in 0.05 M NaOH solution after storage. Rheological characteristics of Rosella starch differed from those of rice starches. This might be caused by difference in structure of amylopectin and large amount of amylose content on starch.
Keywords: Wheat starch; Non-Newtonian behavior; Elastic modulus; Gelatinization; Retrogradation; Hydrogen bonding; van der Waals forces of attraction

Bert Lagrain, Pedro Leman, Hans Goesaert, Jan A. Delcour, Impact of thermostable amylases during bread making on wheat bread crumb structure and texture, Food Research International, Volume 41, Issue 8, October 2008, Pages 819-827, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.07.006.
(http://www.sciencedirect.com/science/article/B6T6V-4T0FF3W-1/2/78360396df8e1278a2165114efa3bf22)
Abstract:
Thermostable amylases [Bacillus subtilis [alpha]-amylase (BSuA) and B. stearothermophilus maltogenic amylase (BStA)] with different modes of action and impacts on firming properties were added during straight-dough bread making. BSuA continuously degraded the starch fraction during bread making. Its action resulted in larger gas cells than in control bread, but did not change initial firmness. In contrast to BSuA, BStA mainly degraded starch at the end of the baking phase and during bread cooling, which caused little if any impact on bread crumb texture. However, it led to higher initial firmness readings than for the control breads. Neither BSuA nor BStA were inactivated during bread making. The results evidence that starch properties have a large impact on bread crumb structure and initial firmness and are highly influenced by the mode of action of the enzyme.
Keywords: Amylase; Starch; Partial hydrolysis; Bread making; Molecular properties; Crumb structure

U. Hennig, W. Hackl, Antje Priepke, A. Tuchscherer, W.B. Souffrant, C.C. Metges, Comparison of ileal apparent, standardized and true digestibilities of amino acids in pigs fed wheat and lupine seeds, Livestock Science, Volume 118, Issues 1-2, October 2008, Pages 61-71, ISSN 1871-1413, DOI: 10.1016/j.livsci.2008.01.010.
(http://www.sciencedirect.com/science/article/B7XNX-4S028B0-2/2/7e596f9f28a0b7a05df77bd703bb597b)
Abstract:
The aims of the investigation were to compare calculation methods for ileal apparent digestibility (AD) of amino acids (AA) and to demonstrate the calculation of ileal true digestibility (TD) using the regression approach and additionally, to compare the TD with the standardized digestibility (SD). Eight Goettingen minipigs, average 52 kg initial BW, were fitted with ileo-rectal anastomoses and fed consecutively with assay diets in four experiments according to a Latin rectangle design. To determine AD by using the `direct method', diets contained wheat, lupine, or casein as the sole sources of protein. Furthermore, the `difference method' was used by applying diets with wheat plus casein or wheat plus lupine. To determine AD using the regression (`Reg2') method, three graded levels of lupine mixed with wheat were fed. The TD and the basal ileal endogenous losses of AA (ELbAA) were determined using the regression approach (`Reg1') by feeding both 5 graded levels of lupine and 5 graded levels of wheat, each added with N-free mixture at 1000 g. In each experiment, one repetition comprised 10 days for adaptation and 4 days for quantitative collection of ileal effluents. Pigs were fed twice a day and the target dietary allowance was 35 g DM kg- 0.75 BW d- 1 in all experiments. There were no differences in the AD of any AA in lupine or in wheat when those were determined with the direct, difference or Reg2 method. The TD values of the most indispensable AA were higher than the AD (in lupine 8 to 20%-units for lysine and methionine and in wheat 6 to 11%-units for tryptophan and lysine, respectively). These differences reflected

the ELbAA derived from the intercept (a) of the Reg1. The ELbAA were higher in lupine than in wheat for arginine, histidine, leucine, methionine, phenylalanine, tryptophan, cysteine, glutamine, and serine ($P < 0.007$ to 0.047). In conclusion, the TD of AA should be determined by Reg1 regression rather than calculation of SD, i.e. AD values corrected with means of ELbAA, because the latter cannot be assumed as constant.
Keywords: Amino acids; Wheat; Lupine; Ileal true digestibility; Standardized digestibility; Methodology; Pigs

Youling L. Xiong, Kingsley K. Agyare, Kwaku Addo, Hydrolyzed wheat gluten suppresses transglutaminase-mediated gelation but improves emulsification of pork myofibrillar protein, Meat Science, Volume 80, Issue 2, October 2008, Pages 535-544, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2008.02.005.
(http://www.sciencedirect.com/science/article/B6T9G-4RV17SB-1/2/ad0c6d5fffd25129b3c0484ba5fa03b1)
Abstract:
The influence of 15-h chymotrypsin-hydrolyzed wheat gluten (GH) on microbial transglutaminase (MTGase)-mediated interaction, gelation and emulsification of pork myofibrillar protein isolate (MPI) was investigated at two ionic strengths (0 M and 0.6 M NaCl) and pH 6.5. MTGase treatments in 0 M NaCl solution decreased the size of myosin heavy chain through deamidation, but this was inhibited by GH or in 0.6 M NaCl where myosin polymerization dominated. Stabilization of MPI (thermal transitions) by the MTGase treatment was also diminished ($P < 0.05$) by the presence of GH at both ionic strengths. These GH-induced MPI physicochemical changes greatly weakened the ability of MTGase to promote MPI thermal gelation (gel storage modulus, $P < 0.05$), especially at 0.6 M NaCl, which was shown to result from reduced protein aggregation. However, GH improved ($P < 0.05$) emulsifying properties of MPI, regardless of MTGase treatment.
Keywords: Hydrolyzed wheat gluten; Gelation; Emulsification; Myofibrillar protein; Microbial transglutaminase

Olivia J. Desmond, John M. Manners, Peer M. Schenk, Donald J. Maclean, Kemal Kazan, Gene expression analysis of the wheat response to infection by Fusarium pseudograminearum, Physiological and Molecular Plant Pathology, Volume 73, Issues 1-3, October 2008, Pages 40-47, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2008.12.001.
(http://www.sciencedirect.com/science/article/B6WPC-4V59VWH-1/2/9956342f8dbb147c51301b010f76f168)
Abstract:
Crown rot (CR) of wheat, caused by Fusarium pseudograminearum (Fp) and other Fusarium species, is an important disease globally. To understand the host response to challenge by Fp, we examined gene expression changes in the wheat stem base following inoculation with macroconidia using the Affymetrix GeneChip Wheat Genome Array. Induced genes included mainly those with defensive functions such as genes encoding anti-microbial proteins as well as oxidative stress-related proteins, signalling molecules, and proteins involved in both primary and secondary metabolism. Comparison of genes induced by Fp and the biotrophic rust pathogen Puccinia triticina revealed substantial overlap in most functional classes of induced genes, except for oxidative stress-related genes which were specifically induced by the necrotroph, Fp. Differential expression of selected Fp-induced genes was confirmed and further analysed using real-time quantitative RT-PCR on an inoculation time-course of wheat cultivars Kennedy and Sunco. Interestingly, several genes were induced earlier, and to higher levels, in the partially CR-resistant cultivar Sunco than in susceptible Kennedy. Many Fp-induced genes were also activated by methyl jasmonate and benzothiadiazole, an analogue of salicylic acid, suggesting that these signalling molecules may be involved in activating defences during crown rot. Most of the genes identified here that were induced by Fp were also induced by deoxynivalenol (DON), a toxin

produced by Fp during CR. In particular, DON induced several genes encoding glucosyltransferases that may be involved in DON detoxification. To initiate functional characterisation, one of these wheat glucosyltransferase genes was over-expressed in Arabidopsis thaliana, however this did not result in improved tolerance to DON. This study is the first comprehensive analysis of the wheat transcriptome during CR and provides new insights into the host processes potentially involved in plant defence against this pathogen.
Keywords: Microarray; Necrotroph; Deoxynivalenol; Methyl jasmonate; Arabidopsis; Salicylic acid; Defence responses; Fusarium graminearum

M.D. Groppa, E.P. Rosales, M.F. Iannone, M.P. Benavides, Nitric oxide, polyamines and Cd-induced phytotoxicity in wheat roots, Phytochemistry, Volume 69, Issue 14, October 2008, Pages 2609-2615, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2008.07.016.
(http://www.sciencedirect.com/science/article/B6TH7-4TF5H36-1/2/567502717c8d93b0e85d0af7594d91da)
Abstract:
To further explore the biochemical basis of Cd toxicity in developing wheat seedlings, we studied the possible role of nitric oxide (NO) and polyamines as signaling molecules involved in metal-induced root growth inhibition. When used at 0.1 mM, sodium nitroprusside, a NO-releasing compound, inhibited root growth to a similar extent as Cd and enhanced the polyamine contents as Cd also did. Putrescine and spermidine treatments caused significant decreases in root growth with spermine giving the greatest level of inhibition (77% reduction). The simultaneous addition of Cd and inhibitors of putrescine biosynthesis (DFMA and DFMO) prevented increases in putrescine levels but did not restore normal root growth. NO content, as evidenced by the fluorescent probe DAF-FM diacetate, was found to be significantly increased in the roots of both Cd and polyamine treated plants, especially in those exposed to spermine. The effect was specific for NO since the NO scavenger cPTIO almost suppressed the fluorescent signal. Concerning the oxidative status of the root system, only Cd and spermine enhanced lipid peroxidation in roots. At the same time, all treatments led to a significant increase in levels of the non-enzymatic antioxidant defense glutathione. Our results strongly suggest that Cd and spermine treatments induce NO formation in wheat roots which, in turn, is involved in root growth inhibition.
Keywords: Triticum aestivum; Gramineae; Cadmium; Root growth; Nitric oxide; Polyamines

S. Isaac Kirubakaran, S. Mubarak Begum, K. Ulaganathan, N. Sakthivel, Characterization of a new antifungal lipid transfer protein from wheat, Plant Physiology and Biochemistry, Volume 46, Issue 10, October 2008, Pages 918-927, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.05.007.
(http://www.sciencedirect.com/science/article/B6VRD-4SKK205-1/2/424760489d1710262c5ba16e51517e1b)
Abstract:
Lipid transfer proteins (LTPs) are members of the family of pathogenesis-related proteins (PR-14) that are believed to be involved in plant defense responses. In this study, a novel gene Ltp 3F1 encoding an antifungal protein from wheat (Sumai 3) was subcloned, overexpressed in Escherichia coli BL-21 (DE3) and enriched using ammonium sulfate fractionation followed by gel permeation chromatography. Molecular phylogeny analyses of wheat Ltp 3F1 gene showed a strong identity to other plant LTPs. Predicted three-dimensional structural model showed the presence of 6 [alpha]-helices and 9 loop turns. The active site catalytic residues Gly30, Pro50, Ala52 and Cys55 may be suggested for catalyzing the reaction involved in lipid binding. SDS-PAGE analysis confirmed the production of recombinant fusion protein. The LTP fusion protein exhibited a broad-spectrum antifungal activity against Alternaria sp., Rhizoctonia solani, Curvularia lunata, Bipolaris oryzae, Cylindrocladium scoparium, Botrytis cinerea and Sarocladium oryzae. Gene cassette with cyanamide hydratase (cah) marker and Ltp 3F1 gene was constructed for genetic transformation in tobacco. Efficient regeneration was achieved in selective media

amended with cyanamide. Transgenic plants with normal phenotype were obtained. Results of PCR and Southern, Northern and Western hybridization analyses confirmed the integration and expression of genes in transgenic plants. Experiments with detached leaves from transgenic tobacco expressing Ltp 3F1 gene showed fungal resistance. Due to the innate potential of broad-spectrum antifungal activity, wheat Ltp 3F1 gene can be used to enhance resistance against fungi in crop plants.
Keywords: Heterologous expression; Lipid transfer protein; Antifungal activity; Transgenic tobacco

Sofia Hjortmo, Johan Patring, Jelena Jastrebova, Thomas Andlid, Biofortification of folates in white wheat bread by selection of yeast strain and process, International Journal of Food Microbiology, Volume 127, Issues 1-2, 30 September 2008, Pages 32-36, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.06.001.
(http://www.sciencedirect.com/science/article/B6T7K-4SPC0JM-1/2/476eebe65d270e42850c4b4a84fcbfd4)
Abstract:
We here demonstrate that folate content in yeast fermented food can be dramatically increased by using a proper (i) yeast strain and (ii) cultivation procedure for the selected strain prior to food fermentation. Folate levels were 3 to 5-fold higher in white wheat bread leavened with a Saccharomyces cerevisiae strain CBS7764, cultured in defined medium and harvested in the respiro-fermentative phase of growth prior to dough preparation (135-139 [micro sign]g/100 dry matter), compared to white wheat bread leavened with commercial Baker's yeast (27-43 [micro sign]g/100 g). The commercial Baker's yeast strain had been industrially produced, using a fed-batch process, thereafter compressed and stored in the refrigerator until bakings were initiated.
This strategy is an attractive alternative to fortification of bread with synthetically produced folic acid. By using a high folate producing strain cultured a suitable way folate levels obtained were in accordance with folic acid content in fortified cereal products.
Keywords: Folate; Baker's yeast; Saccharomyces cerevisiae; Bread; Food fermentation

Yanhai Zheng, Aijun Jia, Tangyuan Ning, Jialin Xu, Zengjia Li, Gaoming Jiang, Potassium nitrate application alleviates sodium chloride stress in winter wheat cultivars differing in salt tolerance, Journal of Plant Physiology, Volume 165, Issue 14, 29 September 2008, Pages 1455-1465, ISSN 0176-1617, DOI: 10.1016/j.jplph.2008.01.001.
(http://www.sciencedirect.com/science/article/B7GJ7-4S0353W-2/2/fb735d55d56592715d3b3f9449fc9796)
Abstract: Summary
A sand culture experiment was conducted to answer the question whether or not exogenous KNO3 can alleviate adverse effects of salt stress in winter wheat by monitoring plant growth, K+/Na+ accumulation and the activity of some antioxidant enzymes. Seeds of two wheat cultivars (CVs), DK961 (salt-tolerant) and JN17 (salt-sensitive), were planted in sandboxes and controls germinated and raised with Hoagland nutrient solution (6 mM KNO3, no NaCl). Experimental seeds were exposed to seven modified Hoagland solutions containing increased levels of KNO3 (11, 16, 21 mM) or 100 mM NaCl in combination with the four KNO3 concentrations (6, 11, 16 and 21 mM). Plants were harvested 30 d after imbibition, with controls approximately 22 cm in height. Both CVs showed significant reduction in plant height, root length and dry weight of shoots and roots under KNO3 or NaCl stress. However, the combination of increased KNO3 and NaCl alleviated symptoms of the individual salt stresses by improving growth of shoots and roots, reducing electrolyte leakage, malondialdehyde and soluble sugar contents and enhancing the activities of antioxidant enzymes. The salt-tolerant cultivar accumulated more K+ in both shoots and roots compared with the higher Na+ accumulation typical for the salt-sensitive cultivar. Soluble sugar content and activities of antioxidant enzymes were found to be more stable in the salt-tolerant cultivar. Our findings suggest that the optimal K+/Na+ ratio of the nutrient solution should

be 16:100 for both the salt-tolerant and the salt-sensitive cultivar under the experimental conditions used, and that the alleviation of NaCl stress symptoms through simultaneously applied elevated KNO3 was more effective in the salt-tolerant than in the salt-sensitive cultivar.
Keywords: Potassium nitrate; Salt tolerance; Sodium chloride stress; Stress alleviation; Winter wheat

Xu Tang, Jumei Li, Yibing Ma, Xiying Hao, Xiuying Li, Phosphorus efficiency in long-term (15 years) wheat-maize cropping systems with various soil and climate conditions, Field Crops Research, Volume 108, Issue 3, 23 September 2008, Pages 231-237, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.05.007.
(http://www.sciencedirect.com/science/article/B6T6M-4T13J93-1/2/996aece505778d36b0e7fdfe15ca6cc8)
Abstract:
Long-term (over 15 years) winter wheat (Triticum aestivum L.)-maize (Zea mays L.) crop rotation experiments were conducted to investigate phosphorus (P) fertilizer utilization efficiency, including the physiological efficiency, recovery efficiency and the mass (the input-output) balance, at five sites across different soil types and climate zones in China. The five treatments used were control, N, NP, NK and NPK, representing various combinations of N, P and K fertilizer applications. Phosphorus fertilization increased average crop yield over 15 years and the increases were greater with wheat (206%) than maize (85%) across all five sites. The wheat yield also significantly increased over time for the NPK treatments at two sites (Xinjiang and Shanxi), but decreased at one site (Hunan). The P content in wheat was less than 3.00 g kg-1 (and 2.10 g kg-1 for maize) for the N and NK treatments with higher values for the Control, NP and NPK treatments. To produce 1 t of grain, crops require 4.2 kg P for wheat and 3.1 kg P for maize. The P physiological use efficiency was 214 kg grain kg-1 P for wheat and 240 kg grain kg-1 P for maize with over 62% of the P from P fertilizer. Applying P fertilizer at 60-80 kg P ha-1 year-1 could maintain 3-4 t ha-1 yields for wheat and 5-6 t ha-1 yields for maize for the five study sites across China. The P recovery efficiency and fertilizer use efficiency averaged 47% and 29%, respectively. For every 100 kg P ha-1 year-1 P surplus (amount of fertilizer applied in excess of crop removal), Olsen-P in soil was increased by 3.4 mg P kg-1. Our study suggests that in order to achieve higher crop yields, the long-term P input-output balance, soil P supplying capacity and yield targets should be considered when making P fertilizer recommendations and developing strategies for intensively managed wheat-maize cropping systems.
Keywords: Wheat; Maize; Phosphorus; Long-term; Yield; Efficiency; Balance

T.A. Woyengo, W. Guenter, J.S. Sands, C.M. Nyachoti, M.A. Mirza, Nutrient utilisation and performance responses of broilers fed a wheat-based diet supplemented with phytase and xylanase alone or in combination, Animal Feed Science and Technology, Volume 146, Issues 1-2, 15 September 2008, Pages 113-123, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.11.013.
(http://www.sciencedirect.com/science/article/B6T42-4RWJVW0-1/2/6485a10b513fbaa74eee39e926bbeaba)
Abstract:
An experiment was conducted to determine the effect of supplementing phytase (PHY) and xylanase (XYL) individually or in combination on nutrient utilisation and broiler performance. Three hundred and twenty male broilers were divided into 80 groups of four birds and fed 10 wheat-based diets in mash form (eight groups per diet) from 1 to 23 days of age. The 10 diets were a positive control diet (calcium, 9 g/kg and non-phytate phosphorus, 4.3 g/kg) and a negative control diet (calcium, 8.2 g/kg and non-phytate phosphorus, 2.8 g/kg) supplemented with PHY at three levels (0, 250 and 500 FTU/kg) and XYL at three levels (0, 1250 and 2500 XU/kg) in a 3 x 3 factorial arrangement to give nine treatment combinations. Chromic oxide (3 g/kg) was added to the diets as a marker to determine nutrient digestibility. No interactions (P>0.05) between PHY

and XYL were detected on any of the response criteria measured. Birds fed the negative control diet had lower (P<0.001) feed intake, body weight gain and tibia ash than the positive control diet. Phytase (250 FTU/kg) supplementation did not affect feed intake (P>0.05) and body weight gain (P>0.05). However, PHY at 250 FTU/kg compared to PHY at 0 FTU/kg, improved (P<0.05) feed conversion ratio, tibia ash, coefficient of ileal apparent digestibility of phosphorus, and coefficient of apparent retention of phosphorus and calcium by 2.0, 3.5, 17.7, 8.7 and 8.4%, respectively, but with no further response (P>0.05) at a higher level of PHY (500 FTU/kg) supplementation. Also, mineralisation of tibias from birds fed diets with PHY at 500 FTU/kg did not improve (P>0.05) tibia ash to that of the positive control diet. Xylanase supplementation did not affect (P>0.05) performance and mineral utilisation responses except for coefficient of apparent retention of calcium, which was increased (P<0.001). In conclusion, PHY improved phosphorus and calcium utilisation, but showed no synergistic effect with XYL on any of the response criteria measured.
Keywords: Broiler performance; Nutrient digestibility; Phytase; Wheat; Xylanase

Zhanshan (Sam) Ma, Edward J. Bechinski, A survival-analysis-based simulation model for Russian wheat aphid population dynamics, Ecological Modelling, Volume 216, Issues 3-4, 10 September 2008, Pages 323-332, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2008.04.011.
(http://www.sciencedirect.com/science/article/B6VBS-4SS9VB9-2/2/994b712a4e6d9c726aba0d3a768d96b0)
Abstract:
A simulation model for Russian wheat aphid (RWA), Diuraphis noxia (Mordvilko), populations is built by integrating survival-analysis-based development and survivor functions and the same-shape reproduction distribution model in the framework of Leslie [Leslie, P.H., 1945. On the use of matrices in certain population mathematics. Biometrika 33, 183-212] matrix structure. Survival analysis is utilized to model both the development and survival of RWA populations, and the Cox (1972) proportional hazards model is fitted with the data sets from our laboratory observation of 1800 RWA individuals under 25 factorial combinations of five temperature regimes and five barley plant-growth stages. Rather than using simple age-specific survivor rates as in the traditional Leslie matrix, the survivor functions based on survival analysis describe age-specific, temperature and plant stage-dependent RWA survival probabilities. Similarly, a probability model from survival analysis to estimate the probability that an individual will reach mature adult stage is utilized to describe the development process; this makes the transition from nymphal stage to mature adult stage dependent on RWA age as well as temperature and plant-growth stage.
Inspired by the same-shape distribution and rate-summation approach for modeling insect development, a similar approach for modeling insect reproduction under variable temperature is developed. This new same-shape reproduction distribution model incorporates individual variation in reproduction capability, as well as the effects of RWA age, temperature and plant-growth stage. Consequently, the same-shape reproduction distribution model replaces the simple age-specific fecundities in Leslie matrix model. To the best of our knowledge, this work is the first to introduce survival analysis to simulation modeling in entomology and ecology and also the first to integrate our newly developed same-shape reproduction distribution model into application.
Keywords: Simulation modeling; Proportional hazards model; Same-shape reproduction distribution; Failure time analysis; Population dynamics; Survival analysis

Nathalie Leblanc, Redouan Saiah, Eric Beucher, Richard Gattin, Michel Castandet, Jean-Marc Saiter, Structural investigation and thermal stability of new extruded wheat flour based polymeric materials, Carbohydrate Polymers, Volume 73, Issue 4, 5 September 2008, Pages 548-557, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.12.034.
(http://www.sciencedirect.com/science/article/B6TFD-4RP0MMB-1/2/50a305308f6092c87103e36f69d1ab98)
Abstract:

In this study, we compare physical properties of wheat starch and wheat-flour based materials. The comparison has been done using thermogravimetric, calorimetric, X-ray diffraction, mechanic and morphologic experiments conducted on a series of wheat-flour extruded materials. The wheat flour used here can be understood as a by-product of the farm-produce wheat flour. All data obtained by means of these experimental methods allow us to conclude that, basically no significant difference exists between our wheat-flour based and wheat-starch based materials. Only one clear difference occurs for the strain to break value which decreases by about 30% for wheat-flour based materials.
Keywords: Cereal flours; Biodegradable material; Thermoplastics; Extrusion; SEM; Thermogravimetry; DSC; X-ray diffraction

Feng Xu, Jian-Xing Jiang, Run-Cang Sun, Dai She, Bai Peng, Jin-Xia Sun, John F. Kennedy, Rapid esterification of wheat straw hemicelluloses induced by microwave irradiation, Carbohydrate Polymers, Volume 73, Issue 4, 5 September 2008, Pages 612-620, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2008.01.002.
(http://www.sciencedirect.com/science/article/B6TFD-4RJRVNR-1/2/65807b338ace8603cc07adba05386002)
Abstract:
Esterification of wheat straw hemicelluloses with acetyl chloride, propionyl chloride, n-octanoyl chloride, lauroyl chloride, palmitoyl chloride, stearoyl chloride, and oleoyl chloride, respectively, using N-bromosuccinimide (NBS) as a catalyst was achieved in DMF/LICl medium by microwave irradiation. The effects of various acyl chlorides and the molar ratios of xylose units in hemicelluloses/acyl chloride on the degree of substitution (DS) were investigated and DS reached up to 1.34 by a few minutes. 13C NMR studies showed that the esterification occurred preferentially at the C-3 and C-2 positions. On the other hand, microwave irradiation brought a partial degradation of the polymer, and therefore resulted in a slight decrease in thermal stability of the hemicellulosic derivatives in comparison with conventional heating technique.
Keywords: Hemicelluloses; Microwave; Esterification; 13C NMR; Thermal stability

R. Bhattacharyya, S. Kundu, S.C. Pandey, K.P. Singh, H.S. Gupta, Tillage and irrigation effects on crop yields and soil properties under the rice-wheat system in the Indian Himalayas, Agricultural Water Management, Volume 95, Issue 9, September 2008, Pages 993-1002, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.03.007.
(http://www.sciencedirect.com/science/article/B6T3X-4SB9DWR-1/2/b5d393ae2c23b2b3ac93b6791294c7f5)
Abstract:
Conservation tillage systems generally improve soil organic C (SOC), plant available water capacity (PAWC), aggregation and soil water transmission. A field experiment was conducted for 4 years (2001-2002 to 2004-2005) to study tillage (conventional tillage (CT) and zero tillage (ZT)) systems. The selected irrigation treatments were at four levels (I1: pre-sowing (PS), I2: PS + active tillering (AT)/crown root initiation (CRI), I3: PS + AT/CRI + panicle initiation (PI)/flowering (FL), and I4: PS + AT/CRI + PI/FL + grain filling (GF)), applied at the critical growth stages on rice (Oryza sativa L.) and wheat (Triticum aestivum L.). Their effects on direct seeded rice productivity and soil properties (SOC and selected physical properties) after rice and wheat harvest were investigated. Soil organic C contents after rice and wheat harvest in the 0-15 cm soil depth were higher under ZT than under CT. Soil organic C increased significantly with I2 over I1 for both crops and with I4 over I2 for the wheat crop. The PAWC was significantly higher with ZT than CT. Zero tilled and frequently irrigated plots showed enhanced infiltration characteristics (infiltration rate, cumulative infiltration and sorptivity) and saturated hydraulic conductivity. Both direct seeded rice and wheat yields were not significantly different in the plots under ZT and CT. There was a significant increase in both rice and wheat yields in the plots under I2 over I1. However, water use

efficiency between irrigation treatments was not significantly different. Hence, under direct seeded rice-wheat system in a sandy clay loam soil of the sub-temperate Indian Himalayas, farmers may adopt ZT with two irrigations in each crop for optimum resource conservation.
Keywords: Tillage; Irrigation; Soil organic C; Soil physical properties; Rice and wheat yield; Water use

J. Timsina, D. Godwin, E. Humphreys, Yadvinder-Singh, Bijay-Singh, S.S. Kukal, D. Smith, Evaluation of options for increasing yield and water productivity of wheat in Punjab, India using the DSSAT-CSM-CERES-Wheat model, Agricultural Water Management, Volume 95, Issue 9, September 2008, Pages 1099-1110, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.04.009.
(http://www.sciencedirect.com/science/article/B6T3X-4SN8V5S-2/2/6c7d49b8ec8927d4b64e748740e4f89d)
Abstract:
The DSSAT-CSM-CERES-Wheat V4.0 model was calibrated for yield and irrigation scheduling of wheat with 2004-2005 data and validated with 13 independent data sets from experiments conducted during 2002-2006 at the Punjab Agricultural University (PAU) farm, Ludhiana, and in a farmer's field near PAU at Phillaur, Punjab, India. Subsequently, the validated model was used to estimate long-term mean and variability of potential yield (Yp), drainage, runoff, evapo-transpiration (ET), crop water productivity (CWP), and irrigation water productivity (IWP) of wheat cv. PBW343 using 36 years (1970-1971 to 2005-2006) of historical weather data from Ludhiana. Seven sowing dates in fortnightly intervals, ranging from early October to early January, and three irrigation scheduling methods [soil water deficit (SWD)-based, growth stage-based, and ET-based] were evaluated. For the SWD-based scheduling, irrigation management depth was set to 75 cm with irrigation scheduled when SWD reached 50% to replace 100% of the deficit. For growth stage-based scheduling, irrigation was applied either only once at one of the key growth stages [crown root initiation (CRI), booting, flowering, and grain filling], twice (two stages in various combinations), thrice (three stages in various combinations), or four times (all four stages). For ET-driven irrigation, irrigations were scheduled based on cumulative net ETo (ETo-rain) since the previous irrigation, for a range of net ETo (25, 75, 125, 150, and 175 mm). Five main irrigation schedules (SWD-based, ET-driven with irrigation applied after accumulation of either 75 or 125 mm of ETo, i.e., ET75 or ET125, and growth stage-based with irrigation applied at CRI plus booting, or at CRI plus booting plus flowering stage) were chosen for detailed analysis of yield, water balance, and CWP and IWP. Nitrogen was non-limiting in all the simulations.
Mean Yp across 36 years ranged from 5.2 t ha-1 (10 October sowing) to 6.4 t ha-1 (10 November sowing), with yield variations due to seasonal weather greater than variations across sowing dates. Yields under different irrigation scheduling, CWP and IWP were highest for 10 November sowing. Yields and CWP were higher for SWD and ET75-based irrigations on both soils, but IWP was higher for ET75-based irrigation on sandy loam and for ET150-based irrigation on loam. Simulation results suggest that yields, CWP, and IWP of PBW343 would be highest for sowing between late October and mid-November in the Indian Punjab. It is recommended that sowing be done within this planting period and that irrigation be applied based on the atmospheric demand and soil water status and not on the growth stage. Despite the potential limitations recognised with simulation results, we can conclude that DSSAT-CSM-CERES-Wheat V4.0 is a useful decision support system to help farmers to optimally schedule and manage irrigation in wheat grown in coarse-textured soils under declining groundwater table situations of the Indian Punjab. Further, the validated model and the simulation results can also be extrapolated to other areas with similar climatic and soil environments in Asia where crop, soil, weather, and management data are available.
Keywords: Triticum aestivum; CERES-Wheat; Model calibration; Model evaluation; Model application; Crop and irrigation water productivity; Irrigation scheduling

Johan Uddling, Johanna Gelang-Alfredsson, Per Erik Karlsson, Gun Sellden, Hakan Pleijel, Source-sink balance of wheat determines responsiveness of grain production to increased [CO2] and water supply, Agriculture, Ecosystems & Environment, Volume 127, Issues 3-4, September 2008, Pages 215-222, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.04.003.
(http://www.sciencedirect.com/science/article/B6T3Y-4SNGRDJ-1/2/11656f78039ef63a8a95218cb4adbc8a)
Abstract:
Manipulation of source (flag-leaf removal) and sink (ear trimming) was conducted in a factorial CO2-irrigation field chamber experiment with spring wheat (Triticum aestivum L.) in south-west Sweden to test the hypothesis that responsiveness of grain production and biomass partitioning to CO2 concentration ([CO2]) and water supply is dependent on the source-sink balance of the plant. Negative effects of doubled [CO2] on both individual grain mass (IGM) and harvest index (HI) were strongly related to decreasing relative sink strength (i.e. increasing source:sink ratio), probably as a result of feedbacks from sink limitation on source activity under elevated [CO2] being relatively more important as relative sink strength decreases. Substantial down-regulation of photosynthetic capacity in elevated [CO2], resulted in lack of significant stimulation of grain yield (GY) of unmanipulated shoots growing under elevated [CO2]. GY was even reduced by elevated [CO2] in sink-manipulated shoots, implying that high source:sink ratio may result in a down-regulation of photosynthetic capacity that more than offsets the direct stimulating effect of elevated [CO2]. High irrigation positively affected IGM and HI in source-manipulated shoots only, probably as a result of the timing of irrigation treatment effects on soil moisture during, but not before, grain filling. Irrigation thus probably affected source activity during grain filling rather than potential sink capacity determined before and around anthesis, an effect that should be more pronounced for shoots with low source:sink ratio. We conclude that effects of [CO2] and irrigation on grain production and biomass partitioning of wheat are strongly modified by source-sink balance of the plant, and that sink limitation is a major constraint on CO2-induced GY enhancement of spring wheat under Scandinavian climatic conditions. These findings may explain earlier observations of decreased CO2 responsiveness of GY in modern wheat cultivars, with lower whole-plant sink strength before and around anthesis compared to old cultivars, and call into question current attempts of molecular plant breeding to maximise photosynthetic activity before and around anthesis in order to enhance GY in a world with rising atmospheric [CO2].
Keywords: Carbon dioxide; Grain yield; Harvest index; Source:sink; Water supply; Wheat

Patricia A. Okubara, Robert F. Bonsall, Accumulation of Pseudomonas-derived 2,4-diacetylphloroglucinol on wheat seedling roots is influenced by host cultivar, Biological Control, Volume 46, Issue 3, September 2008, Pages 322-331, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.03.013.
(http://www.sciencedirect.com/science/article/B6WBP-4S5FJDJ-2/2/bf9c79efa6f834948b9d5e3e74041265)
Abstract:
Production of antifungal metabolites, including the polyketide 2,4-diacetylphloroglucinol (2,4-DAPG), is one mechanism by which biocontrol strains of Pseudomonas fluorescens suppress soilborne fungal pathogens. P. fluorescens strains vary in ability to produce 2,4-DAPG, but the role of the host in modulating metabolite accumulation in the rhizosphere is not well defined. To examine 2,4-DAPG production and accumulation during early stages of rhizoplane interactions, we compared metabolite production by two P. fluorescens strains in culture and on seedling roots of three Triticum aestivum L. (wheat) cultivars, Buchanan, Finley, and Tara, in a soil-free system. P. fluorescens strain Q8r1-96, an aggressive colonizer of the wheat rhizosphere, produced 1850 [mu]g mL-1 2,4-DAPG after 48 h of growth in King's Medium B, significantly (P > 0.05) more than 19.4 [mu]g mL-1 metabolite produced by the moderately aggressive strain Q2-87V1 under the same conditions. Rhizoplane levels of 2,4-DAPG after 4 d of Q8r1-96 colonization were 1946,

1650, and 2767 ng g-1 for Buchanan, Finley, and Tara, respectively. Metabolite levels obtained for Q2-87V1 colonization were 1468, 366, and 80 ng g-1 on the respective cultivars. Strain Q8r1-96 deposited significantly ($P < 0.05$) more 2,4-DAPG than Q2-87V1 on Tara and Finley roots, whereas both strains produced similar ($P > 0.05$) amounts of the metabolite on Buchanan roots. In greenhouse experiments, take-all damage was reduced only on Tara roots inoculated with Q8r1-96. To our knowledge, this is the first report to compare 2,4-DAPG accumulation in the rhizoplanes of different cultivars, and to demonstrate that rhizoplane 2,4-DAPG accumulation depends on a cultivar-bacterial strain interaction.
Keywords: Biological control; Disease suppression; Gaeumannomyces graminis; PGPR; Rhizobacteria; Root colonization

Fubao Sun, Hongzhang Chen, Enhanced enzymatic hydrolysis of wheat straw by aqueous glycerol pretreatment, Bioresource Technology, Volume 99, Issue 14, September 2008, Pages 6156-6161, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.12.027.
(http://www.sciencedirect.com/science/article/B6V24-4RN488X-4/2/16a490ace503a3431b52c7eddab70010)
Abstract:
Considering the practical technology-economy of glycerol processing from oleochemicals industry, the ensuing work was proposed to further explore the atmospheric aqueous glycerol autocatalytic organosolv pretreatment (AAGAOP) to improve the enzymatic hydrolysis of lignocellulosic biomass.
With the liquid-solid ratio of 20 g g-1 at 220 [degree sign]C for 3 h, the AAGAOP enabled wheat straw to remove ~70% hemicelluloses and ~65% lignin, with ~98% cellulose retention. The pretreated fiber was achieved with ~90% of the enzymatic hydrolysis yield after 48 h. At oven-drying, dehydration was likely to cause the hornification of fiber, which was responsible for the low enzymatic hydrolysis of dried fiber. With SEM observations, the AAGAOP disrupted wheat straw into thin and fine fibrils, with a small average size and more surface area.
The AAGAOP technique, as a novel strategy, enhanced the enzymatic hydrolysis of lignocellulosic biomass by removing the chemically compositional barrier and altering the physically structural impediment.
Keywords: Organosolv pretreatment; Glycerol; Enzymatic hydrolysis; Lignocellulosic biomass; Biodiesel

Fubao Sun, Hongzhang Chen, Organosolv pretreatment by crude glycerol from oleochemicals industry for enzymatic hydrolysis of wheat straw, Bioresource Technology, Volume 99, Issue 13, September 2008, Pages 5474-5479, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.11.001.
(http://www.sciencedirect.com/science/article/B6V24-4RWC86F-1/2/efdf51e885f4294a5ac39c7102a0e46f)
Abstract:
In order to defray the cost of biodiesel production, the ensuing work was to further investigate utilization of the crude glycerol (CG) from oleochemicals industry in the atmospheric autocatalytic organosolv pretreatment (AAOP) to enhance enzymatic hydrolysis.
The AAOP-CG enabled wheat straw to achieve with reasonable enzymatic hydrolysis yields, reaching [greater-or-equal, slanted]75% for the wet substrate and [less-than-or-equals, slant]63% for the dried. Lipophilic compounds from the CG formed pitch deposition on the fiber, which was responsible for low delignification ([less-than-or-equals, slant]30%) and also troublesome in practical operation. Pitch deposits itself had no significant role on enzymatic hydrolysis. A striking finding of the lignin recondensation and/or lignin-carbohydrate complex helped explain why dried pretreated wheat straw had a low enzymatic hydrolysis yield. The CG was suitable for the AAOP to enhance enzymatic hydrolysis of lignocellulosic biomass. But it was advisable to remove lipophilic compounds from crude glycerol before utilization.

Keywords: Crude glycerol; Atmospheric autocatalytic organosolv pretreatment; Enzymatic hydrolysis; Lignocellulosic biomass; Oleochemical industry

Chunping Yang, Zhiqiang Shen, Guoce Yu, Jianlong Wang, Effect and aftereffect of [gamma] radiation pretreatment on enzymatic hydrolysis of wheat straw, Bioresource Technology, Volume 99, Issue 14, September 2008, Pages 6240-6245, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.12.008.
(http://www.sciencedirect.com/science/article/B6V24-4RKDHMH-6/2/0c5f92fabdb9211261e6564b1a31ae46)
Abstract:
Irradiation pretreatment of wheat straw was carried out at different doses by using Co-60 [gamma] radiation. The weight loss and fragility of wheat straw after irradiation, the combination effect of irradiation and mechanical crushing on enzymatic hydrolysis of wheat straw as well as the aftereffect of irradiation were examined. It is shown that irradiation can cause significant breakdown of the structure of wheat straw. The weight loss of wheat straw increased and the size distribution after crushing moved to fine particles at elevated irradiation doses. The glucose yield of enzymatic hydrolysis of wheat straw increased with increasing doses and achieved the maximum (13.40%) at 500 kGy. A synergistic effect between irradiation and crushing was observed, with a glucose yield of 10.24% at a dose of 500 kGy with powder of 140 mesh. The aftereffect of irradiation had important impact on enzymatic hydrolysis of wheat straw. The aftereffect (at 22nd day) of 400 kGy irradiation accounted for 20.0% of the initial effect for glucose production, and the aftereffects of 50, 100, 200 (at 9th day) and 300 kGy (at 20th day) accounted for 12.9%, 14.9%, 8.9% and 9.1%, respectively, for reducing sugar production.
Keywords: Wheat straw; Radiation; Pretreatment; Enzymatic hydrolysis; Aftereffect

Radhouane Kammoun, Belgacem Naili, Samir Bejar, Application of a statistical design to the optimization of parameters and culture medium for [alpha]-amylase production by Aspergillus oryzae CBS 819.72 grown on gruel (wheat grinding by-product), Bioresource Technology, Volume 99, Issue 13, September 2008, Pages 5602-5609, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.10.045.
(http://www.sciencedirect.com/science/article/B6V24-4RH2SRY-1/2/04a56d3ca9e94412edeef9ae9129b2be)
Abstract:
The production optimization of [alpha]-amylase (E.C.3.2.1.1) from Aspergillus oryzae CBS 819.72 fungus, using a by-product of wheat grinding (gruel) as sole carbon source, was performed with statistical methodology based on three experimental designs. The optimisation of temperature, agitation and inoculum size was attempted using a Box-Behnken design under the response surface methodology. The screening of nineteen nutrients for their influence on [alpha]-amylase production was achieved using a Plackett-Burman design. KH2PO4, urea, glycerol, (NH4)2SO4, CoCl2, casein hydrolysate, soybean meal hydrolysate, MgSO4 were selected based on their positive influence on enzyme formation.
The optimized nutrients concentration was obtained using a Taguchi experimental design and the analysis of the data predicts a theoretical increase in the [alpha]-amylase expression of 73.2% (from 40.1 to 151.1 U/ml). These conditions were validated experimentally and revealed an enhanced [alpha]-amylase yield of 72.7%.
Keywords: Aspergillus oryzae; [alpha]-Amylase; Box-Behnken design; Plackett-Burman design; Taguchi design

S. Mahesh, A. Manickavasagan, D.S. Jayas, J. Paliwal, N.D.G. White, Feasibility of near-infrared hyperspectral imaging to differentiate Canadian wheat classes, Biosystems Engineering, Volume

101, Issue 1, September 2008, Pages 50-57, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.05.017.
(http://www.sciencedirect.com/science/article/B6WXV-4T3KTFP-3/2/9f661dfe8e495140eda31a433dba35f4)
Abstract:
Differentiation of wheat classes is one of the important challenges to the Canadian grain industry. Even though some wheat classes may look similar, their chemical composition and consequently the end-product quality can vary significantly. Visual differentiation of wheat classes suffers from disadvantages such as inconsistency, low throughput, and labour intensiveness. A near-infrared (NIR) hyperspectral imaging system was used to develop classification models to differentiate wheat classes grown in western Canada. Wheat bulk samples were scanned in the wavelength region of 960-1700 nm at 10 nm intervals using an InGaAs NIR camera. Seventy-five relative reflectance intensities were extracted from the scanned images and used for the differentiation of wheat classes using a statistical classifier and an artificial neural network (ANN) classifier. Classification accuracies were 100% in classifying Canada Prairie Spring Red (CPSR), Canada Western Red Winter (CWRW), and Canada Western Soft White Spring (CWSWS) wheat classes and >94% for the other wheat classes (Canada Western Extra Strong (CWES), Canada Western Hard White Spring (CWHWS), Canada Western Red Spring (CWRS), Canada Prairie Spring White (CPSW) and Canada Western Amber Durum (CWAD)) using Linear Discriminant Analysis (LDA) with a leave-one-out cross-validation method. In Quadratic Discriminant Analysis (QDA) with a leave-one-out cross-validation method, the classification accuracies were >86% for all wheat classes. The overall classification accuracies of 60% training-30% testing-10% validation (referred to as 60-30-10) and 70% training-20% testing-10% validation (referred to as 70-20-10) ANN models were above 90% for independent validation sets using three-layer standard and Wardnet back-propagation neural network architectures.

P.K. Ghosh, D.S. Jayas, E.A. Smith, M.L.H. Gruwel, N.D.G. White, P.A. Zhilkin, Erratum to ``Mathematical modelling of wheat kernel drying with input from moisture movement studies using magnetic resonance imaging (MRI), Part I: Model development and comparison with MRI observations" [Biosystems Engineering 100 (2008) 389-400], Biosystems Engineering, Volume 101, Issue 1, September 2008, Page 143, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.07.001.
(http://www.sciencedirect.com/science/article/B6WXV-4T2VP48-4/2/d70d261e9f1f9010703364eff027ed78)

Yuefeng Ruan, Yuncai Hu, Urs Schmidhalter, Insights on the role of tillering in salt tolerance of spring wheat from detillering, Environmental and Experimental Botany, Volume 64, Issue 1, September 2008, Pages 33-42, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.04.004.
(http://www.sciencedirect.com/science/article/B6T66-4SCDB2G-1/2/7224a59920ee59c5f34ab12d473e2817)
Abstract:
Tillering is reduced by salinity, with the primary and secondary tillers being more affected than is the mainstem. To understand the importance of tillering in the salt tolerance of wheat plants, two contrasting genotypes of spring wheat (Triticum aestivum L.) were grown in a greenhouse under saline or non-saline conditions and were subjected to five progressive levels of detillering. Regardless of the genotype and salinity, shoot dry weight, seed yield and seed number per plant were all significantly decreased in the treatments where only one or two tillers per plant remained compared with the untouched treatment (more than three tillers), whereas these same variables per tiller tended to be increased on a per tiller (mainstem or substem tiller) basis. The increased seed yield per tiller observed with tiller reduction may be attributed to the enhanced seed number within the spikelet. Under saline conditions, the reductions in shoot dry weight, seed yield and

seed number per plant for the salt-tolerant genotype Kharchia were of a greater magnitude in the treatments where only one or two tillers per plant were present compared with the untouched treatment, whereas the magnitude of this reduction in the salt-sensitive genotype Sakha 61 was decreased.
Keywords: Detillering; Wheat genotypes; Salt tolerance; Tillering

Supradip Saha, K.A. Gopinath, Banshi Lal Mina, Hari Shankar Gupta, Influence of continuous application of inorganic nutrients to a Maize-Wheat rotation on soil enzyme activity and grain quality in a rainfed Indian soil, European Journal of Soil Biology, Volume 44, Issues 5-6, Special Section of the 7th International Apterygota Seminar, 7th International Apterygota Seminar, September-December 2008, Pages 521-531, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.09.009.
(http://www.sciencedirect.com/science/article/B6VR7-4TNTK9V-2/2/8c7dc9f1fd86c865d84994e0515f2353)
Abstract:
To explore long-term impact of organic and inorganic fertilizers on soil health and grain quality, we monitored the enzyme activities and chemical properties of soil; and chemical composition of grain from eight treatments at an experimental field site established in 1996. There were eight treatments applied to both wheat and maize seasons: a control; four inorganic fertilizers, that is, nitrogen and phosphorus (NP), nitrogen and potassium (NK), phosphorous and potassium (PK) and nitrogen, phosphorus and potassium (NPK); farm yard manure alone (FYM) and addition of FYM at two different doses (100 and 50% of recommendation) to NPK that is, NPK + FYM and 1/2 NPK + FYM. After 11 years of the experiment the NPK + FYM and 1/2 NPK + FYM treatments had the highest yields, about 5 Mg maize ha-1 and 2 Mg wheat ha-1 with about 2 and 0.5 Mg ha-1, respectively more than the NPK treatments. The dehydrogeanse activity of soils increased significantly in FYM and 1/2 NPK + FYM. Except urease all other enzymatic activities were increased in those treatments, which received manure. Urease activity was higher in mineral-N applied plots. Grain protein content of both maize and wheat was highest in mineral fertilized plots. Test weight also increased significantly on application of mineral fertilizer. Plots treated with half dose of recommended mineral fertilizer along with FYM were higher in urease, phosphomono and diesterase activities than that of NPK + FYM treated plots. Long-term application of inorganic nutrients along with FYM improved grain mineral composition and yield. Inhibition of few enzymatic activities were also observed upon application of inorganic nutrients either alone or in combination.
Keywords: Long-term experiment; Maize-wheat system; Grain quality; Soil enzymes; Yield

B.T. Manu, U.J.S. Prasada Rao, Influence of size distribution of proteins, thiol and disulfide content in whole wheat flour on rheological and chapati texture of Indian wheat varieties, Food Chemistry, Volume 110, Issue 1, 1 September 2008, Pages 88-95, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.01.060.
(http://www.sciencedirect.com/science/article/B6T6R-4RSBYFW-5/2/299d9e8b814c156e080af4871a0252f5)
Abstract:
The influence of protein composition, as measured by size-exclusion high performance liquid chromatography (SE-HPLC), on rheological properties and chapati texture was investigated in the whole wheat flours of eight Indian wheat cultivars grown at a single location. Proteins were extracted using two-step procedure: extraction with buffer containing 0.5% SDS (SDS buffer), followed by sonication. The results showed that SDS buffer extracted 72-90% of the total flour protein in different varieties and 7-11% protein was extracted from the remaining residues by sonication. The proteins extracted were fractionated by SE-HPLC into large polymeric proteins (>130 kDa), small polymeric proteins (80-130 kDa) and monomeric proteins (10-80 kDa). Total polymeric protein content in the flour protein showed a significant positive correlation with dough hardness ($r = 0.71$, $p < 0.05$) and positive correlation with chapati texture ($r = 0.58$, $p < 0.05$). Of

the SDS extractable polymeric proteins, large polymeric protein in flour protein had significant positive correlation to dough hardness ($r = 0.89$, $p < 0.05$) and chapati cutting force, which reflects the chapati texture ($r = 0.70$, $p < 0.05$). Protein disulfide content showed positive correlation to dough hardness ($r = 0.66$, $p < 0.05$) and texture of chapati ($r = 0.58$, $p < 0.05$) while protein thiol content showed significant negative correlation to chapati texture ($r = -0.77$, $p < 0.05$). Thus, the results indicate that high proportion of SDS extractable large polymeric protein in flour protein increases the toughness of chapati texture while flours having high thiol content decrease the toughness of chapati.
Keywords: Wheat proteins; Dough rheology; Size distribution of proteins; Chapati texture; Thiol and disulfide content of flour

Saeed Akhtar, F.M. Anjum, Salim-Ur Rehman, Munir A. Sheikh, Kalsoom Farzana, Effect of fortification on physico-chemical and microbiological stability of whole wheat flour, Food Chemistry, Volume 110, Issue 1, 1 September 2008, Pages 113-119, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.01.065.
(http://www.sciencedirect.com/science/article/B6T6R-4RSRDPH-3/2/d4a9d0770511d930f9eeba0c64b26e76)
Abstract:
Stability of fortified whole wheat flour (WWF) was evaluated using NaFeEDTA, elemental iron, $ZnSO_4$ and ZnO as fortificants. Fortified WWF was stored in tin boxes and polypropylene bags for 60 days under ambient storage condition (ASC) and controlled storage condition (CSC). Fortification significantly (p [less-than-or-equals, slant] 0.05) decreased moisture and protein content and increased ash content to 5.44%, 6% and 23%, as compared to control. Fortified WWF, assayed periodically for mould contamination manifested a significant inhibition (~1 log reduction) in flours containing elemental iron. Low storage temperature and relative humidity (RH) indicated lower level of mould count during extended storage time. Tin boxes, as storage material, exhibited a better protection against mould attack, acting as an effective barrier for moisture. Fortificants exerted a slight deteriorative effect on texture characteristics of the chapattis made of these flours but chapattis were still accepted by the judges. Zinc fortificants seemed like having little or no effect on the quality of the flours and chapattis, made of such flours. Shelf life of fortified flour may be extended by using elemental iron as fortificant and storing the product in tin boxes under relatively low temperature and RH.
Keywords: Whole wheat flour; Fortification; Storage; Mould; Chapatti

Ping Shao, Peilong Sun, Yanjie Ying, Response surface optimization of wheat germ oil yield by supercritical carbon dioxide extraction, Food and Bioproducts Processing, Volume 86, Issue 3, September 2008, Pages 227-231, ISSN 0960-3085, DOI: 10.1016/j.fbp.2007.04.001.
(http://www.sciencedirect.com/science/article/B8JGD-4S0959F-1/2/da48cd4dd6174f7206aac90cad4a90b1)
Abstract:
The supercritical fluid extraction (SFE) of wheat germ oil was studied. Response surface methodology (RSM) was used to optimize the parameters of the supercritical carbon dioxide extraction. Independent variables were operating temperature (40, 50 and 60 [degree sign]C), pressure (20, 27.5 and 35 MPa) and flow rate (15, 20 and 25 L/h). The response and variables were fitted well to each other by multiple regressions. All the independent parameters and quadratic of temperature and pressure affected the oil yield significantly. The maximum wheat germ oil yield to be about 10.15% by SFE were obtained when SFE was carried out at 35 MPa of pressure, 50 [degree sign]C of temperature, 22.5-25 L/h of solvent flow rate and 1 h of extraction time. The humidity of wheat germ influenced negatively the extraction process. A comparison between the relative qualities by SFE and by organic solvent extraction using hexane was made. The quality of wheat germ oil extracted by SFE was similar to that of oil extracted by hexane. The

experimental results indicated that SFE technique reduced solvent consumption and extraction time with no adverse effect on the extraction yield and fatty acid composition of the oil.
Keywords: Supercritical carbon dioxide; Wheat germ oil; Response surface methodology; Extraction

Himadri Roy Ghatak, Spectroscopic comparison of lignin separated by electrolysis and acid precipitation of wheat straw soda black liquor, Industrial Crops and Products, Volume 28, Issue 2, September 2008, Pages 206-212, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.02.011.
(http://www.sciencedirect.com/science/article/B6T77-4S7S2NB-2/2/5b12bb15766ea37b7ab7d24004a4c34d)
Abstract:
Electrolysis experiments were carried out with wheat straw soda black liquor. Organics from black liquor were electrodeposited at the anode. These organics were studied for their FTIR and NMR spectra and compared with those separated by acid precipitation of black liquor. The electrodeposited organics were found to be chemically distinct from those obtained by the acidification of the black liquor. Notably, they differed in the characteristic features of the aromatic part from hitherto known lignin formulations as revealed by the absence of signals for quaternary aromatic carbon between [delta] 129 and [delta]155 ppm in their 13C NMR spectra and higher proportion of aromatic protons in their 1H NMR spectra. The hydroxyl environment was also found to be different by the shift in OH stretching band to higher frequency. Other significant differences were noted in the FTIR and NMR spectra of the electrodeposited solids from those of acid precipitated solids.
Keywords: Black liquor; Electrolysis; Lignin; NMR; FTIR

S.H. Peighambardoust, R.J. Hamer, R.M. Boom, A.J. van der Goot, Migration of gluten under shear flow as a novel mechanism for separating wheat flour into gluten and starch, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 327-338, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.005.
(http://www.sciencedirect.com/science/article/B6WHK-4R6B2JP-1/2/3911085e2722fe98aacc09077537fd53)
Abstract:
This paper describes a novel principle for the separation of wheat flour into starch and gluten in a concentrated medium. The process is based on the use of simple shear flow in a cone-and-cone device. The separation takes place in two steps. Initially, local segregation of gluten and starch phases occurs, leading to formation of macroscopically visible gluten patches distributed throughout the dough. This local segregation can be understood by considering the dough as a visco-elastic matrix containing an inert filler (starch). Further shearing leads to aggregation of those patches and migration (large-scale separation) towards the apex of the cone. As a result, the wheat dough is separated into a protein-poor fraction, containing less than 4% protein, and a protein-rich fraction containing almost 50% protein on a dry weight basis. However, under the process conditions used, upon a very long shearing, a redistribution of the aggregated gluten structures in the starch phase was observed, demonstrating a processing limit for the separation performance. Compared to traditional processing, the separation process presented shows opportunities for producing high quality gluten accompanied with significant water savings. Considering the fact that simple shear flow in steady rate is less harmful to gluten quality, such a separation process could benefit gluten quality.
Keywords: Gluten; Starch; Shear; Separation; Migration; Glutenin macro-polymer; Wheat; Processing

Dale Every, Lidia Motoi, Shiva P. Rao, Stephen C. Shorter, Lyall D. Simmons, Predicting wheat quality - consequences of the ascorbic acid improver effect, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 339-348, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.002.
(http://www.sciencedirect.com/science/article/B6WHK-4R68NC1-5/2/e1f8948c5aa481b319ecaa406582b543)
Abstract:
Genotype and environment sets of wheat cultivars and breeding lines were tested for bread making, dough mixing, dough rheology, protein composition and thiol/disulphide composition to find methods that could identify wheat with high baking quality (high-BQ) and moderate work input (moderate-WI) requirement using the mechanical dough development system. Wheat with these properties generally had a high baking response to ascorbic acid (AA) and a GluD1a (HMW-GS 2 + 12) allelic composition. Strong wheat with high WI and high-BQ generally had low baking response to AA and a GluD1d (HMW-GS 5 + 10) allelic composition. Using protein composition data to identify wheat of high-BQ (with AA) and moderate-WI, it was best to select wheat with as high as possible percent of SDS-unextractable polymeric protein (%UPP) in flour and as low as possible %UPP in total polymeric protein. Using a dough extension test for identifying wheat of high-BQ (with AA) and moderate-WI, it was best to select wheat with intermediate values for maximum resistance to extension (Rmax) and for values of extension at Rmax as high as possible within the intermediate Rmax range. Cysteine content of protein fractions and glutathione content of flour gave mostly poor to weak correlations with all baking and mixing properties.
Keywords: Bread making; Ascorbic acid; Protein composition; Dough mixing; Dough extension; Dough rheology; Protein-thiols; Glutathione

E. Patrick Fuerst, Steven S. Xu, Brian Beecher, Genetic characterization of kernel polyphenol oxidases in wheat and related species, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 359-368, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.003.
(http://www.sciencedirect.com/science/article/B6WHK-4R68NC1-7/2/a9f550ab457e0050eab0bdc59f5ecf0e)
Abstract:
Polyphenol oxidase (PPO) activity causes undesirable darkening of raw Asian noodles and other wheat products. In this study we investigate the genetic origins and diversity of wheat kernel PPO. PPO was characterized via activity assays, antigenic staining, and Southern blots in Triticum aestivum, Triticum dicoccoides, Triticum durum, Triticum dicoccum, Triticum monococcum, Triticum urartu, Aegilops speltoides, and Aegilops tauschii. Among these species, PPO activity was well-correlated with antigenic staining intensity toward a wheat kernel-type PPO antibody. High PPO activity was observed in all three T. monococcum accessions (Am genome), one Ae. speltoides accession, one T. durum accession, and two hexaploid wheat cultivars. Southern blots suggested the presence of two or more kernel-type PPO genes in diploid progenitors of the hexaploid A, B, and D genomes. Whole-kernel PPO activity was evaluated in disomic substitution lines derived from three T. dicoccoides accessions in the background of T. durum `Langdon'. PPO activity was primarily associated with chromosome 2A and to a much lower degree with chromosome 2B. DNA sequence comparisons showed that the intron associated with the high PPO allele on chromosome 2AL of hexaploid wheat had 94% nucleotide identity with the homeologous intron found in T. monococcum, a species with high kernel PPO activity. This implies that the ancestral PPO allele on the A genome is one of the high activity, and the low PPO allele found in hexaploid wheat represents a relatively recent genetic alteration. Results confirm the presence of multiple kernel-type PPO genes in the diploid and tetraploid progenitors and relatives of hexaploid wheat. However, it is likely that relatively few of the many kernel-type PPO genes present in wheat contribute substantially to kernel PPO activity. A single genetic locus on homeologous group 2 chromosomes may be the primary cause of high PPO activity in wheat kernels.

Keywords: Triticum aestivum; T. durum; T. monococcum; T. dicoccoides; T. urartu; T. dicoccum; Aegilops speltoides; Ae. tauschii; Chromosome substitution; Noodle discoloration

Bao-Lam Huynh, Lachlan Palmer, Diane E. Mather, Hugh Wallwork, Robin D. Graham, Ross M. Welch, James C.R. Stangoulis, Genotypic variation in wheat grain fructan content revealed by a simplified HPLC method, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 369-378, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.004.
(http://www.sciencedirect.com/science/article/B6WHK-4R68NC1-6/2/74353c8351124387998f71e31df9986a)
Abstract:
Fructans are prebiotics, with potentially beneficial effects on human health. This study aimed to examine genetic variation in wheat grain fructan content using a simplified analytical method. The method involves extracting fructans from wheat grain followed by enzymatic hydrolysis to break down fructans into monosaccharides that can then be quantitatively measured by anion-exchange liquid chromatography coupled with pulsed amperometric detection. The modified procedure is reliable and allows the handling of large numbers of flour samples at a low cost, and could therefore be useful for assessing large numbers of wheat breeding lines. Using this method, grain samples taken from 19 bread wheat cultivars and breeding lines grown in both glasshouse and the field were analysed for grain fructan content. In addition, grain samples of 29 international wheat landraces and 14 new wheat breeding lines from the International Maize and Wheat Improvement Center (CIMMYT) were surveyed for their fructan contents. There was significant genotypic variation among these materials, with grain fructan content ranging from 0.7 to 2.9% of grain dry weight. There was no evidence of strong genotype-by-environment interaction; the fructan contents of field-grown grain samples were positively correlated (r = 0.83) with those of glasshouse-grown samples of the same cultivars. It should therefore be possible to investigate the genetic control of variation for this trait using the simplified HPLC method and to select effectively for increased grain fructan content in wheat breeding.
Keywords: Cereal grains; Fructans; HPLC; Prebiotics; Raffinose; Wheat

Hicran Koc, Virgil W. Smail, David L. Wetzel, Reliability of InGaAs focal plane array imaging of wheat germination at early stages, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 394-400, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.015.
(http://www.sciencedirect.com/science/article/B6WHK-4R8H1R7-1/2/b1e362e3b49d600365aa0db415b893c9)
Abstract:
To assist our Kansas breeding program, we have developed nondestructive methods to test new lines of wheat for resistance to premature germination. The high sensitivity of subsurface imaging, compared with visual detection, [alpha]-amylase determination, or viscosity testing, permits germination detection at early stages. This report is concerned with detection reliability via chemical imaging of intact wheat kernels at early stages of germination by using an InGaAs focal plane detector array in the 1100-1700 nm range. Ninety kernels from each of six different cultivars, including HRW and HWW wheat, were exposed to moist conditions for 6, 12, 24, 36, and 48 h. Images of each 90 kernel group were examined, and images of those kernels exposed to moisture for 36 h were compared with images of kernels treated for 3 h as a control. Images of each were classified as sprouted or unsprouted. Criteria for classification included images of log 1/R at select wavelengths or images of select factors resulting from principle component analysis (PCA) treatment of reflectance intensity data from each pixel. Sprouted kernels determined by PCA factors 1 and 4 from 90 kernels tested in a 36-h moisture exposure numbered 87, 85, 80, 74, 70, 48 for six cultivars tested. Cultivar KS-2174 was shown to be distinctly more resistant to germination than the other cultivars. When KS-2174 was compared with Betty wheat, for all exposure times, Betty had approximately 45% more germinated kernels.

Keywords: Chemical imaging; Near-IR spectroscopy; Wheat breeding; Germination detection

Rikard Landberg, Afaf Kamal-Eldin, Marjatta Salmenkallio-Marttila, Xavier Rouau, Per Aman, Localization of alkylresorcinols in wheat, rye and barley kernels, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 401-406, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.013.
(http://www.sciencedirect.com/science/article/B6WHK-4R6B2JP-2/2/ce01cb0fae4641555729661a20f26bb0)
Abstract:
Cereal alkylresorcinols (AR), a group of phenolic lipids mainly found in the outer parts of wheat and rye kernels, are currently being studied for the possibility to use them as biomarkers for the intake of whole grain wheat and rye foods. In this work, AR were localised in grains by using light microscopy and gas chromatographic analysis of hand-dissected botanical and pearling fractions. GC-analysis of hand-dissected fractions showed that more than 99% of the total AR content was located in an intermediate layer of the caryopsis, including the hyaline layer, testa and inner pericarp. Microscopic examination showed that the outer cuticle of testa/inner cuticle of pericarp was the exact location, and that no AR were found in the endosperm or in the germ, suggesting that AR could be used as a selective marker of testa.
Keywords: Alkylresorcinols; Wheat; Rye; Barley; Whole grain; Biomarker

D. Peressini, S.H. Peighambardoust, R.J. Hamer, A. Sensidoni, A.J. van der Goot, Effect of shear rate on microstructure and rheological properties of sheared wheat doughs, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 426-438, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.008.
(http://www.sciencedirect.com/science/article/B6WHK-4R9JTTV-1/2/e81c7cb477c2a2b98b7daf9ba54b535e)
Abstract:
Structure formation in dough systems is the result of an interplay between processing conditions and subsequent interactions in the protein phase. These interactions can be both of a covalent (disulfide bonds) and physical nature and occur at all length scales.
The aim of this work was to investigate the effect of simple shear deformation at various shear rates on wheat dough rheological properties, microstructure and GMP fraction. Shear processing was compared with a z-blade mixing. The contribution of disulfide bonds on different length scales was investigated using NEMI as SH-blocker agent.
Dough strength and strain hardening decreased with the increase in shear rate leading to dough weakening. Sheared dough at low shear rate exhibited the highest strength among doughs under large deformation conditions. Mixing or shearing in the presence of NEMI strongly reduced fracture properties and GMP content of mixed and sheared doughs. Only the dough that was sheared at low shear rate still exhibited some strength and strain hardening. Large deformation results were integrated with linear viscoelastic properties using low shear rate-long time creep tests. Elastic compliance curves for reference doughs were lower than the dough containing NEMI. Shearing at low and intermediate shear rates gave similar elastic compliance. Dough rheological behaviour was interpreted in the context of polymer gels containing reversible cross-links and physical interactions.
Shearing led to the formation of a heterogeneous structure. Very large protein domains were observed for dough at low shear rate, which became smaller upon higher shear rates suggesting that those structures are quite weak. When NEMI was present, large protein structures were lost more easily. The break-up of gluten domains during mixing and shearing was proposed to be a result from a different mechanism.
Keywords: Shear; Couette; Dough; Gluten; Microstructure

Agata Gadaleta, Angelica Giancaspro, Ann E. Blechl, Antonio Blanco, A transgenic durum wheat line that is free of marker genes and expresses 1Dy10, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 439-445, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.005.
(http://www.sciencedirect.com/science/article/B6WHK-4RBYD14-1/2/33f614372c1b3ebcf92e4a4057bc5f6a)
Abstract:
As currently practiced, genetic engineering of monocots requires the use of selective agents, such as herbicides and antibiotics, and marker genes for resistance to favor the multiplication of the initially transformed cells. In the present paper we have used 'minimal gene cassettes' and positive selection to generate transgenic durum wheat lines free of herbicide and antibiotic resistance marker genes. Two biolistic transformation experiments were carried out using three 'minimal gene cassettes' consisting of linear DNA fragments each excised from the source plasmids. The targeted trait genes were two bread wheat sequences encoding the Dx5 and Dy10 high-molecular-weight (HMW) glutenin subunits, which have been associated with superior bread-making quality and which are absent from durum wheats. The positive selectable marker was the Escherichia coli phosphomannose isomerase (pmi) gene, whose product catalyzes the reversible interconversion of mannose-6-phosphate and fructose-6-phosphate, allowing plant cells to utilize mannose as a carbon source. PCR assays of genomic DNA from regenerated plants identified 15 T0 plants that contained the pmi marker gene for an overall transformation efficiency of 1.5%, which is similar to biolistic transformation efficiencies of durum wheat with intact circular plasmids. Line TC-52, which initially contained pmi, non-expressed 1Dx5, and expressed 1Dy10 HMW glutenin subunit transgenes, was further investigated. PCR was used to follow inheritance of the pmi marker gene and 1Dx5 from the T1 to T3 generations. Transgene expression was monitored by the chlorophenol-red assay for pmi and SDS-PAGE of seed proteins for 1Dy10. From these analyses, we observed that the 1Dy10, 1Dx5 and pmi transgenes were not linked, allowing us in the T3 generation to identify 1Dy10 transgenic segregants that contained no marker or silent 1Dx5 transgenes. Homozygotes containing and expressing only the 1Dy10 transgene were identified in the T4 generation. These experiments show that it is possible to combine biolistic transformation by minimal gene cassettes with genetic segregation to make marker-free transgenic wheat plants with new traits.
Keywords: Phosphomannose isomerase; Marker genes; HMW glutenin subunits; Minimal gene cassettes

Tulin Ozderen, Burcu Olanca, Turgay Sanal, Dilek Sivri Ozay, Hamit Koksel, Effects of suni-bug (Eurygaster spp.) damage on semolina properties and spaghetti quality characteristics of durum wheats (Triticum durum L.), Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 464-470, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.004.
(http://www.sciencedirect.com/science/article/B6WHK-4R9JTTV-3/2/ac54483822f77f9b8bbe712c09f3e6b7)
Abstract:
Effects of suni-bug (Eurygaster spp.) damage on semolina properties and spaghetti quality characteristics of durum wheats (Triticum durum L.) were investigated. The semolinas obtained from sound (control), medium damage (around 20%) and high damage (around 40%) samples of five durum wheat cultivars (cvs. Diyarbakir, Firat, Ege, Svevo and Zenith) were processed into spaghetti. As the bug damage level increased, Glutograph stretch values of all cultivars decreased significantly probably due to deteriorative effects of bug damage on gluten quality. Glutograph relaxation values and gluten spread values of the damaged samples were considerably higher compared to those of sound samples in all cultivars, due to proteolytic degradation. The breaking force of the uncooked spaghetti samples decreased significantly with increasing bug damage level indicating that they were susceptible to breakage and not suitable for handling, packaging and

shipment. Panel tests indicated significant deterioration in sensory properties (stickiness, firmness and bulkiness) generally at the medium damage level.
Deterioration in gluten quality supported the significant increases in total organic matter (TOM) and cooking loss values of the spaghetti samples with increasing damage levels.
Keywords: Durum wheat; Suni-bug; Spaghetti; Cooking quality

Saray Servi, Hazim Ozkaya, Abdullah S. Colakoglu, Dephytinization of wheat bran by fermentation with bakers' yeast, incubation with barley malt flour and autoclaving at different pH levels, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 471-476, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.10.011.
(http://www.sciencedirect.com/science/article/B6WHK-4RSBY3J-1/2/e875e8377e96541e5d9997d0649acd55)
Abstract:
Wheat bran is an important source of dietary fiber but also contains considerable amounts of phytic acid, which is known to impair mineral absorption. The present study was conducted to investigate the phytic acid reduction in coarse and fine wheat bran by fermentation with the different levels of bakers' yeast (3, 6 and 9%) for 8 h at 30 [degree sign]C, incubation with the different levels of barley malt flour (2.5, 5.0, 7.5 and 10.0%) for 8 h at pH 5.2 and 55 [degree sign]C, and autoclaving at the different pH levels (pH 5.0, 4.5, 4.0 and 3.5) adjusted with acetic acid for 2 h. The phytic acid content of the wheat bran was effectively reduced by all treatments, and the phytic acid lost was in the range of 88.4-96.9%. Without addition of yeast or malt flour, or autoclaving without pH adjustment, the phytic acid content of the bran samples was reduced at most to 44.9% of the initial amounts under the investigated conditions. Increasing the concentration of yeast or malt flour or decreasing the pH towards 3.5 did not enhance the phytic acid reduction. The most reduction occurred after 2 h of yeast fermentation and malt flour incubation, and after 30 min of autoclaving, which made up 92-98% of the total phytic acid loss. Extending the treatment periods contributed nominally to further increase in the phytic acid reduction, and the rate of the phytic acid loss decreased progressively.
Keywords: Autoclaving; Barley malt flour; Dephytinization; Fermentation; Phytic acid; Wheat bran

Raniero Mendichi, Salvatore Fisichella, Anna Savarino, Molecular weight, size distribution and conformation of Glutenin from different wheat cultivars by SEC-MALLS, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 486-493, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.006.
(http://www.sciencedirect.com/science/article/B6WHK-4RRNXPD-1/2/5fb6dfc38f997940c39ee6ea5bc3251e)
Abstract:
Molecular weight and size distributions of two glutenin polymers were determined by a multi-angle laser light scattering (MALLS) photometer on-line to a size exclusion chromatography (SEC) system. Two glutenin polymers extracted, sonicated and purified from wheat flours of different cultivars, i.e. Cheyenne and Chinese Spring, were accurately fractionated by SEC using three buffers (pH 2.6, 4.0 and 6.9) and two column sets. Both molecular weight distribution (MWD) and radius of gyration distribution (RGD) could be used to differentiate the two cultivars. MWD of glutenin polymers is a complex mixture of high- and low-molecular weight fractions and the relative percentage was found to be very different. The two cultivars were found to be different; in particular, the Chinese Spring polymer showed more compact conformation than the Cheyenne polymer. The slope of the conformation plot for glutenin was about 0.37, close to the theoretical value for compact spheres. Determination of glutenin MWD and RGD was difficult and depended on the buffer used and the SEC columns.
Keywords: Glutenin; SEC-MALLS; Molecular weight distribution; Radius of gyration distribution

G.M. Borrelli, A.M. De Leonardis, C. Platani, A. Troccoli, Distribution along durum wheat kernel of the components involved in semolina colour, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 494-502, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.007.
(http://www.sciencedirect.com/science/article/B6WHK-4RSRDG5-1/2/478ece066a488cbd9bcd93810c822cb8)
Abstract:
A bright yellow colour of pasta is an important qualitative trait for the durum wheat industry. Final colour is the result of the balance between yellow and brown components in semolina. Carotenoid pigments and lipoxygenase (LOX) enzyme are mainly involved in yellowness, whereas peroxidase (POD) and ash affect brown hue. All these components have a different distribution across the kernel, with varietal differences too. This study aimed to evaluate the distribution pattern of carotenoid pigments, [alpha]-tocopherol, linoleic acid, and ash content as well as of LOX and POD activities within the kernel of six durum wheat cultivars characterised by different pigment content and hydroperoxidation activity of LOX in semolina. The results confirmed differences in the distribution of these components across the kernel and among varieties. Additionally, this study identified for some components (POD, pigments and bleaching activity of LOX) a higher effect of genotype whereas for others (ash, [alpha]-tocopherol, hydroperoxidation activity) a marked effect of the debranning process. These results suggest that improvement of the final semolina colour could be reached both through breeding activity, enabling an early selection of better lines, and through an appropriate debranning process.
Keywords: Durum wheat; Semolina colour; Debranning; Breeding

Shane R. McIntosh, Don Brushett, Robert J. Henry, GTP cyclohydrolase 1 expression and folate accumulation in the developing wheat seed, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 503-512, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.11.008.
(http://www.sciencedirect.com/science/article/B6WHK-4RSRDG5-2/2/d5ba882a4d78a0b9142218d7392a3af7)
Abstract:
Folates are essential cofactors required by most living organisms yet only plants and microorganisms have retained the ability of de novo synthesis. Human deficiencies remain prevalent due to inadequate dietary intake. Cereals are the most widely consumed plant product yet fail to supply sufficient levels of folates, however an active folate pathway in seeds identifies cereals as a potential target for biofortification. GTP cyclohydrolase 1 mRNAs were isolated from developing wheat seed tissues, leaves and roots suggesting de novo folate synthesis is occurring throughout the wheat plant. A homologous gene was identified in the rice genome sequence revealing both wheat and rice GCH1 transcripts have conserved features identified in other plant GCH1 genes. Wheat seed transcripts produced functional recombinant proteins which catalysed the formation of dihydroneopterin triphosphate from GTP. A differential expression profile of GCH1 transcripts occurred throughout seed development whereas folate accumulation decreased. Interestingly, the mature seed has retained GCH1 activity only in the embryo and maternal layers which explains the apparent partitioning of folate accumulation in the mature seed. The wheat seed has a continually active folate biosynthetic pathway through development and by inference the capacity to produce folate continues as long as the seed remains viable.
Keywords: GCH1; Folate; Wheat seeds; Gene expression

Sibel Irmak, Hamid A. Naeem, George L. Lookhart, Finlay MacRitchie, Effect of heat stress on wheat proteins during kernel development in wheat near-isogenic lines differing at Glu-D1, Journal of Cereal Science, Volume 48, Issue 2, September 2008, Pages 513-516, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.12.002.
(http://www.sciencedirect.com/science/article/B6WHK-4RSJDT4-1/2/850f728a0e46b581c02708bd73d38659)

Abstract:
Two near-isogenic lines of the wheat variety Lance having Glu-D1a (HMW-GS 2 + 12) and Glu-D1d (HMW-GS 5 + 10) were subjected to several regimes of heat stress. In 2001, the temperature regimes were (i) 20/16 (day/night, [degree sign]C) from planting to maturity, (ii) 20/16 except for a 3-day heat treatment of 35/20, 25 days after anthesis and (iii) 20/16 until 25 DAA, after which plants were subjected to 40/25 until maturity. In 2002, treatments (i) and (iii) were the same while treatment (ii) used a temperature of 40/25 [degree sign]C for 3 days at 25 DAA. Seed was collected at 3-day intervals starting from 16 days after anthesis and analyzed for protein composition by SE-HPLC. The line with the Glu-D1d allele showed an earlier polymerization of glutenin than its allelic counterpart and a higher molecular weight of glutenin at maturity, this being deduced from measurements of the percentage of unextractable polymeric protein. It is postulated that the timing and rate of glutenin polymerization, and the timing of high temperature application may be the key factors contributing to an explanation of the effect of heat stress on functionality.
Keywords: Grain filling; Heat stress; Molecular weight; Near-isogenic lines

M. Mastromatteo, S. Chillo, G.G. Buonocore, A. Massaro, A. Conte, M.A. Del Nobile, Effects of spelt and wheat bran on the performances of wheat gluten films, Journal of Food Engineering, Volume 88, Issue 2, September 2008, Pages 202-212, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.02.006.
(http://www.sciencedirect.com/science/article/B6T8J-4RT4XPP-1/2/3e81c93e59c367f6c6734a140f512a36)
Abstract:
The individual and interactive effects of the spelt and wheat bran as well as glycerol, on the properties of wheat gluten based edible films were investigated in this work using response surface methodology. Tests were run to determine water vapour permeability (WVP), mechanical and dynamical properties and colour of the films as well as the rheological properties of the film forming solutions. Results highlight that the glycerol presence had a negative effect on water vapor permeability values of the films (increase of WVP), whereas the bran presence had a positive influence (decrease of WVP). The Elastic modulus (Ec) of the composite films increased with the increase of bran concentration and with the decrease of glycerol. The tenacity increased with the increase of glycerol and spelt bran up to a threshold value after which a decrease was observed. The complex modulus (E*) of the composite films increased with the decrease of the glycerol concentration and with the increase of the wheat bran. All film forming solutions presented pseudoplastic behaviour; moreover, the apparent viscosity increased with the increase of bran concentration due to the fact that a greater number of water molecules are immobilized. The complex viscosity ([eta]*) was affected by a positive interaction between spelt bran and wheat bran. Results also showed that Yellow Index (YI) and b parameter of Hunter scale increased with the bran concentration, whereas the L values decreased. The glycerol increase determined a decrease in the YI and b value and an increase in L value.
Keywords: Edible films; Wheat gluten; Spelt bran; Wheat bran; Response surface methodology

Aldo Corsetti, Luca Settanni, Teresa M. Braga, Maria de Fatima Silva Lopes, Giovanna Suzzi, An investigation of the bacteriocinogenic potential of lactic acid bacteria associated with wheat (Triticum durum) kernels and non-conventional flours, LWT - Food Science and Technology, Volume 41, Issue 7, September 2008, Pages 1173-1182, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.07.022.
(http://www.sciencedirect.com/science/article/B6WMV-4PJCYN8-1/2/b0da50203496b5564dcbc0192f7f5854)
Abstract:
One hundred and thirty-seven lactic acid bacteria (LAB), previously isolated from wheat (Triticum durum) grains and non-conventional flour samples, were tested for the production of antibacterial

substances. A total of 16 strains (5 Enterococcus faecium, 5 Enterococcus mundtii, 4 Pediococcus pentosaceus, 1 Lactobacillus coryniformis and 1 Lactococcus garvieae) were found to inhibit the growth of Listeria innocua. The antibacterial activities were preliminarily investigated for their general behaviour with proteolytic (proteinase K, protease B and trypsin), amylolytic ([alpha]-amylase) and lipolytic (lipase) enzymes, after heat treatment, and exposure to different pHs and ethanol concentrations. Bacteriocin-like inhibitory substances (BLIS) were also characterized for their inhibition spectra against non-pathogenic and pathogenic food-associated and human pathogenic bacteria. LAB showing the best characteristics in terms of inhibition spectrum, inhibition activity and mode of action (bactericidal) belonged to the species Ent. mundtii. The high percentage (11.68%) of BLIS-producing strains detected confirmed previous observations that raw materials may harbour higher numbers of bacteriocinogenic LAB than fermented foods.
Keywords: Bacteriocin-like inhibitory substances; Biopreservation; Lactic acid bacteria; Non-conventional flours; Triticum durum

Lin Hai, Huijun Guo, Carola Wagner, Shihe Xiao, Wolfgang Friedt, Genomic regions for yield and yield parameters in Chinese winter wheat (Triticum aestivum L.) genotypes tested under varying environments correspond to QTL in widely different wheat materials, Plant Science, Volume 175, Issue 3, September 2008, Pages 226-232, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.03.006.
(http://www.sciencedirect.com/science/article/B6TBH-4S4JYJD-1/2/40b7c4825af8cb390909ae4117581d60)
Abstract:
Field trials with a population of 108 doubled haploid (DH) lines of bread wheat (Triticum aestivum L.) derived from a cross between the Chinese winter wheat cultivars CA9613 and H1488 were carried out at Beijing (China) in 2000/2001 and 2001/2002. In addition, a field trial and a pot experiment were carried out at the experimental field stations of Giessen University (Germany) in the vegetation periods 2004/2005 and 2006/2007. Phenotypic data for major agronomic yield-related traits, i.e. grain weight per ear (GWE), grain number per ear (GNE), plant height and thousand-grain weight (TGW), were recorded in all experiments. In addition, biomass weight per tiller and ear weight were evaluated in the two field trials at Beijing. Based on the phenotypic data and a genetic map comprising 168 SSR markers, an analysis of quantitative trait loci (QTL) was carried out for yield and yield parameters using the composite interval mapping (CIM) approach. A total of 30 QTL were detected for these traits across four environments. Five of these QTL located on chromosomes 1A, 1B, 2B, 2D and 7D exhibited pleiotropic effects. Such pleiotropic gene loci will be very useful for understanding the homologous/homeologous relationships among QTL and designing an appropriate marker-assisted breeding programme including multi-trait selection in order to accumulate ('pyramide') favorable alleles at different genetic loci.
Keywords: Doubled haploids (DHs); Quantitative trait loci (QTL); Grain weight; Biomass weight; Bread wheat (Triticum aestivum L.)

Roberta Roberti, AnnaRita Veronesi, Augusto Cesari, Annunziata Cascone, Iris Di Berardino, Laura Bertini, Carla Caruso, Induction of PR proteins and resistance by the biocontrol agent Clonostachys rosea in wheat plants infected with Fusarium culmorum, Plant Science, Volume 175, Issue 3, September 2008, Pages 339-347, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.05.003.
(http://www.sciencedirect.com/science/article/B6TBH-4SJ2WPS-1/2/fec44d41ae79a41fd94ab98c909d9f1a)
Abstract:
Clonostachys rosea (CR) is a common worldwide saprophyte with destructive effect against several plant pathogenic fungi showing antagonistic features against a wide variety of pathogens. We recently isolated a strain of C. rosea, named CR47, from wheat crown infected with Fusarium culmorum (FC); this strain proved to be effective against Fusarium seed borne diseases of cereals under field condition. In this paper the function of C. rosea applied as seed treatment on wheat

seedling growth was investigated. In addition, we investigated the expression pattern of peroxidases and chitinases as well as PR4 proteins following both CR treatments of seeds and FC infection and also in the three-component system pathogen-antagonist-wheat. Several chitinase isoforms were induced by CR-treatment both in coleoptiles and roots, whereas some peroxidase isoforms were induced only in the presence of both antagonist and pathogen. In the latter case, it seems that CR-treatment by itself promotes plant growth and reduces the peroxidase expression, while enhances some chitinase isoforms probably involved in cell wall disruption. Moreover, both the antagonist and the pathogen studied induced PR4 protein expression, which probably exerts its role on the invading microorganisms by a translation-inhibitory process that could be ascribed to their ribonuclease activity.
Keywords: Biocontrol agent; Clonostachys rosea; Fusarium culmorum; Phytopathogen; PR proteins; Resistance induction

Qiyan Jiang, Hui Chen, Xinglai Pan, Qianying Pan, Yinhong Shi, Xiurong Li, Guiyun Zhang, Yongjie Wang, Sangang Xie, Shihua Shen, Proteomic analysis of wheat (Triticum aestivum L.) hybrid necrosis, Plant Science, Volume 175, Issue 3, September 2008, Pages 394-401, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.05.017.
(http://www.sciencedirect.com/science/article/B6TBH-4SNWVY5-1/2/75e463f36becf81c999992be1d869064)
Abstract:
Comparison of protein expression in necrotic leaves and in normal leaves of wheat (Triticum aestivum L.) showed that the abundance of 39 proteins was changed significantly, and 26 of these proteins were identified. Analysis of the function of the differentially expressed proteins in the necrotic hybrid leaves showed that the cytoprotective heat shock proteins may be induced to maintain the integrity of other proteins, facilitating the intercellular transportation of vital cellular enzymes upon necrosis. The increased abundance of NADH dehydrogenase indicated that the chloroplasts of necrotic leaves were under photo-oxidative stress. In addition, the light and dark events of photosynthesis were impacted differently during necrosis. The increased abundance of the hormone-sensitive enzymes phospholipase and [beta]-1,3-glucanase suggested that the level of plant hormones may be increased in necrotic leaves. Both DNA helicase and maturase K were down-regulated in necrotic leaves, indicating basic genetic processes, including replication, repair, recombination, transcription and translation, were impacted during necrosis. The results of this study give a comprehensive picture of the post-transcriptional response to necrosis in hybrid wheat leaves and serve as a platform for further characterization of gene function and regulation in wheat hybrid necrosis.
Keywords: Hybrid necrosis; Proteomic; Wheat

Sarit Weissmann, Moshe Feldman, Jonathan Gressel, Hypothesis: Transgene establishment in wild relatives of wheat can be prevented by utilizing the Ph1 gene as a senso stricto chaperon to prevent homoeologous recombination, Plant Science, Volume 175, Issue 3, September 2008, Pages 410-414, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.05.014.
(http://www.sciencedirect.com/science/article/B6TBH-4SM6299-1/2/88dd805492f2fb0b9a5c666c40a7cab5)
Abstract:
Durum and bread wheat need transgenic traits such as herbicide and disease resistance due to recent evolution of herbicide resistant grass weeds and an intractable new strain of stem rust. Transgenic wheat varieties have not been commercialized partly due to potential transgene movement to wild/weedy relatives, which occurs naturally to closely related Aegilops and other spp. Recombination does not occur in the F1 hybrid between wheat and its relatives due to the presence of the Ph1 gene on wheat chromosome arm 5BL, which acts as a chaperone, preventing promiscuous homoeologous pairing to similar, but not homologous chromosomes of the

wild/weedy species. Thus recombination must occur during backcrossing after the wheat Ph1 gene has been eliminated. Based on these findings, we speculate that Ph1 could be used to prevent gene introgression into weedy relatives. We propose two methods to prevent such transgene establishment: (1) link the transgene in proximity to the wheat Ph1 gene and (2) insert the transgene in tandem with the lethal barnase on any chromosome arm other than 5BL, and insert barstar, which suppresses barnase on chromosome arm 5BL in proximity to Ph1. The presence of Ph1 in backcross plants containing 5BL will prevent the homoeologous establishment of barnase coupled to the desired transgene in the wild population. 5BL itself will be eliminated during repeated backcrossing to the wild parent, and progeny bearing the desired transgene in tandem with barnase but without the Ph1-barstar complex will die.
Keywords: Transgenic wheat; Ph1; Transgene establishment; barnase/barstar; Mitigation

Rehana Rasool, S.S. Kukal, G.S. Hira, Soil organic carbon and physical properties as affected by long-term application of FYM and inorganic fertilizers in maize-wheat system, Soil and Tillage Research, Volume 101, Issues 1-2, September-October 2008, Pages 31-36, ISSN 0167-1987, DOI: 10.1016/j.still.2008.05.015.
(http://www.sciencedirect.com/science/article/B6TC6-4SYKKS7-1/2/f72e73d981669b0b5ebfcf80a446c4e4)
Abstract:
The physical quality of the soil, which creates suitable environment for the availability and uptake of the plant nutrients, is generally ignored. Though the effect of organic manures on soil physical quality has been widely appreciated but that of inorganic fertilizers is studied to a lesser extent. The present study carried out during 2004-2005 aims to characterize the soil physical quality in relation to the long-term (32 years) application of farmyard manure (FYM) and inorganic fertilizers in maize (Zea mays L.) wheat (Triticum aestivum L.) cropping system. The treatments during both maize and wheat crops were (i) farm yard manure at 20 Mg ha-1 (FYM), (ii) nitrogen at 100 kg ha-1 (N100), (iii) nitrogen and phosphorus at 100 and 50 kg ha-1 (N100P50) and (iv) nitrogen, phosphorus and potassium at 100, 50 and 50 kg ha-1 (N100P50K50) in addition to (v) control treatment, i.e. without any fertilizer and/or FYM addition. The treatments were replicated four times in randomized block design in a sandy loam (Typic Ustipsament, non-saline, slightly alkaline). Bulk density, organic carbon content, structural stability of soil aggregates and water holding capacity of 0-60 cm soil layer were measured.
The application of FYM to maize increased the organic carbon by 16% whereas N100P50K50 increased it by 21%. The increased organic matter with both FYM and N100P50K50 increased the total soil porosity and decreased soil bulk density from that in control plots. The mean weight diameter (MWD) was highest in FYM plots of both maize (0.160 mm) and wheat (0.172 mm) closely followed by that in N100P50K50 plots. The effect of FYM in increasing the MWD decreased with soil depth. The average water holding capacity (WHC) was higher with FYM and N100P50K50 application than that in control plots. The MWD, total porosity, OC content and WHC improved with the application of balanced application of fertilizers. The grain yield and uptake of N, P and K by both maize and wheat were higher with the application of FYM and inorganic fertilizers than in control plots. The uptake of N, P and K increased with the application of FYM and N100P50K50.
Keywords: Bulk density; Soil organic carbon; FYM; Inorganic fertilizers; Maize-wheat; Mean weight diameter; Water holding capacity

Ryan A. Davis, David Huggins, R. James Cook, Timothy C. Paulitz, Can placement of seed away from relic stubble limit Rhizoctonia root rot in direct-seeded wheat?, Soil and Tillage Research, Volume 101, Issues 1-2, September-October 2008, Pages 37-43, ISSN 0167-1987, DOI: 10.1016/j.still.2008.05.014.

(http://www.sciencedirect.com/science/article/B6TC6-4SYD9FS-3/2/c7c20bee72258a24df8baec9316abe15)
Abstract:
Rhizoctonia root rot of wheat can be a problem in no-till systems, especially during the transition from conventional tillage. There are no effective chemical controls or resistant varieties, leaving only cultural methods to manage this disease. In a no-till system, residue and inoculum of soilborne pathogens are not moved by cultivation, therefore the inoculum may be concentrated in the seeding row of the previous year. Using GPS tracking systems with sub-meter accuracy, the seeding row could be placed away from the row of the previous year. We tested the hypothesis that seeding away from the relic row may reduce Rhizoctonia root rot. In two field experiments, plants were sampled at three distances from the seed row, as well as from fumigated plots. Intact soil cores were also removed from the field, planted with seeds at various distances from the previous row, and grown in the greenhouse under controlled conditions. Pasteurized cores served as controls. Disease levels were higher in the field in the second year, but there was no consistent effect of seed row placement on disease or plant parameters. However, soil fumigation and pasteurization had significant effects, indicating that soilborne pathogens were active. Inoculum of Rhizoctonia is not produced in the crowns and lower stems of the plant, but the pathogen survives in living and dead roots of the previous year crop, volunteers, and grassy weeds. Thus, high inoculum densities may be present in between the relic rows, as well as within the rows. If this is the situation with Rhizoctonia, precision placement of seed rows would not be efficacious.
Keywords: Direct seeding; Rhizoctonia root rot; Precision seed placement; Relic seed row; Soilborne fungal pathogens; Pathogen inoculum; Crop residue; Rhizoctonia solani

Peter Jamieson, Ian Brooking, Robert Zyskowski, Catherine Munro, The vexatious problem of the variation of the phyllochron in wheat, Field Crops Research, Volume 108, Issue 2, 23 August 2008, Pages 163-168, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.04.011.
(http://www.sciencedirect.com/science/article/B6T6M-4SSGCKJ-1/2/4ffb17eda41277697a94f9269c87f6c0)
Abstract:
Measurements of the thermal phyllochron in wheat using air temperature show a systematic variation with sowing date, with long phyllochrons for crops sown in autumn and winter, but shorter phyllochrons for sowings outside that range. Based on the hypothesis that the phyllochron is constant, two sources of error for the apparent variation in phyllochron are investigated, namely the site of temperature measurement (air or soil) and the implicit assumption that leaf appearance rate responds linearly to temperature. Measurements of the phyllochron from three sowings per annum for 6 years, from controlled environments, and from a sequence of sowings through an annual cycle are presented. The field results show similar systematic variation to that found elsewhere. However, for the annual cycle, calculations of the phyllochron based on soil temperature at 2 cm depth were much more stable than those based on air temperature. In addition, leaf appearance rate was linearly related to 2 cm soil temperatures across all environments, with a 0 [degree sign]C intercept, and the optimum temperature was still not reached in the highest temperature treatment (30.9 [degree sign]C soil temperature). Following earlier published work, we then show that the assumption that the phyllochron is constant, but that the controlling temperature at the apex is different from air temperature, requires a correction of less than 1 [degree sign]C when sowing dates do not stray too much outside the range of normal practice. We show that the correction to air temperature is systematically related to sowing date, and a suitable correction can be made by using daylength some time after emergence as a predictive surrogate for seasonal variation in the air-apex temperature difference. We suggest that a model using such a predictor will improve predictions of leaf appearance rate over earlier functional models. However, we suggest that the observed response is caused by the physics of the system rather than the biology.

Keywords: Sirius; Simulation models; Soil temperature; Wheat apex; Leaf appearance rate

W. Chen, Y.Y. Shen, M.J. Robertson, M.E. Probert, W.D. Bellotti, Simulation analysis of lucerne-wheat crop rotation on the Loess Plateau of Northern China, Field Crops Research, Volume 108, Issue 2, 23 August 2008, Pages 179-187, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.04.010.
(http://www.sciencedirect.com/science/article/B6T6M-4SPSPJB-1/2/a53bb6dc8dba7b98616a298259970e03)
Abstract:
The Agricultural Production System Simulator (APSIM) was parameterised and tested against datasets from two field experiments being conducted on Heilu soil at the Qingyang Research Station, Gansu, China as to investigate long-term lucerne productivity and management options of reducing impact of lucerne on winter wheat yield in a lucerne-wheat rotation system. With minimal parameterisation and configuration of the APSIM-Lucerne module, APSIM was able to simulate phenological development and seasonal growth of winter-dormant lucerne cultivar, Longdong compared with the observed data. Flowering date was accurately simulated using the established relationship between accumulated thermal time and mean photoperiod. After the APSIM-Lucerne module was configured for the seasonal variation in RUE (radiation use efficiency), the model simulated lucerne seasonal biomass production over three growing seasons in the continuous lucerne treatment with a root mean squared deviation (RMSD) of 1132 kg/ha (30% of the mean observed biomass). In the treatment where lucerne was removed in August 2001 and two winter wheat crops were sown and harvested in 2001/2002 and 2002/2003 growing seasons, APSIM simulated winter wheat crop biomass in both growing seasons with a RMSD of 1420 kg/ha (20% of the mean observed crop biomass). Wheat grain yield was simulated with a RMSD of 918 kg/ha (27% of the mean observed grain yield). Using measurements of drained upper limit (DUL) and lower limit (LL), and standard soil evaporation and runoff parameters, the model was able to simulate soil water dynamics and water use by lucerne in the lucerne-fallow, continuous lucerne and lucerne-wheat treatments.
The long-term simulation suggested that under local climatic conditions, lucerne could produce 11,000 kg/ha biomass annually. The simulation also indicated that integrating lucerne with annual cropping could potentially reduce runoff and early removal improved soil water storage prior to sowing winter wheat and optimise wheat yield following lucerne in a lucerne-wheat rotation system. The findings from these long-term simulations suggest there is need to develop management strategies when lucerne is integrated with annual cropping system to improve soil water use and reduce runoff. There is also need to consider a balance between sustaining wheat yield and providing feed for livestock when developing management strategies for timing of lucerne removal and cropping option in lucerne-based rotation systems. The successful test of APSIM will give local researchers confidence to use the tool exploring cropping system issues in Northern China.
Keywords: APSIM; Simulation; Lucerne; Rotation; Runoff

Farah S. Hosseinian, Wende Li, Trust Beta, Measurement of anthocyanins and other phytochemicals in purple wheat, Food Chemistry, Volume 109, Issue 4, 15 August 2008, Pages 916-924, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.083.
(http://www.sciencedirect.com/science/article/B6T6R-4RP0MTK-3/2/a7c9f9eb979f5fa8653fd72cfd9c82db)
Abstract:
The major anthocyanin composition of normal purple wheat and heat stressed purple wheat were measured using HPLC, LC-MS/MS and the pH differential method. The lignan secoisolariciresinol diglucoside (SDG) and melatonin content were also measured. Total anthocyanin profile of normal purple wheat (491.3 mg/kg) was significantly ($P < 0.05$) lower than that of the heat stressed purple wheat (522.7 mg/kg). Thirteen major anthocyanins were isolated and cyanidin 3-glucoside was the

predominant anthocyanin in purple wheat. Using the pH differential method, the total anthocyanin content of normal (500.6 mg/kg) and heat stressed (526.0 mg/kg) purple wheat were similar to those observed using HPLC. The SDG content of normal and heat stressed purple wheat were 770 and 520 [mu]g/kg, while melatonin content was 4 and 2 [mu]g/kg, respectively. The presence of SDG and melatonin in addition to anthocyanins may contribute to the health benefits associated with consumption of coloured cereal grains.
Keywords: Purple wheat; Phytochemicals; Anthocyanins; Secoisolariciresinol diglucoside; SDG; Melatonin; HPLC; LC-MS/MS

Juliusz Perkowski, Maciej Busko, Jaroslaw Chmielewski, Tomasz Goral, Bozena Tyrakowska, Content of trichodiene and analysis of fungal volatiles (electronic nose) in wheat and triticale grain naturally infected and inoculated with Fusarium culmorum, International Journal of Food Microbiology, Volume 126, Issues 1-2, 15 August 2008, Pages 127-134, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2008.05.028.
(http://www.sciencedirect.com/science/article/B6T7K-4SM6294-1/2/e626063409c21b53eee1457249bfaed4)
Abstract:
Four groups of cereal kernels were analyzed in terms of their volatile metabolite contents using GC/MS and the electronic nose. Analyses were conducted on 36 triticale breeding lines and 22 wheat breeding lines. Grain came from field samples inoculated with Fusarium culmorum and simultaneous non-inoculated samples--controls. All sample groups contained significantly varied levels of trichodiene (TRICH), a precursor for the formation of fusarium metabolites, with approx. two times higher concentration recorded in triticale. In inoculated samples TRICH concentration for wheat was on average six times higher and for triticale eight times higher than in non-inoculated samples. In the course of analysis using the electronic nose in tested groups of grain differences were observed in the profiles of detected volatile compounds. This resulted in a statistically significant distribution of investigated samples into four objects.
Keywords: Fungal volatiles; Trichodiene; Fusarium culmorum; GC/MS; Electronic nose; Wheat; Triticale

Kun-Pu ZHANG, Liang ZHAO, Yan HAI, Guang-Feng CHEN, Ji-Chun TIAN, QTL Mapping for Adult-Plant Resistance to Powdery Mildew, Lodging Resistance, and Internode Length Below Spike in Wheat, Acta Agronomica Sinica, Volume 34, Issue 8, August 2008, Pages 1350-1357, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60046-2.
(http://www.sciencedirect.com/science/article/B94TW-4V2FYB4-3/2/8164d31195ceff4d1fadbdb6f1fce884)
Abstract:
Quantitative trait loci (QTLs) for adult-plant resistance (APR) to powdery mildew, lodging resistance (LDR), and the internode length below spike (ILBS) in wheat (Triticum aestivum L.) were studied using a set of 168 doubled haploid (DH) lines derived from the cross between Huapei 3 and Yumai 57. A genetic linkage map was constructed using 305 simple sequence repeat (SSR) markers. The DH population and the parents were evaluated for APR to powdery mildew, LDR, and ILBS in 2005 and 2006 growing seasons in Tai'an, Shandong Province and in 2006 growing season in Suzhou, Anhui Province, China. QTL analysis was performed using the software of QTLNetwork version 2.0 based on the mixed linear model. A total of 12 additive QTLs and 10 pairs of epistatic QTLs were detected for APR to powdery mildew, LDR, and ILBS. QTL qApr4D was detected for APR to powdery mildew on chromosome 4D with an increased effect on resistance. The QTL was from Yumai 57, which explained 20.0% of the phenotypic variances without additive x environment (AE) interactions. QTL qIlbs7D was identified for ILBS on chromosome 7D, explaining 12.9% of the phenotypic variances without AE interactions. Both additive and epistatic effects are important genetic bases for APR to powdery mildew, LDR, and ILBS, and are

sometimes subjected to environmental modifications. The 2 QTLs mentioned earlier are applicable in marker-assisted selection for APR to powdery mildew and ILBS in wheat breeding programs.
Keywords: wheat powdery mildew; adult-plant resistance; internode length below spike; lodging resistance; quantitative trait locus

Guo-Wei XU, Li-Nian YANG, Hao ZHANG, Zhi-Qin WANG, Li-Jun LIU, Jian-Chang YANG, Absorption and Utilization of Nitrogen, Phosphorus, and Potassium in Rice Plants Under Site-Specific Nitrogen Management and Wheat-Residue Incorporation, Acta Agronomica Sinica, Volume 34, Issue 8, August 2008, Pages 1424-1434, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60049-8.
(http://www.sciencedirect.com/science/article/B94TW-4V2FYB4-6/2/34f3f7d9d0d7cad85702d3b0bade6364)
Abstract:
To investigate the absorption and utilization of major nutrient elements of rice (Oryza sativa L.) plant when wheat (Triticum aestivum L.) residues returned to the field (residue incorporation, RI) or under site-specific nitrogen management (SSNM), the effects of RI and SSNM on harvest index, translocation, and transportation efficiency were evaluated in 2005-2006, using a midseason japonica rice cultivar of Yangjing 9538. The results showed that under same N level, compared with the no straw incorporation, RI reduced N content and the accumulations of N, phosphorus (P), and potassium (K) in rice plants at the early growth stage but maintained high levels of contents of P and K during the whole growth period. Moreover, RI improved the N use efficiency and the harvest index and biomass production efficiency of N, P, and K. Under RI with the same amount of wheat residues, rice plants in SSNM had less absorption of N and P than in the N fertilizer rate in farmer practice (FFP). However, the transportation percentages of N, P, and K from heading to maturity, as well as the harvest indices of N and P under SSNM, were higher than those under FFP. The results indicate that both RI and SSNM can increase the absorptions and use efficiencies of N, P, and K in rice plants, and their combination shows better effects.
Keywords: rice; wheat residue incorporation; site-specific nitrogen management; phosphorous; potassium; nutrition use efficiency

Min-na YANG, Zhi-bin XU, Mei-nan WANG, Jian-rong SONG, Jin-xue JING, Zhen-qi LI, Inheritance and Molecular Mapping of Stripe Rust Resistance Gene Yr88375 in Chinese Wheat Line Zhongliang 88375, Agricultural Sciences in China, Volume 7, Issue 8, August 2008, Pages 901-906, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60128-5.
(http://www.sciencedirect.com/science/article/B82XG-4T9DCT2-1/2/41527c42520243298218b71b01d0270c)
Abstract:
Stripe rust is one of the most important diseases of wheat worldwide. Inheritance of stripe rust resistance and mapping of resistance gene with simple sequence repeat (SSR) markers are studied to formulate efficient strategies for breeding cultivars resistant to stripe rust. Zhongliang 88375, a common wheat line, is highly resistant to all three rusts of wheat in China. The gene conferring rust disease was deduced originating from Elytrigia intermedium. Genetic analysis of Zhongliang 88375 indicated that the resistance to PST race CYR31 was controlled by a single dominant gene, temporarily designated as Yr88375. To molecular map Yr88375, a F2 segregating population consisting of 163 individuals was constructed on the basis of the hybridization between Zhongliang 88375 and a susceptible wheat line Mingxian 169; 320 SSR primer pairs were used for analyzing the genetic linkage relation. Six SSR markers, Xgwm335, Xwmc289, Xwmc810, Xgdm116, Xbarc59, and Xwmc783, are linked to Yr88375 as they were all located on chromosome 5BL. Yr88375 was also located on that chromosome arm, closely linked to Xgdm116 and Xwmc810 with genetic distances of 3.1 and 3.9 cM, respectively. The furthest marker Xwmc783 was 13.5 cM to Yr88375. Hence, pedigree analysis of Zhongliang 88375 combined with

SSR markers supports the conclusion that the highly resistance gene Yr88375 derived from Elytrigia intermedium is a novel gene for resistance to stripe rust in wheat. It could play an important role in wheat breeding programs for stripe rust resistance.
Keywords: Puccinia striiformis f. sp. Tritici; Zhongliang 88375; resistance gene; molecular mapping

Wen-yang LI, Su-hui YAN, Yan-ping YIN, Yong LI, Tai-bo LIANG, Feng GU, Zhong-min DAI, Zhen-lin WANG, Comparison of Starch Granule Size Distribution Between Hard and Soft Wheat Cultivars in Eastern China, Agricultural Sciences in China, Volume 7, Issue 8, August 2008, Pages 907-914, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60129-7.
(http://www.sciencedirect.com/science/article/B82XG-4T9DCT2-2/2/06e978910fee826f1c37066ec236048a)
Abstract:
Granule size distribution of wheat starch is an important characteristic that can affect its chemical composition and functionality. Two types of wheat cultivars, the hard and soft wheat cultivars, grown at Tai'an Experimental Station of Shandong Agricultural University, Taian, Shandong, China, were examined in this study. The granule size distribution and amylose contents in wheat grains were studied and compared, and relationships between the properties were identified. A clear bimodal distribution of granule size was shown in all wheat cultivars. Volume distribution of starch granules shows the typical bimodal with peak values in the ranges of 5.6-6.1 [mu]m and 20.7-24.9 [mu]m, respectively. Also, granule surface area distribution was bimodal with peak values in the ranges of 2.4-3.2 [mu]m and 20.7-24.9 [mu]m, respectively. Number distribution of granules was a typical population with a peak value in the range of 0.54-1.05 [mu]m. Contributions from the granules < 2.8 [mu]m and < 9.9 [mu]m to the total volume were in the ranges of 94.2-95.1% and 99.7-99.9% of total number, respectively. Proportions of granules < 2.8 [mu]m, 2.8-9.9 [mu]m, 9.9-22.8 [mu]m, and 22.8-42.8 [mu]m were in the ranges of 12.9-14.3%, 28.4-31.1%, 33.5-35.6%, and 19.7-22.7% for hard wheat, and 10.3-13.9%, 26.6-28.1%, 32.7-34.6%, and 24.2-27% for soft wheat. Hard wheat had greater B-type granules (< 9.9 [mu]m), and had fewer granules of 22.8-42.8 [mu]m than soft wheat. Amylose content was positively related to volume percentage of granules 22.8-42.8 [mu]m, and negatively related to volume percentage of granules 2.8-22.8 [mu]m.
Keywords: wheat (Triticum aestivum L.); starch granule; size distribution; amylose; hard wheat; soft wheat

J.H. Kjaersgaard, F. Plauborg, M. Mollerup, C.T. Petersen, S. Hansen, Crop coefficients for winter wheat in a sub-humid climate regime, Agricultural Water Management, Volume 95, Issue 8, August 2008, Pages 918-924, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.03.004.
(http://www.sciencedirect.com/science/article/B6T3X-4SGTS8Y-1/2/b11e9a0134966059ca248294a1c35152)
Abstract:
Estimations of evapotranspiration (ET) from natural surfaces are used in a large number of applications such as agricultural water management and water resources planning. Lack of reliable, cheap and easy-to-use instruments, associated with the chaotic and varying nature of the meteorological and plant physiological factors influencing ET cause these estimations to be based on calculated values rather than the measured ones. The two-step approach where ET from a reference crop is calculated and multiplied by empirical crop coefficients to obtain ET from a crop has gained wide acceptance. Daily coefficients for a winter wheat crop growing under standard conditions, i.e. not short of water and growing under optimal agronomic conditions, were estimated for a cold sub-humid climate regime. One of the two methods used to estimate ET from a reference crop required net radiation (Rn) as input. Two sets of coefficients were used for calculating Rn. Weather data from a meteorological station was used to estimate Rn and ET from the reference crop. The winter wheat ET was measured using an eddy covariance system during

the main parts of the growing seasons 2004 and 2005. The meteorological data and field measurements were quality controlled and discarded from the analysis if flagged for errors. Daily values of ET from the reference crop and winter wheat calculated from hourly values were used to calculate the crop coefficients. Average daily crop coefficients were in the 1.1-1.15 range during mid-season with standard deviations ranging from 0.13 to 0.23 for both years. These values exceed values used in some sub-humid climate regime studies, but agree well with values from the international literature.
Keywords: Reference evapotranspiration; Crop evapotranspiration; Crop coefficients; Net radiation; Eddy covariance

Guoju Xiao, Qiang Zhang, Yubi Yao, Hong Zhao, Runyuan Wang, Huzhi Bai, Fengju Zhang, Impact of recent climatic change on the yield of winter wheat at low and high altitudes in semi-arid northwestern China, Agriculture, Ecosystems & Environment, Volume 127, Issues 1-2, August 2008, Pages 37-42, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.02.007.
(http://www.sciencedirect.com/science/article/B6T3Y-4SBRTGT-1/2/3b28693d9bcc1b035896e14291cf0461)
Abstract:
This study analyses data on winter wheat (Triticum aestivum L.) development and climate from Tongwei County (35[degree sign]13'N, 105[degree sign]14'E), Gansu, in the semiarid northwest of China during 1981-2005. Two study sites were chosen: one at Tongwei Meteorological Station, situated at 1798 m above sea level at the foot of LuLu Mountain, and the second on the summit of LuLu Mountain at an altitude of 2351 m. The objective was to investigate whether there were significant trends in the change of climate variables, and whether these changes have significantly affected the development and production of winter wheat at different altitudes above sea level. The results showed that, with changes in temperature and precipitation, there was a significant change in the phenology of winter wheat that crop yields increased at both sites from 1981 to 2005, and that the increase in yields was higher at the high-altitude site. During 1981-1998 the yields at the high-altitude site were lower than at the low altitude site, whereas after 1998 the yields at the high-altitude site were higher than at the low altitude site. In the face of climate change, winter wheat production in this region during 1981-2005 was higher at the higher altitude site than at the lower altitude site. It is expected that, by 2030, the interaction of warming temperature and changed rainfall will have led to a further increase of 3.1% in wheat yields at a low altitude and of 4.0% at a high altitude in the semiarid northwest of China.
Keywords: Climate changes; Precipitation; Temperature; Winter wheat; Semiarid northwest of China

P.K. Ghosh, D.S. Jayas, E.A. Smith, M.L.H. Gruwel, N.D.G. White, Mathematical modelling of wheat kernel drying with input from moisture movement studies using magnetic resonance imaging (MRI), Part II: Model comparison with published studies, Biosystems Engineering, Volume 100, Issue 4, August 2008, Pages 547-554, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.04.014.
(http://www.sciencedirect.com/science/article/B6WXV-4SS8CM5-2/2/c5f7f650a65edc0141cd138ec457cbb6)
Abstract:
The predicted moisture data, using the three-dimensional (3D) single wheat drying model (Part I) considering actual kernel geometry, were compared with two published semi-empirical thin-layer wheat drying models, and one published axisymmetric heat and mass transfer model for a single wheat kernel. The published axisymmetric model assumed a uniform initial moisture distribution within the whole kernel of ellipsoidal geometry and a single value of the water diffusion coefficient. Our model predictions agreed well with the observations obtained from the published models. Further, our model can predict the moisture distribution pattern within individual wheat components

with drying time. Moisture and temperature distributions inside the wheat kernel and the effect of drying temperature on wheat quality were explained by calculating the Biot and Lewis numbers. High Biot numbers for moisture transfer (0.89x106-3.04x106 for endosperm and 1.98x106-3.37x106 for germ) indicated that moisture transfer inside the wheat structural components was governed by high internal resistance, whereas low Biot numbers for heat transfer (0.12-0.20 for endosperm and 0.02-0.10 for germ) indicated that heat transfer was controlled by external resistance and, hence, temperature within the wheat kernels was uniform at any given time during drying. Lewis numbers indicated that the rate of heat transfer was very high compared to moisture transfer in both the endosperm and the germ. Sensitivity analysis was performed for selecting proper model parameters which indicated that values of water diffusion coefficients in the germ and endosperm are the most sensitive parameters for a grain drying process.

Chang-Xing Zhao, Ling-Yu Guo, Cheruth Abdul Jaleel, Hong-Bo Shao, Hong-Bing Yang, Prospectives for applying molecular and genetic methodology to improve wheat cultivars in drought environments, Comptes Rendus Biologies, Volume 331, Issue 8, August 2008, Pages 579-586, ISSN 1631-0691, DOI: 10.1016/j.crvi.2008.05.006.
(http://www.sciencedirect.com/science/article/B6X1F-4SVM12J-3/2/c9f93b7b20e5b8b7ccdd8936851b545f)
Abstract:
With the advent of molecular biotechnologies, new opportunities are available for plant physiologists to study the relationships between wheat traits and their genetic control. The functional determinations of all genes that participate in drought adaptation or tolerance reactions are expected to provide an integrated understanding of the biochemical and physiological basis of stress responses in wheat. However, despite all the recent technological breakthroughs, the overall contribution of genomics-assisted breeding to the release of drought-resilient wheat cultivars has so far been marginal. This paper critically analyses how biotechnological, genetic and information tools can contribute to accelerating the release of improved, drought-tolerant wheat cultivars. Armed with such information from established models, it will be possible to elucidate the physiological basis of drought tolerance and to select genotypes with an improved yield under water-limited conditions. To cite this article: C.-X. Zhao et al., C. R. Biologies 331 (2008).
Keywords: Wheat (Triticum aestivum L.); Drought environments; Comparative mapping; Segregating population; Genetic linkage maps; Genomics-assisted breeding

J.W. Muthomi, J.K. Ndung'u, J.K. Gathumbi, E.W. Mutitu, J.M. Wagacha, The occurrence of Fusarium species and mycotoxins in Kenyan wheat, Crop Protection, Volume 27, Issue 8, August 2008, Pages 1215-1219, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.03.001.
(http://www.sciencedirect.com/science/article/B6T5T-4SHN07Y-1/2/1c69f71a48a4e957796407565491f338)
Abstract:
Freshly harvested wheat grain samples were collected during the 2004 growing season to determine the presence of head blight-causing Fusarium species. Fungal contamination was determined by isolation on agar media, while mycotoxin analysis was by direct competitive enzyme-linked immunosorbent assay (ELISA). The wheat grain samples were highly contaminated with fungi, especially Epicoccum, Alternaria and Fusarium species. The mean Fusarium infection rate varied from 13% to 18%, with the major head blight-causing species being Fusarium poae, Fusarium graminearum, Fusarium equiseti and Fusarium avenaceum. F. graminearum isolates were found to be highly virulent (79% disease severity) and significantly reduced kernel weight. Most grain samples were contaminated with mycotoxins, with a mean incidence rate of up to 75% for deoxynivalenol (DON) and 86% for T-2 toxin. Other mycotoxins detected were zearalenone and aflatoxin B1. Co-occurrence of DON, T-2 toxin and zearalenone was found in up to 35% of the samples. The results suggested the presence of Fusarium head blight and associated mycotoxins

in Kenya. The presence of several mycotoxins, even at such low levels, could pose chronic adverse health effects to human and livestock fed on the contaminated wheat products.
Keywords: Fusarium; Mycotoxins; Wheat; Head blight

Lambros Farmakis, Athanasia Koliadima, George Karaiskakis, Andrea Zattoni, Pierluigi Reschiglian, Study of the influence of surfactants on the size distribution and mass ratio of wheat starch granules by sedimentation/steric field-flow fractionation, Food Hydrocolloids, Volume 22, Issue 6, August 2008, Pages 961-972, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.05.001.
(http://www.sciencedirect.com/science/article/B6VP9-4NRK4MV-4/2/d2e1647e4c1668ec1ba1347ad6d80aaf)
Abstract:
The determination of the particle size distribution and mass ratio of two types (small and large) of starch granules is of great significance in the food industry, since the size of the granules influences the gelatinization, digestibility and thermomechanical behavior of starch. In order to achieve that, the ideal experimental conditions for sample analysis should be determined. The influence of the various surfactants (FL-70, a mixture of anionic and nonionic surfactants; Triton X-100, a nonionic surfactant; and SDS, an ionic surfactant) used during the analysis on these results was investigated, as the chemical structure of the suspending medium affects the interaction forces between the starch granules themselves, as well as the starch granules and the accumulation wall. Two different mathematical methodologies were applied, which were found to lead to approximately similar conclusions concerning the mass ratio of starch granules. The kind of detergent used was found to have a strong influence on the results of the experimental analysis. The total experimental procedure was performed by sedimentation field-flow fractionation (SdFFF). The results were compared with those obtained by scanning electron microscopy (SEM) or with those found in the literature.
Keywords: Wheat starch granules; Size distribution of starch granules; Influence of surfactants; Sedimentation field-flow fractionation

Shaomin Sun, Yihu Song, Qiang Zheng, Thermo-molded wheat gluten plastics plasticized with glycerol: Effect of molding temperature, Food Hydrocolloids, Volume 22, Issue 6, August 2008, Pages 1006-1013, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.05.012.
(http://www.sciencedirect.com/science/article/B6VP9-4NX2NMV-2/2/d993f5202369efe525df994dcfac3cad)
Abstract:
The present work aims to study the influence of molding temperature on the properties of thermo-molded biodegradable wheat gluten plastics plasticized with glycerol. Moisture absorption, tensile properties (tensile strength and elongation at break), crosslinking density and stress relaxation were evaluated in relation to the molding temperatures. Dynamic mechanical analysis was conducted for further revealing the effect of molding temperature on the structure of the protein network. Increasing molding temperature from 25 to 125 [degree sign]C significantly improves crosslinking density of the three-dimensional protein network through disulfide bonding, thus leading to increases in tensile strength, Young's modulus and relaxation time.
Keywords: Wheat gluten; Molding temperature; Mechanical properties; Stress relaxation

Shaomin Sun, Yihu Song, Qiang Zheng, pH-induced rheological changes for semi-dilute solutions of wheat gliadins, Food Hydrocolloids, Volume 22, Issue 6, August 2008, Pages 1090-1096, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.06.006.
(http://www.sciencedirect.com/science/article/B6VP9-4P1G9RT-1/2/251568895b70e5e9ee7c4417ab44357d)
Abstract:

Rheological behaviors of wheat gliadins in 50% (v/v) propanol/water solutions with a concentration of 13 wt% at various pHs were investigated by means of steady and dynamic experiments. Gliadin solutions behave as weak non-Newton liquids with a slight shear thinning. Both zero-rate viscosity and mechanical relaxation time decrease with increasing pH of the solution, which is ascribed to the pH-induced enhancement of intermolecular association. A hybrid model proposed by Ferry et al. [Warren, Schrag, & Ferry, 1973. Infinite-dilute viscoelastic properties of poly-[gamma]-benzyl-l-glutamate in helicogenic solvents. Biopolymer, 12, 1905-1915.] is applicable to account for the dynamic data, suggesting that gliadin macromolecules are partially flexible and are highly elongated due to electrostatic interaction. The experimental results showed that the viscosity and the characteristic relaxation times were related to pH of the gliadin solutions.
Keywords: Gliadin; Rheology; Shear thinning; Hybrid model

R. Cabanas, M.R. Bragulat, M.L. Abarca, G. Castella, F.J. Cabanes, Occurrence of Penicillium verrucosum in retail wheat flours from the Spanish market, Food Microbiology, Volume 25, Issue 5, August 2008, Pages 642-647, ISSN 0740-0020, DOI: 10.1016/j.fm.2008.04.003.
(http://www.sciencedirect.com/science/article/B6WFP-4S9G93M-2/2/8de695eb14168b9930fc6e15aab91175)
Abstract:
In Spain, low ochratoxin A (OTA) levels have been detected in wheat and different wheat products but no information has been published about the fungi involved in this OTA contamination. Some species of the genera Penicillium and Aspergillus are known to form OTA but few of them are known to contaminate foods with this mycotoxin. Penicillium verrucosum, an important OTA producer typical of temperate and cold climates, is much more frequently found on cereals in countries where they occasionally have OTA problems as in North European countries compared with South Europe, where levels of OTA generally seem to be lower or is not detected. The aim of this study was to determine, identify and characterize the occurrence of potential OTA-producing Aspergillus spp. and Penicillium spp. from retail wheat flours purchased in the Spanish market and used for human consumption. A total of 105 Aspergillus isolates were analyzed in order to know whether they are able to produce OTA and/or citrinin (CIT). None of these isolates were able to produce these mycotoxins. However, 17 suspected P. verrucosum isolates were recovered and confirmed by RAPD analyses. Eleven isolates were OTA producers and 14 isolates produced CIT. Our results confirm the potential risk of OTA and CIT production in wheat flours if stored improperly and the occurrence of P. verrucosum in South European countries. This was the only species able to produce these mycotoxins.
Keywords: Aspergillus; Citrinin; DYSG (dichloran yeast extract sucrose glycerol agar); Wheat flour; Flour; Ochratoxin; Penicillium verrucosum; RAPD typing; Wheat

D. Curic, D. Novotni, D. Skevin, C.M. Rosell, C. Collar, A. Le Bail, I. Colic-Baric, D. Gabric, Design of a quality index for the objective evaluation of bread quality: Application to wheat breads using selected bake off technology for bread making, Food Research International, Volume 41, Issue 7, August 2008, Pages 714-719, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.05.006.
(http://www.sciencedirect.com/science/article/B6T6V-4SNWW14-1/2/72a71e71cfd35d9cbb5a1b558204b2aa)
Abstract:
Bread quality index was established using the instrumental analysis of bread parameters that influence the consumers' acceptability. The instrumental methods that describe bread appearance, structure and texture have been chosen in order to enable the identification and quantification of main discrepancies of wheat bread produced by different processes such as fully baked frozen bread (FBF), partially baked frozen (PBF) and bread from unfermented frozen dough (UFD) in comparison to bread baked conventionally (CON). The significant influence of bread making technology on bread texture, crust appearance and specific volume was proven at $p = 0.01$. The

quality index was calculated as a sum of grouped linearly normalized variables multiplied by group factor of significance and relatively to the CON bread. The presented quality index could be very useful in the bakery products development especially when innovative production process is applied.
Keywords: Bread; Quality index; Texture; Freezing process; Bake off technology

Ning Hui Song, Liang Chen, Hong Yang, Effect of dissolved organic matter on mobility and activation of chlorotoluron in soil and wheat, Geoderma, Volume 146, Issues 1-2, 31 July 2008, Pages 344-352, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2008.05.031.
(http://www.sciencedirect.com/science/article/B6V67-4T1SFPD-3/2/b4d9ffe242b2aab2940f215f85ad8a84)
Abstract:
Chlorotoluron is a pesticide that is moderately absorbed and fairly mobile and leaching in soils. Dissolved organic matter (DOM) plays a critical role in affecting the environmental behavior of pesticides. In this study, we report the effect of DOM extracted from sludge (SL) and straw (ST) on chlorotoluron sorption/desorption and mobility using several techniques including batch experiment, soil column, soil thin-layer chromatography and bioefficacy estimation. Application of DOM (SL and ST) at 50 and 150 mg DOC L- 1 decreased the sorption of and increased desorption of chlorotoluron in soils. Freundlich constant Kf values (sorption) of chlorotoluron for SL1 (50 mg DOC L- 1 sludge extract) and SL2 (150 mg DOC L- 1 sludge extract) treatments were 0.06 and 0.04, respectively, which were significantly lower than the value (0.29) for the control. The respective values for treatments of ST1 (50 mg DOC L- 1 straw extract) and ST2 (150 mg DOC L- 1 straw extract) were 0.04 and 0.02. Mobility of chlorotoluron was tested in packed soil columns and soil plate. Addition of DOM to both systems significantly increased the mobility of chlorotoluron and the total concentration of chlorotoluron in the leachate in columns. Biological analysis with wheat plant revealed that application of DOM reduced the chlorotoluron accumulation in tissues at lower concentration of chlorotoluron and increased its accumulation at higher level of chlorotoluron. Finally, we analyzed FT-IR spectral and fluorescence for DOMs and found that more unsaturated components and amine were present in DOM-ST than in DOM-SL. These results may help our understanding of the general role of DOMs in regulating the activation and mobility of organic chemicals (e.g. herbicide and contaminants) in the ecosystem.
Keywords: Chlorotoluron; DOM; Sorption; Desorption; Mobility

Maria Rosaria Leucci, Marcello Salvatore Lenucci, Gabriella Piro, Giuseppe Dalessandro, Water stress and cell wall polysaccharides in the apical root zone of wheat cultivars varying in drought tolerance, Journal of Plant Physiology, Volume 165, Issue 11, 31 July 2008, Pages 1168-1180, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.09.006.
(http://www.sciencedirect.com/science/article/B7GJ7-4RFD021-4/2/8053bab86eef44f8a1c8e688666aca53)
Abstract: Summary
Glycosyl composition and linkage analysis of cell wall polysaccharides were examined in apical root zones excised from water-stressed and unstressed wheat seedlings (Triticum durum Desf.) cv. Capeiti ('drought-tolerant') and cv. Creso ('drought sensitive'). Wall polysaccharides were sequentially solubilized to obtain three fractions: CDTA+Na2CO3 extract, KOH extract and the insoluble residue ([alpha]-cellulose). A comparison between the two genotypes showed only small variations in the percentages of matrix polysaccharides (CDTA+Na2CO3 plus KOH extract) and of the insoluble residues ([alpha]-cellulose) in water-stressed and unstressed conditions. Xylosyl, glucosyl and arabinosyl residues represented more than 90 mol% of the matrix polysaccharides. The linkage analysis of matrix polysaccharides showed high levels of xyloglucans (23-39 mol%), and arabinoxylans (38-48 mol%) and a low amount of pectins and (1-->3), (1-->4)-[beta]-d-glucans. The high level of xyloglucans was supported by the release of the diagnostic disaccharide

isoprimeverose after Driselase digestion of KOH-extracted polysaccharides. In the 'drought-tolerant' cv. Capeiti the mol% of side chains of rhamnogalacturonan I and II significantly increased in response to water stress, whereas in cv. Creso, this increase did not occur. The results support a role of the pectic side chains during water stress response in a drought-tolerant wheat cultivar.
Keywords: Cell wall polysaccharides; Drought stress; Root; Triticum durum; Wheat

K. Walsh, P. O'Kiely, A.P. Moloney, T.M. Boland, Intake, digestibility, rumen fermentation and performance of beef cattle fed diets based on whole-crop wheat or barley harvested at two cutting heights relative to maize silage or ad libitum concentrates, Animal Feed Science and Technology, Volume 144, Issues 3-4, 15 July 2008, Pages 257-278, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.10.018.
(http://www.sciencedirect.com/science/article/B6T42-4RB5BJ3-2/2/24988d07cdadf3dc38b701458707f2ff)
Abstract:
This experiment aimed to quantify the relative intake, digestibility, rumen fermentation, performance and carcass characteristics of beef cattle fed diets based on good quality whole-crop wheat and barley silages, each harvested at two cutting heights, and to rank these relative to good quality maize silage and an ad libitum concentrates-based diet. Ninety beef steers, initial live-weight 438 +/- 31.0 kg, were allocated to one of the following dietary treatments in a randomised complete block design: maize silage (MS), whole-crop wheat harvested at a normal cutting height (WCW) (stubble height 0.12 m) or an elevated cutting height (HCW) (stubble height 0.29 m), whole-crop barley harvested at a normal cutting height (WCB) (stubble height 0.13 m) or an elevated cutting height (HCB) (stubble height 0.30 m), each being supplemented with 3 kg concentrates/head/day, and ad libitum concentrates (ALC) supplemented with 5 kg grass silage/head/day for the duration of the 160-day study. Mean dry matter (DM) of the maize silage, whole-crop wheat, head-cut wheat, whole-crop barley and head-cut barley was 301, 488, 520, 491 and 499 g/kg, respectively. There were no differences in total DM intake among treatments, or in rumen fermentation characteristics (except ammonia), or in DM digestibility among the forage-based treatments. Neutral detergent fibre digestibility was lower ($P<0.05$) for whole-crop wheat than head-cut barley, and starch digestibility was lower ($P<0.05$) for whole-crop barley and head-cut barley than maize silage. Steers fed ALC had a higher carcass gain ($P<0.001$) and carcass weight ($P<0.05$) than all other treatments, but there were no differences between any of the forage-based treatments. Steers fed MS had a better feed conversion efficiency (FCE) than those on WCW or WCB ($P<0.05$) but were similar to HCW and HCB. The FCE was better for ALC versus any of the other treatments, particularly compared to WCW or WCB ($P<0.001$). Subcutaneous fat from steers fed ALC was more yellow ($P<0.01$) than that from steers fed the other treatments. Neither intake nor performance were altered by raising the cutting height of cereals or by replacing whole-crop wheat by barley. However, head-cut cereals numerically favoured DM intake, carcass gain and feed conversion efficiency values nearer to that of maize than whole-crop cereal silages. Ad libitum concentrates supported superior levels of growth by steers compared to all other treatments.
Keywords: Maize; Whole-crop wheat; Whole-crop barley; Cutting height; Ad libitum concentrates

Umran Uygun, Berrin Senoz, Hamit Koksel, Dissipation of organophosphorus pesticides in wheat during pasta processing, Food Chemistry, Volume 109, Issue 2, 15 July 2008, Pages 355-360, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.048.
(http://www.sciencedirect.com/science/article/B6T6R-4RF45D6-F/2/eade5e4b91cd7fef988a5593b95bc175)
Abstract:
For investigating the carryover of some organophosphorus pesticide residues in the cereal food chain from grain to consumer, a study was set up on durum wheat, semolina and pasta. Pesticide-

free durum wheat was placed into a small-scale model of a commercial storage vessel and treated with pesticides (malathion, fenitrothion, chlorpyrifos methyl, and pirimiphos methyl) according to the raw material legislation of Turkey. The residue levels of insecticides were determined in wheat, semolina, and spaghetti produced from stored wheat at various time intervals during five months of storage. A multiresidue analysis was performed using GC equipped with an NPD. The confirmation was performed by GC-MS. The residue levels of insecticides in wheat exceeded the maximum residue limits (MRLs) for wheat. The storage period was generally not effective enough to reduce the residues in wheat to levels below the MRLs. Although a considerable amount of the insecticides remained in the semolina, spaghetti processing significantly reduced residue concentrations in general. Pirimiphos methyl was the most persistent of the insecticides and comparatively less substantial loss occurred during milling and spaghetti processing due to its physicochemical properties.
Keywords: Malathion; Fenitrothion; Chlorpyrifos methyl; Pirimiphos methyl; Wheat; Semolina; Spaghetti

Lewis H. Ziska, Three-year field evaluation of early and late 20th century spring wheat cultivars to projected increases in atmospheric carbon dioxide, Field Crops Research, Volume 108, Issue 1, 11 July 2008, Pages 54-59, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.03.006.
(http://www.sciencedirect.com/science/article/B6T6M-4SK4X98-1/2/271922d65e6052062742403d58b105bc)
Abstract:
Carbon dioxide (CO2), along with light, water and nutrients, represents an essential resource needed for plant growth and reproduction. Projected and recent increases in atmospheric carbon dioxide may allow breeders and agronomists to begin intra-specific selection for yield traits associated with CO2 sensitivity. However, selection for maximum yield, particularly for cereals, is continuous, and it is possible that modern cereal cultivars are, in fact, the most CO2 sensitive. To test CO2 responsiveness, we examined two contrasting spring wheat cultivars, Marquis and Oxen, over a 3-year period under field conditions at two different planting densities. Marquis was introduced into North America in 1903, and is taller, with greater tiller plasticity (i.e. greater variation in tiller production), smaller seed and lower harvest index relative to modern wheat cultivars. Oxen, a modern cultivar released in 1996, produces fewer tillers, and has larger seed with a higher harvest index relative to Marquis. As would be expected, under ambient CO2 conditions, Oxen produced more seed than Marquis for all 3 years. However, at a CO2 concentration 250 [mu]mol mol-1 above ambient (a concentration anticipated in the next 50-100 years), no differences were observed in seed yield between the two cultivars, and vegetative above ground biomass (e.g. tillers), was significantly higher for Marquis relative to Oxen in 2006 and 2007. Significant CO2 by cultivar interaction was observed as a result of greater tiller production and an increased percentage of tillers bearing panicles for the Marquis relative to the Oxen cultivar at elevated carbon dioxide. This greater increase in tiller bearing panicles also resulted in a significant increase in harvest index for the Marquis cultivar as CO2 increased. While preliminary, these results intimate that newer cultivars are not intrinsically more CO2 responsive; rather, that yield sensitivity may be dependent on the availability of reproductive sinks to assimilate additional carbon. Overall, understanding and characterizing vegetative vs. reproductive sink capacity between cultivars may offer new opportunities for breeders to exploit and adapt varieties of wheat to projected increases in atmospheric carbon dioxide concentration.
Keywords: Breeding; Carbon dioxide; Wheat

Krzysztof Kaklewski, Janina Nowak, Marek Ligocki, Effects of selenium content in green parts of plants on the amount of ATP and ascorbate-glutathione cycle enzyme activity at various growth stages of wheat and oilseed rape, Journal of Plant Physiology, Volume 165, Issue 10, 7 July 2008, Pages 1011-1022, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.04.010.

(http://www.sciencedirect.com/science/article/B7GJ7-4RW4RRK-1/2/ddddc7eda452f6bcee97bb5c05f20113)
Abstract: Summary
The aim of this experiment, conducted under greenhouse conditions, was to assess the influence of various H2SeO3 concentrations added to soil (0.05, 0.15, and 0.45 mM kg-1) on selenium and adenosine triphosphate (ATP) content, and on the activity of the ascorbate-glutathione cycle enzymes in green parts of wheat and oilseed rape. Selenium uptake by the test plants was found to vary, with content increasing from one developmental stage to the next over four stages of the developmental cycle. At the lowest H2SeO3 dose (0.05 mM kg-1), the wheat plants took up much more selenium than did the oilseed rape plants, while the amount of selenium taken up at higher doses (0.15 and 0.45 mM kg-1) was markedly higher in rape. The increasing Se content in the wheat to about 10 mg kg-1 (in the dark) and to about 16 mg kg-1 (in the light) was accompanied by a concurrent increase in the ATP content, which remained unchanged in the light-exposed plants, while clearly decreasing in those kept in the dark. On the other hand, the ATP content of the light-exposed oilseed rape was maintained at a stable level to about 10 mg Se kg-1, following which ATP content was observed to decrease. In contrast, the tendency for the ATP content to decrease appeared immediately in the dark. The increasing plant selenium concentration was accompanied by decreased APX activity in wheat, increased activity in oilseed rape, no major change in the dehydroascorbate reductase (DHAR) activity in oilseed rape and a slight increase in wheat to about 8 mg Se kg-1, followed by a reduction. The glutathione reductase (GR) activity in wheat differed from the activity of DHAR; an increase in the selenium content to about 8 mg kg-1 was accompanied by a distinct reduction, while a significant increase was observed at higher selenium contents; in oilseed rape, the activity was observed to increase slightly within a narrow range of selenium contents (up to 5 mg kg-1), and to decrease thereafter.
Keywords: ATP; Ascorbate-glutathione cycle; Rape; Selenium; Wheat

H.L. Wang, Y.T. Gan, R.Y. Wang, J.Y. Niu, H. Zhao, Q.G. Yang, G.C. Li, Phenological trends in winter wheat and spring cotton in response to climate changes in northwest China, Agricultural and Forest Meteorology, Volume 148, Issues 8-9, 4 July 2008, Pages 1242-1251, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.03.003.
(http://www.sciencedirect.com/science/article/B6V8W-4SD1KHF-1/2/bdc29f6b539c6734b23909fd19226e6a)
Abstract:
Understanding of the effects of climatic change on phenological phases of a crop species may help optimize management schemes to increase productivity. This study determined the trend of climatic changes during the period of 1981-2004 in northwest China and assessed the impacts of climatic changes on phenological phases and productivity of winter wheat (Triticum aestivum L.) and spring cotton (Gossypium hirsutum L.) at two locations. There was a clear trend of climate warming during the study period, leading to the earliness of pseudo stem elongation, booting, anthesis, and ripening stages of winter wheat by 13.2, 9.8, 11.0, and 10.8 d during the 24-year period, respectively. The growth period from seedling emergence to stem elongation shortened 16.1 d, but the growth period from anthesis to milk prolonged 8.2 d during the 24-year period. In cotton, the dates of seedling emergence, budding, anthesis, and boll-opening stages became earlier by, respectively, 10.9, 9.0, 13.9, and 16.4 d during the period of 1983-2004. However, the growth periods from five-leaf stage to budding, budding to anthesis, and anthesis to boll-opening stages were prolonged by 2.4, 12.0, and 9.0 d, respectively, for every 1 [degree sign]C of rise in minimum temperature during their respective growth period. Increasing minimum temperatures during the vegetative period positively affected winter wheat growth but increases in maximum temperatures during the reproductive period negatively affected kernel weight and grain yield. Consequently, the grain yield of winter wheat had decreased, but the yield of cotton had increased

during the study period. The trend of climate warming appeared to be favourable for cotton production but unfavourable for winter wheat in northwest China.
Keywords: Phenological phases; Growth stage; Climate warming; Gossypium hirsutum; Triticum aestivum

K.S. Kim, R.M. Beresford, Use of a spectrum model and satellite cloud data in the simulation of wheat stripe rust (Puccinia striiformis) dispersal across the Tasman Sea in 1980, Agricultural and Forest Meteorology, Volume 148, Issues 8-9, 4 July 2008, Pages 1374-1382, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2008.04.004.
(http://www.sciencedirect.com/science/article/B6V8W-4SM0XB2-2/2/2b5083149159449b77166a615675cade)
Abstract:
Long distance dispersal of plant pathogens has been simulated using different approaches. Models to predict dispersal of airborne spores often use simplified methods to estimate solar radiation in order to estimate mortality of spores. We incorporated a spectrum model into a Lagrangian approach to simulate dispersal of wheat stripe rust from Australia to New Zealand across the Tasman Sea. To estimate cloud cover conditions, satellite data were also used in our study. The combination of a spectrum model and satellite cloud data made it easy to identify sites at which viable spores were deposited. In our study, 0.6% of deposition near New Zealand followed exposure to UV radiation less than our mortality threshold (0.9 MJ m-2). Model spores of wheat stripe rust arrived at sites within 40 km from Otama, New Zealand, where wheat stripe rust was first reported in November 1980. It appeared that the uredospores were transported under an overcast cloud condition, which would increase the chance of successful infection on host crops. Further studies on the relationship between solar UV radiation and mortality of pathogen uredospores would facilitate the use of the spectrum model and satellite data to predict dispersal of airborne spores.
Keywords: Wheat stripe rust; Long distance dispersal; Spectrum model; Satellite data

Jin-Hua WU, Yin-Gang HU, Hong ZHANG, Chang-You WANG, Qiu-Ying WANG, Wan-Quan JI, Expression of Special Genes Resistant to Powdery Mildew (Blumeria graminis f. sp. tritici) in Wheat Germplasm N9436, Acta Agronomica Sinica, Volume 34, Issue 7, July 2008, Pages 1143-1152, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60040-1.
(http://www.sciencedirect.com/science/article/B94TW-4TS6MWT-2/2/7f0065ec57a19942b7eaf27409c6f21b)
Abstract:
Powdery mildew, caused by Blumeria graminis f. sp. tritici, is one of the most important fungal diseases in common wheat (Triticum aestivum L.) worldwide. Wheat germplasm N9436 is resistant to powdery mildew. In the present study, a suppression subtraction hybridization (SSH) cDNA library was constructed with cDNA from N9436 leaves inoculated with Blumeria graminis as the tester and cDNA from uninoculated N9436 leaves as the driver. A total of 140 positive clones were randomly chosen from the SSH-cDNA library. Amplification using primers sp6 and t7 indicated that the sizes of the inserts ranged from 200 to 1000 bp with an average of 238 bp. Among the 140 clones, 32.86% showed redundant and repeated sequences. The most frequent sequence was glutathione transferase followed by ribulose-1,5-bisphosphate carboxylase/oxygenase small/large subunit. After screening the repeated and redundant sequences, 94 expressed sequence tags (ESTs) were acquired. Nucleic acid and protein homology search were performed using the basic local alignment search tool (BLAST) program with the default settings at NCBI website. BlastX results in nr-protein database revealed that 49 ESTs were highly homologous with known proteins involved in the disease resistance and defense reactions, energy metabolism, cell structure, protein synthesis and processing, and transport and signal transduction. BlastNr results showed that 69 and 20 ESTs had high identities with known Unigene and function-unknown ESTs,

respectively, and 5 ESTs matched none in the nr-database. Thirty-three ESTs were both in the nucleic acid and protein databases, including 22 ESTs associated with powdery mildew resistance. Among them, 6 were responsible for signal transduction, 2 for hypersensitive necrosis reaction system, and 14 for systemic acquired resistance system, respectively.
Keywords: wheat; powdery mildew; suppression subtraction hybridization (SSH); expressed sequence tag (EST)

Tie-Zhu HU, Hong-Jie LI, Chao-Jie XIE, Ming-Shan YOU, Zuo-Min YANG, Qi-XinSUN, Zhi-Yong LIU, Molecular Mapping and Chromosomal Location of Powdery Mildew Resistance Gene in Wheat Cultivar Tangmai 4, Acta Agronomica Sinica, Volume 34, Issue 7, July 2008, Pages 1193-1198, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60043-7.
(http://www.sciencedirect.com/science/article/B94TW-4TS6MWT-5/2/da31fedfb503ebbfeb60dbebd04b2747)
Abstract:
Powdery mildew, caused by Blumeria graminis f. sp. tritici, is one of the most important diseases in wheat (Triticum aestivum L.) worldwide. Breeding for resistance is the most economical and effective method for controlling the disease. Tangmai 4 carries a pair of T1BL[middle dot]1RS wheat-rye (Secale cereale L.) translocated chromosomes and is resistant to a wide spectrum of wheat powdery mildew isolates. Genetic analysis indicated that a single semidominant gene in Tangmai 4 conferred resistance to powdery mildew, temporarily designated PmTm4. Segregating F2 population and their F3 progenies derived from the cross between Tangmai 4 and Clement were used for bulked segregation analysis. Four SSR, one EST-SSR, and one EST-STS polymorphic markers were linked to the powdery mildew resistance gene PmTm4 in an order of Xcau12-Xgwm611-PmTm4-XEST92-Xbarc1073-Xbarc82. Gene PmTm4 was physically mapped on the distal bin of chromosome 7BL using Chinese Spring nullisomic-tetrasomic, ditelosomic, and deletion lines. The results demonstrate that PmTm4 gene may be either an allele at the Pm5 locus or a member of closely linked cluster of genes.
Keywords: wheat; Tangmai 4; powdery mildew resistance gene; molecular marker

Lei FU, Ji-chun TIAN, Cai-ling SUN, Chun LI, RVA and Farinograph Properties Study on Blends of Resistant Starch and Wheat Flour, Agricultural Sciences in China, Volume 7, Issue 7, July 2008, Pages 812-822, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60118-2.
(http://www.sciencedirect.com/science/article/B82XG-4T1Y01K-5/2/94913eca22f401732bd9275cfac33b79)
Abstract:
Resistant starch (RS) is the undigested starch that passes through the small intestine to the large intestine. As a functional low calorie additive, it has special applications in the food industry. Rapid visco analysis (RVA) and the Brabender farinograph were used to study the pasting properties and the viscoelasticity of blends of RS (RS3 and RS2) and three wheat flours. The wheat flours represented strong gluten wheat (SGW), intermediate gluten wheat (IGW), and weak gluten wheat (WGW) flours, at different levels of RS substitution (0, 5, 10, 15, and 20%). The influence of RS3 on the control wheat flours and RS-wheat flour blends were consistent with those of RS2. The peak, trough, and final viscosities of RS3-wheat flour blends were higher than those of the corresponding RS2-wheat flour blends. The peak, trough, breakdown, final, and setback viscosities of wheat-RS blends decreased with an increase in resistant starch contents from 0 to 20% in the blends. The 0-20% RS-wheat flour blends were all able to form doughs. The dough development times, dough stabilities, dough breakdown times, and farinograph quality numbers for the RS-wheat flour blends decreased as the RS proportion in the blends increased. The values for RS-SGW flour blends were the highest, followed by RS-IGW and then RS-WGW flour blends. The water absorption values for RS-wheat flour blends and the mixing tolerance index for RS-WGW flour blends were found to increase significantly with an increasing proportion of RS from 0 to 20%,

but the mixing tolerance index for RS-SGW and RS-IGW flour blends showed no significant differences amongst the different ratios. Correlation analysis showed that the Farinograph quality number was highly positively correlated with dough breakdown time, dough stability, and dough development time (r = 1.000, 0.958, 0.894), and highly negatively correlated with the mixing tolerance index (r = -0.890). Data from this study can be used for the development of dough-based products. It also provides a basis for RS-wheat flour blends and quality evaluation in the food industry.
Keywords: resistant starch; wheat flour; pasting properties; rapid viscosity analysis; dough stability; farinograph quality number

Anil Kumar Singh, Rojalin Tripathy, Usha Kiran Chopra, Evaluation of CERES-Wheat and CropSyst models for water-nitrogen interactions in wheat crop, Agricultural Water Management, Volume 95, Issue 7, July 2008, Pages 776-786, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.02.006.
(http://www.sciencedirect.com/science/article/B6T3X-4S9RDG8-2/2/6f9d93a131093656c03dc9004dbd4a3e)
Abstract:
Crop simulation models can provide an alternative, less time-consuming and inexpensive means of determining the optimum crop N and irrigation requirements under varied soil and climatic conditions. In this context, two dynamic mechanistic models (CERES (Crop Environment REsource Synthesis)-Wheat and CropSyst (Cropping Systems Simulation Model)) were validated for predicting growth and yield of wheat (Triticum aestivum L) under different nitrogen and water management conditions. Their potential as N and water management tool was evaluated for New Delhi representing semi-arid irrigated ecosystems in the Indo-Gangetic Plains. The field experiment was carried out on a silty clay loam soil at the Research Farm of the Indian Agricultural Research Institute, New Delhi, India during 2000-2001 to collect the input data for the calibration and validation of both the models on wheat crop (variety HD 2687). The models were evaluated for three water regimes [I4 (4 irrigations within the growing season), I3 (3 irrigations within the growing season) and I2 (2 irrigations within the growing season)] and five N treatments (N0, N60, N90, N120 and N150). Both the models were calibrated using data obtained from the treatments receiving maximum nitrogen and irrigations, i.e., N150 and I4 treatments. The models were then validated against other water and nitrogen treatments. For performance evaluation, in addition to coefficient of determination (R2), root mean square error (RMSE), mean absolute error (MAE) and Wilmot's index of agreement (IoA) were estimated. Both CERES-Wheat and CropSyst provided very satisfactory estimates for the emergence, flowering and physiological maturity dates. For CERES-Wheat overall prediction (pooled result of the three water regimes) of grain yield was satisfactory with significant R2 values (0.88). The model, however, under estimated the biomass under all water regimes and N levels except for N0 level, under which biomass was overpredicted. CropSyst predicted yield and biomass of wheat more closely than CERES-Wheat. The combined RMSE for the three water regimes between predicted and observed grain yield was 0.36 Mg ha-1 for CropSyst as compared to 0.63 Mg ha-1 for CERES-Wheat. Similarly, RMSE between observed and predicted biomass by CropSyst was 1.27 Mg ha-1 as compared to 1.94 Mg ha-1 between observed and predicted biomass by CERES-Wheat. Wilmot's index of agreement (IoA) also indicated that CropSyst model is more appropriate than CERES-Wheat in predicting growth and yield of wheat under different N and irrigation application situations in this study.
Keywords: CERES-Wheat; CropSyst; Nitrogen; Water regimes; Yield; Biomass; Indo-Gangetic Plains

Mette Hedegaard Thomsen, Anders Thygesen, Anne Belinda Thomsen, Hydrothermal treatment of wheat straw at pilot plant scale using a three-step reactor system aiming at high hemicellulose

recovery, high cellulose digestibility and low lignin hydrolysis, Bioresource Technology, Volume 99, Issue 10, July 2008, Pages 4221-4228, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.08.054.
(http://www.sciencedirect.com/science/article/B6V24-4PYRK9N-1/2/9cd82c994b50de5119563d263c4ef26a)
Abstract:
A pilot plant (IBUS) consisting of three reactors was used for hydrothermal treatment of wheat straw (120-150 kg/h) aiming at co-production of bioethanol (from sugars) and electricity (from lignin). The first reactor step was pre-soaking at 80 [degree sign]C, the second extraction of hemicellulose at 170-180 [degree sign]C and the third improvement of the enzymatic cellulose convertibility at 195 [degree sign]C. Water added to the third reactor passed countercurrent to straw. The highest water addition (600 kg/h) gave the highest hemicellulose recovery (83%). With no water addition xylose degradation occurred resulting in low hemicellulose recovery (33%) but also in high glucose yield in the enzymatic hydrolysis (72 g/100 g glucose in straw). Under these conditions most of the lignin was retained in the fibre fraction, which resulted in a lignin rich residue with high combustion energy (up to 31 MJ/kg) after enzymatic hydrolysis of cellulose and hemicellulose.
Keywords: Lignocellulose; Pilot plant; Bioethanol; Combustion enthalpy; Enzymatic hydrolysis

Emanuela Locci, Samuela Laconi, Raffaello Pompei, Paola Scano, Adolfo Lai, Flaminia Cesare Marincola, Wheat bran biodegradation by Pleurotus ostreatus: A solid-state Carbon-13 NMR study, Bioresource Technology, Volume 99, Issue 10, July 2008, Pages 4279-4284, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.08.048.
(http://www.sciencedirect.com/science/article/B6V24-4R008GF-3/2/bac6446094e685c79c5981bc3b5b8aaa)
Abstract:
Solid-state 13C nuclear magnetic resonance (NMR) and elemental analysis techniques were used to monitor the degradation of wheat bran by the white-rot fungus Pleurotus ostreatus during a 62-day cultivation period. The weight loss and in vitro organic matter digestibility of the substrate were also evaluated after fungal treatment. The 13C NMR spectra of degraded wheat bran samples showed a lower content in carbohydrates and a higher content in aliphatic and carboxylic groups than the untreated control sample. In parallel, changes in the wheat bran elemental composition evidenced a decrease in carbon content and a concomitant increase in nitrogen and oxygen content during mycelium growth. These results clearly indicate the occurrence of progressive changes in the composition of wheat bran during fungal treatment and are interpreted in terms of preferential degradation of amorphous vs. crystalline polysaccharides by the fungal mycelium and accumulation of proteins in the substrate. At the end of the cultivation period, the treated samples experienced an average weight loss of 20% and an increase in organic matter digestibility of 17%.
Keywords: Wheat bran; Pleurotus ostreatus; Fungal degradation; Solid-state 13C NMR

J. Rato Nunes, F. Cabral, A. Lopez-Pineiro, Short-term effects on soil properties and wheat production from secondary paper sludge application on two Mediterranean agricultural soils, Bioresource Technology, Volume 99, Issue 11, Exploring Horizons in Biotechnology: A Global Venture, July 2008, Pages 4935-4942, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.09.016.
(http://www.sciencedirect.com/science/article/B6V24-4R05J2T-8/2/6e9ba8f0352587d8b61695e51aacaa88)
Abstract:
This study was conducted under greenhouse conditions to evaluate the potential use of SPS as a fertilizer, amendment and/or liming agent for wheat (Triticum aestivum L.). Two representative Mediterranean agricultural soils, a Cambic Arenosol (cmAR) and a Cromic Cambisol (crCM) were used. Treatments included four sludge rates ranging from 0 to 40 g kg-1 (equivalent of 0, 38, 88 and 120 Mg ha-1). A significant increment in soil pH, organic carbon, N total, available P and

exchangeable K were observed in both soils. Sludge application significantly increased N and decreased Zn, Mn and Cu concentrations in wheat. Wheat grain yields were reduced by 33% and 37% when 120 Mg SPS ha-1 was applied to cmAR and crCM soils, respectively, due apparently to unavailability of Mg. However, straw yields, with much lower Mg requirements, increased significantly with SPS rates. Secondary pulp mill sludge seems to be a potential source of organic matter, N, P, K and a potential soil amendment liming agent for acid soils, when appropriate supplemental fertilizer was provided. For grain crops grown in these soils, addition of Mg is required for proper nutrient balance.
Keywords: Mediterranean soils; Secondary paper mill sludge; Wheat fertilization

Freda R. Hawkes, Helen Forsey, Giuliano C. Premier, Richard M. Dinsdale, Dennis L. Hawkes, Alan J. Guwy, Jon Maddy, Samantha Cherryman, James Shine, David Auty, Fermentative production of hydrogen from a wheat flour industry co-product, Bioresource Technology, Volume 99, Issue 11, Exploring Horizons in Biotechnology: A Global Venture, July 2008, Pages 5020-5029, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.09.010.
(http://www.sciencedirect.com/science/article/B6V24-4R0CPVS-1/2/c102484e6710a7a960afbf71a7e05589)
Abstract:
The global flour industry produces 96 million ton/year of wheatfeed, which is mainly used for animal feed. This co-product is high in carbohydrates and potentially a significant substrate for biohydrogen production. A 10 l bioreactor, inoculated with sewage sludge, was operated on wheatfeed (10 g l-1) at pH 5.5 and 35 [degree sign]C in batch and semi-continuous mode (15 h hydraulic retention time (HRT)). Wheatfeed hydrolysate was also investigated in continuous mode (15 h HRT). NaOH-H2O2 treatment of 25 g l-1 wheatfeed resulted in hydrolysate containing on average 8.1 g l-1 total sugar. Hydrogen yields of 64 and 56 m3 H2 per ton dry weight were produced from wheatfeed in batch and 56 m3 H2 per ton dry weight of wheatfeed in semi-continuous mode. Hydrogen yields from hydrolysate were only 22 and 31 m3 H2 per ton dry weight, (or 0.9 mol H2 per mol hexose degraded, assuming all sugar is hexose). Fermentation of unhydrolysed wheatfeed is therefore recommended. It is calculated that approximately 264 m3/ton of CH4 can be produced from a subsequent anaerobic digestion stage. The biohydrogen produced (diesel equivalents) from the 1.2 million ton/year of wheatfeed in the UK would be more than twice that required for transportation by the UK flour industry.
Keywords: Wheatfeed; Biohydrogen

P.K. Ghosh, D.S. Jayas, E.A. Smith, M.L.H. Gruwel, N.D.G. White, P.A. Zhilkin, Mathematical modelling of wheat kernel drying with input from moisture movement studies using magnetic resonance imaging (MRI), Part I: Model development and comparison with MRI observations, Biosystems Engineering, Volume 100, Issue 3, July 2008, Pages 389-400, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.04.006.
(http://www.sciencedirect.com/science/article/B6WXV-4ST4CFD-1/2/c1b5f082df255cfb42df321d40b1c1e9)
Abstract:
A three-dimensional (3D) simultaneous heat and moisture transfer drying model for a single wheat kernel was developed. The model was based on the information obtained from magnetic resonance imaging (MRI) of wheat drying. The model assumed a non-uniform initial moisture distribution and two different values of water diffusion coefficients in the germ and endosperm of a wheat kernel. The model was theoretically developed using finite element method and then solved using COMSOL(R) Multiphysics(TM), a commercial finite element software package. Model simulations were performed on the actual shaped 3D geometric objects obtained from the MR images of wheat kernels using image processing algorithms. Model-predicted moisture data were compared with the results obtained from MR images under similar drying conditions. Activation

energies of the water removal process in the endosperm and germ were calculated to be 26.5 and 13.8 kJ mol-1, respectively, based on the range of drying temperatures under study.

C. Loyce, J.M. Meynard, C. Bouchard, B. Rolland, P. Lonnet, P. Bataillon, M.H. Bernicot, M. Bonnefoy, X. Charrier, B. Debote, T. Demarquet, B. Duperrier, I. Felix, D. Heddadj, O. Leblanc, M. Leleu, P. Mangin, M. Meausoone, G. Doussinault, Interaction between cultivar and crop management effects on winter wheat diseases, lodging, and yield, Crop Protection, Volume 27, Issue 7, July 2008, Pages 1131-1142, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.02.001.
(http://www.sciencedirect.com/science/article/B6T5T-4S2VM55-1/2/5b4cea947fbe17621ee980845d0317a1)
Abstract:
The breeding of winter wheat (Triticum aestivum L.) for resistance to major fungal diseases has been a priority over the last 15 years in France. During this period, integrated low-input strategies have been developed for winter wheat, to cope with falling grain prices and growing environmental concerns. We investigated the interactions between genotype and management for disease and lodging intensities, and analysed their effects on yield within an integrated crop management (CM) context.
A multi-environment experimental network (13 locations, studied in three seasons, between 1999-2000 and 2001-2002) comprising several combinations of cultivars and CM systems was carried out. Four rule-based CM plans were defined, with a decrease in input level from CM1 (a high-input CM plan designed to maximise the yield of a given cultivar) to CM4 (a low-input system with no fungicide protection, no plant growth regulator applications, a sowing density 40% lower than for CM1, and 90 kg ha-1 less N fertiliser than for CM1). Cultivars were clustered into three groups (cultivar type (CT) CT1-CT3), according to their scores for resistance to diseases, for the analysis of yield, whereas the resistance cultivar rating (CR) for each disease and for lodging was considered for the analysis of disease and lodging intensities.
For all diseases, CM had a significant effect ($P<0.0001$), with disease intensity increasing from CM1 to CM4, whereas CR had a negative effect ($P<0.005$). An interaction between CR and CM was also detected for all diseases ($P<0.005$) except eyespot. Lodging intensity decreased significantly from CM1 to CM4 ($P<0.0001$), and significant increases in lodging resistance score ($P<0.0001$) were not associated with a genotype by management interaction.
Lastly, yield was significantly affected by CM ($P<0.0001$), CT ($P<0.0003$), and CM by CT interaction ($P=0.0023$). Cultivar ranking differed as a function of CM for yield, demonstrating that breeding programs focusing on cultivar evaluation in high-input environments do not result in the selection of cultivars suited to low-input environments.
Keywords: Cultivar; Resistance; Crop management; Winter wheat; Septoria tritici blotch; Brown rust; Yellow rust; Eyespot; Lodging; Genotype by management interaction; Multi-environment experimental network

M.S. Saharan, A. Naef, Detection of genetic variation among Indian wheat head scab pathogens (Fusarium spp./isolates) with microsatellite markers, Crop Protection, Volume 27, Issue 7, July 2008, Pages 1148-1154, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.01.008.
(http://www.sciencedirect.com/science/article/B6T5T-4S1BWTN-2/2/ea23e9df6f736544da6ea6396087b13d)
Abstract:
Fusarium head blight (FHB) of wheat is responsible for extensive damage of wheat in humid and semi-humid regions of the world. Presently, FHB of wheat is a minor disease in India but due to global climate change, there is a chance that moist conditions and high humidity resulting from more rainfall during mid-anthesis could increase the susceptibility of wheat to Fusarium infection. For the present study, 27 isolates of three Fusarium spp. viz., Fusarium graminearum, Fusarium verticillioides and Fusarium oxysporum were isolated from naturally infected wheat sampled from

Punjab, Himachal Pradesh and Wellington (Tamil Nadu) during 2000-2003. Genomic DNA was isolated from fresh mycelia using the CTAB method. Fusarium spp./isolates were analyzed with four newly developed microsatellite markers (MS-Fg1353, MS-Fg6808, MS-Fg307 and MS-Fg3654) and six previously published microsatellite markers (MS-Fg97, MS-Fc1, MS-Fg103, MS-Fg30, MS-Fg75 and MS-Fg90). All markers amplified a DNA fragment of variable length for different Fusarium spp./isolates. Microsatellite markers, MS-Fg103, MS-Fg103 did not amplify F. oxysporum and F. verticillioides isolates, respectively. MS-Fg307 amplified a fragment of 200 bp with F. graminearum isolates of Wellington. This study has shown that there is considerable genotypic variability among Fusarium spp./isolates causing FHB of wheat in India.
Keywords: Fusarium spp.; Isolates; Head scab; Microsatellites; Genetic variability

Agustin Limon-Ortega, Bram Govaerts, Kenneth D. Sayre, Straw management, crop rotation, and nitrogen source effect on wheat grain yield and nitrogen use efficiency, European Journal of Agronomy, Volume 29, Issue 1, July 2008, Pages 21-28, ISSN 1161-0301, DOI: 10.1016/j.eja.2008.01.008.
(http://www.sciencedirect.com/science/article/B6T67-4S7HWRR-1/2/5ef5429c52714c536ff0cd0dc7ec8d6c)
Abstract:
Nitrogen fertilizer management from different sources and annual crop rotations are important components of wheat (Triticum aestivum L.) production systems, especially where air and soil quality issues have prompted a search for alternatives to wheat straw burning. This study examined the effects of two different wheat straw management options (burning and incorporation by tillage), three crop rotations [wheat-sesbania (Sesbania spp.), wheat-maize (Zea mays L.), and wheat-clean fallow] and three N sources (urea, chicken manure, and urea plus chicken manure) on wheat grain yield and N use efficiency. The experiment was conducted as split-split plot treatment arrangement with three replications for eight wheat cropping seasons in the state of Sonora, Mexico. Results indicated that both wheat grain yield and N use efficiency were higher with burning than incorporation of wheat straw and with fertilization with urea or urea plus chicken manure than chicken manure alone. As shown by the crop rotation-by-straw management interaction, planting sesbania following incorporation of the straw by tillage produced comparable grain yields to straw burning treatment. In contrast, wheat in annual rotation with maize produced the lowest wheat grain yield and N use efficiency irrespective of the wheat straw management and N source applied.
Keywords: N sources; Chicken manure; Urea; Burning; Sesbania

Alex A. Anton, Kelly A. Ross, Odean M. Lukow, R. Gary Fulcher, Susan D. Arntfield, Influence of added bean flour (Phaseolus vulgaris L.) on some physical and nutritional properties of wheat flour tortillas, Food Chemistry, Volume 109, Issue 1, 1 July 2008, Pages 33-41, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.005.
(http://www.sciencedirect.com/science/article/B6T6R-4RBYG2H-2/2/2dc22f022df5e37e59049ea357be5ed4)
Abstract:
Composite flours containing 15%, 25%, or 35% of small red, black, pinto, or navy bean flours (BF) and wheat were made into tortillas. Dough rheology, firmness, cohesiveness, rollability, and some physical properties of tortillas were negatively affected as BF concentration increased regardless of bean cultivar. Nutritionally, all bean tortillas had significantly higher levels of crude protein, total phenols, 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azinobis-(3-ethylbenzothiazoline-6-sulphonic acid) (ABTS+) in vitro antioxidant activity (AA) and antinutritional compounds such as phytic acid (PA) and trypsin inhibitors (TI) than the wheat control. Tortillas to which 35% of small red, pinto and black BF was added had the highest levels of phenols, which were significantly correlated with both DPPH (r = 0.99) and ABTS+ (r = 0.99) AA. Compared to raw flours, PA and TI

were reduced from 37.37% to 43.78% and from 50% to 66%, respectively, in the tortillas. Overall analysis indicated that tortillas with acceptable texture and improved nutritional profile were produced at 25% substitution.
Keywords: Beans; Tortillas; Texture; Antioxidant activity; Phytic acid; Trypsin inhibitors

Jing Wang, Baoguo Sun, Yanping Cao, Huanlu Song, Yuan Tian, Inhibitory effect of wheat bran feruloyl oligosaccharides on oxidative DNA damage in human lymphocytes, Food Chemistry, Volume 109, Issue 1, 1 July 2008, Pages 129-136, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.12.031.
(http://www.sciencedirect.com/science/article/B6T6R-4RDS474-D/2/e9bae2a0efb42c39b950a3a4060c2982)
Abstract:
The present work assessed the protective effect of feruloyl oligosaccharides (FOs), the ferulic acid ester of oligosaccharides from wheat bran, against oxidative DNA damage in normal human peripheral blood lymphocytes induced by hydrogen peroxide (H2O2). The DNA damage was measured by using the single cell gel electrophoresis assay (comet assay). Lymphocytes were subjected to DNA damage by exposure to a range of H2O2 concentrations (10-200 [mu]mol/l). H2O2, at a concentration of 200 [mu]mol/l, resulted in nearly all cells being highly damaged. FOs showed no cytotoxicity and genotoxicity to normal human lymphocytes at the tested concentrations (10-500 [mu]mol/l). In addition, DNA damage in human lymphocytes induced by 100 [mu]mol/l H2O2 was inhibited by FOs in a concentration-dependent fashion with 91.1% inhibition of lymphocyte DNA damage at 500 [mu]mol/l as compared with the control. The results suggest that water-soluble FOs from wheat bran are able to enhance the ability of human lymphocytes to resist H2O2 induced oxidative damage.
Keywords: Comet assay; Feruloyl oligosaccharides; Human lymphocytes; Wheat bran

T.A. Shittu, A. Dixon, S.O. Awonorin, L.O. Sanni, B. Maziya-Dixon, Bread from composite cassava-wheat flour. II: Effect of cassava genotype and nitrogen fertilizer on bread quality, Food Research International, Volume 41, Issue 6, July 2008, Pages 569-578, ISSN 0963-9969, DOI: 10.1016/j.foodres.2008.03.008.
(http://www.sciencedirect.com/science/article/B6T6V-4S39MM7-1/2/7d45421a9b2bca10417ced523c51920c)
Abstract:
There is an increasing interest in the use of cassava roots for food and industrial purposes especially in the baking industry in Nigeria. Development of some cassava mosaic disease (CMD) resistant clones and application of inorganic fertilizers are principal strategies targeted in the country to boost and sustain cassava root production and utilization. A study was conducted to determine the effect of cassava genotype and field application of nitrogen fertilizer on some physical properties of bread from composite cassava-wheat (CCW) flour. Five CMD cassava clones were planted in a randomized complete block design with two level of fertilizer treatments (0 and 160 kg nitrogen/ha) with two replications while harvesting was done 12 months after planting. Composite flour was produced at a ratio of 10/90 (cassava/wheat flour, w/w). The oven spring, specific volume, crumb texture (softness) and crumb moisture of loaves ranged from -0.57 to 0.63 cm, 4.37 to 6.85 cm3/g, 18.4 to 29.4 mm and 31.40% to 34.70%, respectively. The crust's tristimulus color parameters L*, a*, b* and brownness index also ranged from 54 to 67, 9 to 15, 22 to 29, and 57 to 83, respectively. These values differed significantly from each other at $p < 0.01$. Out of all these loaf properties, crumb texture was the most affected by the main and interactive effects of cassava genotype and fertilizer application ($p < 0.001$) while loaf weight was only affected by their interactive effects ($p < 0.05$). Digital image analysis of the bread crumb showed that the total number of cells, number of small cells and total cell area of the bread crumb ranged from about 22 to 27 cm-3, 20 to 25 cm-3 and 12% to 29%, respectively. The distribution of large

cells and total cell area occupied in the crumb were principally determined by the genotypic difference ($p < 0.05$) in the cassava roots. The main effect of fertilizer application significantly affected the distribution of small cells, total number of cell and the cell area ($p < 0.05$). However, the interactive effects of genotype and fertilizer application was more significant ($p < 0.01$) on the crumb cell characteristics. The study indicated that optimal quality of CCW bread loaf could be attained by appropriate selection of cassava genotype and fertilizer application.
Keywords: Cassava; Wheat; Composite bread; Physical properties; Image analysis

Soren Halvarsson, Hakan Edlund, Magnus Norgren, Properties of medium-density fibreboard (MDF) based on wheat straw and melamine modified urea formaldehyde (UMF) resin, Industrial Crops and Products, Volume 28, Issue 1, July 2008, Pages 37-46, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.01.005.
(http://www.sciencedirect.com/science/article/B6T77-4S1BX12-1/2/bb9c1a3bb9cce04b48edb2d3ab1f7682)
Abstract:
Wheat straw was investigated as a raw material for manufacturing of medium density fibreboard (MDF) in a fully equipped pilot-plant. Commercial urea melamine formaldehyde (UMF) and a mixture of UMF-resin and urea melamine phenol formaldehyde (UMPF) adhesives were used as binders in manufacturing of high performance MDF. The study evaluated the quality of MDF produced of straw (i.e., SMDF). Different qualities of wheat straw and different resin contents (14-17%) were used. Moreover, the SMDF was produced at different thicknesses of 9 and 16 mm and densities of 750-1000 kg/m3. The properties of the resulting SMDF were evaluated by analysing mechanical and water absorption (anti-swelling) properties as a function of density. Internal bond (IB), modulus of rupture (MOR), modulus of elasticity (MOE), thickness swelling (TS), and water absorption (WABS) were the properties analysed. SMDF-panels produced with densities above 780 kg/m3 and resin contents above 14% met the requirements for wood-based MDF standard EN 622-5:1997.
Keywords: Wheat straw; Nonwood fibres; MDF; Uf-resin; Muf-resin; Refining; Board properties

Yihu Song, Qiang Zheng, Cheng Liu, Green biocomposites from wheat gluten and hydroxyethyl cellulose: Processing and properties, Industrial Crops and Products, Volume 28, Issue 1, July 2008, Pages 56-62, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2008.01.004.
(http://www.sciencedirect.com/science/article/B6T77-4S0301T-1/2/1ecced614efc8c5b9809e48256add177)
Abstract:
Environmentally friendly biocomposites were prepared by conventional blending wheat gluten (WG) as matrix, hydroxyethyl cellulose (HEC) as filler and glycerol as plasticizer followed by thermo-molding of the mixture at 120 [degree sign]C to crosslinking the matrix. Moisture absorption, tensile properties (Young's modulus, tensile strength and elongation at break), dynamic mechanical analysis and dynamic rheology were evaluated in relation to HEC content. Influence of molding time was also investigated. It was found that addition of HEC can significantly improve Young's modulus and tensile strength of the biocomposites, which is accompanied by a decrease in loss factor in the glass transition temperature region of the gluten-rich phase. The mechanical properties and molecular relaxation could be further tailored by adjusting the molding time to control the crosslinking of the WG matrix.
Keywords: Wheat gluten; Hydroxyethyl cellulose; Biocomposites; Mechanical properties; Dynamic mechanical analysis

Sibel Irmak, Ramakanth S. Jonnala, Finlay MacRitchie, Effect of genetic variation on phenolic acid and policosanol contents of Pegaso wheat lines, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 20-26, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.007.

(http://www.sciencedirect.com/science/article/B6WHK-4PB6VVW-1/2/2d51ebfae2b6873de4753de8765f5ec5)
Abstract:
Total phenolic acid and policosanol contents and compositions of bran from an Italian bread wheat variety Pegaso and its 11 near-isogenic lines were measured. The near-isogenic wheat lines differed at one or more loci coding for storage proteins. The genetic variation included deletions, additions and/or combinations of variations. Almost 95% or more of phenolic acids were in the bound form. Ferulic acid was the predominant bound phenolic acid present in wheat bran samples. Other phenolic acids were p-coumaric, vanillic and syringic acids. Tetracosanol, docosanol, hexacosanol, octacosanol, tricosanol and heneicosanol were found as major policosanol compounds in their decreasing order. Highly significant genotypic differences were observed in total phenolic acid and policosanol concentrations. None of the genetic lines had higher phenolic acid contents than the parent line Pegaso, whereas some of the lines had more policosanol levels. In general, both total phenolic acid composition and contents were higher with genetic lines that varied at Glu-1 loci with 2+Dy high molecular weight glutenin subunit (HMW-GS) (Pegaso 184), variation at Gli-D2 loci (Pegaso 219) and single null A1 (variation at Gli-1/Glu-3 loci; Pegaso 30). Highest total policosanol content was observed with the double null at Glu-A1/Glu-D1 loci (Pegaso 236). These findings may lead to new opportunities for wheat breeders and eventually commercial wheat growers to promote the production of wheat with enhanced levels of health beneficial compounds.
Keywords: Wheat bran; Near-isogenic lines; Phenolic acid; Policosanol

Daniel R. Kindred, Tamara M.O. Verhoeven, Richard M. Weightman, J. Stuart Swanston, Reginald C. Agu, James M. Brosnan, Roger Sylvester-Bradley, Effects of variety and fertiliser nitrogen on alcohol yield, grain yield, starch and protein content, and protein composition of winter wheat, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 46-57, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.010.
(http://www.sciencedirect.com/science/article/B6WHK-4PC8RGS-1/2/d8093e30a2175d5545eb2ae87f8faed0)
Abstract:
The effects of nitrogen (N) fertiliser on grain size and shape, starch and protein concentration, vitreosity, storage protein composition, and alcohol yield of two winter wheat varieties contrasting in endosperm texture were studied in a field trial in Herefordshire, UK in 2004. Averaged across varieties, the alcohol yield was 439 L/tonne for grain with a protein concentration of 11.5 g/100 g. The soft endosperm wheat variety Riband produced on average 7.7 L more alcohol per tonne of grain at a given protein concentration than the hard endosperm variety, Option. At the same time, N fertiliser was shown to have significant effects on alcohol production through its major influence on grain protein concentration. Averaged over both varieties, there was a reduction in alcohol yield of 5.7 L for each 10 kg increase in protein content per tonne of grain. The starch concentration of Riband was 2.9 g/100 g higher than Option at a given grain protein concentration, supporting its higher observed alcohol yields. A low conversion of starch to alcohol in this study (6.30 L/10 kg starch) compared to the theoretical value (6.61 L/10 kg starch) indicated that there is potential for improvement of this character. The traits relating to grain size and shape were principally influenced by genotype, and were not influenced by N fertiliser. Conversely, there were only minor genotypic effects on grain protein concentration and vitreosity. An important finding was that there were no interactions between variety and N treatment for any of the variables considered, indicating that the response of the two varieties to changes in applied N was the same, resulting in consistent differences in starch concentration and alcohol yield between genotypes at different levels of grain protein. An analysis of the composition of the wheat storage proteins by size-exclusion chromatography showed that the gliadins increased on average by 0.56 g per g increase in total grain protein and were quantitatively the major protein fraction, suggesting that selection for

low gliadin content may be a desirable means by which to reduce grain protein, and thereby increase alcohol yield in wheat. The relationship between alcohol yield per unit area and applied N rate was described by a quadratic function and the maximum alcohol yield per unit area was ca. 3630 L/ha. Statistical analysis suggested that the economic optimum rate of N applied for grain yield was close to the optimum N rate for maximum alcohol productivity.
Keywords: Alcohol yield; Starch; Protein; Wheat

Yihu Song, Qiang Zheng, Influence of gliadin removal on strain hardening of hydrated wheat gluten during equibiaxial extensional deformation, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 58-67, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.08.001.
(http://www.sciencedirect.com/science/article/B6WHK-4PCXGFW-2/2/f1c2b03677caebf0d91446d9d11c48e1)
Abstract:
The aim of the present work has been to study the equibiaxial extensional deformation of doughs of gluten- and glutenin-rich fractions containing 40 wt% water subjected to lubricated squeezing flow with four different crosshead speeds at room temperature. The gluten dough shows strain softening and hardening in succession whilst the dough where the gliadins have been removed by alcohol extraction does not show strain hardening behavior but breaks immediately after strain softening. The equibiaxial extensional viscosity decreases with increasing strain rate at given strains, appearing as strain rate thinning behavior, which is stronger in the glutenin dough than in the gluten dough. The large extensibility with strain hardening in the gluten dough is due to the presence of gliadins acting as both plasticizers and promoters for the more extensible networks.
Keywords: Wheat gluten; Glutenin; Equibiaxial extensional deformation; Softening; Hardening

M.R. Pirozi, B. Margiotta, D. Lafiandra, F. MacRitchie, Composition of polymeric proteins and bread-making quality of wheat lines with allelic HMW-GS differing in number of cysteines, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 117-122, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.08.011.
(http://www.sciencedirect.com/science/article/B6WHK-4PK7P5P-1/2/bd64d8d2ce15c0a62a9ed38dcf5659bb)
Abstract:
Three lines of Australian wheat variety Avocet, two biotypes of Australian variety Halberd, and the Italian bread wheat cultivar Fiorello and its derived line were used to study the possible role of the Glu-B1 HMW-GS in polymeric protein composition and flour functionality. These sets of lines contain HMW-GS 7+8, 7+9, 20x+20y or 26+27. Subunit Bx7 has four cysteine residues, while subunit Bx20 has only two. Compared to Avocet A (7+8), line Avocet C (20x+20y) exhibited an increase in polymeric protein, a decrease in the gliadin-to-glutenin ratio, and a marked decrease in unextractable polymeric protein (UPP). Avocet C doughs exhibited greater extensibility and shorter Mixograph dough development times, and baked into smaller loaves compared to those from Avocet A. Similar differences were observed in comparisons between the two Fiorello lines and between the two Halberd biotypes that had differing Glu-B1 alleles. These results show that in closely related genotypes, the presence of the Bx7+By8 or Bx7+By9 HMW-GS instead of Bx20+By20 or Bx26+By27 is associated with higher UPP, higher dough strength and better bread-making performance. It is suggested that this could be due to the greater number of cysteines in the Bx7 subunit that are available for forming higher-molecular-weight glutenin polymer. This could give the possibility to manipulate dough properties and bread-making quality by utilizing HMW-GS alleles with varying numbers of cysteine residues.
Keywords: Wheat; Glutenin polymers; Cysteine residue; Flour functionality

Hyun-Seok Kim, Kerry C. Huber, Channels within soft wheat starch A- and B-type granules, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 159-172, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.002.
(http://www.sciencedirect.com/science/article/B6WHK-4PN05NN-1/2/a04082d269f479414f61a3f86d3668e0)
Abstract:
The nature of channels within wheat starch granules was investigated using scanning electron and confocal laser scanning microscopy. A-type granules stained with 3-(4-carboxybenzoyl)quinoline-2-carboxaldehyde (CBQCA, protein-specific probe) revealed a network of radially oriented, channel-like protein structures similar to those previously reported. However, treatment of the same starch granules with methanolic merbromin (fluorescent dye) solution, which is used to highlight external granule surfaces (including those of channels) under non-swelling conditions, revealed few, if any, channels extending into the granule interior. This discrepancy suggested that channels within wheat starch granules were filled at least in part with protein. Removal of protein with protease facilitated greater access of methanolic merbromin to channels and/or cavities for both granule types. For A-type starch granules, relatively large channels were observed in the equatorial groove region, while finer channels originated from other regions of the granule. This work reports the first visualization of B-type granule channels, which most frequently occurred as less-defined voids (as opposed to the fine, discrete channels of A-type granules) extending to granule surfaces. Channels of A- and B-type starch granules appeared to facilitate transfer of chemical reagent into the granule matrix, though this effect was aided by granule swelling (hydration) and/or removal of channel-associated protein.
Keywords: Soft wheat starch; A-type granules; B-type granules; Channels; Pores; Starch granule microstructure

M.A. Edwards, B.G. Osborne, R.J. Henry, Effect of endosperm starch granule size distribution on milling yield in hard wheat, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 180-192, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.001.
(http://www.sciencedirect.com/science/article/B6WHK-4PN05NN-2/2/13db2c93eb043cf1471fa5f3cf2b4cee)
Abstract:
Increased flour yield in hard wheat is associated with increased endosperm rheology index, calculated from strength and stiffness as measured by the SKCS. A study of the fractured endosperm of hard wheat varieties grouped according to similar rheology index values was performed using environmental scanning electron microscopy (ESEM). Differing microstructures and fracture patterns were observed between each group. Specifically, the group representing high rheology index had a greater concentration of small starch granules in prismatic cells. Samples of diverse wheat germplasm were grown at two sites and subjected to laboratory milling. Starch granule size distribution (SGSD) analysis using a laser diffraction method was undertaken on a subset of samples in triplicate representing a range in flour yield. The results supported an hypothesis for a significant influence of SGSD on flour yield of hard wheat varieties. In addition, a significant part ($R2>0.40$ ($p<0.05$) at two sites) of the association appeared to be under genetic control. Results indicate a more even gradation of distributions involving an increase in the sample volume % of small granule (types B and C) and decrease in type A granules. This was associated with increased rheology index values and higher flour yield. The ratio of type A:C starch granules accounted for up to 58% ($p<0.05$) of the variation in flour yield in the samples studied. Thus, rheological parameters measured using a rapid SKCS screening method can be linked to the genetic regulation of SGSD with implications for the improvement of commercial processing performance of hard wheat.
Keywords: Environmental scanning electron microscopy; Laser diffraction; SKCS; Starch granule size distribution; Wheat milling

L. Wang, G. Jeronimidis, Investigation of the fracture mode for hard and soft wheat endosperm using the loading-unloading bending test, Journal of Cereal Science, Volume 48, Issue 1, July 2008, Pages 193-202, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.004.
(http://www.sciencedirect.com/science/article/B6WHK-4PP7753-1/2/557b232743c6135b6cffeb078de5879b)
Abstract:
Investigation of the fracture mode for hard and soft wheat endosperm was aimed at gaining a better understanding of the fragmentation process. Fracture mechanical characterization was based on the three-point bending test which enables stable crack propagation to take place in small rectangular pieces of wheat endosperm. The crack length can be measured in situ by using an optical microscope with light illumination from the side of the specimen or from the back of the specimen. Two new techniques were developed and used to estimate the fracture toughness of wheat endosperm, a geometric approach and a compliance method. The geometric approach gave average fracture toughness values of 53.10 and 27.0 J m-2 for hard and soft endosperm, respectively. Fracture toughness estimated using the compliance method gave values of 49.9 and 29.7 J m-2 for hard and soft endosperm, respectively. Compressive properties of the endosperm in three mutually perpendicular axes revealed that the hard and soft endosperms are isotropic composites. Scanning electron microscopy (SEM) observation of the fracture surfaces and the energy-time curves of loading-unloading cycles revealed that there was a plastic flow during crack propagation for both the hard and soft endosperms, and confirmed that the fracture mode is significantly related to the adhesion level between starch granules and the protein matrix.
Keywords: Wheat endosperm; Compressive properties; Fracture toughness; Crack propagation

Ondrej Jirsa, Marie Hruskova, Ivan Svec, Near-infrared prediction of milling and baking parameters of wheat varieties, Journal of Food Engineering, Volume 87, Issue 1, CHISA 2006 Special Section (pp. 1-63) - Selected papers from the symposium 'Food Processing and Technology' held at the 2006 CHISA Congress, Prague, Czech Republic, 2006 CHISA Congress, July 2008, Pages 21-25, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.09.008.
(http://www.sciencedirect.com/science/article/B6T8J-4PP2CKR-2/2/10bf5b25e63b286b17f74a72e370158f)
Abstract:
In wheat and flour processing many traits have to be investigated for quality control. However, conventional methods available for technological quality assessment of wheat grain and flour are generally tedious and/or requiring expensive equipment. To overcome these drawbacks in common use, alternative methods using spectroscopy have been developed. The objective of this study was to utilize near-infrared reflectance spectroscopy (NIR) to analysis of milling and baking parameters: flour extraction, protein content, Zeleny sedimentation, deformation energy, gas volume and baking volume. Samples including Czech and international varieties were collected from a field experiments (crop years 2002-2005) and laboratory milled on Chopin CD1. Spectra were acquired on a scanning monochromator NIRSystems 6500 in the range from 400 to 2500 nm. Calibration equations were obtained both with classical and modified partial least square (PLS) regression analysis of conventional laboratory analysis values on 168 selected NIR spectra using WinISI computer software. Those were externally validated with additional samples from commercial wheats. Prediction of flour extraction, Zeleny sedimentation and protein content in particular gave a very good accuracy. The results indicate that NIRS can also determine some rheological traits (deformation energy, gas volume and specific loaf volume) at least with a screening performance.
Keywords: Wheat; Dough; Rheology; NIR; Spectroscopy

Yung-Shin Shyu, Jean-Yu Hwang, Cheng-Kuang Hsu, Improving the rheological and thermal properties of wheat dough by the addition of [gamma]-polyglutamic acid, LWT - Food Science and Technology, Volume 41, Issue 6, July 2008, Pages 982-987, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.06.015.
(http://www.sciencedirect.com/science/article/B6WMV-4P2S982-2/2/ecdce1f360b448f8e6a35928b40d0a6a)
Abstract:
The rheological and thermal properties of wheat dough with the addition of [gamma]-polyglutamic acid (PGA) (0.5, 1.0, 5.0 g kg-1, w/w) was evaluated by the measurements of farinography, rapid visco analysis and differential scanning calorimetry. Adding 5.0 g kg-1 PGA in wheat dough increased the mixing stability and raised the pasting temperature from 75.8 to 84.4 [degree sign]C, but decreased the peak viscosity and breakdown. The water holding capacity of wheat dough increased with the addition of 5.0 g kg-1 of PGA. At 5.0 g kg-1 level, PGA caused significant declines in the enthalpy, onset and peak temperatures of ice-melting transition of wheat dough. Scanning electron microscopy showed that wheat bread with the addition of 1.0 and 5.0 g kg-1 PGA exhibited microstructures with smoother surfaces. During storage, PGA retarded the staling process of wheat bread.
Keywords: Wheat bread; [gamma]-Polyglutamic acid; Wheat dough; Differential scanning calorimetry; Scanning electron microscopy

K. Walsh, P. O'Kiely, A.P. Moloney, T.M. Boland, Intake, performance and carcass characteristics of beef cattle offered diets based on whole-crop wheat or forage maize relative to grass silage or ad libitum concentrates, Livestock Science, Volume 116, Issues 1-3, July 2008, Pages 223-236, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.10.010.
(http://www.sciencedirect.com/science/article/B7XNX-4R718S5-1/2/0ce8af554bbcd5ce7bbfbab8251cc6bb)
Abstract:
Seventy beef steers, mean initial live-weight 424 (S.D. 33.0) kg, were blocked by live-weight and breed and allocated to one of 5 dietary treatments in a randomised complete block design. Treatments, including supplementation with 3 kg concentrates/head/day, were grass silage (GS), maize silage (MS), fermented whole-crop wheat (FWCW), urea-treated, processed whole-crop wheat (UPWCW), and ad libitum concentrates supplemented with 5 kg grass silage/head/day (ALC). The grain in urea-treated, processed whole-crop wheat (WCW) was cracked and the crop ensiled with a urea plus urease-based additive. The mean dry matter (DM) of the grass silage, maize silage, fermented WCW and urea-treated, processed WCW was 174, 315, 404 and 716 g/kg, respectively. Total DM intake and carcass growth were lowest for GS ($P < 0.001$). Relative to ALC, feed conversion efficiency (FCE) ($P < 0.05$), live-weight gain ($P < 0.05$), carcass-weight gain ($P < 0.01$) and kill-out rate ($P < 0.05$) were lower for GS, FWCW and UPWCW. The MS had a better FCE than the UPWCW ($P < 0.001$) or the FWCW ($P < 0.05$). Plasma urea concentration was lowest for MS and highest for UPWCW ($P < 0.001$). Animals offered the GS treatment had the most yellow fat (higher ($P < 0.05$) `b' value) and those offered UPWCW had the whitest fat (lower ($P < 0.01$) `b' value). It is concluded that MS, FWCW and UPWCW supported superior levels of growth by cattle compared to GS (in vitro DM digestibility 674 g/kg). There was no animal productivity advantage with UPWCW compared to FWCW.
Keywords: Maize; Whole-crop wheat; Ad libitum concentrates; Cattle; Feed intake; Growth rate

Laure Weisskopf, Renee-Claire Le Bayon, Florian Kohler, Valerie Page, Maryline Jossi, Jean-Michel Gobat, Enrico Martinoia, Michel Aragno, Spatio-temporal dynamics of bacterial communities associated with two plant species differing in organic acid secretion: A one-year microcosm study on lupin and wheat, Soil Biology and Biochemistry, Volume 40, Issue 7, July 2008, Pages 1772-1780, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2008.02.018.

(http://www.sciencedirect.com/science/article/B6TC7-4SFRDFD-G/2/7ccc17ca79bea8c1b0db552e68122619)
Abstract:
Plants are generally assumed to influence the surrounding soil microflora through rhizodeposition. However, the role of rhizodeposits, and especially organic acids, in structuring the bacterial communities is still poorly understood. In this study, we asked the question whether plants differing in organic acid secretion have a different impact on the soil bacterial communities, and if this is the case, to which extent this impact is due to different organic acid concentrations in the rhizosphere. To investigate this question, we compared white lupin and wheat. The former is a high organic acid-secreting species, while the latter secretes only low amounts of carboxylates. We grew the plants in large microcosms including root-free control compartments for one year (replanted every second month) and analyzed the spatio-temporal changes in soil ATP concentrations, as well as in diversity and structure of bacterial communities (using DNA- and RNA-based DGGE) along a root-soil gradient after two, six and twelve month's cultivation. Our results showed: i) that white lupin and wheat differed in their impact on soil ATP concentrations and on the structure of root bacterial communities; ii) that cultivation time was a key factor in explaining the observed differences in all the parameters studied; and iii) that the amounts of organic acids accounted for a significant proportion (15%) of the variability within root active communities. These results indicate that plants influence their associated bacterial communities in a species-specific way and that for communities living in the direct vicinity of roots (rhizoplane-endorhizosphere), a significant part of this influence can be attributed to root-secreted organic acids.
Keywords: Organic acids; Bacterial communities; Rhizosphere; Lupin; Wheat; Microcosm

Olaf Erenstein, Vijay Laxmi, Zero tillage impacts in India's rice-wheat systems: A review, Soil and Tillage Research, Volume 100, Issues 1-2, July-August 2008, Pages 1-14, ISSN 0167-1987, DOI: 10.1016/j.still.2008.05.001.
(http://www.sciencedirect.com/science/article/B6TC6-4ST45MV-1/2/213de2c600fb92054efc610225fba098)
Abstract:
To date, the most widely adopted resource conserving technology in the Indo-Gangetic Plains (IGP) of South Asia has been zero-tillage (ZT) wheat after rice, particularly in India. The paper reviews and synthesizes the experience with ZT in the Indian IGP. ZT wheat is particularly appropriate for rice-wheat systems in the IGP by alleviating system constraints by allowing earlier wheat planting, helping control the weed Phalaris minor, reducing production costs and saving water. ZT wheat after rice generates substantial benefits at the farm level (US$97 ha-1) through the combination of a `yield effect' (a 5-7% yield increase, particularly due to more timely planting of wheat) and a `cost savings effect' (US$52 ha-1, particularly tillage savings). These benefits explain the widespread interest of farmers and the rapidity of the diffusion across the Indian IGP, further aided by the wide applicability of this mechanical innovation.
Keywords: Zero tillage; Direct drilling; Wheat; Impact; Rice-wheat system; Indo-Gangetic Plains

K. Lyberg, M. Olstorpe, V. Passoth, J. Schnurer, J.E. Lindberg, Biochemical and microbiological properties of a cereal mix fermented with whey, wet wheat distillers' grain or water at different temperatures, Animal Feed Science and Technology, Volume 144, Issues 1-2, 23 June 2008, Pages 137-148, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.028.
(http://www.sciencedirect.com/science/article/B6T42-4R2GX1V-3/2/b45785be9419fb997b1c386ce9263276)
Abstract:
Microbiological and biochemical properties of three different liquid diets fermented at 10, 15 or 20 [degree sign]C were studied. The liquid diets consisted of a cereal grain mix of wheat, barley and triticale, blended with whey (diet WH), wet wheat distillers' grain (diet WDG) or water (diet WAT).

The diets were fermented for 5 days without disturbance, followed by 14 days of daily feed replacements, where 4/5 of the contents were replaced with fresh feed mixtures. Starting pH values were 5.1, 3.9 and 6.3 in WH, WDG and WAT, respectively. For most diets, the pH decreased to approximately 4.0 by day 5. However, the WAT diet fermented at 10 [degree sign]C required 7 days to reach a pH of 4.0. A higher (P<0.001) pH was seen in the WH diet fermented at 10 [degree sign]C than in the other diets. Composition of the diets was determined during day 17-19 of fermentation to allow the microbial populations to stabilise and to reflect conditions in practice. Lactic acid bacteria (LAB) grew in all diets during fermentation and the growth was affected by temperature and type of diet (P<0.001), and the interaction between these two factors (P<0.001). The highest LAB counts were found at higher temperatures in the WAT and WH diets and the lowest counts were found in diet WDG. The highest levels of acetic, succinic and propionic acids were found in diet WDG (P<0.001). Lactic acid concentrations increased with temperature (P<0.001) and were highest in the WAT and WH diets. In vitro digestibility of organic matter was highest for diet WH and lowest for diet WDG (P<0.001). Inositol hexaphosphate-bound phosphorus (P) and total P in the cereal grain mix were 2.2 and 3.7 g kg-1 dry matter, respectively. No inositol phosphate-bound P was found in any of the diets after fermentation. Some moulds, probably originating from spores in the cereal grain mix, were detected in the fermented diets, but total numbers did not increase with time. Enterobacteriaceae detected in diet WH, probably originated from the cereal grain mix and the whey. Yeasts were present in all diet ingredients. In conclusion, fermentation processes and biochemical properties differed greatly due to temperature, type of diet and the interaction of these two factors. Dietary inositol hexaphosphate was completely degraded in all fermented diets.
Keywords: Pigs; Liquid diets; Fermentation; In vitro digestibility; Feed microbiology

Sanjay Kumar, James Gomes, Performance evaluation of reactors designed for bioconversion of wheat straw to animal feed, Animal Feed Science and Technology, Volume 144, Issues 1-2, 23 June 2008, Pages 149-166, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.09.030.
(http://www.sciencedirect.com/science/article/B6T42-4R2Y4BH-1/2/894c593d2011f3ac4c553e6d2f5bbdf4)
Abstract:
A chronology of reactor design from laboratory scale to pilot scale for the bioconversion of wheat straw to animal feed is presented. The engineering criteria considered at each stage of development are discussed. Designs were executed at each stage and their performance was compared based on engineering and bioconversion parameters. Illustrative detailed analyses of data obtained from performance evaluation experiments from selected designs are provided. Schematics diagrams of the different generations of reactor designs are also presented.
Keywords: Reactor design; Engineering criteria; Vertical reactors; Fluidized bed reactors; Reactor performance; Bioconversion; Solid substrates

Gaetan Vanloqueren, Philippe V. Baret, Why are ecological, low-input, multi-resistant wheat cultivars slow to develop commercially? A Belgian agricultural `lock-in' case study, Ecological Economics, Volume 66, Issues 2-3, 15 June 2008, Pages 436-446, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2007.10.007.
(http://www.sciencedirect.com/science/article/B6VDY-4R5G893-2/2/1677175d7668d699a14e11f4c0dc7a84)
Abstract:
The use of multi-resistant cultivars allows a significant reduction in fungicide use in low-input cropping systems. However, many major wheat cultivars used in Europe remain sensitive to frequent diseases and require fungicide protection. This paper aims at understanding the factors explaining the low level of adoption of multi-resistant wheat cultivars in Wallonia (Belgium). Cultivar adoption has been an important topic of research, but few analyses have been done in

Europe in the past decades. We used a systems approach combining a survey among stakeholders in the food chain and a systematic analysis of the publications of extension services. We identified twelve factors impeding wider adoption of multi-resistant cultivars. These factors explain why current wheat-cropping systems are maintained in a `pesticide lock-in' situation, an economic concept that could be used more frequently to study agricultural innovations. Considering these intangible `barriers' to current and forthcoming innovations is a first step towards a more comprehensive policy to promote sustainable agriculture. Similarities between Wallonia and France are discussed and methods of promoting wide use of resistant cultivars are proposed.
Keywords: Technology adoption; Agricultural innovations; Integrated pest management; Pesticide lock-in; wheat

Takashi Masaoka, Mayuko Nishi, Akihide Ryo, Yaeta Endo, Tatsuya Sawasaki, The wheat germ cell-free based screening of protein substrates of calcium/calmodulin-dependent protein kinase II delta, FEBS Letters, Volume 582, Issue 13, 11 June 2008, Pages 1795-1801, ISSN 0014-5793, DOI: 10.1016/j.febslet.2008.04.060.
(http://www.sciencedirect.com/science/article/B6T36-4SHN8RD-3/2/c098218bd342415f2cee9294086f9a2d)
Abstract:
Calcium/calmodulin-dependent protein kinase II (CaMKII) plays a crucial role in mediating calcium signaling. Here, we demonstrate a method for screening substrates phosphorylated by human CaMKII[delta] using a wheat cell-free system. The cell-free mixture expressing CaMKII[delta] was incubated with HeLa extracts and radiolabeled ATP. From analysis of two-dimensional electrophoresis gels and mass spectrometry, two proteins were found. The cell-free based in vitro kinase assay revealed that CaMKII[delta] phosphorylates eukaryotic translation initiation factor 4B and stress-induced phosphoprotein 1 (STIP1), the latter on Ser189. Furthermore, constitutively-active CaMKII[delta] phosphorylated STIP1 in HeLa cells and dramatically promoted nuclear localization of STIP1, suggesting that calcium signals via CaMKII[delta] may regulate subcellular localization of STIP1. This approach may be a useful tool for target screening of protein kinases.Structured summary

MINT-6538664: CAMK2D (uniprotkb:Q13557) phosphorylates (MI:0217) STIP1 (uniprotkb:P31948) by protein kinase assay (MI:0424)
MINT-6538652: CAMK2D (uniprotkb:Q13557) phosphorylates (MI:0217) EIF4B (uniprotkb:P23588) by protein kinase assay (MI:0424)
Keywords: Cell-free protein synthesis; Protein kinase; Phosphorylation; Substrate screening; Calcium/calmodulin-dependent protein kinase II; Stress-induced phosphoprotein 1

Ridvan Kizilkaya, Yield response and nitrogen concentrations of spring wheat (Triticum aestivum) inoculated with Azotobacter chroococcum strains, Ecological Engineering, Volume 33, Issue 2, 3 June 2008, Pages 150-156, ISSN 0925-8574, DOI: 10.1016/j.ecoleng.2008.02.011.
(http://www.sciencedirect.com/science/article/B6VFB-4S97J9T-4/2/88868e065483e0e121144070ce71cf30)
Abstract:
This study explored the effectiveness of non-indigenous and indigenous Azotobacter chroococcum strains on yield response and N concentrations of spring wheat cultivation under greenhouse and field conditions in Merzifon, Turkey. The non-indigenous, A. chroococcum strain Beijerinck 1901 (DSMZ 2286), was tested in the study. Ten indigenous strains of A. chroococcum were isolated from various sources in Northern Anatolia, Turkey. Seeds of wheat (Triticum aestivum) were inoculated with 11 bacterial strains of A. chroococcum; Beijerinck 1901, RK33, RK34, RK38, RK39, RK40, RK41, RK46, RK48, RK49 and RK50. Plants were harvested for 83 days in pots and

106 days in plots after sowing. Research result showed that all A. chroococcum strains had positive effect on the yield and N concentrations of wheat. Also, indigenous strain A. chroococcum RK49 had the highest effects on yield and increased the production of grain yield by 84% in field experiment and by in 95% pot experiment compared to control treatment without A. chroococcum inoculation. Based on the research results, it was suggested that the use of indigenous A. chroococcum strains might be suitable when producing and using bio-fertilizer.
Keywords: Seed inoculation; Azotobacter chroococcum; Wheat; Nitrogen; Yield

John Kirkegaard, Olaf Christen, Joseph Krupinsky, David Layzell, Break crop benefits in temperate wheat production, Field Crops Research, Volume 107, Issue 3, 3 June 2008, Pages 185-195, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.02.010.
(http://www.sciencedirect.com/science/article/B6T6M-4S69H68-1/2/38a9f06ccf7bca2ca71dbee41cff6bac)
Abstract:
Changes in the sequence of crops grown on agricultural land are well known to enhance the yield of grain crops such as wheat. A survey of the literature gathered from around the world show mean yield benefits of up to 20% or more. Much is known about the principal mechanisms responsible for these benefits, including effects on disease control, improved nitrogen nutrition and water supply, although researchers continue to be challenged by inexplicable 'rotation effects' that have yet to be documented or fully understood. This review summarizes our current understanding of the `better-known' mechanisms of crop rotation, and discusses other mechanisms (e.g. changes in rhizosphere biology, allelopathy or soil structure) that may help to account fully for the rotation benefits that have been observed by agricultural producers for more than 2000 years. Where possible we emphasise new techniques employed to investigate these less well-understood aspects of the 'rotation effect'. At the farm level, the inability to capitalize on the benefits of break crops may owe more to economics, the availability of suitable break crops and the complexity of the crop response. Computer-based decision support tools have been developed to assist growers to apply the information gathered from scientific studies, although efforts to integrate this information at whole-farm scales are embryonic.
Keywords: Disease; Structure; Soil biology; Sequence; Rotation; Preceding crop

S.P. Milroy, S. Asseng, M.L. Poole, Systems analysis of wheat production on low water-holding soils in a Mediterranean-type environment: II. Drainage and nitrate leaching, Field Crops Research, Volume 107, Issue 3, 3 June 2008, Pages 211-220, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.02.008.
(http://www.sciencedirect.com/science/article/B6T6M-4S6GRPN-1/2/9a0ea08eba35f25e79f7da815e619a6e)
Abstract:
In Mediterranean-type environments, the concentration of rainfall in winter months results in average winter rainfall that is in excess of evaporative demand. Cropping coarse textured soils in such regions results in a risk of drainage below the root zone, and associated with this, nutrient leaching. We used the APSIM-Nwheat simulation model to quantify the magnitude and variability of drainage and nitrate-N leaching under wheat crops for six locations and three soil types in the northern sandplain region of the Western Australian wheat belt and to assess the impact of varying crop management on drainage and leaching. Overall, the combination of a high concentration of rainfall in the winter months and coarse soil types resulted in a significant risk of drainage and leaching events of considerable magnitude even at the driest sites considered: the assumption that leaching and drainage are low in areas of low rainfall is an over-simplification. For some locations, simulated drainage was high, exceeding 100 mm for two locations on two soils; the sand and the acid loamy sand. Across the six locations considered, drainage was linearly related to average growing season rainfall. Leaching varied markedly between the soil types, with loamy

sand having only one fifth the leaching that was calculated for the acid loamy sand or the sand. This emphasises the importance of small differences in soil type for the risk of drainage and leaching, and hence the potential for negative off-site effects, when cropping light soils in a Mediterranean-type environment. Although sandy soils are held to present the most scope for reducing drainage through agronomic management, the analysis suggested the potential improvements are likely to be small. Consistent with experimental results from other parts of the Western Australian wheat belt, modification of rooting depth appears to present the best option to reduce drainage beneath annual crops.
Keywords: Drainage; Leaching; Modelling; Nitrate; Sand; Simulation; Soil texture; Soil water

S.T. Kotzamanidis, A.S. Lithourgidis, A.G. Mavromatis, D.I. Chasioti, D.G. Roupakias, Prediction criteria of promising F3 populations in durum wheat: A comparative study, Field Crops Research, Volume 107, Issue 3, 3 June 2008, Pages 257-264, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.02.012.
(http://www.sciencedirect.com/science/article/B6T6M-4S7HWKF-1/2/805c5d891cff3231cad627fadb0da0ea)
Abstract:
Effective selection of parental material and promising segregating populations is an essential requirement for breeding success. There are many contradictive reports about the best parent selection criterion for the development of promising crosses. For the clarification of this problem field experiments were conducted for four consecutive years to compare the effectiveness of six criteria for the prediction of the most promising F3 populations in durum wheat (Triticum durum L.): the mid-parent value, the F1, the F2, the (F1 + F2)/2, and the genetic distance among the parents as it is calculated using the SSR and RAPD molecular markers. During the first growing season (2003-2004) nine commercial cultivars of durum wheat and four landraces were crossed. The following growing season (2004-2005), 17 crosses (F1 generation) were evaluated under low plant density (1.15 plants m-2) in a replicated (R-21) honeycomb design. During the third growing season (2005-2006), the four highest yielding crosses, one cross with an intermediate yield, and the three crosses with the lowest yield (F2 generation) were evaluated under low plant density in a R-9 honeycomb design. Finally, in the fourth growing season (2006-2007) progeny of the aforementioned eight crosses (F3 generation) and the ten parents were evaluated in a randomized complete block design in two locations. Furthermore, the genetic distance among the parents was determined using the SSR and RAPD molecular markers. It was observed that the three F3 populations with the lowest yielding ability were the ones with the lowest mid-parental value. In addition, one of the two top F3 populations was second in the rank according to the mid-parental value. Furthermore, the two top F3 populations were also the highest yielding in the F1 and F2 generations. On the contrary, none of these crosses were predicted by the genetic distance as it was calculated using the SSR and RAPD molecular markers. It was concluded that parental pairs with high mid-parental value and high combined yield (F1 + F2)/2 obtained after evaluation of their F1 and F2 at low plant density was the most effective way to predict promising F3 populations.
Keywords: Durum wheat; Prediction crosses; Mid-parental value; F1; F2; SSR; RAPD

J.S. Gill, P.W.G. Sale, C. Tang, Amelioration of dense sodic subsoil using organic amendments increases wheat yield more than using gypsum in a high rainfall zone of southern Australia, Field Crops Research, Volume 107, Issue 3, 3 June 2008, Pages 265-275, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.02.014.
(http://www.sciencedirect.com/science/article/B6T6M-4S8TW5J-1/2/ad7dcdca5f8cd44648bbe33cc551e7dd)
Abstract:
Subsoil constraints are major limiting factors in crop production in many soils of southern Australia. A field study examined effects of deep incorporation of organic and inorganic amendments in 30-

40 cm on soil properties, plant growth and grain yield of wheat (Triticum aestivum var. Ambrook) on a Sodosol with dense sodic subsoil with or without lucerne history in a high rainfall region (long-term average annual rainfall 576 mm) of Victoria. Amendments were applied at a rate of 10-20 t ha-1. Deep ripping alone and deep ripping with gypsum did not significantly affect grain yields. In comparison, application of organic materials doubled biomass production and increased grain yield by 1.7 times. Organic amendment-treated plots produced 60% more grains per area than the untreated control. The crop extracted over 50 mm extra water from below 40 cm soil in organic amendment-treated plots than the untreated control. Nitrogen uptake was almost doubled (403 kg ha-1) in the organic amendment-treated plots than the untreated control (165 kg ha-1). The improved yield with amendments was related to an increase in plant available water in the hostile subsoil, and prolonged greenness of leaves and supply of nitrogen and other nutrients.
Keywords: High yield; Long-season wheat; Nitrogen uptake; Soil water use; Subsoil constraints

Li-Fang ZHUANG, Li-Xiao SONG, Yi-Gao FENG, Bao-Li QIAN, Hai-Bin XU, Zi-You PEI, Zeng-Jun QI, Development and Chromosome Mapping of New Wheat EST-SSR Markers and Application for Characterizing Rye Chromosomes Added in Wheat, Acta Agronomica Sinica, Volume 34, Issue 6, June 2008, Pages 926-933, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60033-4.
(http://www.sciencedirect.com/science/article/B94TW-4TJT5JS-2/2/8befa6ebd366a26b108fb6a61c083dde)
Abstract:
On the basis of the reported expressed sequence tags (ESTs) that are related to salinity stress and stem in wheat (Triticum aestivum L.), 81 new EST-derived simple sequence repeat (eSSR) markers were developed. Among these markers, 67, 46, 18, and 61 eSSRs produced 124, 72, 26, and 124 stable amplicons in the genomes of wheat, rye (Secale cereals L.), Haynaldia villosa L. Schur., and barley (Hordeum vulgare L.), respectively, indicating their high transferability. Totally, 81 loci amplified by 43 markers were mapped on 18 wheat chromosomes. Eight eSSRs from the 30 markers, which produced specific loci in rye, were mapped on chromosomes 1R, 4R, 5R, and R7 of rye, and 7 eSSRs were located on more than 1 chromosome. The remaining 15 eSSRs might be used to trace chromosomes that are not involved in this study.
Keywords: wheat; EST-SSR (eSSR); chromosome mapping; Secale cereale L.; specific marker

Hong-Xia LI, Long-Yu ZHANG, Gai-Sheng ZHANG, Na NIU, Zhan-Wang ZHU, Construction of cDNA Library from Fertility Related Genes of Male Sterile Wheat with Aegilops kotschyi Cytoplasm by SSH, Acta Agronomica Sinica, Volume 34, Issue 6, June 2008, Pages 965-971, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60035-8.
(http://www.sciencedirect.com/science/article/B94TW-4TJT5JS-4/2/904061ded1ee3636dba1138a3be622f7)
Abstract:
Male sterility with Aegilops kotschyi cytoplasm has a great potential in hybrid wheat (Triticum aestivum L.) breeding for its stable sterility and broad-spectrum of restoring gene resources. To further study the genetic mechanism of male sterility with Ae. kotschyi cytoplasm, a male sterile line ms(Kots)-90-110(A) and its near isogenic line BC4F1 (fertility restored by rk5451) were used to construct sterility and fertility cDNA libraries, using the suppression subtractive hybridization (SSH) method. Wheat anthers with pollen mother cells at the dikaryophase were sampled for RNA extraction via microscopic examination. Both cDNA libraries were good in quality with high efficiency of SSH. A total of 120 positive clones were randomly selected and sequenced from the 2 libraries, and 100 high quality sequences were obtained. According to BLAST screening and functional annotation, energy-related genes were identified with high frequencies in the fertility cDNA library, whereas, MADS-box transcriptional factor TaAGL7, ubiquitin-conjugating enzyme, and adenosine diphosphate glucose pyrophosphatase were detected in the sterility cDNA library. The MADS-box transcription factor TaAGL7 played an important role in regulating flower

development. The immature spike ubiquitin-conjugating enzyme would probably relate to apoptosis. The expression of adenosine diphosphate glucose pyrophosphatase directly affected starch synthase and the normal supply of energy. The genes detected in the present study are probably important genes associated with the fertility in wheat with Ae. kotschyi cytoplasm.
Keywords: wheat; sterility gene; suppression subtractive hybridization (SSH); expressed sequence tag (EST)

Yun-xiang ZHAO, Pei LIU, Zhao-shi XU, Ming CHEN, Lian-cheng LI, Yao-feng CHEN, Xiang-jin XIONG, You-zhi MA, Analysis of Specific Binding and Subcellular Localization of Wheat ERF Transcription Factor W17, Agricultural Sciences in China, Volume 7, Issue 6, June 2008, Pages 647-655, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60098-X.
(http://www.sciencedirect.com/science/article/B82XG-4SWFK1G-2/2/8812f7cd58b83e53098e132bb0e3d66d)
Abstract:
The study aims to detect the subcellular localization of ERF (ethylene-responsive element binding factor) transcription factor W17 protein, the interaction between W17 and cis-acting regulatory elements GCC-box and DRE in vitro, the binding and transactivating ability in vivo, and the role of W17 in higher plant stress-signal pathway. Recombinant plasmid W17/163hGFP was introduced into onion epidermal cells by the particle bombardment method with a PDS1000/He. Transformed cells were incubated for 24 h at 22[degree sign]C in the dark and green fluorescence was monitored under a confocal microscope. The gene W17 was fused N-terminus of GST (glutathione-S-transferase) in prokaryotic expression vector pGEX-4T-1 and then transformed into E. coli strain BL21 (DE3). IPTG (0.5 mmol L-1) was added to induce the expression of recombinant GST/W17 for 3 h. The fused proteins were purified by GST purification columns, and then subjected to gel retardation assay with a 32P-labeled GCC or DRE sequence. The different reporter and effector plasmids were introduced into tobacco leaves through agroinfiltration, then transformed leaves stained by X-Gluc, faded with 75% alcohol and monitored under a Stereozooming microscope. The GFP fused with W17 protein was localized in the nuclei; SDS-PAGE assay demonstrated that the fused protein GST/W17 could be induced and purified with molecular weight at around 42.2 kD under the induction of IPTG. Purified fused protein was able to specifically bind to both the wild-type GCC-box and DRE element, but had no interaction with either the mutant DRE or GCC-box; W17 protein can bind to GCC-box and transactive downstream GUS gene in vivo. W17 can localize into the nuclei, and it may be involved not only in biotic stresses controlled by GCC-box, but also in abiotic stresses (e.g., salt-) induced signaling pathway.
Keywords: ERF/AP2 domain; ERF; DRE element; GCC-box; subcellular localization

Luis A. Mendez-Barroso, Jaime Garatuza-Payan, Enrique R. Vivoni, Quantifying water stress on wheat using remote sensing in the Yaqui Valley, Sonora, Mexico, Agricultural Water Management, Volume 95, Issue 6, June 2008, Pages 725-736, ISSN 0378-3774, DOI: 10.1016/j.agwat.2008.01.016.
(http://www.sciencedirect.com/science/article/B6T3X-4S4BDH2-1/2/71ae3979c9040680f61cf5f1d6e081fb)
Abstract:
Remote sensing can allow a more efficient irrigation water management by applying the water when crops require it or when symptoms of water stress appear. In this study, the spatial and temporal distribution of the water deficit index (WDI) and crop evapotranspiration (ET) in wheat were determined through analysis of satellite-based remote sensing images in the Yaqui Valley, Sonora, Mexico. We utilize an empirical model based on the canopy temperature-vegetation cover relationship methodology known as the Moran's trapezoid. We analyze and discuss the spatial and temporal distributions of WDI and ET at the regional and local scales. Results show a linear

relationship (R2 = 0.96) between the values of WDI and the number of days elapsed since the last irrigation. The water deficit index could be utilized to estimate the quantity of available water in wheat and to know the degree of stress presented by the crop. Advantages offered by this methodology include obtaining WDI and evapotranspiration values in zones with partial or null vegetation cover and for large irrigation schemes lacking the necessary data for traditional water management.
Keywords: Vegetation index; Crop management; Yaqui Valley; Water stress; Evapotranspiration

Rodomiro Ortiz, Kenneth D. Sayre, Bram Govaerts, Raj Gupta, G.V. Subbarao, Tomohiro Ban, David Hodson, John M. Dixon, J. Ivan Ortiz-Monasterio, Matthew Reynolds, Climate change: Can wheat beat the heat?, Agriculture, Ecosystems & Environment, Volume 126, Issues 1-2, International Agricultural Research and Climate Change: A Focus on Tropical Systems, June 2008, Pages 46-58, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.01.019.
(http://www.sciencedirect.com/science/article/B6T3Y-4S0R6HH-2/2/f3dcefe4da500c1d138c25d0a49a12d3)
Abstract:
Climate change could strongly affect the wheat crop that accounts for 21% of food and 200 million hectares of farmland worldwide. This article reviews some of the approaches for addressing the expected effects that climate change may likely inflict on wheat in some of the most important wheat growing areas, namely germplasm adaptation, system management, and mitigation. Future climate scenarios suggest that global warming may be beneficial for the wheat crop in some regions, but could reduce productivity in zones where optimal temperatures already exist. For example, by 2050, as a result of possible climate shifts in the Indo-Gangetic Plains (IGPs) - currently part of the favorable, high potential, irrigated, low rainfall mega-environment, which accounts for 15% of global wheat production - as much as 51% of its area might be reclassified as a heat-stressed, irrigated, short-season production mega-environment. This shift would also represent a significant reduction in wheat yields, unless appropriate cultivars and crop management practices were offered to and adopted by South Asian farmers. Under the same climate scenarios, the area covered by the cool, temperate wheat mega-environment could expand as far as 65[degree sign]N in both North America and Eurasia. To adapt and mitigate the climate change effects on wheat supplies for the poor, germplasm scientists and agronomists are developing heat-tolerant wheat germplasm, as well as cultivars better adapted to conservation agriculture. Encouraging results include identifying sources of alleles for heat tolerance and their introgression into breeding populations through conventional methods and biotechnology. Likewise, agronomists and extension agents are aiming to cut CO2 emissions by reducing tillage and the burning of crop residues. Mitigation research promises to reduce emissions of nitrous oxide by using infrared sensors and the normalized differential vegetative index (NDVI) that determines the right times and correct amounts of fertilizer to apply. Wheat geneticists and physiologists are also assessing wild relatives of wheat as potential sources of genes with inhibitory effects on soil nitrification. Through the existing global and regional research-for-development networks featuring wheat, technology and knowledge can flow to allow farmers to face the risks associated with climate change.
Keywords: Triticum aestivum; Climate change; Conservation agriculture; Genetic enhancement; Mega-environment; Wheat

D. Nishanth, D.R. Biswas, Kinetics of phosphorus and potassium release from rock phosphate and waste mica enriched compost and their effect on yield and nutrient uptake by wheat (Triticum aestivum), Bioresource Technology, Volume 99, Issue 9, June 2008, Pages 3342-3353, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.08.025.
(http://www.sciencedirect.com/science/article/B6V24-4PT2FN5-2/2/0982070571957eb836bf6bdba61df8b8)

Abstract:
An attempt was made to study the efficient use of rice straw and indigenous source of phosphorus and potassium in crop production through composting technology. Various enriched composts were prepared using rice straw, rock phosphate (RP), waste mica and bioinoculant (Aspergillus awamori) and kinetics of release of phosphorus and potassium from enriched composts and their effect on yield and nutrient uptake by wheat (Triticum aestivum) were carried out. Results showed sharp increases in release in water-soluble P and K from all the composts at 8th to 12th day of leaching, thereafter, it decreased gradually. Maximum release of water-soluble P and K were obtained in ordinary compost than enriched composts during the initial stages of leaching, but their differences narrowed down at latter stages. Data in pot experiments revealed that enriched composts performed poorly than diammonium phosphate during initial stages of crop growth, but they out yielded at the latter stages, particularly at maturity stage, as evident from their higher yield, uptake, nutrient recoveries and fertility status of P and K in soils. Moreover, enriched composts prepared with RP and waste mica along with A. awamori resulted in significantly higher biomass yield, uptake and recoveries of P and K as well as available P and K in soils than composts prepared without inoculant. Results indicated that enriched compost could be an alternate technology for the efficient management of rice straw, low-grade RP and waste mica in crop production, which could help to reduce the reliance on costly chemical fertilizers.
Keywords: Aspergillus awamori; Enriched compost; Kinetics; Nutrient uptake; Nutrient release; Rock phosphate; Waste mica; Wheat

Y. Ziaie-Shirkolaee, J. Mohammadi-Rovshandeh, P. Rezayati-Charani, M.B. Khajeheian, Influence of dimethyl formamide pulping of wheat straw on cellulose degradation and comparison with Kraft process, Bioresource Technology, Volume 99, Issue 9, June 2008, Pages 3568-3578, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.07.066.
(http://www.sciencedirect.com/science/article/B6V24-4PSJSNY-2/2/16672b4451d4949b5882b8a6048d8b4a)
Abstract:
The pulping of wheat straw with dimethyl formamide was studied in order to investigate the effects of the cooking variables (temperature (190 [degree sign]C, 200 [degree sign]C, and 210 [degree sign]C) and time (120 min, 150 min, and 180 min) and organic solvent ratio (30%, 50%, and 70%) dimethyl formamide (DMF + water) value) on the degradation of cellulose and degree of polymerization (DP) of organosolv pulp. The SCAN viscosity was applied to estimating the extent of cellulose degradation produced by cooking condition and then, it was compared with Kraft pulp at equal Kappa number.
Response of pulp and handsheets properties to the process variables were analyzed using statistical software (MINITAB 14). The process variables (cooking temperature and cooking time) must be set at low variables with high DMF ratio in order to ensure a high yield and high SCAN viscosity. Also, pulps with high mechanical properties can be acceptably obtained at 210 [degree sign]C for 150 min with 50% DMF. Generally, the cooking temperature was a significant factor while the cooking time and DMF ratio had a smaller role. By the comparison of Kraft and organosolv pulp, it can be resulted that DMF basically had improvement role on reducing of cellulose degradation by reason of high SCAN viscosity of organosolv pulp than Kraft pulp under equal kappa number and, scanning electron microscopy (SEM) of obtained pulp. Consequently, the protective action of organic solvent on non-cellulosic polysaccharides of wheat straw against degradation under Kraft pulping conditions was pointed as a main reason of the fairly high yield of organosolv pulps.
Keywords: Cellulose degradation; Lignin; Organosolv pulping; Dimethyl formamide; Wheat straw

Xiaowei Peng, Hongzhang Chen, Single cell oil production in solid-state fermentation by Microsphaeropsis sp. from steam-exploded wheat straw mixed with wheat bran, Bioresource

Technology, Volume 99, Issue 9, June 2008, Pages 3885-3889, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.08.015.
(http://www.sciencedirect.com/science/article/B6V24-4PPWM8M-5/2/4d2c6fbd4ff7dd80cae5583c4a864c99)
Abstract:
Microsphaeropsis sp. was used to produce SCO in solid-state fermentation (SSF) from a substrate consisting of steam-exploded wheat straw (SEWS) and wheat bran (WB). The yield of SCO was 42 mg/g dry substrate (gds) without adding cellulase. To achieve a higher SCO yield, cellulase was added to the solid-state medium, resulting in an increase of SCO from 42 to 74 mg/gds with a cellulase loading of 10 FPU/gds. Other SSF parameters such as ratio of SEWS to WB of the dry substrate, initial moisture content, and incubation temperature were optimized under the condition of cellulase loading of 10 FPU/gds. So optimized, the SCO yield was 80 mg/gds, and the SCO content of the dry fermented mass was 10.2%. This research explored a novel method to produce SCO from the abundant and cheap agricultural residues - wheat straw and wheat bran.
Keywords: Bioconversion; Single cell oil; Straw; Cellulase; Solid-state fermentation

L.S. Bewick, F.L. Young, J.R. Alldredge, D.L. Young, Agronomics and economics of no-till facultative wheat in the Pacific Northwest, USA, Crop Protection, Volume 27, Issue 6, June 2008, Pages 932-942, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.11.013.
(http://www.sciencedirect.com/science/article/B6T5T-4RHXT9K-1/2/56114eb1c8a0983d8e8f2ce1dbd2b91f)
Abstract:
Winter wheat (Triticum aestivum L.) (WW) rotated with dust-mulch summer fallow (WW/SF) has been the dominant production practice in the low-precipitation zone (<300 mm annual precipitation) of the Pacific Northwest (PNW) since the early 1900s. Over time, WW/SF has experienced several problems including severe wind erosion, increased pest problems and costs of production, and reduced crop yields. Producers need system alternatives to replace or modify the traditional WW/SF system. One proposed alternative is production of no-till facultative wheat (T. aestivum L.) (FW). Generally, FWs have less cold tolerance, a shorter but distinct period required for vernalization, and start growing and initiate flowering earlier compared with true WWs. This study compares agronomic, economic, and soil moisture components of FW/chemical fallow (FW/ChF), FW/spring wheat (T. aestivum L.) (FW/SW), and WW/reduced tillage SF (WW/RSF) rotations as part of an inter-disciplinary, multi-component research trial conducted near Ralston, Washington, USA. Over the 4-year study period, spring soil water content (SWC) was greater for ChF compared with RSF at all depths except 0.3-0.6 m. In the fall, difference in SWC between ChF and SF disappeared at depths below 0.6 m but was less for ChF from the soil surface to 0.6 m. WW/RSF and FW/ChF were more productive, both economically and agronomically, than FW/SW, with WW/RSF being more productive than either FW rotation by a wide margin. The FW/SW rotation produced lower yields that were more susceptible to fluctuations in crop year precipitation, contained more weeds, cost more to produce, and was less profitable than either WW/RSF or FW/ChF. The FW/ChF rotation was less variable than WW/RSF; however, net returns over total cost were consistently negative for FW/ChF and averaged $69.00 rotational ha-1 less than WW/RSF. Even though FW/ChF yielded and earned less than WW/RSF, the FW/ChF rotation may be a viable conservation system with cost sharing and/or further research. The yield of FW following ChF was excellent in 2002 in large-scale demonstration plots, in 2003 in the main study where it out-yielded WW, and in 2006 when FW was planted into ChF without sulfentrazone herbicide. The advantages of FW/ChF include (1) spread-out fall planting and summer harvesting operations; (2) opportunities to control problem winter-annual weeds; (3) better competition with summer annual weeds than spring wheat; and (4) a late planting date that does not rely on seed-zone soil water like WW.

Keywords: Chemical fallow; Reduced tillage summer fallow; Winter wheat; Spring wheat; Low precipitation; Soil moisture

J.F. Doane, O. Olfert, Seasonal development of wheat midge, Sitodiplosis mosellana (Gehin) (Diptera: Cecidomyiidae), in Saskatchewan, Canada, Crop Protection, Volume 27, Issue 6, June 2008, Pages 951-958, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.11.016.
(http://www.sciencedirect.com/science/article/B6T5T-4RJJRB0-1/2/f4a1b78ac4236f668c20d071de600515)
Abstract:
Wheat midge, Sitodiplosis mosellana (Gehin) (Diptera: Cecidomyiidae), was first detected as early as 1901 in western Canada. The first major outbreak in Saskatchewan was recorded in 1983. In 1984, Saskatchewan wheat midge populations were found to be parasitized by the egg parasitoid, Macroglenes penetrans (Kirby) (Hymenoptera: Pteromalidae). This paper describes the effect of temperature on diapause termination, larval and pupal development, and on emergence of field populations of adult wheat midge, S. mosellana, and its parasitoid, M. penetrans, in Saskatchewan. Wheat midge and parasitoid populations were investigated from 1984 to 1985 in five wheat fields where wheat midge populations ranged from 5256 to 43,798 larvae/m2. The appearance of midge larvae in soil samples on May 14 and May 9 in 1984 and 1985, respectively, marked the end of overwintering diapause. Pupae first appeared in samples on June 15 (139 degree-days (DD); >6 [degree sign]C) and June 10 (125 DD) in 1984 and 1985, respectively. Adult midge and parasitoids began to emerge at all locations on July 6 (411 DD; >6 [degree sign]C) and on July 9 (447 DD) in 1984 and 1985, respectively. In relation to the pest-host plant synchrony, adults of both wheat midge and parasitoids were present throughout July, with peak midge emergence coinciding both years with the emergence of primary wheat heads from the boot. We observed the first primary heads from about July 12 to 15 at the five sites. Therefore, the relatively long wheat midge emergence has significance because it contributes to damage on the first and second tillers and to a possible increase in populations for the following year. The use of temperature and day-degree accumulation in relation to development is discussed as a predictive tool for management decisions.
Keywords: Insect pest; Triticum species; Wheat midge; Life history; Degree-days

Jose F.C. Barros, Gottlieb Basch, Mario de Carvalho, Effect of reduced doses of a post-emergence graminicide to control Avena sterilis L. and Lolium rigidum G. in no-till wheat under Mediterranean environment, Crop Protection, Volume 27, Issue 6, June 2008, Pages 1031-1037, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.12.006.
(http://www.sciencedirect.com/science/article/B6T5T-4RPD76Y-2/2/3900faf7ec2986e7a5cef389bd1dabfe)
Abstract:
The study was carried out over 2 years (2004-2005 and 2005-2006) in a private farm in the Alentejo region (Evora), in the south of Portugal where rainfed wheat is sown after the beginning of the winter rainfall season. The wheat crop used for this study was established using no-till, as this technology provides the necessary machine-bearing capacity of the soil to assure post-emergence application of herbicides at different weed development stages. A mixture of clodinafop+cloquintocete was applied using three different dosages and volumes on two dates.
The results indicate that lower herbicide doses than those recommended by the manufacturer were sufficient to achieve a high Avena sterilis L. and Lolium rigidum G. control efficiency and consequently potential grain yield, when the treatments were carried out on an early application date (beginning of tillering). When the herbicide application was delayed (complete tillering) it was necessary to increase the herbicide dose in order to achieve the highest grain yield. There was a positive and significant correlation between weed control efficiency and grain yield, but the respective correlation coefficient was not very high. This is because at the first application stage,

both weeds and crop were more sensitive to the herbicide and consequently there was some crop phytotoxicity caused by the herbicide when its concentration increased.
Weed reinfestation was low for both application dates, indicating that lower herbicide doses than the recommended ones can be used for satisfactory control of A. sterilis L. and L. rigidum G.
Keywords: Weed control; Weed development stage; Herbicide doses; Application volume

I.S.M. Zaidul, H. Yamauchi, C. Matsuura-Endo, S. Takigawa, T. Noda, Thermal analysis of mixtures of wheat flour and potato starches, Food Hydrocolloids, Volume 22, Issue 4, June 2008, Pages 499-504, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.01.003.
(http://www.sciencedirect.com/science/article/B6VP9-4MXJ3V0-1/2/725f28d7ee1dbe3a00a803266be2face)
Abstract:
Potato starches with various contents of amylose from the Eniwa, Benimaru, and Norin No. 1 cultivars were blended with wheat flour at 10 to 50% potato starch (on a weight basis), and differential scanning calorimetry (DSC) studies were then conducted to determine if there were any traces of starch at 30% wt suspension. The amylose content of Eniwa potato starch was higher than those of the Benimaru and Norin No. 1 potato starches. Eniwa potato starch also exhibited significantly higher DSC traces than the Benimaru and Norin No. 1 potato starches. The DSC traces of the gelatinization peak temperature (TP) of the Eniwa potato starch-wheat flour mixture remained almost identical up to 30% and then showed a tendency to decrease from 40% potato starch in the mixtures due to significant dilution of wheat flour by potato starches at 40 and 50%. However, the TP values of the Eniwa potato starch-wheat flour mixture were significantly higher than those of the Benimaru potato starch-wheat flour and Norin No. 1 potato starch-wheat flour mixtures, and exhibited a trailing shoulder up to 40% Eniwa potato starch. On the other hand, no trailing shoulder was evident at 50% Eniwa potato starch in the mixture or in the Benimaru and Norin No. 1 potato starch-wheat flour mixtures. Such phenomena occurred due to the smaller differences in the TP of the control wheat flour, Benimaru and Norin No. 1 potato starches. The TP of the mixtures was slightly higher than that of the control samples due to the influences of the wheat gluten in the mixtures.
Keywords: Wheat flour; Potato starch; Mixture; Gelatinization characteristics

Yibin Zhou, Dongfeng Wang, Li Zhang, Xianfeng Du, Xiaoling Zhou, Effect of polysaccharides on gelatinization and retrogradation of wheat starch, Food Hydrocolloids, Volume 22, Issue 4, June 2008, Pages 505-512, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.01.010.
(http://www.sciencedirect.com/science/article/B6VP9-4MYD679-3/2/c686cac819b4fff98abbc339a65e4cbb)
Abstract:
We employed differential scanning calorimetry and X-ray powder diffraction to determine the effect of tea polysaccharide (TPS) and carboxymethyl cellulose (CMC) on the gelatinization and retrogradation behavior of wheat starch (WS) gels. The total WS concentration of the gels was 35 wt%; WS/polysaccharide mixing ratios were 10/0, 9.9/0.1, 9.8/0.2, 9.7/0.3, 9.6/0.4, and 9.5/0.5. As the polysaccharide level was increased, the onset temperature, conclusion temperature and enthalpy of starch melting also increased. Samples blended with CMC exhibited higher gelatinization parameters than TPS mixtures at the same concentration. Upon reheating the starch samples after storage at 4 [degree sign]C, we found that the glass transition temperature and retrogradation ratio decreased with increasing polysaccharide ratio and increased with the duration of storage. As the concentration of polysaccharide was increased, the endothermic enthalpy gradually decreased for the WS/TPS system and slightly increased for WS/CMC. After 20 days of storage at 4 [degree sign]C, the degree of crystallization in the WS/TPS system was significantly lower than in the WS/CMC system. Avrima equation analysis revealed that the retrogradation rate of the control was eight times higher than samples containing 5% TPS and two times higher than

samples containing 5% CMC. The overall results demonstrated that the inhibitory effect of TPS was greater than that of CMC under the same conditions.
Keywords: Tea polysaccharides; Carboxymethyl cellulose; Wheat starch; Gelatinization; Retrogradation

Yihu Song, Qiang Zheng, Network formation in glycerol plasticized wheat gluten as viewed by extensional deformation and stress relaxation: Final conclusions, Food Hydrocolloids, Volume 22, Issue 4, June 2008, Pages 674-681, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2007.02.007.
(http://www.sciencedirect.com/science/article/B6VP9-4N49VRG-3/2/a7c94049e28d4bad5db66783dee5adea)
Abstract:
The aim of the present work has been to study the influence of rest time on the structural development of gluten/glycerol mixtures with gluten volume fraction ranging from 0.56 to 0.75 by equibiaxial and uniaxial deformations at room temperature. The Gaussian and the Mooney-Rivlin relations are used to evaluate shear moduli at small and medium strains and the Kohlrausch-Williams-Watts (KWW) model is used to analysis relaxation modulus at biaxial strain 0.7. Shear moduli and average relaxation time are discussed in relation to gluten content for the mixtures with a rest time of 150 min and also to a mixture of 0.61 gluten volume fraction with different rest times.
Keywords: Wheat gluten; Network; Rest; Extensional deformation; Relaxation modulus

Janete Alaburda, Adriana P. de Almeida, Luzia Shundo, Valter Ruvieri, Myrna Sabino, Determination of folic acid in fortified wheat flours, Journal of Food Composition and Analysis, Volume 21, Issue 4, June 2008, Pages 336-342, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.12.002.
(http://www.sciencedirect.com/science/article/B6WJH-4RSJDSJ-4/2/8dfb66f92efd302481162c3b92dbfe95)
Abstract:
A reversed-phase high-performance liquid chromatography (HPLC) method with ultraviolet detection to determine folic acid (FA) in fortified wheat flour is described. The method includes FA extraction with tetraborate and trichloroacetic acid buffer solution and purification by solid-phase extraction with strong anion-exchange cartridges. Good results were obtained with respect to repeatability (relative standard deviation [less-than-or-equals, slant]8.8) and recovery ([greater-or-equal, slanted]97%). Detection and quantification limits were 0.06 and 0.19 [mu]g g-1, respectively. The comparison between the HPLC method and both microbiological and immunoenzymatic assays revealed similar results. FA determination results on 33 wheat flours samples revealed that 51% of these samples had below 1.50 [mu]g g-1 FA concentration added, the enrichment level established by Brazilian Regulation.
Keywords: Folic acid; Fortification; Wheat flour; HPLC; ELISA; Sao Paulo; Brazil; Regulation; Microbiological assay; Immunoenzymatic assay

Christine Sticht, Stefan Schrader, Anette Giesemann, Hans-Joachim Weigel, Atmospheric CO2 enrichment induces life strategy- and species-specific responses of collembolans in the rhizosphere of sugar beet and winter wheat, Soil Biology and Biochemistry, Volume 40, Issue 6, Special Section: Functional Microbial Ecology: Molecular Approaches to Microbial Ecology and Microbial Habitats, 18th World Congress of Soil Science, June 2008, Pages 1432-1445, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.12.022.
(http://www.sciencedirect.com/science/article/B6TC7-4RPD1T4-4/2/d60121b38c98576d20821572487ee4df)
Abstract:
We studied atmospheric CO2 enrichment effects on life form types, species composition, dominance structure and individual density of collembolans under cultivation of sugar beet and

winter wheat. The study was part of a long-term CO2 enrichment field experiment (FACE: Free Air CO2 Enrichment) at the Federal Agricultural Research Centre (FAL) in Braunschweig (Germany), using isotopically labelled CO2. The stable C-isotopic signature ([delta]13C) of collembolan species, plant material, and soil indicated CO2 impacts on C translocation. The [delta]13C values of both crops significantly increased from above-ground to below-ground plant parts and significantly decreased under FACE conditions. The [delta]13C values of collembolan species differed significantly depending on CO2 treatment and crop and showed a distinct tendency depending on plant growth stage. The extent, to which [delta]13C values of collembolans decreased under FACE conditions, was species- and life strategy-dependent. The stable C-isotopic signatures of euedaphic and hemiedaphic species were similar in the control, but, depending on crop, differently affected by atmospheric CO2 enrichment. Under winter wheat cultivation, hemiedaphic species showed more negative [delta]13C values than euedaphic ones under FACE conditions. CO2 enrichment effects on occurrence, density and dominance distribution of the collembolan species differed strongly between crops and their developmental stages, which reveal crop-specific below-ground effects due to different food qualities in the rhizosphere. CO2 impacts were stronger under sugar beet compared to winter wheat cultivation. Independent of crop, CO2 enrichment enhanced the diversity of collembolans before harvest and increased the proportion of hemiedaphic in relation to euedaphic species in a community. Our results on collembolan communities imply CO2-induced changes in the root-derived carbon resources used by the soil food web. The present study reveals atmospheric CO2 enrichment impacts to specifically affect collembolan species according to their food preferences.
Keywords: FACE; Collembolans; Soil biodiversity; C-turnover; Arable crops; Stable C-isotopic analysis

Tomasz Glab, Bogdan Kulig, Effect of mulch and tillage system on soil porosity under wheat (Triticum aestivum), Soil and Tillage Research, Volume 99, Issue 2, June 2008, Pages 169-178, ISSN 0167-1987, DOI: 10.1016/j.still.2008.02.004.
(http://www.sciencedirect.com/science/article/B6TC6-4S3G9HV-1/2/1a150963db1aa62f442af8d0ba4f90ec)
Abstract:
Crop residues and reduced tillage become current tendency in modifying tillage due to better water management, organic and nutrient supply and increasing crop production. This study was carried out to quantify the effect of fodder radish mulching and different tillage systems in wheat production. In 2004-2006 the field trial was set up on Luvic Chernozems derived from loess. This experiment consisted of two factors: tillage system (conventional or reduced) and mulch (with or without). The air-water properties of soil with particular focus on macropore characteristics were investigated.
The tillage system and mulch application significantly influenced physical properties of investigated soil. Reduced tillage, without mouldboard plough, increased the soil density with respect to conventional tillage. However, in the upper soil layer (0-10 cm) with mulch residues the bulk density decreased and reached the similar value as those obtained at conventional tillage (1.25 g cm-3). The macroporosity of soil with conventional tillage (14.79%) was significantly higher in comparison with reduced tillage (6.55%). The mulch of fodder radish added at reduced tillage increased the macroporosity in pore diameter range of 50-500 [mu]m. These changes referred to all shape classes: regular, irregular and elongated pores. The lowest transmission pores content (0.078 cm3 cm-3) was noticed at the reduced tillage without mulch at the 0-10 cm layer. Due to lack of differences in storage pores the tillage and mulching had no effect on both AWC (available water content) and PWC (productive water content) values. The higher value of AWC was noticed in the upper soil layer (0.198 cm3 cm-3 in average), whereas in the 10-20 cm soil layer it was 0.186 cm3 cm-3. Similar relation was recorded in PWC values, 0.165 and 0.154 cm3 cm-3, respectively. The results obtained in physical properties of soil reflected in wheat yields. The yields

obtained at reduced tillage system without mulch (5.54 t ha-1) were significant lower with respect to treatment when mulch applied (6.79 t ha-1). The mulch residues did not affect yields at conventional tillage (6.53 t ha-1 without mulch and 7.00 t ha-1 with mulch). The main conclusion is that the mulching can help to avoid yield reduction in wheat production when reduced tillage is used.
Keywords: Mulch; Conventional tillage; Reduced tillage; Wheat; Porosity; Water retention; Biopores; Yields

Eduardo Martinez, Juan-Pablo Fuentes, Paola Silva, Susana Valle, Edmundo Acevedo, Soil physical properties and wheat root growth as affected by no-tillage and conventional tillage systems in a Mediterranean environment of Chile, Soil and Tillage Research, Volume 99, Issue 2, June 2008, Pages 232-244, ISSN 0167-1987, DOI: 10.1016/j.still.2008.02.001.
(http://www.sciencedirect.com/science/article/B6TC6-4S69S1V-1/2/6466020fada2839e8005bcdb93ae85b3)
Abstract:
No-tillage systems affect soil properties depending on the soil, climate, and the time since its implementation. In heavy no-tilled soils a surface compacted layer is commonly found. Such layer can affect root growth and soil water infiltration. In several cases, surface organic carbon can buffer these problems. The aim of this study was to evaluate the effect of 4- and 7-year-old conventional (CT) and no-tillage (NT) treatments on soil physical properties, root growth, and wheat (Triticum turgidum L. var. durum) yield in an Entic Haploxeroll of Central Chile. In both tillage treatments we study soil water retention, bulk density ([rho]b), soil particle density ([rho]s), soil water infiltration, mean-weight diameter of soil aggregates (MWD), penetration resistance, grain yield, and root length density (Lv) up to a depth of 15 cm. The MWD and the penetration resistance were higher under NT as compared to CT. For the top 5 cm of soil, Lv was greater under NT as compared to CT. Differences of Lv between NT and CT were 2.09, 7.60, and 4.31 cm root cm-3 soil during the two leaves, flowering and grain filling phenological stages, respectively. Generally, the effect of NT on these properties was more evident near the soil surface. In contrast, fast drainage macropores, [rho]s, and soil water infiltration rates were higher under CT than under NT. Tillage treatments did not significantly affect [rho]b and yield. A longer time under no-tillage enhanced aggregate stability, however, other soil physical properties were negatively affected.
Keywords: No-till; Wheat root density; Soil physical properties; Chile

C. Remond, I. Boukari, G. Chambat, M. O'Donohue, Action of a GH 51 [alpha]-l-arabinofuranosidase on wheat-derived arabinoxylans and arabino-xylooligosaccharides, Carbohydrate Polymers, Volume 72, Issue 3, 16 May 2008, Pages 424-430, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.09.008.
(http://www.sciencedirect.com/science/article/B6TFD-4PPF699-1/2/3e3e0bebb33e6883e3280aa9e05aa67e)
Abstract:
The substrate specificity of an arabinofuranosidase (AbfD3) from family 51 of glycoside hydrolase classification was investigated in order to precisely evaluate its catalytic abilities. AbfD3 activity on destarched wheat bran was poor and less than 1% of total arabinose was released. AbfD3 was also tested on arabinoxylans derived from destarched wheat bran that present different degrees of polymerization, A/X ratios, ferulic acid content and solubility. Results indicated that AbfD3 can hydrolyze polymeric arabinoxylans, even if this action was moderate when compared to the efficient hydrolysis of oligosaccharides. The limited action of AbfD3 on polymeric arabinoxylans is discussed with regard to the heterogeneous distribution of the arabinose residues along the xylan main chain, the insolubility of arabinoxylans and to the presence of disubstituted xylose or feruloylated arabinose.

Keywords: Arabinofuranosidase; Substrate specificity; Wheat bran; Arabinoxylans; Arabinoxylo-oligosaccharides

T.B. Biddulph, J.A. Plummer, T.L. Setter, D.J. Mares, Seasonal conditions influence dormancy and preharvest sprouting tolerance of wheat (Triticum aestivum L.) in the field, Field Crops Research, Volume 107, Issue 2, 10 May 2008, Pages 116-128, ISSN 0378-4290, DOI: 10.1016/j.fcr.2008.01.003.
(http://www.sciencedirect.com/science/article/B6T6M-4S0HBYG-1/2/fc0bbc1e87a9f691f414b91dd25e683d)
Abstract:
Preharvest sprouting occurs following rainfall after maturity and reduces grain quality and value. Dormancy at maturity is a trait frequently used by wheat breeders to improve tolerance to sprouting. To determine the environmental influence on the predicative relationship between dormancy at maturity and improved preharvest sprouting tolerance, dormancy (germination index) at maturity and grain quality (falling number) at maturity and then, after rainfall, was measured over three seasons. Based on the results it was possible to draw three main conclusions. Firstly, genotypes with strong dormancy (germination index <0.20) which have the embryo and seed coat component of dormancy maintained a falling number >300 s at all sites and seasons for the 2-month period after maturity despite receiving up to 122 mm of rain. Adequate preharvest sprouting tolerance also occurred in dormant genotypes, with just the embryo component; in all but the most severe conditions. Secondly, though the effect of environment and interaction of genotype and environment was significant, the G by E interaction did not account for a large proportion of the variation (<6%) in sprouting tolerance (measured by falling number after rainfall) or change the relative rankings of preharvest sprouting tolerance. Finally, other defects associated with rainfall during grain filling such as black point and fungal staining may slightly reduce dormancy estimates and preharvest sprouting tolerance. For this reason grain defects need to be improved in parallel with preharvest sprouting tolerance. In conclusion, strong dormancy provides a reliable source of preharvest sprouting tolerance in the field.
Keywords: Preharvest sprouting; Dormancy; Germination index; Falling number; Fungal staining; Black point

Ihwa Tan, P.J. Torley, P.J. Halley, Combined rheological and optical investigation of maize, barley and wheat starch gelatinisation, Carbohydrate Polymers, Volume 72, Issue 2, 5 May 2008, Pages 272-286, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.08.018.
(http://www.sciencedirect.com/science/article/B6TFD-4PJ04X8-2/2/3a06c0d7096f94bea159ed00f7f461c4)
Abstract:
Microstructural and rheological changes during gelatinisation are important indicators of starch functionality. A combined rheometer and optical microscope system (Rheoscope 1, Thermo Haake) was used to monitor the gelatinisation of different starches (maize starch containing 0%, 24%, 55% and 85% amylose; wheat starch and barley starch) suspended in a 0.1% guar solution (to minimise settling during the initial stages of gelatinisation). The 0.1% guar solution was selected after Rapid Visco Analyser, Modulated DSC and settling studies indicated that it minimised any effect on starch gelatinisation compared to carboxy methyl cellulose and xanthan. The Rheoscope study demonstrated that the viscosity of the starch during gelatinisation is related to changes in starch granules as a result of swelling. There was a two to threefold increase in starch granule size during the gelatinisation for all starches except for high amylose maize starches. Viscosity development during the gelatinisation was affected by the presence of B-type granules, whose presence tended to reduce the overall viscosity increase, indicating the importance of starch granules size and their distribution in determining the rheological responses of starch during gelatinisation.

Keywords: Rheo-optics; Starch gelatinisation; Amylose content; Barley; Maize; Wheat; Guar gum; Guar; Xanthan gum; Xanthan; CMC

Haruyoshi Konno, Yoshiki Yamasaki, Manabu Sugimoto, Kazuyoshi Takeda, Differential changes in cell wall matrix polysaccharides and glycoside-hydrolyzing enzymes in developing wheat seedlings differing in drought tolerance, Journal of Plant Physiology, Volume 165, Issue 7, 5 May 2008, Pages 745-754, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.07.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4PJD9GY-5/2/45f4544a6afd432c594ea8d5a656d4e9)
Abstract: Summary
The growth kinetics and variations in cell wall matrix polysaccharides and glycoside hydrolases during seedling development of the drought-tolerant wheat cultivar (cv. Hong Mang Mai) were compared with the drought-sensitive cultivar (cv. Shirasagikomugi). After 15 d of culture in water at 22 [degree sign]C under constant irradiance of 98 [mu]mol m-2 s-1, the length of the coleoptile and leaf sheath of Hong Mang Mai seedlings was 1.7 times longer than those of Shirasagikomugi seedlings. In the cell walls isolated from coleoptiles and leaf sheaths of the seedling of the two cultivars, the contents of arabinose, xylose, and glucose changed during development. The cell walls were fractionated progressively with 50 mM CDTA, 50 mM Na2CO3, 1 M KOH and 4 M KOH, and sugar composition was determined. The amount of CDTA-soluble fraction from the Hong Mang Mai cell walls was 2.4-fold higher than that from the Shirasagikomugi cell walls at 6 d of culture, and a considerable decrease was observed during development. The ratio of arabinose to xylose in 1 M KOH-soluble fraction from the two cultivars decreased. The amount of 4 M KOH-soluble fraction from the Shirasagikomugi cell walls was affected much more than those of the Hong Mang Mai cell walls. Many glycoside hydrolase activities were detected in the protein fractions from coleoptiles and leaf sheaths of the two cultivars, and the activities of licheninase, 1,3-1,4-[beta]-glucanase, and 1,3-[beta]-glucanase in the LiCl-soluble protein fraction increased drastically during development of the Shirasagikomugi seedlings. These findings suggest that the metabolism of the cell wall matrix polysaccharides of the drought-tolerant wheat cultivar is far different from that of the drought-sensitive wheat cultivar during seedling development.
Keywords: Cell wall; Drought tolerance; Glycoside hydrolase; Matrix polysaccharide; Wheat (Triticum aestivum)

Zhong-Min DAI, Yan-Ping YIN, Min ZHANG, Wen-Yang LI, Su-Hui YAN, Rui-Guo CAI, Zhen-Lin WANG, Distribution of Starch Granule Size in Grains of Wheat Grown Under Irrigated and Rainfed Conditions, Acta Agronomica Sinica, Volume 34, Issue 5, May 2008, Pages 795-802, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60029-2.
(http://www.sciencedirect.com/science/article/B94TW-4TCY8H1-2/2/62557e94237fbb9867a3f7452910dde7)
Abstract:
Starch granule comprises A and B types in mature wheat (Triticum aestivum L.) grains, which are different in chemical composition and functional properties. The granule size distribution of wheat starch is affected by both genotypic and environmental factors. Two wheat cultivars, Lumai 21 (starch content 68.9%) and De 99-3 (starch content 64.6%) were used to investigate the distribution of grain starch granule size, under irrigated and rainfed conditions, at Tai'an and Dezhou in Shandong Province, in the 2004-2005 growing season. In mature grains, the diameter of starch granules ranged from 0.37 to 52.60 [mu]m, and the percent volume distribution showed a two-peak curve with the mean granule diameter of 5 (B type) and 25 [mu]m (A type) at each peak. The volume percentages of A and B types were 56.1-65.5% and 34.5-43.9%, respectively. The two-peak curve was also shown in the percent surface area distribution of starch granules, but only 1 peak was seen in the percent number, because the number of B-type granules accounted for over 99% of the total starch granules. Compared with the irrigated treatment, the rainfed

treatment affected the distribution of starch granules in grains of both cultivars by increasing the percent volume and the percent surface area of 2.0-9.8 and <9.8 [mu]m starch granules, and decreasing those of >18.8 [mu]m starch granules. Soil water deficit also decreased the contents of amylose and starch in grains, but increased protein content, peak viscosity, and final viscosity. This indicated that the rainfed treatment probably improved the wheat grain quality. In the 2 cultivars, the contents of amylose and starch in grains had significantly negative correlations to the percent volume of 2.0-9.8 and <9.8 [mu]m starch granules, whereas, the content of protein in grains was significantly positively correlated with the percent volume of the 2 types of starch granules. This suggests that small starch granules (2.0-9.8 and <9.8 [mu]m) are low in contents of amylose and starch, and high in protein content, whereas, big starch granules (9.8-18.8 and >9.8 [mu]m) are high in both the contents of amylose and starch.
Keywords: wheat; starch granule size in grains; irrigated cultivation; rainfed cultivation

Neila Rassaa, Halim Ben Haj Salah, Kaouther Latiri, Thermal responses of Durum wheat Triticum durum to early water stress. Consequence on leaf and flower development, Comptes Rendus Biologies, Volume 331, Issue 5, May 2008, Pages 363-371, ISSN 1631-0691, DOI: 10.1016/j.crvi.2008.02.005.
(http://www.sciencedirect.com/science/article/B6X1F-4S97JDS-1/2/a6073de8167c1631feed01efcf57658a)
Abstract:
Drought can alter stem apex temperature and plant phenological development and it can then have an effect on the duration of the durum wheat stages. Thermal responses of plants to water stress are tentatively analysed as regards microclimate conditions by applying three different water treatments. Apex temperature measurements showed that they are related to radiation and that acceleration of apex development could be related to their increase. To cite this article: N. Rassaa et al., C. R. Biologies 331 (2008).
Keywords: Apex temperature; Water stress; Durum wheat; Temperature apicale; Stress hydrique; Ble dur

Harminder Pal Singh, Daizy Rani Batish, Gurpreet Kaur, Komal Arora, Ravinder Kumar Kohli, Nitric oxide (as sodium nitroprusside) supplementation ameliorates Cd toxicity in hydroponically grown wheat roots, Environmental and Experimental Botany, Volume 63, Issues 1-3, May 2008, Pages 158-167, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.12.005.
(http://www.sciencedirect.com/science/article/B6T66-4RDS43C-1/2/89c344dc03d379d007548ceb33aca23d)
Abstract:
Cadmium (Cd) is a non-redox toxic heavy metal present in the environment and induces oxidative stress in plants. We investigated whether exogenous nitric oxide (NO) supplementation as sodium nitroprusside (SNP) has any ameliorating action against Cd-induced oxidative damage in plant roots and thus protective role against Cd toxicity. Cd treatment (50 or 250 [mu]M) alone or in combination with 200 [mu]M SNP was given to hydroponically grown wheat roots for a short time period of 24 h and then these were shifted to distilled water to observe changes in levels of oxidative markers (lipid peroxidation, H2O2 content and electrolyte leakage). Supplementation of Cd with SNP significantly reduced the Cd-induced lipid peroxidation, H2O2 content and electrolyte leakage in wheat roots. It indicated a reactive oxygen species (ROS) scavenging activity of NO. However, even upon removal of Cd-treatment solution, the levels of oxidative markers increased during 24 h recovery stage and later at 48 h these decreased. Cd treatment resulted in an upregulation of activities of antioxidant enzymes--superoxide dismutase (SOD, 1.15.1.1), guaiacol peroxidase (GPX, 1.11.1.7), catalase (CAT, 1.11.1.6), and glutathione reductase (GR, 1.6.4.2). SNP supply resulted in a reduction in Cd-induced increased activities of scavenging enzymes. The protective role of exogenous NO in decreasing Cd-induced oxidative damage was also evident

from the histochemical localization of lipid peroxidation, plasma membrane integrity and superoxides. The study concludes that an exogenous supply of NO protects wheat roots from Cd-induced toxicity.
Keywords: Cadmium; Heavy metal toxicity; Histochemical localization; Nitric oxide; Oxidative markers; Scavenging enzymes; Sodium nitroprusside; Triticum aestivum (wheat)

Habib-ur-Rehman Athar, Ameer Khan, Muhammad Ashraf, Exogenously applied ascorbic acid alleviates salt-induced oxidative stress in wheat, Environmental and Experimental Botany, Volume 63, Issues 1-3, May 2008, Pages 224-231, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.10.018.
(http://www.sciencedirect.com/science/article/B6T66-4PWKSNS-3/2/383b673aff3c1e8fa6e6e38984b8d2ab)
Abstract:
Although ascorbic acid (AsA) is one of the most important and abundantly occurring water soluble antioxidants in plants, relatively little is known about its role in counteracting the adverse effects of salt stress on plant growth. To address this issue that whether exogenous application of ascorbic acid (AsA) through rooting medium could alleviate the adverse effects of salt stress on wheat plants, a hydroponic experiment was conducted under glasshouse conditions using two wheat cultivars, S-24 (salt tolerant) and MH-97 (moderately salt sensitive). Plants of both cultivars were subjected to 0 or 150 mM NaCl solution supplemented with 0, 50, or 150 mg L-1 AsA for 58 days. Imposition of salt stress reduced the growth of both wheat cultivars by causing reduction in photosynthesis, and endogenous AsA level, and enhancing accumulation of Na+ and Cl- coupled with a decrease in K+ and Ca2+ in the leaves and roots of both cultivars thereby decreasing tissue K+/Na+ ratio. However, root applied AsA counteracted the adverse effects of salt stress on the growth of cv. S-24 only, particularly at 100 mg L-1 AsA level. AsA-induced enhancement in growth of salt-stressed plants of S-24 was associated with enhanced endogenous AsA level and CAT activity, and higher photosynthetic capacity, and accumulation of K+ and Ca2+ in the leaves. Although root applied AsA did not improve the growth of salt-stressed plants of MH-97, it enhanced endogenous level of AsA, CAT activity, photosynthetic capacity, and leaf K+ and Ca2+. These findings led us to conclude that root applied AsA counteracts the adverse effects of salt stress on growth of wheat by improving photosynthetic capacity of wheat plants against salt-induced oxidative stress and maintaining ion homeostasis, however, these effects were cultivar specific.
Keywords: Antioxidants; Catalase; Ion homeostasis; K+/Na+ ratio; Photosynthesis; Salt tolerance

L. Gabriela Abeledo, Roxana Savin, Gustavo A. Slafer, Wheat productivity in the Mediterranean Ebro Valley: Analyzing the gap between attainable and potential yield with a simulation model, European Journal of Agronomy, Volume 28, Issue 4, May 2008, Pages 541-550, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.12.001.
(http://www.sciencedirect.com/science/article/B6T67-4RWBWRV-1/2/aac5cf70058c8a772abbc5ead56cbed4)
Abstract:
Water deficit is an important constraint for wheat yield generation under Mediterranean environments. However, nitrogen (N) availability could limit yield in a more important way than poor water conditions. The aim of the work was to analyze, using the Ceres-Wheat crop simulation model, to what degree N fertilization constitutes a tool for reducing the gap between attainable and potential yield. Firstly, the model was calibrated and validated under a wide range of N and water conditions for the region of the Ebro Valley (NE Spain). Anthesis and maturity date were adequately predicted by the model. Predictions of yield tended to be quite accurate in general, though under severe water deficits precision was lower. We then assessed the gap between attainable and potential yield considering different N availabilities at sowing taking into account a

weather database of 17 years for the location of Agramunt (NE Spain), representative of cereal growing conditions of the Mediterranean Catalonia. Potential yield ranged between 3.5 and 8.1 Mg ha-1. Variations in potential yield were explained by the duration of the period from sowing to anthesis and by the level of incident radiation during the period immediately previous to anthesis. Average attainable yield was 1.8 Mg ha-1 for N availability of 50 kgN ha-1; but increased to 2.8 Mg ha-1 for higher N availabilities (100-250 kgN ha-1). In the 25% of the worst years there was no effect of N availability on attainable yield. Increasing N availability beyond 100 kgN ha-1 generated a gain in yield only in 6% of the years. Variations between years in attainable yields were mainly explained by rainfall during the period from sowing to anthesis, whereas differences in attainable yield between N treatments increased with increases in rainfall. The gap between potential yield and attainable yield was higher in years with higher potential yield. On the other hand, the higher the attainable yield, the lower the gap. Thus, the proportion of the yield gap ascribed to N availability varied depending on the conditions of the growing season. In the high-yielding potential years, the main restriction for growth was water shortage, and fertilizing only slightly reduced the gap. Conversely, in rainy years characterized by low potential yields and mild water stresses, N management may constitute a simple tool for effectively reducing yield gap under rain-fed conditions.
Keywords: Potential yield; Attainable yield; Nitrogen availability; Wheat; CERES model

S. Menendez, R.J. Lopez-Bellido, J. Benitez-Vega, C. Gonzalez-Murua, L. Lopez-Bellido, J.M. Estavillo, Long-term effect of tillage, crop rotation and N fertilization to wheat on gaseous emissions under rainfed Mediterranean conditions, European Journal of Agronomy, Volume 28, Issue 4, May 2008, Pages 559-569, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.12.005.
(http://www.sciencedirect.com/science/article/B6T67-4RWBWRV-2/2/f2c79ec21cef63590528b1e8d5547c9f)
Abstract:
A field study was conducted to assess the effect of N fertilizer application to wheat (Triticum aestivum L.), tillage system and crop rotation on total denitrification N losses, N2O and CO2 emissions under Mediterranean conditions in a long-term trial started 18 years ago on a Vertisol soil. The tillage system consisted of conventional tillage vs. no-tillage and the crop rotation system consisted of two different 2-years rotations: wheat-sunflower (Helianthus annuus L.) (WS) and wheat-faba bean (Vicia faba L.) (WF). Fertilizer rates were 0 and 100 kg N ha-1 applied to wheat splitted in two amendments of 50 kg N ha-1 each. Two different fertilization systems were studied. In the old fertilized plots system fertilizer had been applied for 18 years since the beginning of the trial, and in the new fertilized plots system fertilizer was applied for the first time when this experiment was started. Measurements were carried out after fertilizer applications.
In the long term, continued fertilizer application produced a higher soil total N content. Nevertheless, no increase in denitrification potential, N2O + N2 production by denitrification, N2O or CO2 emissions was observed either by the recent application of N or by the continued application during 18 years. The soil presented a higher potential to denitrify up to N2 than up to N2O. So, denitrification was probably occurring mainly in the form of N2, while N2O emissions were occurring in a great manner by nitrification, both denitrification and nitrification occurring simultaneously at soil field capacity (60-70%) expressed as water filled pore space (WFPS). Conventional tillage induced an increase in soil total N content and in the potential to denitrify up to N2 with respect to no-tillage. This higher potential was translated into higher N2O + N2 production by denitrification presumably stimulated in the short time by the higher available carbon provided by decomposing roots and by the subsequent creation of soil anaerobic microsites. Contrarily, no effect of tillage was observed on N2O emissions because of being produced in an important manner by nitrification, which does not depend on carbon availability. The wheat-faba bean rotation induced higher soil nitrate contents than the wheat-sunflower, although the effect in the long time was not observed regarding soil total N content. The same as for the fertilizer effect, this

increase in nitrate content was not followed by a higher denitrification potential or higher N2O + N2 production by denitrification because of the lack of organic matter, while an increase was observed in N2O emissions.
Keywords: Denitrification; Denitrification potential; Nitrification; Nitrous oxide; Vertisol

Supradip Saha, Ved Prakash, Samaresh Kundu, Narendra Kumar, Banshi Lal Mina, Soil enzymatic activity as affected by long term application of farm yard manure and mineral fertilizer under a rainfed soybean-wheat system in N-W Himalaya, European Journal of Soil Biology, Volume 44, Issue 3, May-June 2008, Pages 309-315, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2008.02.004.
(http://www.sciencedirect.com/science/article/B6VR7-4S4S4PK-1/2/e0f50404ae149462c91577a929bbace9)
Abstract:
Long-term experimental sites are expected to provide important information regarding soil properties as affected by management practices. This study was designed to examine the effects of continuous fertilization, and manuring on the activities of enzymes involved in mineralization of C, N, and P on a long term (33 years) field trial under sub-temperate conditions in India. Treatments at the site included application of recommended doses of nitrogen and phosphorus (NP), nitrogen and potassium (NK), nitrogen, phosphorus and potassium (NPK), farmyard manure (FYM) with N (N + FYM), FYM with NPK (NPK + FYM) and un-amended control (C). The study was done under rainfed soybean-wheat rotation. Manure application increased soil carbohydrate, dehydrogenase, acid and alkaline phosphatases, cellulase, and protease activity significantly. Urease activity was not influenced by the manure treatment and the activity was highest in controls. Both acid and alkaline phosphatase activities were negatively influenced by chemical fertilizer treatment. Almost all the enzymes studied were significantly correlated with soil C content. The results suggest that application of FYM directly or indirectly influences the enzyme activity and it in turn regulates nutrient transformation.
Keywords: Long-term experiment; Soil carbohydrate; Soil enzymes; Nutrient dynamics

Biljana Skrbic, Bojana Filipcev, Nutritional and sensory evaluation of wheat breads supplemented with oleic-rich sunflower seed, Food Chemistry, Volume 108, Issue 1, 1 May 2008, Pages 119-129, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.10.052.
(http://www.sciencedirect.com/science/article/B6T6R-4R06434-6/2/545bce5b165f5813d0a000efcd6b16e4)
Abstract:
Wholegrain and refined (white) wheat breads were prepared with the addition of high-oleic sunflower seed at various levels (8%, 12%, 16% flour basis). The nutritive value of breads was determined by measuring the chemical composition, including the mineral content, the fatty acid composition (saturated, monounsaturated, polyunsaturated, linoleic and linolenic acids) and the contents of tocopherols ([alpha]-, [beta]-, [gamma]-, [delta]-). The obtained data were used to estimate the intakes of nutrients and compare them to the dietary reference intakes (DRIs). The breads made with the addition of sunflower seed were sensorially acceptable, containing significantly more tocopherols, fat, essential fatty acids, crude fibre, copper and zinc. It was estimated that wholegrain supplemented breads would contribute to the corresponding DRIs in the range 33.7-40.8% (adults) for copper and 4.7-18.4% (males), i.e. 6.4-25.3% (females) for zinc, 18.3-26.8% (males), i.e. 25.9-37.9% (females) for linoleic (omega-6) acid, 7.4-7.6% (males), i.e. 10.7-11.0% (females) for alpha-linoleic (omega-3) acid.
Keywords: Bread; Sunflower seed; Nutrients; Minerals; Tocopherols; Fatty acids; Intake

Sandeep Singh, Gurpreet Singh, Prabhjeet Singh, Narpinder Singh, Effect of water stress at different stages of grain development on the characteristics of starch and protein of different wheat

varieties, Food Chemistry, Volume 108, Issue 1, 1 May 2008, Pages 130-139, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.10.054.
(http://www.sciencedirect.com/science/article/B6T6R-4R0CKMB-1/2/84f1b94504a6cdc8a40012a170ab9180)
Abstract:
The effect of water stress (WS) at 8 and 15 days post anthesis (DPA) on the characteristics of starch and protein separated from C-306, HD-2329, PBW-175, PBW-343 and NI-5439 wheat varieties was studied. WS-induced changes in A-, B- and C-type granules distribution were variety- and stage-dependent. A-type granules increased in response to WS at both stages in all varieties, the extent of increase being greater at 15 DPA. The proportion of B-type granules decreased in all the varieties, except C-306, in response to WS at 15 DPA. C-type granules also decreased in response to 15 DPA in all varieties, except HD-2329. The starch from wheat exposed to WS at 15 DPA showed lower amylose content, lipids content and pasting temperature, and higher peak viscosity, final viscosity and setback. DSC analysis of starches showed two endotherms (associated with the melting of crystallites and amylose-lipid [AML] complexes) during heating, and an exotherm (associated with reforming of AML) during cooling. Transition temperatures (To, Tp and Tc) of AML dissociation and association were lower for starch from wheat exposed to WS, the effect being more at 15 DPA. The changes in pasting and thermal properties of starch caused by WS were observed to be related to lipids, amylose content and distribution of granules. The effect of WS on accumulation of different dimethyl formamide-soluble and insoluble proteins was significant and variety dependent.
Keywords: Wheat starch; Protein; Water stress; Thermal; Morphology; Pasting properties

Felicidad Ronda, Jose Manuel Rodriguez-Nogales, Daniel Sancho, Bonastre Oliete y Manuel Gomez, Multivariate optimisation of a capillary electrophoretic method for the separation of glutenins. Application to quantitative analysis of the endosperm storage proteins in wheat, Food Chemistry, Volume 108, Issue 1, 1 May 2008, Pages 287-296, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.10.016.
(http://www.sciencedirect.com/science/article/B6T6R-4PWF0X3-4/2/4d7b56632bb3316e8605d079de8d782b)
Abstract:
A capillary electrophoretic method has been designed to allow separation of glutenins with high resolution. Several factors, such as buffer composition, running voltage and capillary temperature were optimised using factorial design and response surface methodology. On the other hand, quantification of content of glutenins and gliadins of different wheat varieties were achieved for the first time using a glutenin extract of wheat gluten and a gliadin extract as external standards, respectively, and using the lys-tyr-lys tripeptide as internal standard. The optimised method and an early reported method for the gliadin separation were validated by evaluating linearity, sensitivity, detection and quantitation limits, repeatability and precision.
Keywords: Gliadins; Glutenins; Endosperm storage proteins; Capillary electrophoresis; Wheat; Quantification; Validation; Multivariate optimization

Yihu Song, Zheng Wang, Qiang Zheng, Equibiaxial extensional deformation and stress relaxation of glycerol plasticized wheat gluten at different concentrations, Food Hydrocolloids, Volume 22, Issue 3, May 2008, Pages 414-420, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.12.010.
(http://www.sciencedirect.com/science/article/B6VP9-4MMWHMD-2/2/8b5cd35717f75a893207438aef62aeaf)
Abstract:
The aim of the present work has been to study the equibiaxial extensional deformation of glycerol plasticized moisture-containing gluten (MG) with different MG volume fractions ranging from 0.56 to 0.75 under lubricated squeezing flow at room temperature. The hyperelastic model with a strain

energy potential of the Mooney-Rivlin form is applied to describe the biaxial stress as a function of biaxial strain at low strains. The initial shear modulus as a function of MG volume fraction reveals a particle network of gluten. Analysis of the relaxation modulus at biaxial strain 0.7 on the basis of the Kohlrausch-Williams-Watts (KWW) model reveals that decreasing volume fraction of MG increases the width of the distribution of relaxation times as well as the average relaxation time of wheat proteins.
Keywords: Wheat gluten; Equibiaxial extensional deformation; Lubricated squeeze flow; Hyperelastic model; Relaxation modulus

Q. Xu, J. Xu, C.L. Liu, C. Chang, C.P. Wang, M.S. You, B.Y. Li, G.T Liu, PCR-based markers for identification of HMW-GS at Glu-B1x loci in common wheat, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 394-398, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.002.
(http://www.sciencedirect.com/science/article/B6WHK-4NVH7V7-1/2/b93805568d67145eae02af5b42e0c10b)
Abstract:
The bread wheat elasticity, which is very important for bread-making quality, is largely determined by the composition of high-molecular-weight glutenin subunits (HMW-GS). The HMW-GS encoded by Glu-B1 loci are highly polymorphic and the combinations 17+18 and 14+15 are good for bread making. Thus it is very important to identify the alleles at Glu-B1 loci for wheat quality improvement. In this study, the five common HMW-GS types encoded by Glu-B1x locus carried by 18 Chinese bread wheat cultivars (or lines) were analyzed by SDS-PAGE. Two pairs of PCR primers which could distinguish the Glu-Blx alleles of the five common HMW-GS types were designed based on the Glu-B1x gene sequences (Reddy and Appels, 1993; Genbank accession: X13927; Genbank accession:AY367771). 22 recombinant inbred lines (RILs) derived from Jing711 (contains 17 subunit on Glu-B1x) and Pm97034 (contains 14 subunit on Glu-B1x) were used to validate the accuracy of the primers, which showed that the two specific markers could be used together to distinguish alleles at Glu-B1x locus and accelerate wheat quality breeding by marker assisted selection.
Keywords: Wheat; High-molecular-weight glutenin subunit (HMW-GS); Glu-B1x locus; PCR-based marker; Marker-assisted selection

C. Saint Pierre, C.J. Peterson, A.S. Ross, J.B. Ohm, M.C. Verhoeven, M. Larson, B. Hoefer, Winter wheat genotypes under different levels of nitrogen and water stress: Changes in grain protein composition, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 407-416, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.007.
(http://www.sciencedirect.com/science/article/B6WHK-4NXHC96-1/2/df6df6a417559d7b5ab282d0a5d00857)
Abstract:
Hard white winter wheat with superior and consistent quality is preferable for Asian markets. This study investigated the combined influences of moisture deficit during grain-fill and N management on protein quality, dough rheological properties, and protein molecular weight distributions in soft and hard winter wheats. Genotypes were grown under an irrigation gradient and two N-fertilization levels. Grain polyphenol oxidase (PPO) activity, SDS sedimentation, and Mixograph analyses were evaluated. Flour protein composition was characterized using SE-HPLC. Moisture stress during grain-fill increased flour protein content. N fertilization increased flour protein content. No significant correlation was found between flour protein and PPO. Changes in protein composition were related to general increases in protein content, regardless if the result of reduced irrigation or increased fertilization rate. The percentage of monomeric proteins increased more than the polymeric proteins as flour protein increased. Similarly, SDS sedimentation volume increased as a function of protein content. As expected, subunit GluD1 5+10 was associated with larger sedimentation volume and higher dough strength in genotypes as compared to those with subunit

GluD1 2+12. Biplot analyses showed that genotypes of similar protein quality and composition responded similarly to N and irrigation treatments.
Keywords: Hard white wheat; Grain protein; SE-HPLC; Stress

Jasim Ahmed, Hosahalli S. Ramaswamy, Vijaya G.S. Raghavan, Dynamic viscoelastic, calorimetric and dielectric characteristics of wheat protein isolates, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 417-428, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.013.
(http://www.sciencedirect.com/science/article/B6WHK-4P06CDS-1/2/3e18da188a80ae3dbb13a1ef58f62ea9)
Abstract:
Dynamic oscillatory rheology of two wheat protein isolate (Prolite 100 and Prolite 200) doughs ([approximate]48% moisture content, wet basis) were studied over a frequency range of 0.1-10 Hz during temperature sweep from 20 to 90 [degree sign]C at a heating rate of 2 [degree sign]C/min. Both doughs behaved similarly during heating; showed a threshold value and increased sharply, thereafter. Prolite 200 dough had a higher elastic modulus (G') and lower phase angle ([delta]) whereas Prolite 100 showed a distinct gel point at 52.2 [degree sign]C followed by significant increase up to 90 [degree sign]C. Rheological data of doughs after isothermal heating at 90 [degree sign]C for 15 min followed by cooling to 20 [degree sign]C resulted in strong mechanical strength. However, Prolite 100 dough showed more viscoelastic characteristics with significant transformation from liquid-like to solid-like behavior after heating than Prolite 200. Thermal analysis of isolates indicated distinct endothermic peaks in wider temperature range (50-130 [degree sign]C) at various moisture levels. Lower temperatures could be associated with denaturation of various fractions of proteins whereas higher temperature linked to glass transition temperature of isolates. SDS-PAGE did not show any clear distinction among protein subunits between two isolates. Dielectric measurements of isolates at frequencies from 500 to 3000 MHz and temperature range between 30 and 80 [degree sign]C indicated Prolite 200 had higher dielectric constant ([epsilon]') and loss factor ([epsilon]'') than Prolite 100. Isolates showed significant changes in dielectric properties above 50 [degree sign]C indicating protein denaturation and supported rheological and calorimetric data.
Keywords: Wheat protein isolate; Elastic modulus; Viscoelasticity; Solid-like property; Denaturation; Glass transition temperature; Dielectric loss factor; Penetration depth

J.Y. Delenne, Y. Haddad, J.C. Benet, J. Abecassis, Use of mechanics of cohesive granular media for analysis of hardness and vitreousness of wheat endosperm, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 438-444, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.009.
(http://www.sciencedirect.com/science/article/B6WHK-4NYJ0RS-1/2/a33fdceea1b476df00290ae000944c2c)
Abstract:
The characterisation of the wheat endosperm by mechanical tests of compression highlighted a relation between the rupture energy and the elasticity modulus for different varieties of wheat; this relation allows us to distinguish mealy and vitreous endosperms. An approach based on the micromechanics of cohesive granular materials is used to analyse these experimental results. A geometrical model of the wheat endosperm made of grains linked by cohesive bonds is proposed. We introduced two parameters, the first one [alpha] represents the percentage of active bonds (bonds where the stiffness and strength are non-zero), and the second one [beta] represents the threshold of the bond's rupture. The parameter [beta] can be related to the cross-section of the bond. This model successfully describes the mechanical tests on the wheat endosperm. The comparison with the experimental tests makes it possible to clearly differentiate vitreous wheats and mealy wheats and then attribute this property to the parameter [beta]. The model shows the same tendency as regards the evolution of the rupture energy and the elastic modulus with the parameter [alpha]. The modelling of endosperm by the mechanics of cohesive granular media

provides a new theoretical framework to interpret the rheology of endosperm. This approach allows us to connect this rheology to the mechanical actions at the scale of the granules.
Keywords: Wheat endosperm; Rheology; Hardness; Vitreousness; Cohesive granular media; Numerical simulation

Celine Loussert, Yves Popineau, Cecile Mangavel, Protein bodies ontogeny and localization of prolamin components in the developing endosperm of wheat caryopses, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 445-456, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.012.
(http://www.sciencedirect.com/science/article/B6WHK-4P06CDS-2/2/5cfd0b525731a6a622ca35ed0d31cfcc)
Abstract:
During caryopsis development, prolamins are initially stored in individual protein bodies, then generate a protein matrix in the ripe caryopsis. The ontogeny of the protein bodies was analyzed by fluorescence and electron microscopy from 7 to 43 days after anthesis (dAA), a period of time from the cellularization of endosperm to its desiccation. A series of antibodies specific to each prolamin type ([alpha]/[beta]-, [gamma]-, [omega]-gliadins, low-molecular weight and high-molecular weight glutenin subunits) made it possible to localize and co-localize the different prolamins in organelles of endosperm cells at different developmental stages. Protein bodies containing prolamins were observed as early as 7 dAA. At the early developmental stages, protein bodies were spherical with diameters around 1-2 [mu]m. Later, around 15 dAA, the PBs enlarged, and aggregation and/or coalescence were prominent at 21 dAA. From 33 dAA, individual PBs were no longer visible, but a protein matrix was confined in the space between starch granules. All prolamins were found in the same protein bodies, without any segregation according to their types. Immunochemical labelling of prolamins failed to reveal in TEM analyses any particular internal organization in protein bodies. Glutenin subunits and gliadins were observed in the Golgi apparatus at the early stages of endosperm development.
Keywords: Immunolabelling; Prolamins; Protein bodies; Wheat

Richard M. Weightman, Sam Millar, Juan Alava, M. John Foulkes, Lesley Fish, John W. Snape, Effects of drought and the presence of the 1BL/1RS translocation on grain vitreosity, hardness and protein content in winter wheat, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 457-468, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.011.
(http://www.sciencedirect.com/science/article/B6WHK-4NYJ0RS-2/2/551e947c2d1dd8af9845b282147e94f3)
Abstract:
Grain texture is an important component of end-use quality in wheat. The effects of water availability on the components of texture; vitreosity, determined using a Light Transflectance meter (LTm), grain hardness measured using the single-kernel characterisation system (SKCS), and protein content, were studied in field experiments of winter wheat in the UK in 2001/2002 and 2002/2003. Experiments were grown on a drought prone soil and employed a mapping population of 46 doubled haploid (DH) lines and their parents, Beaver (+1BL/1RS, soft wheat) and Soissons (1B, hard wheat). The results showed that drought increased hardness in both seasons, but the effect was never sufficient to move a line from the soft class into the hard class. Puroindoline (PIN)-a:b peak height ratio explained ca. 78% of the variation in hardness, and drought also appeared to increase the amounts of PINs in the grain. Minor quantitative trait loci (QTLs) were found for hardness on chromosomes 2A, 2D, 3A and 6D, also associated with QTLs for PINs. Vitreosity also increased in response to drought in both seasons. Variation in vitreosity explained 7-11% of the overall variation in texture within a hardness class, with hardness increasing on average by 2.2 SKCS units for each 10% increase in the proportion of vitreous grains. The relationship between vitreosity and protein content was poor, despite the fact that protein content

also increased in response to drought. Minor QTLs associated with both protein content and vitreosity were found on chromosomes 1B, 4D and 5D. A minor QTL for vitreosity was also found on chromosome 2D. However, there appeared to be no direct relationship between alleles at the Ha locus, the gene which controls the difference between hard and soft wheats, and vitreosity. A positive relationship between the presence of the 1BL/1RS translocation and the proportion of vitreous grains was identified, suggesting that vitreosity was strongly linked to changes in protein quality.
Keywords: Wheat; Grain hardness; Vitreosity; Drought

Genying Li, Zhonghu He, Morten Lillemo, Qixin Sun, Xianchun Xia, Molecular characterization of allelic variations at Pina and Pinb loci in Shandong wheat landraces, historical and current cultivars, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 510-517, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.003.
(http://www.sciencedirect.com/science/article/B6WHK-4P1P6VC-4/2/38062782e1500706cb0ea96ca35a74f1)
Abstract:
Grain hardness is very important in determining the milling and end-use quality of bread wheat. The objectives of this study were to develop gene specific primers for the allele Pina-D1b, evaluate the method for the identification of Pinb-D1p with restriction enzyme PflMI and characterize allelic variations at Pina and Pinb loci in Shandong wheat germplasm. Based on the nucleotide sequences of Ha locus reported previously (CR626934 and CR626926), 121 primer sets were developed to test the Pina-D1b allele. Sequence alignment showed that the promoter region of Pina-D1b allele was highly conserved in the region from -1134 to -23 bp relative to the transcription start codon ATG. Pinb-D1p was first reported in Chinese wheat landraces, with a base A deletion at position 213 in the coding region. Restriction analysis of Pinb-D1p indicated that the base A deletion resulted in the missing of the cleavage site with enzyme PflMI and the digestion with PflMI was validated as a reliable tool for the identification of Pinb-D1p allele. A total of 523 wheat accessions from Shandong province including 431 landraces, 63 historical and 29 current cultivars were chosen for the test of SKCS hardness and identification of puroindoline alleles using DNA markers developed in this study and those reported previously. Frequencies of soft, mixed and hard genotypes were 3.9%, 20.4% and 75.6% in Shandong landraces; 68.3%, 19.0% and 12.7% in historical cultivars; and 27.6%, 58.6% and 13.8% in current cultivars, respectively. Frequencies of Pina-D1b, Pinb-D1b and Pinb-D1p were 38.0%, 0.9% and 59.6% in hard landraces; and 37.5%, 37.5% and 25% in hard historical cultivars, respectively, whereas the Pinb-D1b was the only genotype in hard current cultivars. A novel Pinb allele with double mutations at the positions 96 (C to A) and 213 (deletion of A) was found in three landraces and designated as Pinb-D1aa.
Keywords: Bread wheat (Triticum aestivum L.); Grain hardness; Pina-D1b; Pinb-D1p; Molecular marker

A. Manickavasagan, G. Sathya, D.S. Jayas, N.D.G. White, Wheat class identification using monochrome images, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 518-527, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.008.
(http://www.sciencedirect.com/science/article/B6WHK-4P29KB8-2/2/af42b5f5188258e2c68ec55b016e9642)
Abstract:
Wheat class identification by bulk sample analysis using a machine vision method would be helpful for automation of grain handling, binning and shipping operations in grain elevators. A machine vision system with a monochrome camera was used to identify eight western Canadian wheat classes at four moisture levels (11%, 14%, 17% and 20% wet basis) by bulk sample analysis (n=100 images for each group of samples). Grayscale images (1024x768 pixels) of the grain bulk

were captured by the monochrome camera, and stored on a data acquisition system. Algorithms were developed to extract 32 textural features automatically from the grayscale images. The mean gray values of the western Canadian wheat classes ranged between 106 and 143, and it was the highest for Canada Prairie Spring Red and the lowest for Canada Western Extra Strong and Canada Western Red Winter. The mean gray values of the wheat samples were significantly higher at 17% moisture content and lower at 11% moisture content among the tested moisture levels ([alpha]=0.05). The overall classification accuracies of a quadratic discriminant function were 93.8%, 92.5%, 92.0% and 94.4% when the wheat classes were at 11%, 14%, 17% and 20% moisture contents, respectively. Similarly, the accuracies of a linear discriminant function were 96.1%, 95.0%, 95.4% and 96.3% at 11%, 14%, 17% and 20% moisture contents, respectively. When the wheat classes were identified irrespective of moisture levels (images of the four moisture level grains in each class were mixed together), the accuracy was 89.8% and 85.4% for quadratic and linear discriminant functions, respectively. A monochrome image analysis system has the potential to use for online identification of classes in wheat handling facilities. However, further research is required to determine the performance of the developed method for impurities in bulk grain such as foreign material and dockage.
Keywords: Wheat class; Monochrome image; Machine vision; High moisture grain

Aili Wang, Liyan Gao, Xiaohui Li, Yanzhen Zhang, Zhonghu He, Xianchun Xia, Yong Zhang, Yueming Yan, Characterization of two 1D-encoded [omega]-gliadin subunits closely related to dough strength and pan bread-making quality in common wheat (Triticum aestivum L.), Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 528-535, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.009.
(http://www.sciencedirect.com/science/article/B6WHK-4P2J03V-1/2/e83b2c8cf6e13d47d35fc149aa5f37b9)
Abstract:
Gliadin proteins of 113 common or bread wheat (Triticum aestivum L.) cultivars and advanced lines from China and other countries, were analyzed by high performance capillary electrophoresis (HPCE) and reversed-phase high performance liquid chromatography (RP-HPLC). A major protein peak migrating at 3 min by HPCE and eluting at about 20 min by RP-HPLC was identified in the [omega]-gliadin region. It was present in cultivars with good pan bread-making quality, whereas most cultivars with poor bread-making quality lacked this protein peak. Quality testing and statistical analysis showed that this [omega]-gliadin peak was significantly related to dough strength, loaf volume and loaf score. It was separated into two apparent protein components by one-dimensional SDS-PAGE and two-dimensional electrophoresis (2-DE). According to their relative mobilities on the gels, the proteins were designated [omega]-15 and [omega]-16, and their accurate molecular masses (42590.5 Da for [omega]-15 and 41684.1 Da for [omega]-16) were determined by MALDI-TOF-MS. The [omega]-15 and [omega]-16 gliadins possessed the N-terminal amino acid sequences of ARELNPSNKELQQQQ and KELQSPQQQF, and therefore they belonged to 1D-encoded [omega]-2 type and [omega]-1 type gliadins, respectively. Both gliadin subunits were always present together among the 86 cultivars analyzed, suggesting that they were encoded by two closely linked genes at Gli-D1 locus. The accumulative characteristics of gliadins during grain development indicated possible additive quantitative effects of [omega]-15+16 on dough strength. The [omega]-15 and [omega]-16 gliadins could be used as valuable genetic markers for wheat quality improvement.
Keywords: Bread wheat; Gliadins; HPCE; RP-HPLC; Mass spectrometry; Dough strength; Pan bread-making quality

Achim Claus, Melanie Mongili, Georg Weisz, Andreas Schieber, Reinhold Carle, Impact of formulation and technological factors on the acrylamide content of wheat bread and bread rolls,

Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 546-554, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.011.
(http://www.sciencedirect.com/science/article/B6WHK-4P3DY10-2/2/55f99a86521b58bbaad538818d82ba4d)
Abstract:
This study clearly demonstrates that formulation and baking technology have strong influence on the acrylamide content in the baked products. NaCl plays an ambiguous role: Whereas low doses up to 2% lowered acrylamide by inhibition of the enzyme activities, higher addition remarkably increased the contents due to growth inhibition of the yeast. The results of previous model studies concerning the influence of cysteine could be confirmed in pilot plant experiments. Its addition to the dough resulted in significantly lower acrylamide content whereas its application to the crust proved to be ineffective. Furthermore, it was demonstrated that enzyme-bearing bakery improvers had no influence on acrylamide formation. In pilot plant experiments acrylamide was reduced with increasing fermentation time, and minimum acrylamide levels were already reached after 60 min thus avoiding flattened breads due to prolonged amylase activity. Besides formulation and fermentation also process technology is crucial. As shown by our data, reduced baking temperature and prolonged heat treatment is favorable. Furthermore, convection ovens seem to enhance acrylamide formation compared to deck oven.
Keywords: Acrylamide; Bakery products; Formulation; NaCl; Bakery improvers; Cysteine; Fermentation time; Oven; Time-temperature regime

A. Lehner, N. Mamadou, P. Poels, D. Come, C. Bailly, F. Corbineau, Changes in soluble carbohydrates, lipid peroxidation and antioxidant enzyme activities in the embryo during ageing in wheat grains, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 555-565, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.017.
(http://www.sciencedirect.com/science/article/B6WHK-4P77836-1/2/42cf888558de9a58bc9358b5299fc962)
Abstract:
Soluble sugar contents and antioxidant enzyme activities were measured in the embryo of wheat (Triticum aestivum L., cv Charger) seeds throughout their storage under two conditions (45 [degree sign]C and 100% relative humidity (RH), and 30 [degree sign]C and 75% RH) to investigate whether grain deterioration during ageing was related to lipid peroxidation resulting in a decrease in the efficiency of the antioxidant defence system, and in changes in sugar metabolism. The half-viability period (P50) was only 6 d at 45 [degree sign]C and 100% RH against about 3.75 months at 30 [degree sign]C and 75% RH. However, sensitivity of grains to accelerated ageing carried out at 45 [degree sign]C and 100% RH increased during their pre-storage at 30 [degree sign]C and 75% RH. Loss of grain viability at 45 [degree sign]C and 100% RH was associated with an accumulation of H2O2 which was concomitant with a progressive decrease in catalase (CAT) and superoxide dismutase (SOD) activities, and with an increase in glutathione reductase (GR) activity. However, malondialdehyde content did not change, suggesting that there was no lipid peroxidation during such an ageing. In return, ageing of grains at 30 [degree sign]C and 75% RH was not associated either with strong changes in CAT, SOD and GR activities or with an accumulation of H2O2. When there was no correlation between CAT, SOD and GR activities and seed viability, there was a linear correlation between CAT activity and seed vigour evaluated by the T50 during ageing at 45 [degree sign]C and 100% RH. Sugar metabolism in wheat embryo largely depended on ageing conditions. Loss of grain viability at 45 [degree sign]C and 100% RH was associated with a marked decrease in sucrose (Su) and a slight increase in raffinose (Ra), and subsequently in the Ra/Su ratio. At 30 [degree sign]C and 75% RH, seed ageing was associated with an increase in both sugars but with no strong increase in Su/Ra ratio. Our results suggest that ageing was associated with various mechanisms depending on the conditions of

ageing, and that accelerated ageing at 45 [degree sign]C and 100% RH was not the only model to consider in order to understand the mechanisms involved in seed deterioration.
Keywords: Wheat; Ageing; Soluble carbohydrates; Antioxidant enzymes; Lipid peroxidation

M. Elangovan, R. Rai, B.B. Dholakia, M.D. Lagu, R. Tiwari, R.K. Gupta, V.S. Rao, M.S. Roder, V.S. Gupta, Molecular genetic mapping of quantitative trait loci associated with loaf volume in hexaploid wheat (Triticum aestivum), Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 587-598, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.003.
(http://www.sciencedirect.com/science/article/B6WHK-4P77836-4/2/b659185e1a5efc3c3bdcc875191b2c2f)
Abstract:
Major efforts in wheat research are being made to improve the yield and quality of wheat. Loaf volume (Lv) is the main quality parameter deciding the bread making potential of wheat. To genetically dissect quantitative trait loci (QTLs) for Lv, a Recombinant Inbred Line (RIL) population (F8) was developed from a cross between two Indian wheat varieties 'HI 977' and 'HD 2329'. A total of 914 SSR and 100 ISSR primers were used for molecular analysis and the genetic map comprising 19 chromosomes was constructed with 202 SSR markers and 2 HMW glutenin subunit loci: Glu-B1 and Glu-D1. The phenotypic data were collected from six environments including three different agro-climatic zones for 2 consecutive years. Dissection of Lv through AMMI model revealed significant GxE variance for the trait. QTL analysis was performed using composite interval mapping. A total of 30 QTLs for Lv were detected and significant QTLs were identified on 6B and 6D chromosomes; 1B, 1D, 2A, 3A, 5B and 5D also contributed genetically to Lv. Association between 6B and 6D QTLs and variable expression of gliadins on group 6 chromosomes were discussed. QTLs detected in this study were compared with other QTL analysis in wheat.
Keywords: Breadmaking; Loaf volume; Wheat quality; QTL; SSR

Samy Gobaa, Emmanuelle Bancel, Gerard Branlard, Geert Kleijer, Peter Stamp, Proteomic analysis of wheat recombinant inbred lines: Variations in prolamin and dough rheology, Journal of Cereal Science, Volume 47, Issue 3, May 2008, Pages 610-619, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.07.001.
(http://www.sciencedirect.com/science/article/B6WHK-4P77836-3/2/1e6e838aa2a994618e049375394dfeb4)
Abstract:
To investigate the impact of the 1BL.1RS translocation on dough strength and to understand how 1BL.1RS genotypes may overcome the loss of Glu-B3 and Gli-B1, proteomic profiles of 16 doubled haploid (DH) lines of similar glutenin composition but of different strength, as measured by Chopin's alveograph, were compared. The results showed that 32 spots, mainly prolamins, were differentially expressed and that five others were specific to high-strength DH lines. The identification and quantification of the prolamin fractions on the two-dimensional (2D) electrophoresis gels demonstrated that the high-molecular weight glutenin sub-unit (HMW-GS) were up-regulated by 25% in 1BL.1RS DH lines, even though the corresponding genes were not located on the missing 1BS chromosome. The [gamma]-gliadins were also up-regulated (by 36%) in such lines to counterbalance, to some extent, the loss of LMW-GS of Glu-B3. The polymeric prolamin fractions also accumulated in high-tenacity lines and decreased in high-extensibility lines confirming the role of the inter-chain disulfide bonds in resistance to deformation. In contrast, the monomeric fraction of [alpha]-gliadin favored extensibility and decreased tenacity by increasing the accumulation (+12%) of [alpha]-gliadins in high-extensibility lines; the Gli-A1 allele of the parent Toronit was found to be more abundant when compared to the Gli-A1 allele of parent 211.12014.
Keywords: Wheat; Proteome; Prolamins; Alveograph; Bread-making quality

Virginie Landillon, Denis Cassan, Marie-Helene Morel, Bernard Cuq, Flowability, cohesive, and granulation properties of wheat powders, Journal of Food Engineering, Volume 86, Issue 2, May 2008, Pages 178-193, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.09.022.
(http://www.sciencedirect.com/science/article/B6T8J-4PRYFR4-2/2/e561253838092188975d8da900d2bd0c)
Abstract:
The objective of the present work is to investigate the diversity in flowability, cohesive, and granulation properties for a large variety of wheat powders, obtained from different wheat grain species (durum wheat or common wheat) by different milling conditions. The flowability, cohesive, and granulation properties were evaluated at low (15-16% db) and high (33% db) moisture contents, during mixing and under different stress conditions (confined or unconfined compression). The properties are discussed in regard with the initial physical and biochemical characteristics of particles. Results demonstrate a large diversity in flowability and cohesive properties for the selected wheat powders at initial moisture content. At low moisture content, the particle size distribution of wheat particles is found to significantly contribute to flowability and cohesive properties. The flowability and cohesion properties at high moisture content was found to be partly dependent on physico-chemical and biochemical mechanisms, because of the plasticizing effect of water molecules on the wheat components. The glass transition concept was used to discuss changes in mechanical properties of wheat powders due to changes in moisture content.
Keywords: Wheat; Powder; Flowability; Cohesion; Granulation

I.S.M. Zaidul, N. Absar, S.-J. Kim, T. Suzuki, A.A. Karim, H. Yamauchi, T. Noda, DSC study of mixtures of wheat flour and potato, sweet potato, cassava, and yam starches, Journal of Food Engineering, Volume 86, Issue 1, May 2008, Pages 68-73, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.09.011.
(http://www.sciencedirect.com/science/article/B6T8J-4PNM44P-3/2/931418b0cc2d82362788ca5cabad4ef7)
Abstract:
Differential scanning calorimetry (DSC) traces at a 30 wt% suspension were studied for mixture of wheat flour and following starches: potato (PS), sweet potato (SPS), yam (YS), and cassava (CS) at 10% to 50% starch. In the endothermal transition, the gelatinization peak temperature of the first peak (TP1) was attributed to the wheat flour and that of the second peak (TP2), to the starches. The TP1 of the control wheat flour was lower (62.6 [degree sign]C) than the TP2 of the control PS (67.1 [degree sign]C), SPS (77.6 [degree sign]C), YS (67.2 [degree sign]C), and CS (69.7 [degree sign]C). In the endotherm of the mixtures, the TP1 was always closer to that of control wheat (about 62 [degree sign]C). In contrast, the TP2 of the mixtures was always shifted towards higher values than those of the control starches. However, the TP2 was found to be lower as the starch in the mixtures was increased, and the values ranged from 68.6 to 69.4 [degree sign]C, 80.1 to 82.2 [degree sign]C, 69.3 to 70.7 [degree sign]C, and 73.3 to 74.3 [degree sign]C for the wheat-PS, wheat-SPS, wheat-YS, and wheat-CS mixtures, respectively, at 10% to 50% starch. The apparent shifting towards higher temperatures resulted in a more prominent biphasic gelatinization behavior due to the influence of the wheat gluten in the mixtures of wheat flour and starches.
Keywords: Wheat flour; Tuber and root starches; Substitution; Gelatinization temperature

Zhangjun Cao, Zhiyong Deng, Meinan Wang, Xianping Wang, Jinxue Jing, Xiangqi Zhang, Hongsheng Shang, Zhenqi Li, Inheritance and molecular mapping of an alien stripe-rust resistance gene from a wheat-Psathyrostachys huashanica translocation line, Plant Science, Volume 174, Issue 5, May 2008, Pages 544-549, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.02.007.
(http://www.sciencedirect.com/science/article/B6TBH-4RVMXCD-1/2/04d311d479f928ae5538eb9e4ac8ecb5)

Abstract:
The wheat accession H9020-17-15 is a translocation line previously developed from interspecific hybridization between common wheat and Psathyrostachys huashanica Keng. This translocation line showed resistance to all Chinese stripe-rust races. In this study, the gene conferring rust disease resistance in H9020-17-15 was deduced originating from P. huashanica. This resistance gene, temporarily designated as YrHua, was confirmed to be dominant and monogenetically controlled. To molecularly map YrHua, a F2 segregating population comprised of 119 individuals was constructed on the basis of the hybridization between H9020-17-15 and a susceptible wheat line Mingxian 169. The linkage relationship with YrHua was evaluated for 166 simple sequence repeat (SSR) markers by analyzing this segregating population. YrHua was mapped to the long arm of chromosome 6A linked with the SSR marker Xgwm169 with a distance of 28.7 cM. Using AFLP to analyze the F2 population, two additional AFLP markers PM14 (301) and PM42 (249) were identified to be flanking YrHua at a distance of 5.4 and 2.7 cM, respectively. PM14 (301) was further developed into a 296-bp Sequence Tagged Site (STS) marker. These markers will be useful to combine YrHua with other genes for resistance gene pyramiding.
Keywords: Molecular mapping; Psathyrostachys huashanica; Puccinia striiformis f.sp.tritici; Sequence tagged site; Stripe-rust resistance

Herve Sanguin, Lionel Kroneisen, Kevin Gazengel, Martina Kyselkova, Benoit Remenant, Claire Prigent-Combaret, Genevieve L. Grundmann, Alain Sarniguet, Yvan Moenne-Loccoz, Development of a 16S rRNA microarray approach for the monitoring of rhizosphere Pseudomonas populations associated with the decline of take-all disease of wheat, Soil Biology and Biochemistry, Volume 40, Issue 5, May 2008, Pages 1028-1039, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.11.023.
(http://www.sciencedirect.com/science/article/B6TC7-4RJSGSW-1/2/5391ed1c6559b6696db4311e451ab925)
Abstract:
So far, the analysis of microbial populations associated with wheat monocropping-induced decline of take-all disease (Gaeumannomyces graminis var. tritici) has focused mainly on culturable biocontrol pseudomonads. The objective of this study was to develop a taxonomic rrs (16S rRNA gene) microarray to assess the changes in Pseudomonas populations taking place during take-all decline. The microarray contains 12 probes for five Pseudomonas phylogenetic clusters chosen because they include well-known plant-beneficial pseudomonads. Four of the clusters are within the `Pseudomonas fluorescens' species complex. PCR primers were selected to target these five clusters, and they were validated using 53 pseudomonads belonging or not to these clusters. Microarray analysis of the pseudomonads enabled discrimination between strains from several Pseudomonas clusters. Rhizosphere samples were collected from field plots grown with wheat for 1 (low level of take-all disease), 5 (high level of disease) or 10 years (low level of disease, suppressiveness reached). Microarray data could distinguish Pseudomonas populations from some of the wheat plants grown in the same plot. When comparing treatments, there was a difference between years 1 and 10. Cloning-sequencing of rrs enabled to define more precisely this difference by identifying two major Pseudomonas populations, one associated with year 1 and the other with year 10 (disease suppressiveness), which represent new clades within the `P. fluorescens' complex. These populations may be useful as soil quality indicators. In conclusion, the combination of microarray and cloning-sequencing approaches highlighted changes in the prevalence of two major Pseudomonas populations, giving new insights on the dynamics of root-associated pseudomonads during take-all decline.
Keywords: 16S microarray; Pseudomonas; Suppressive soil; Take-all decline

M. Miransari, H.A. Bahrami, F. Rejali, M.J. Malakouti, Using arbuscular mycorrhiza to alleviate the stress of soil compaction on wheat (Triticum aestivum L.) growth, Soil Biology and Biochemistry,

Volume 40, Issue 5, May 2008, Pages 1197-1206, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.12.014.
(http://www.sciencedirect.com/science/article/B6TC7-4RKVB7G-1/2/fc627d104fbe8f591c0e4c9acaef852a)
Abstract:
Since large areas of agricultural fields in the world become compacted every year, much effort has been made to reduce the adverse effects of soil compaction on plant growth. Mechanical methods to control soil compaction may be laborious and expensive; however, biological methods such as using arbuscular mycorrhiza (AM) may be more useful, economically and environmentally. The objectives of this study were: (1) to evaluate the effects of soil compaction on wheat (Triticum aestivum L.) growth, and (2) to evaluate if using AM of different origin can reduce the stressful effects of soil compaction on wheat growth. Unsterilized and sterilized soils, different levels of compaction and three species of arbuscular mycorrhiza were applied in four replicates. The experiments were conducted in the Soil and Water Research Institute, Karaj, Iran. Soil physical and chemical properties were determined. The AM increased wheat growth in both soils at different levels of soil compaction in both experiments. For root, shoot (P=0.1) and grain (P=0.05) dry weights increases were significant. AM enhanced root growth more than shoot growth under compaction (AM resulted in significant increase in root/shoot ratios, P=0.1). Due to its unique characteristics, AM may reduce the stressful effects of soil compaction on wheat growth, though its effectiveness may decrease with increasing compaction.
Keywords: Arbuscular mycorrhiza; Glomus sp.; Soil compaction; Soil sterilization; Wheat (Triticum aestivum L.) growth; Rhizosphere

Julien Hoyaux, Christine Moureaux, Denis Tourneur, Bernard Bodson, Marc Aubinet, Extrapolating gross primary productivity from leaf to canopy scale in a winter wheat crop, Agricultural and Forest Meteorology, Volume 148, Issue 4, 16 April 2008, Pages 668-679, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2007.11.010.
(http://www.sciencedirect.com/science/article/B6V8W-4RKVCVK-1/2/61706aeac61d7cdc63f1a477c62006b4)
Abstract:
The objectives of this paper are to determine winter wheat gross primary productivity (GPP) by extrapolating to the canopy scale measurements of photosynthetic assimilation made at the leaf scale, to identify the uncertainties inherent in this method and to quantify their impact on GPP predictions. Crop development monitoring and photosynthesis measurements were conducted between 1 May and 19 July 2004 at the Carboeurope site of Lonzee, Belgium, with a portable porometer Li-Cor 6400. The model divided the canopy into 10 layers in which assimilation was computed on the basis of incident radiation and of assimilation to light response curves calibrated in the field. The model also took account of photosynthesis of stems and ears, senescent organ distribution and response of assimilation to leaf to air vapour pressure difference. Model estimates were compared with eddy covariance measurements performed at the site during the same period. The best agreement (regression slope = 1.13, R2 = 0.94) between the two estimates was obtained by postulating a concentration of the senescent organs in the canopy bottom and a stem assimilation rate equal to 63% of the leaf assimilation. This ratio was found compatible with further leaf scale measurements. This led to a GPP of 1570 g C m-2 during the crop development and maturation periods. The sensitivity analysis revealed that the main sources of uncertainties were linked to the photosynthetic capacity of the stems (an increase of 40% in the initial GPP) and ears (an additional increase of 15%) and to the senescent organ spatial distribution (impact of 7-9%). An overestimation of GPP during spring (270 g C m-2) was also observed, due to assimilation reduction at low temperature not be accounted for. Apart from this, the impact of the A-Q curve parameter uncertainties was found to be limited (impact on GPP always lower than 4%).
Keywords: Winter wheat; Photosynthesis; Scaling up; Gross primary productivity; Carboeurope

I. Gabriel, S. Mallet, M. Leconte, A. Travel, J.P. Lalles, Effects of whole wheat feeding on the development of the digestive tract of broiler chickens, Animal Feed Science and Technology, Volume 142, Issues 1-2, 15 April 2008, Pages 144-162, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.036.
(http://www.sciencedirect.com/science/article/B6T42-4PB75D1-2/2/26caecb647b62ab1fe21af6f5e1e8dad)
Abstract:
The objective of the current study was to investigate the impact of including whole wheat in broiler diets on the development of the digestive tract. Chickens were fed a standard feed containing 400 g ground wheat/kg or the same diet with a part of the wheat given separately as whole grains that increased progressively from 200 g/kg at 8 d to 400 g/kg at 22 d. Every week, from 16 to 44 d, growth performance, modifications of the size of the digestive tract organs and intestinal enzyme activities were investigated. Morphology of villi and crypts in the small intestinal segments (duodenum, jejunum, ileum) were analyzed at 23 and 44 d. Microbacterial counts were performed in jejunal, ileal and caecal contents weekly from 16 to 44 d.
During the adaptation period from 8 to 15 d, the birds fed the whole wheat diet had lower feed intake and lower weight gain. Thereafter, they showed improved growth performance so that by the end of the experiment, they had higher body weight compared to the standard-fed birds, 2430 +/- 29 versus 2331 +/- 36 g.
Higher relative weights of gizzard (+26%) and pancreas (+12%) were observed from 16 to 44 d for whole wheat-fed birds compared to standard-fed birds. No differences in relative size of the different intestinal segments were observed, except that the jejunum was shorter. Increased villus to crypt length and surface ratios were observed at 23 d in the duodenum of whole wheat-fed birds, with no differences in morphometry between groups thereafter. Alkaline phosphatase activity was higher from 16 to 44 d in the duodenum and jejunum of whole wheat-fed birds. However, the activities of the digestive enzymes, leucine aminopeptidase and maltase, were similar between the two diets in the measured intestinal segments.
A lower number of facultative anaerobic bacteria was found in the ileum of the whole wheat-fed birds, with no differences between treatments for Escherichia coli and for Lactobacillus counts. In the jejunum and the caeca, no differences in microflora counts were observed.
The present results showed that feeding whole grains to broilers led mainly to modifications in the upper part of the digestive tract (gizzard, pancreas) and had little influence on the small and large intestine.
Keywords: Broiler chickens; Whole grain; Wheat; Digestive tract

F. Gao, Y. Jiang, G.H. Zhou, Z.K. Han, The effects of xylanase supplementation on performance, characteristics of the gastrointestinal tract, blood parameters and gut microflora in broilers fed on wheat-based diets, Animal Feed Science and Technology, Volume 142, Issues 1-2, 15 April 2008, Pages 173-184, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.07.008.
(http://www.sciencedirect.com/science/article/B6T42-4PGH4CK-2/2/06196193c793fa101c8912431857103b)
Abstract:
The aim of this study was to investigate the effects of xylanase supplementation on performance, characteristics of the gastrointestinal tract, blood parameters and gut microflora in broilers fed on wheat-based diets. The experimental diets consisted of a wheat-based diet supplemented with 0 or 1 g/kg enzyme preparation (xylanase activity was 1218 U/g). The diets were fed between 7 and 49 days of age. Enzyme supplementation (ES) improved ($P<0.05$) growth performance and feed conversion efficiency. The addition of enzyme to a wheat-based diet reduced the relative weights of the duodenum, jejunum, pancreas ($P<0.05$) and colon ($P<0.01$) in 21-day-old broiler chickens. Enzyme preparation reduced digesta viscosity in the proventriculus and jejunum of 21-day-old

broiler chickens (P<0.05) and in colon of 49-day-old broiler chickens (P<0.05). The pH of the digesta in the crop, duodenum and jejunum was increased (P<0.05) in 21-day-old broiler chickens and was reduced in the caecum of 49-day-old broiler chickens (P<0.05) with enzymes. There was no significant difference between the two experimental groups in counts of lactobacillus and coliform bacteria in the caecum. Enzyme supplementation increased the concentration of blood insulin-like growth factor I (IGF-I) (P<0.01) of 21-day-old broilers, triiodothyronine (T3) and insulin (P<0.05) at 49 days. ES reduced the concentrations of blood thyroxine (T4) (P<0.01) and uric acid (P<0.05) at 49 days, but had no effect on glucose concentration (P>0.05). In conclusion, ES can improve performance and digestive parameters and can change some blood parameters in broiler chickens fed a wheat-based diet.
Keywords: Xylanase; Wheat; Growth; Characteristics of the gastrointestinal tract; Metabolism; Broiler chicken

L. Willocquet, J.N. Aubertot, S. Lebard, C. Robert, C. Lannou, S. Savary, Simulating multiple pest damage in varying winter wheat production situations, Field Crops Research, Volume 107, Issue 1, 11 April 2008, Pages 12-28, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.013.
(http://www.sciencedirect.com/science/article/B6T6M-4RW4S09-1/2/d3f046bf92018056a272a92c8c445a72)
Abstract:
The production situation-injury profile paradigm can be used as a framework to assess the harmfulness of multiple-pest complexes in a changing agriculture. A mechanistic simulation model for wheat, WHEATPEST, was developed to incorporate drivers of (i) variable production situations and (ii) their related injury profiles. The model simulates the harmful effects of pathogens, pests, and weeds in a simple, open, generic manner. Simulation drivers were derived from published reports, in particular through a meta-analysis of highly detailed farmers' field surveys in the United Kingdom and the Netherlands. Preliminary analysis of the model's performances indicates that WHEATPEST conforms with available published reports in a range of production situations and injury profiles. While improvement on some components of the model are discussed, this work points at the need for the collection of cross-disciplinary, reasonably accurate, and standardised data at a system's level, and at the usefulness of modelling tools for basic research and policy.
Keywords: Injury-profile; Policy; Pest-management; Production-situation; Simulation; Strategic-decision; Wheat; Yield-loss; Aphids; Blumeria graminis; Brown rust; BYDV; Eyespot; Fusarium avenaceum; Fusarium culmorum; Fusarium graminearum; Fusarium head blight; Fusarium poae; Fusarium stem rot; Gaeumannomyces graminis var. tritici; Microdochium nivale; Powdery mildew; Mycosphaerella graminicola; Oculimacula acuformis; Oculimacula yallundae; Puccinia striiformis; Puccinia triticina; Rhizoctonia cerealis; Septoria nodorum; Septoria tritici; Sharp eyespot; Stagonospora nodorum; Take-all; Triticum aestivum; Yellow rust

L. Zhang, W. van der Werf, L. Bastiaans, S. Zhang, B. Li, J.H.J. Spiertz, Light interception and utilization in relay intercrops of wheat and cotton, Field Crops Research, Volume 107, Issue 1, 11 April 2008, Pages 29-42, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.014.
(http://www.sciencedirect.com/science/article/B6T6M-4RW4S09-2/2/2b5ad97d33c31c6e7a6304279e3f1fe3)
Abstract:
In China, a large acreage of cultivated land is devoted to relay intercropping of winter wheat and cotton. Wheat is sown in strips with interspersed bare soil in October and harvested in June of the next year, while cotton is sown in the interspersed paths in the wheat crop in April and harvested before the next wheat sowing in October. This paper addresses the question how strip width and number of plant rows per strip of wheat or cotton affect light interception (LI) and light use efficiency (LUE) of both component crops.

Field experiments were carried out in three consecutive years: 2002, 2003 and 2004. Light interception and productivity were estimated in monocultures of wheat and cotton and four intercropping designs differing in strip and path width as well as number of rows per strip. The intercrop systems were identified by the number of rows per strip of wheat and cotton, respectively, as 3:1, 3:2, 4:2 and 6:2. Total light interception over a season was calculated from LAI measurements, using a model for light interception in a row crop. The spatial distribution and diurnal course of light in intercrops were also measured with sensors.
Wheat monocrops intercepted 618 MJ m-2 photosynthetically active radiation (PAR) from 18 March to harvest in 2002, 337 MJ m-2 from 29 April to harvest in 2003, and 457 MJ m-2 from 13 April to harvest in 2004. Averaged over 3 years, wheat in the four intercrops (3:1, 3:2, 4:2 and 6:2, respectively) intercepted 83, 71, 73 and 75% as much PAR as the sole wheat. From sowing to harvest, cotton monocrops intercepted 491 MJ m-2 PAR in 2002, 426 MJ m-2 in 2003, and 415 MJ m-2 in 2004. Cotton in the four intercrops (3:1, 3:2, 4:2 and 6:2, respectively) intercepted 73, 93, 86 and 67% as much PAR as the sole cotton. LUE of wheat was 2.12 +/- 0.14 g total dry matter MJ-1 PAR during the reproductive period, while that of cotton was 1.33 +/- 0.02 g dry matter MJ-1 PAR over the whole growing period. No differences in LUE of wheat or cotton were found between systems.
The analysis indicates that the high productivity of intercrops, compared to monocultures, can be fully explained by an increase in accumulated light interception per unit cultivated area. The component crops are thus complementary in their interception of light over space and time. The model results indicate that light interception can be modified by choice of the number of crop rows per strip and strip width. The best distribution of light is attained in systems with narrow strips, a high proportion of border rows, and high planting densities of cotton. Suggestions for system improvement are given.
Keywords: Leaf are index (LAI); Light use efficiency (LUE); Photosynthetic active radiation (PAR); Intercropping; Competition

G.B. Huang, R.Z. Zhang, G.D. Li, L.L. Li, K.Y. Chan, D.P. Heenan, W. Chen, M.J. Unkovich, M.J. Robertson, B.R. Cullis, W.D. Bellotti, Productivity and sustainability of a spring wheat-field pea rotation in a semi-arid environment under conventional and conservation tillage systems, Field Crops Research, Volume 107, Issue 1, 11 April 2008, Pages 43-55, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.011.
(http://www.sciencedirect.com/science/article/B6T6M-4RRXJ8J-1/2/1ee508911c517e1aab6b478213d52968)
Abstract:
A long-term rotation experiment was established in 2001 to compare conservation tillage techniques with conventional tillage in a semi-arid environment in the western Loess Plateau of China. We examined resource use efficiencies and crop productivity in a spring wheat (Triticum aestivum L.)-field pea (Pisum arvense L.) rotation. The experimental design included a factorial combination of tillage with different ground covers (complete stubble removal, stubble retained and plastic film mulch). Results showed that there was more soil water in 0-30 cm at sowing under the no-till with stubble retained treatment than the conventional tillage with stubble removed treatment for both field pea (60 mm vs. 55 mm) and spring wheat (60 mm vs. 53 mm). The fallow rainfall efficiency was up to 18% on the no-till with stubble retained treatment compared to only 8% for the conventional tillage with stubble removed treatment. The water use efficiency was the highest in the no-till with stubble retained treatment for both field pea (10.2 kg/ha mm) and spring wheat (8.0 kg/ha mm), but the lowest on the no-till with stubble removed treatment for both crops (8.4 kg/ha mm vs. 6.9 kg/ha mm). Spring wheat also had the highest nitrogen use efficiency on the no-till with stubble retained treatment (24.5%) and the lowest on the no-till with stubble removed treatment (15.5%). As a result, grain yields were the highest under no-till with stubble retained treatment, but the lowest under no-till with no ground cover treatment for both spring wheat (2.4 t/ha vs. 1.9 t/ha)

and field pea (1.8 t/ha vs. 1.4 t/ha). The important finding from this study is that conservation tillage has to be adopted as a system, combining both no-tillage and retention of crop residues. Adoption of a no-till system with stubble removal will result in reductions in grain yields and a combination of soil degradation and erosion. Plastic film mulch increased crop yields in the short-term compared with the conventional tillage practice. However, use of non-biodegradable plastic film creates a disposal problem and contamination risk for soil and water resources. It was concluded that no-till with stubble retained treatment was the best option in terms of higher and more efficient use of water and nutrient resources and would result in increased crop productivity and sustainability for the semi-arid region in the Loess Plateau. The prospects for adoption of conservation tillage under local conditions were also discussed.
Keywords: No-tillage; Stubble retention; Plastic film mulch; Grain yield; Water use efficiency; Nitrogen use

Markus Herndl, Jeffrey W. White, L.A. Hunt, Simone Graeff, Wilhelm Claupein, Erratum to 'Field-based evaluation of vernalization requirement, photoperiod response and earliness per se in bread wheat (Triticum aestivum L.)' [Field Crop Res. 105 (2008) 193-201], Field Crops Research, Volume 107, Issue 1, 11 April 2008, Page 87, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.012.
(http://www.sciencedirect.com/science/article/B6T6M-4RNK414-2/2/bbee134d2baecb4969908ff96f041ffd)

Hui Yu, Ruigang Liu, Dawa Shen, Zhonghua Wu, Yong Huang, Arrangement of cellulose microfibrils in the wheat straw cell wall, Carbohydrate Polymers, Volume 72, Issue 1, 3 April 2008, Pages 122-127, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.07.035.
(http://www.sciencedirect.com/science/article/B6TFD-4PBDR0T-2/2/fbab66f1a55e965bd25f02c373e48817)
Abstract:
The arrangement of cellulose microfibrils in the cell wall from different tissues of wheat straw was investigated mainly using atomic force microscope (AFM). It was revealed that cellulose microfibrillar crystals arrange randomly in the parenchyma cell walls and are ordered quite well longitudinal to the fiber axis in the epidermal fibers. The microfibrillar crystals are about 20 nm in diameter and 150-200 nm in length. Moreover, the cellulose microfibrillar crystals in the epidermal fibers align periodically along the fiber axis and the periodicity is similar to the length of the fibrillar crystals. This structure was confirmed by small angle X-ray scattering (SAXS).
Keywords: Cellulose; Microfibrils; Morphology; Atomic force microscope (AFM)

Yong-qiang LI, Ren-jun ZHU, Ji-chun TIAN, Influence of Wheat Protein Contents and Fractions on Dough Rheological Properties as Determined by Using a Reconstitution Method, Agricultural Sciences in China, Volume 7, Issue 4, April 2008, Pages 395-404, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60082-6.
(http://www.sciencedirect.com/science/article/B82XG-4SM79T5-2/2/a6af0cd278d06b1e6ebfbed17a7e5728)
Abstract:
A strong gluten wheat cultivar Shannong 12 and a medium-strength wheat cultivar Shannong 11 were used to investigate the effects of wheat protein contents and protein fractions on dough rheological properties using a reconstitution method. The results indicated that the peak height, peak width, peak integral, resistance to extension and area under the curve were increased when protein content increased to 120, 140, and 160% (w/w) of the protein content in the base flours for doughs made from each wheat cultivar. All protein fractions were added to each of the base flours at three levels (0.25, 0.50 and 1.00%, w/w) based upon the protein content. The mixograph dough development time, peak width, and resistance to extension increased when the glutenin, insoluble glutenin, soluble glutenin, and glutenin macropolymer were added and increased systematically

with increasing levels of these fractions. Peak integral increased by adding and increasing protein content, however, albumin-globulin had no obvious effects. Extensibility at rupture decreased when the glutenin, insoluble glutenin, soluble glutenin, and glutenin macropolymer were added, and decreased systematically with increasing levels of these fractions. However, extensibility at rupture increased when the monomeric protein, albumin-globulin, and gliadin were added, and increased systematically with increasing levels of these fractions.
Keywords: dough; reconstitution; protein content; protein fraction; rheological properties

Yue-jin ZHENG, Yue-qin YANG, Shan-shan LIANG, Xian-feng YI, Effect of Methanol on Photosynthesis and Chlorophyll Fluorescence of Flag Leaves of Winter Wheat, Agricultural Sciences in China, Volume 7, Issue 4, April 2008, Pages 432-437, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60086-3.
(http://www.sciencedirect.com/science/article/B82XG-4SM79T5-6/2/c7963e773bf958aa650bd134787565d0)
Abstract:
Photosynthesis and chlorophyll a fluorescence parameters, photochemical efficiency of PS II (Fv/Fm), photochemical quenching of PS II (qP), nonphotochemical quenching of PS II (NPQ), maximum activity of PS II (Fv/Fo) as well as electron transport rate (ETR), and quantum yield of PS II ([Psi]PS II) were measured on flag leaves of the winter wheat treated by methanol at different concentrations. The results revealed that photosynthesis was greatly improved by methanol, as indicated by higher photosynthetic rates and stomatal conductance. The enhancement effect of methanol on photosynthesis was maintained for 3-4 days. Different methanol concentration treatments also increased intercellular CO2 concentration and transpiration rates. No significant decline was found in Fv/Fm, Fv/Fo, and [Psi]PS II, which revealed no photoinhibition during methanol application in different methanol concentrations. Methanol showing no apparent inhibitory effects indicated higher potential photosynthetic capacity of flag leaves of winter wheat. However, the increase in photosynthesis was not followed by an increase in the photosynthetic activity (Fv/Fm), and fluorescence parameters did not indicate an improvement in intercellular CO2 concentration and PS II photochemical efficiency compared with the control, thereby encouraging us to propose that lower leaf temperatures caused by applied methanol would reduce both dark respiration and photorespiration (most importantly), thus, increasing net CO2 uptake and photosynthetic rates.
Keywords: methanol; photosynthetic activity; chlorophyll fluorescence; flag leaf; winter wheat

M. Langensiepen, H. Hanus, P. Schoop, W. Grasle, Validating CERES-wheat under North-German environmental conditions, Agricultural Systems, Volume 97, Issues 1-2, April 2008, Pages 34-47, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.11.001.
(http://www.sciencedirect.com/science/article/B6T3W-4S044P0-1/2/26d51926e4851300c3ed30b28f1e7aaf)
Abstract:
The predictive quality of CERES-wheat was tested under contrasting nitrogen management and temperate-maritime climate conditions of North-Germany. Field data from 9 years of observations were used in this study. The magnitudes of the genetic parameters of the local wheat cultivar 'Orestis' were strongly influenced by seasonal weather fluctuations. For predicted yield and harvest biomass, the root mean square error was 2.2 t/ha and 3.2 t/ha, respectively. These errors were too large to permit a practical application of the CERES-wheat model for optimizing fertilizer management under the production conditions of North-Germany. The results of this study suggest that the model needs to be considerably improved with respect to the simulation of soil and plant water-relations, as well as the interaction between water and nitrogen uptake which were found to be inconsistent.

Keywords: CERES; DSSAT; Wheat; Crop modelling; Simulation; Decision support; Validation; Temperate-maritime climate; Nitrogen management; North-Germany

Quanqi Li, Yuhai Chen, Mengyu Liu, Xunbo Zhou, Songlie Yu, Baodi Dong, Effects of irrigation and planting patterns on radiation use efficiency and yield of winter wheat in North China, Agricultural Water Management, Volume 95, Issue 4, April 2008, Pages 469-476, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.11.010.
(http://www.sciencedirect.com/science/article/B6T3X-4RR830N-4/2/31783f87e1b72e63c72f43c1f361926f)
Abstract:
The factor limiting the increase in winter wheat yield was not the deficiency of light radiation but the low radiation use efficiency (RUE). In 2004-2005 and 2005-2006, an experiment was conducted at the Agronomy Station of Shandong Agricultural University to study the effects of irrigation and different planting patterns on the photosynthetic active radiation (PAR) capture ratio, PAR utilization, and winter wheat yield. In this experiment, winter wheat was planted in four patterns as follows: uniform row planting (U; row spacing, 30 cm), '20 + 40' wide-narrow row planting (W), '20 + 40' furrow planting (F), and '20 + 40' bed planting (B), which are very popular in North China. The results showed that under different irrigation regimes, there was no significant difference (less than 15.93%) between any of the planting patterns with respect to the amount of PAR intercepted by the winter wheat canopies. However, significant differences were observed between different planting patterns with respect to the amount of PAR intercepted by plants that were 60-80 cm above the ground surface (53.35-225.16%). This result was mainly due to the changes in the vertical distributions of leaf area index (LAI). As a result, the effects of the planting patterns on RUE and the winter wheat yield were due the vertical distribution of PAR in the winter wheat canopies. During the late winter wheat growing season, irrespective of the applied irrigation, the RUE in case of F was higher than that in case of U, W, and B by 0.05-0.09, 0.04-0.08, and 0.02-0.12 g/mol, respectively, and the yield was higher by 238.39-693.46, 160.02-685.96, and 308.98-699.06 kg/ha, respectively. Only under the fully irrigated conditions, the RUE and winter wheat yield significantly (LSD; $P < 0.05$) increased in case of B. This experiment showed that in North China, where the water shortage is the highest, application of planting pattern B should be restricted. Instead, F should be used in combination with deficit irrigation to increase the RUE and grain yield of winter wheat.
Keywords: Irrigation; Planting pattern; Winter wheat; Radiation use efficiency; Yield

L. Lahaye, P. Ganier, J.N. Thibault, Y. Riou, B. Seve, Impact of wheat grinding and pelleting in a wheat-rapeseed meal diet on amino acid ileal digestibility and endogenous losses in pigs, Animal Feed Science and Technology, Volume 141, Issues 3-4, 1 April 2008, Pages 287-305, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.016.
(http://www.sciencedirect.com/science/article/B6T42-4P77G77-2/2/20cb48c74d656f966d0fe358da400e39)
Abstract:
The purpose of the current experiment was to investigate the impacts of grinding and pelleting procedures applied to wheat in a wheat-rapeseed meal diet on the coefficients of standardized ileal digestibility, i.e., apparent digestibility corrected for basal endogenous losses (CSID), and true ileal digestibility, i.e., apparent digestibility corrected for total endogenous losses (CTID), of nitrogen (N) and amino acids (AA) in pigs. Ileal digestibility was measured by collecting digesta from pigs fitted with ileorectal anastomoses. Four diets, involving four technological treatments applied to wheat, were compared in vivo according to a 4 x 4 Latin square design (four pigs each fed four diets during four successive periods of 1 week). The technological treatments of wheat were two grinding procedures and two pelleting processes. Wheat was ground to obtain mean flour particle sizes of 1000 and 500 [mu]m, leading after mixing with rapeseed meal and minerals-

vitamins premix to the first and second diets named 'coarse' and 'fine', respectively. Part of the 500 [mu]m wheat flour was pelleted through dies of same screen diameter (4 mm) but different thicknesses, 16 and 20 mm, inducing a low and high compression ratio, leading after mixing with rapeseed meal and premix to the third and fourth diets named 'LCR' and 'HCR', respectively. Basal endogenous losses were determined by feeding a protein-free diet during the 5th week of the experiment. Total endogenous losses were measured by way of the isotopic dilution method using 15N-labeled wheat and rapeseed meal. Decreasing wheat particle size from 1000 to 500 [mu]m improved (P<0.05) the coefficient of ileal digestibility of dietary energy (0.707 versus 0.665), organic matter (0.718 versus 0.677) and dry matter (0.681 versus 0.645), but neither AA CSID nor N retention. The pelleting processes did not further increase (P>0.10) energy or organic matter digestibility but improved (P<0.05) N and AA CSID (0.785 versus 0.759 for N and 0.725 versus 0.679 for lysine, with HCR versus fine diet, respectively). Pelleting wheat flour at higher compression ratio (HCR versus LCR diet) was more efficient to improve dietary N and AA digestibility values due to a significant decrease in ileal specific, i.e., total minus basal, N and AA endogenous losses (P<0.05) associated with an increase in CTID. It is concluded that pelleting wheat fine flour at high compression ratio allows maximizing AA digestibility and availability of a wheat-rapeseed meal diet.
Keywords: Flour particle size; Pelleting treatment; Amino acids; Ileal digestibility; Ileal endogenous losses; Pigs

M.A.M. Rodrigues, P. Pinto, R.M.F. Bezerra, A.A. Dias, C.V.M. Guedes, V.M.G. Cardoso, J.W. Cone, L.M.M. Ferreira, J. Colaco, C.A. Sequeira, Effect of enzyme extracts isolated from white-rot fungi on chemical composition and in vitro digestibility of wheat straw, Animal Feed Science and Technology, Volume 141, Issues 3-4, 1 April 2008, Pages 326-338, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.06.015.
(http://www.sciencedirect.com/science/article/B6T42-4P6TH26-1/2/98095415ae1382c97c11c40695d962e0)
Abstract:
A series of in vitro experiments were completed to evaluate the potential of enzyme extracts, obtained from the white-rot fungi Trametes versicolor (TV1, TV2), Bjerkandera adusta (BA) and Fomes fomentarius (FF), to increase degradation of cell wall components of wheat straw. The studies were conducted as a completely randomized design and analysed using one-way ANOVA. Enzyme activities of the extracts, previously obtained from a liquid culture medium, were characterized in terms of laccase and peroxidase for ligninolytic activity. Carboxymethyl cellulase (CMCase) and avicell digesting cellulase (Avicelase) were used for cellulolytic enzyme assays. Wheat straw samples were incubated with enzyme extracts in a citrate buffer (pH 5.0) in a forced air oven at 25 [degree sign]C for 6 days. In vitro NDF digestibility (IVNDFD), and the rate and extent of NDF fermentation, without and after incubation with the white-rot enzyme extracts, were determined using a gravimetric microbiological method and a gas production technique, respectively. Results from cell wall chemical composition showed that TV2 and BA enzyme extracts decreased NDF concentration (P<0.05) and that TV1 had higher activity (P<0.05) towards cellulose. There was an increase in IVNDFD (P<0.05), resulting from treatment of wheat straw with enzyme extracts from BA, TV1 and TV2, reaching a difference of 13% for TV2 (P<0.05), versus the non-treated straw control. Treatment with enzyme extract from TV2 caused increased gas production (P<0.05) after the first 20 h of incubation, and also increased the maximum rate of gas production, thus enhancing fermentation kinetics. This study indicates that enzyme extracts from white-rot fungi can be used to develop new approaches to overcome low digestibility of some plant cell walls. Utilization of different substrates to produce enzyme extracts can lead to production of viable ligninolytic complexes which could improve the nutritive value of fibrous feeds.
Keywords: White-rot fungi; In vitro digestibility; Wheat straw

Marta Heroldova, Emil Tkadlec, Josef Bryja, Jan Zejda, Wheat or barley?: Feeding preferences affect distribution of three rodent species in agricultural landscape, Applied Animal Behaviour Science, Volume 110, Issues 3-4, April 2008, Pages 354-362, ISSN 0168-1591, DOI: 10.1016/j.applanim.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T48-4NWNF5H-1/2/30c9dbdee6285520df477c88268b66a6)
Abstract:
Spatial distribution of voles and mice and their abundances in agricultural landscape are largely influenced by their food preferences and the distribution of preferred crops. Here we examined the correspondence between food preferences of dominant rodent species (two mice and one vole) for two cereals (wheat and barley) estimated in the lab and the long-term field abundances observed at the harvest time in southern Moravia, Czech Republic. In the first laboratory trial, harvested culms of wheat and barley were offered. The pygmy field mouse preferred (100%) the seed head of wheat, also the wood mouse (87%) and common vole (60%) showed low preference for wheat. In the second trial, we observed similar preferences in consuming the offered grains of both cereals, the wheat being preferred by the pygmy field mouse, and the wood mouse, while with the common vole showing no preference. Laboratory analysis of the harvested grains indicated a lower fibre content in wheat compared with barley. In the field, rodent abundances in wheat were higher than those in barley, especially in mice. This suggests that food preferences in the laboratory correspond closely to field distribution of these rodents and their abundances. Therefore, studying diet preferences may be of essential in predicting small rodent abundances in changing agricultural landscape.
Keywords: Agro-ecosystem; Small rodent species; Diet preference; Habitat preference; Pests

Malene Soltoft, Lise N. Jorgensen, Bo Svensmark, Inge S. Fomsgaard, Benzoxazinoid concentrations show correlation with Fusarium Head Blight resistance in Danish wheat varieties, Biochemical Systematics and Ecology, Volume 36, Issue 4, April 2008, Pages 245-259, ISSN 0305-1978, DOI: 10.1016/j.bse.2007.10.008.
(http://www.sciencedirect.com/science/article/B6T4R-4RDBFBC-1/2/21df9a63458ac3f3f4c75f9acdc11ac8)
Abstract:
Fusarium Head Blight (FHB) is a destructive disease that affects the grain yield and quality of cereals. The relationship between the natural defense chemicals benzoxazinoids and the FHB resistance of field grown winter wheat varieties was investigated. FHB resistance was assessed by the inoculation of wheat ears with mixtures of Fusarium avenaceum, Fusarium culmorum, Fusarium graminearum, and Microdochium nivale.
The benzoxazinoids detected in the highest concentration were 2,4-dihydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (3.7-9.4 [mu]mol/kg DW) and 2-hydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (HMBOA, 2.0-11 [mu]mol/kg DW). The cultivars most susceptible to FHB were cvs. Hanseat, Asketis, and Ritmo, while cvs. Petrus, Terra, and Hattrick showed high resistance.
2-O-[beta]-d-Glucopyranosyloxy-4,7-dimethoxy-(2H)-1,4-benzoxazin-3(4H)-one (HDMBOA-glc) and 2-O-[beta]-d-glucopyranosyloxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (HMBOA-glc) were detected. HMBOA-glc was found in higher concentrations than 2-O-[beta]-d-glucopyranosyloxy-2,4-dihydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (DIMBOA-glc). Principal component analyses demonstrated correlation between the susceptibility to FHB and the concentrations of DIMBOA-glc, HMBOA-glc, HMBOA, 2-O-[beta]-d-glucopyranosyloxy-4-hydroxy-(2H)-1,4-benzoxazin-3(4H)-one (DIBOA-glc), 2-O-[beta]-d-glucopyranosyloxy-1,4-benzoxazin-3(4H)-one, and 2-O-[beta]-d-glucopyranosyloxy-4-dihydroxy-(2H)-7,8-dimethoxy-1,4-benzoxazin-3(4H)-one (DIM2BOA-glc).
Keywords: Benzoxazinoids; DIMBOA; Fusarium Head Blight; HMBOA; Susceptibility; Winter wheat

Marie Linde, Eva-Lena Jakobsson, Mats Galbe, Guido Zacchi, Steam pretreatment of dilute H2SO4-impregnated wheat straw and SSF with low yeast and enzyme loadings for bioethanol production, Biomass and Bioenergy, Volume 32, Issue 4, April 2008, Pages 326-332, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.09.013.
(http://www.sciencedirect.com/science/article/B6V22-4R2HKKR-1/2/08743b5afc2650fcd8ddc7fab6a9dbce)
Abstract:
Conversion of lignocellulosic material to monomeric sugars and finally ethanol must be performed at low cost, i.e. with limited consumption of chemicals, yeast and enzymes while still reaching high yields, if it is to compete with other fuel conversion processes. The objective of this study was thus to investigate ethanol production from steam-pretreated wheat straw by simultaneous saccharification and fermentation (SSF). The concentration of sulphuric acid in the impregnation liquid prior to pretreatment was kept low, 0.2%, and SSF was performed at low enzyme loadings, 3-14 FPU g-1 water-insoluble solids (WIS), and a low yeast concentration, 2 g L-1. The pretreatment conditions were optimised to give the highest overall glucose and xylose recovery after enzymatic hydrolysis of the residual WIS. The highest recovery of glucose (102%) and xylose (96%) was obtained after pretreatment at 190 [degree sign]C for 10 min. Achieving high yields of glucose and xylose with the same pretreatment conditions is unusual and makes wheat straw a highly suitable raw material for bioethanol production. SSF was performed on whole slurry from straw pretreated under the optimal conditions. A high overall ethanol yield, 67% of the theoretical based on glucose in the raw material, was obtained.
Keywords: Ethanol; Steam pretreatment; H2SO4; SSF; Wheat; Straw; Biofuel; Agricultural residue

Ayse Alemdar, Mohini Sain, Isolation and characterization of nanofibers from agricultural residues - Wheat straw and soy hulls, Bioresource Technology, Volume 99, Issue 6, April 2008, Pages 1664-1671, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.04.029.
(http://www.sciencedirect.com/science/article/B6V24-4NYBMBP-4/2/e6bab93ea9e449a25d47cdd709958097)
Abstract:
Cellulose nanofibers were extracted from the agricultural residues, wheat straw and soy hulls, by a chemi-mechanical technique to examine their potential for use as reinforcement fibers in biocomposite applications. The structure of the cellulose nanofibers was investigated by transmission electron microscopy. The wheat straw nanofibers were determined to have diameters in the range of 10-80 nm and lengths of a few thousand nanometers. By comparison, the soy hull nanofibers had diameter 20-120 nm and shorter lengths than the wheat straw nanofibers. Chemical characterization of the wheat straw nanofibers confirmed that the cellulose content was increased from 43% to 84% by an applied alkali and acid treatment. FT-IR spectroscopic analysis of both fibers demonstrated that this chemical treatment also led to partial removal of hemicelluloses and lignin from the structure of the fibers. PXRD results revealed that this resulted in improved crystallinity of the fibers. After mechanical treatments of cryocrushing, disintegration and defibrillation, the thermal properties of the nanofibers were studied by the TGA technique and found to increase dramatically. The degradation temperature of both nanofiber types reached beyond 290 [degree sign]C. This value is reasonably promising for the use of these nanofibers in reinforced-polymer manufacturing.
Keywords: Wheat straw; Soy hulls; Natural fibers; Cellulose nanofiber; Nanofiber characteristics

B. Andarzian, A.M. Bakhshandeh, M. Bannayan, Y. Emam, G. Fathi, K. Alami Saeed, WheatPot: A simple model for spring wheat yield potential using monthly weather data, Biosystems Engineering, Volume 99, Issue 4, April 2008, Pages 487-495, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.12.008.

(http://www.sciencedirect.com/science/article/B6WXV-4RV1JT7-2/2/cc559b9303e9dfbcd8aa78c81d3be4d7)
Abstract:
A simple, deterministic crop growth model was developed to predict the site-specific yield potential of wheat. The model simulates critical developmental stages and dry matter production as a function of temperature and solar radiation. Crop-related outputs of the model include development stages, dry matter production, and grain yield. The model requires inputs of site mean monthly weather data (minimum and maximum temperatures in [degree sign]C), the photosynthetically active radiation (PAR in MJ m-2), and plant characteristics including sowing date, growing degree days (GDD) for the vegetative and reproductive phases, radiation-use efficiency (RUE in g MJ-1), and harvest index (HI). The model was verified using experiments that were carried out in several locations in Khuzestan province in Iran during the 2003-2004 and 2004-2005 growing seasons. Comparisons of the simulated and measured outputs under non-limiting conditions indicated satisfactory performance for predicting anthesis and maturity dates, and fair prediction of dry matter production and grain yield. The root-mean-square errors (RMSE) of yield were 3.5 d, 4 d, 0.65 t ha-1, and 1.69 t ha-1, respectively. The model also proved to be a useful tool for the rough estimation of wheat yield potential at the regional level where there is access only to monthly weather data.

Michael Ayliffe, Ravi Singh, Evans Lagudah, Durable resistance to wheat stem rust needed, Current Opinion in Plant Biology, Volume 11, Issue 2, Genome studies and Molecular Genetics, edited by Juliette de Meaux and Maarten Koornneef / Plant Biotechnology, edited by Andy Greenland and Jan Leach, April 2008, Pages 187-192, ISSN 1369-5266, DOI: 10.1016/j.pbi.2008.02.001.
(http://www.sciencedirect.com/science/article/B6VS4-4S2VG51-2/2/7ebf2da8a320b8f3b3400178d4aca7bb)
Abstract:
The recent outbreak of a new wheat stem rust race capable of parasitizing many commercial wheat cultivars highlights the need for durable disease resistance in crop plants. More advanced breeding approaches using quantitative disease resistance genes and resistance gene pyramids are being used to combat wheat stem rust and other diseases, though widespread adoption of these breeding methodologies is needed to maintain resistance efficacy. Advances in understanding the molecular basis of plant disease resistance at both host and nonhost levels offers further possibilities for stem rust resistance using biotechnological approaches. However, truly durable resistance to wheat stem rust and other phytopathogens seems an unlikely prospect in the face of continually evolving pathogen populations.

Martin M. Acreche, Guillermo Briceno-Felix, Juan A. Martin Sanchez, Gustavo A. Slafer, Physiological bases of genetic gains in Mediterranean bread wheat yield in Spain, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 162-170, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.07.001.
(http://www.sciencedirect.com/science/article/B6T67-4PFDPR4-1/2/8b5bb214d1867126dded94335b31ef17)
Abstract:
Three field experiments comparing bread wheats representing different eras of genetic improvement in the Mediterranean area of Spain (one landrace, seven cultivars released since 1950 and two advanced breeding lines) were carried out at the province of Lleida (Catalonia, north-eastern Spain). Experiments were conducted during the 2004/05, 2005/06 and 2006/07 growing seasons at Gimenells and during 2005/06 at Foradada in order to quantify gains in yield, and in its physiological determinants, during much of the last century. At Gimenells, the first two seasons were conducted under relatively high-yielding backgrounds (Gimenells, irrigated) and in

the last season under moderately stressed conditions (Gimenells, rainfed), while at Foradada the experiment was conducted under a severely stressed low-yielding environment.
For almost all the traits analyzed in this paper, there were only significant differences when cultivars were grown under relatively high-yielding environments. In this conditions, grain yield increased with the year of release of the cultivars from 1940 to the 1970s, with no clear further improvements thereafter. On the other hand, total biomass did not show any association with the year of release of the cultivars. Results showed that, even when breeding was performed under Mediterranean conditions, harvest index was the main attribute responsible for yield improvements. Stem height was linearly and negatively related with harvest index, implying a marked height reduction until the 1970s, with no clear further reductions thereafter.
In general yield was lineally and positively associated with number of grains per m2, while average grain weight did not exhibit any clear trend with the year of release of the cultivars. The increase in number of grains was more associated with that in grains per spike than with differences in spikes per m2. Finally, the increase in number of grains per m2 was associated with both number of grains per unit of spike dry weight at anthesis, or 'fruiting efficiency', and spike dry weight at anthesis.
Keywords: Bread wheat; Genetic gains; Yield components; Mediterranean environment

Edward Dickin, David Wright, The effects of winter waterlogging and summer drought on the growth and yield of winter wheat (Triticum aestivum L.), European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 234-244, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.07.010.
(http://www.sciencedirect.com/science/article/B6T67-4PNF2WY-1/2/c84506fcc9bfc1c830a9dc6114796241)
Abstract:
Winter waterlogging and summer drought may become more prevalent as a result of climate change. Their effects on the growth and yield of winter wheat were investigated. Wheat was grown in lysimeters in an unheated glasshouse, over two seasons. Seed rate was included as an additional factor in the first season, and cultivar in the second. Root growth was investigated in both seasons using mini-rhizotrons. Waterlogging for 44 days at 93 days after sowing in 2002, and 58 days at 64 days after sowing in 2003, decreased grain yield by 20% and 24%, respectively. Drought during grain filling further decreased yields but there was no evidence that winter waterlogged plants were more susceptible to damage from drought the following summer, the effects of the two stresses being additive. Waterlogging decreased the total length, but not the final depth of the root system. Plots with a lower plant density demonstrated a smaller decrease in yield due to waterlogging. There was a significant positive linear relationship between the number of shoots per plant and nodal root axes per plant. There appeared to be a difference between cultivars in root system architecture, and in their response to waterlogging, but these differences were not reflected in grain yield.
Keywords: Waterlogging; Drought; Grain yield; Root growth; Winter wheat

K. Piikki, L. De Temmerman, K. Ojanpera, H. Danielsson, H. Pleijel, The grain quality of spring wheat (Triticum aestivum L.) in relation to elevated ozone uptake and carbon dioxide exposure, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 245-254, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.07.004.
(http://www.sciencedirect.com/science/article/B6T67-4PK8G5V-2/2/2588b837a73a4ece31c72aa5faad9839)
Abstract:
Ozone (O3) and carbon dioxide (CO2) effects on the quality of spring wheat (Triticum aestivum L.) were evaluated. The dataset originated from 13 European open-top chamber experiments, including three countries, 10 years and four cultivars. The O3 exposure significantly reduced the protein yield, even though the grain protein concentration (GPC) was increased and tended to

increase the Zeleny value and the Hagberg falling number. These variables reached values representing enhanced grain maturity after elevated O3 exposure, possibly explained by O3 induced early senescence. The CO2 elevation was demonstrated to increase the protein yield but reduce the GPC and the Zeleny value. Both O3 and CO2 were demonstrated to affect wheat grain yield (GY) but by different means; O3 reduced GY ($P < 0.001$) mainly by limiting the 1000-grain weight, while CO2 enhanced GY ($P < 0.01$) mainly by increasing the number of grains produced per unit ground area. Two earlier used O3 indices, the accumulated stomatal uptake of O3 above a flux threshold of 6 nmol m-2 s-1 (AFst6), and the accumulated O3 dose above a concentration threshold of 40 nmol mol-1 (AOT40), were employed in parallel in the derivation of dose-response relationships with all investigated variables (GY, number of grains per unit area, 1000-grain weight, protein yield, GPC, Zeleny value, wet gluten, dry gluten, starch concentration, Hagberg falling number, specific weight and water quotient). The uptake-based index (AFst6) tended to better explain variation in the response variables and yielded dose-response regressions of a higher statistical quality than did the external-dose index (AOT40). Based on an independent subset of the present data, the validities of (1) a negative linear relationship between GPC and GY and (2) a positive but decelerating relationship between protein yield and GY including both O3 and CO2 treatments were tested and confirmed.
Keywords: Carbon dioxide; Grain quality; Ozone; Protein; Triticum aestivum L.; Wheat

Fernando Salvagiotti, Daniel J. Miralles, Radiation interception, biomass production and grain yield as affected by the interaction of nitrogen and sulfur fertilization in wheat, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 282-290, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.08.002.
(http://www.sciencedirect.com/science/article/B6T67-4PT7G1H-2/2/eb7a66108e28ca45723c6df33fe2dbe2)
Abstract:
Grain yield response to sulfur (S) fertilization in wheat (Triticum aestivum L.) has been reported several times. However, the effects of S and its interaction with nitrogen (N) on the physiological attributes that determine biomass and grain yield at field scale have not been deeply studied. This research was conducted to determine the influence of N, S and their interaction on grain yield (GY), crop growth rate (CGR), leaf area index (LAI), intercepted radiation (IPAR) and radiation use efficiency (RUE) in wheat. Field experiments were conducted in 2000 and 2001 in the Argentinean Pampas using a bread-wheat genotype grown under different combinations of N and S fertilizer rates. Nitrogen and sulfur increased biomass at anthesis, with increments of 62 and 13% in LAI, and 20 and 7% in IPAR, due to N and S addition, respectively. However, the effect of S on LAI and IPAR were higher as N fertilizer rate increased. Nitrogen addition increased biomass at physiological maturity from 7 to 19% at the lower S rate, but at the highest S supply, these increments ranged from 20 to 35%, evidencing a clear interaction between both nutrients. This increase in biomass was sustained by a large fertile spike population that increased grain number per unit area and consequently, grain yield. Harvest index was not affected by the different N and S fertilizer rates. Sulfur effects were evident between anthesis and physiological maturity, increasing CGR by 41%. Plants under low S levels produced ca. 10.8 kg of grain per unit of fertilizer N; however, S addition increased this efficiency by 51%. Therefore, the positive interaction between N and S was reflected in a higher N use efficiency when the crop had no S deficiency.
Keywords: Sulfur; Nitrogen; Wheat; Grain yield; IPAR; Leaf area index; Nitrogen use efficiency

Cedric Naud, David Makowski, Marie-Helene Jeuffroy, Is it useful to combine measurements taken during the growing season with a dynamic model to predict the nitrogen status of winter wheat?, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 291-300, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.08.005.

(http://www.sciencedirect.com/science/article/B6T67-4PXNHVN-1/2/2b10dedd65db0b2cb9fd3d1b7164e3d1)
Abstract:
Dynamic crop models can evaluate the effects of weather, soil and farming practices and the interactions between these three sources of variability on production and the environment. However, because of uncertainty about the system equations, the parameters and the input variables of these models, their predictions are imprecise. The objective of this article is to evaluate the usefulness of measurements obtained during the growing season to improve the precision of the values of the nitrogen nutrition index predicted by a dynamic model of winter wheat crop. A Bayesian method, called 'interacting particle filter' was used to correct three state variables of the model from biomass and nitrogen uptake measurements obtained between the end of winter and flowering. The value of this approach was assessed using 16 experiments carried out between 1995 and 2002. The results show that when they were used alone, the biomass measurements did not reduce the prediction errors of the model. On the other hand, the use of measurements of nitrogen uptake alone or in combination with the biomass measurements reduced the values of root mean square error by 32% in predicting the nitrogen nutrition index. The correction of the model at a single date appeared to be sufficient to improve the quality of the predictions so long as this date was late and close to the prediction date. The results also show that the use of less precise measurements than those made on our experiments would still be worthwhile in practice provided that the measurement error does not exceed 15%.
Keywords: Bayesian method; Data assimilation; Dynamic crop model; Interacting particle filter; Nitrogen nutrition index

Roman A. Serrago, Daniel J. Miralles, Gustavo A. Slafer, Floret fertility in wheat as affected by photoperiod during stem elongation and removal of spikelets at booting, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 301-308, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.08.004.
(http://www.sciencedirect.com/science/article/B6T67-4R00FW1-1/2/ac170c2952d0bfb8aafda18ad9d19b73)
Abstract:
Spike growth during the stem elongation phase is critical for the establishment of the number of fertile florets (FF). A longer period of spike growth would lead to an increased number of FF and grains in wheat. The aim of this study was: (i) to analyze in three different commercial cultivars the impact of a photoperiod extension (NP + 10) during the stem elongation phase on the number of FF and (ii) to determine whether the photoperiod extension effect might be reversed by increasing the availability of assimilates by a direct modification of the source/sink ratio at booting. The number of FF per spike was reduced by extended photoperiod in the experiment sown in an optimum date, though no differences were observed when sown much later, probably due to the poor environmental conditions of a spring sowing. The detrimental effect of lengthening the photoperiod on the number of FF per spike was reversed by trimming the spike at booting in two of the three cultivars analyzed. This reversion, together with the effect of photoperiod extension on FF associated with similar effects on spike growth, may be considered as a confirmation that, at least in part, the detrimental effects of photoperiod extension on FF would be mediated by changes in assimilate supply to the developing florets. No differences were observed between photoperiod treatments on the onset of rapid spike growth; however, extended photoperiod reduced the duration of spike growth phase without differences in the maximum rate of spike growth in two of the three cultivars. Although a positive association was found between the number of FF and spike dry weight at anthesis, differences among cultivars were observed in this relationship, suggesting different carbohydrates partitioning (i.e., FF per unit of spike weight) among them.
Keywords: Floret development; Photoperiod; Fertile floret; Wheat (Triticum aestivum L.)

Anne Kari Bergjord, Helge Bonesmo, Arne Oddvar Skjelvag, Modelling the course of frost tolerance in winter wheat: I. Model development, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 321-330, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.10.002.
(http://www.sciencedirect.com/science/article/B6T67-4R71DWS-1/2/47c70f8043b40f314005657fce0a7603)
Abstract:
A Canadian model that simulates the course of frost tolerance in winter wheat under continental climatic conditions was adopted and further developed for use in an oceanic climate. Experiments with two cultivars were conducted during two winters in Central Norway. All plants were hardened at the same location. After hardening, in mid November, they were distributed to three locations with contrasting winter climates. Plants were sampled several times during autumn and winter and tested for frost tolerance, expressed as LT50 (the temperature at which 50% of the plants were killed). Results from the experiment were used in parameterization and cross validation of the new model, called FROSTOL, which simulates LT50 on a daily basis from sowing onwards. Frost tolerance increases by hardening and decreases by dehardening and stress, the latter caused by either low temperatures, or by conditions where the soil is largely unfrozen and simultaneously covered with snow. The functional relationships of the model are all driven by soil temperature at 2 cm depth. One of them is in addition affected by snow cover depth, and two of them are conditioned by stage of vernalization. Altogether five coefficients allotted to four of the functional relationships produced a good agreement (R2 = 0.84) between measured and modelled values of LT50. A cross validation of the model indicated that the parameters were satisfactorily insensitive to variation in winter weather.
Keywords: Triticum aestivum L.; Cold hardiness; Temperature; Snow cover; Vernalization; Winter survival

Raffaele Casa, Annamaria Castrignano, Analysis of spatial relationships between soil and crop variables in a durum wheat field using a multivariate geostatistical approach, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 331-342, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.10.001.
(http://www.sciencedirect.com/science/article/B6T67-4R70RGP-1/2/d9e9a41bfc06339150ab3377c9c70a0b)
Abstract:
For important crop and soil properties, temporal variability is generally higher than spatial variability and the definition of stable low- and high-yield potential zones, for site-specific management, is very difficult.
In this study the application of a multivariate geostatistical methodology, factorial kriging analysis (FKA), is proposed for this purpose, allowing simultaneous processing of several layers of information on spatially and temporally variable crop and soil properties.
The methodology was applied to measurements carried out in a durum wheat field in Viterbo (Central Italy). Soil properties, plant development and biomass, LAI and normalized difference vegetation index (NDVI) were measured following a grid sampling scheme. Yield components were assessed at the same points at harvest. Coregionalization analysis was carried out and FKA was applied in order to clarify the spatial relationships between the different variables acting at the different scales. The application of FKA to soil, plant and yield properties allowed to discriminate between variables with a different rate of variation, pointing out at those more stable which could be used as a basis to site-specific management.
Keywords: Geostatistics; Durum wheat; Yield components; Factor kriging analysis

S. Delin, A. Nyberg, B. Linden, M. Ferm, G. Torstensson, C. Lerenius, I. Gruvaeus, Impact of crop protection on nitrogen utilisation and losses in winter wheat production, European Journal of

Agronomy, Volume 28, Issue 3, April 2008, Pages 361-370, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.002.
(http://www.sciencedirect.com/science/article/B6T67-4RCW5B9-1/2/c793e49b0a1e441796ee4ae8596d1aac)
Abstract:
A 3-year (2002-2004) field experiment investigated the effects of disease and insect attack on nitrogen dynamics and losses during cultivation of winter wheat. Three treatments providing different degrees of crop protection were studied on a silty clay soil in south-western Sweden, in three consecutive wheat crops that were continually inspected for pests and diseases. A field with a history of cereal-dominated crop sequences was chosen to increase the possibilities of disease incidence. Nitrogen leaching was measured directly in tile-drained field plots equipped with individual collectors for drainage water. Ammonia emissions from the wheat stands were measured in one replicate plot during the first two growing seasons. Nitrogen accumulation and distribution in plants were investigated by sampling the crop at different stages of development and analysing different plant parts for total nitrogen content. Soil mineral nitrogen was determined within the 0-90 cm soil layer in early spring, at yellow ripeness and in November. Grain yield and grain nitrogen use efficiency were always significantly larger and mean residual soil mineral nitrogen levels (at maturity and in November) significantly lower in treatments with crop protection. At maturity, total N concentration in straw was significantly higher in the treatment without crop protection. Mean nitrogen leaching tended to be greater in the treatment without crop protection but the differences were not statistically significant. Ammonia emissions of wheat were very small (0.1-0.3 kg N ha-1) in all treatments and could thus be neglected. The better N use efficiency with crop protection was probably due to a combination of larger N amounts in above-ground plant parts and better N translocation to grain when diseases were reduced.
Keywords: Cereal; Disease; Nitrogen use efficiency; Nitrogen leaching; Ammonia emission; Fungicide; Pesticide

W. Feng, X. Yao, Y. Zhu, Y.C. Tian, W.X. Cao, Monitoring leaf nitrogen status with hyperspectral reflectance in wheat, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 394-404, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.005.
(http://www.sciencedirect.com/science/article/B6T67-4RDBFCC-1/2/5178b2413f758d307da1503efb17bfa6)
Abstract:
The objectives of this study were to determine the relationships of leaf nitrogen concentration on a leaf dry weight basis (LNC) and leaf nitrogen accumulation per unit soil area (LNA) to ground-based canopy hyperspectral reflectance and derivative parameters, and to establish quantitative models for real-time monitoring of leaf N status with key hyperspectral bands and estimation indices in wheat (Triticum aestivum L.). Three field experiments were conducted with different N application rates and wheat cultivars across three growing seasons, and time-course measurements were taken on canopy hyperspectral reflectance, LNC and leaf dry weights under the various treatments. The results showed that LNC and LNA in wheat increased with increasing nitrogen fertilization rates, and changes in canopy hyperspectral reflectance under varied N rates were all highly significant, with consistent patterns across the different cultivars and years. The sensitive spectral bands occurred mostly within visible light and near infrared regions, and a close correlation existed between red-edge district and LNC or LNA. An integrated linear regression equation of LNC to spectral parameters REIPIe and [lambda]o well described the dynamic pattern of LNC changes in wheat, giving the determination of coefficients (R2) as 0.831 and 0.834, and the standard errors (SE) as 0.405 and 0.403, respectively. The hyperspectral parameters MSS-SARVI and FD742 were linearly related to LNA, with R2 as 0.861 and 0.873, and SE as 1.11 and 1.06, respectively. When independent data were used to test the derived equations, the R2 values between the measured and estimated LNC from spectral parameters REIPIe and mND705 were

0.752 and 0.695, with the average relative errors (RE) as 14.4% and 16.5%, respectively. For spectral parameters FD742 and SDr/SDb, the R2 values between the measured and estimated LNA were 0.872 and 0.828, with RE as 14.1% and 15.2%, respectively. The high fit between the measured and estimated values indicated that the present models based on hyperspectral reflectance could be used for reliable estimation of the leaf N status in wheat plant under different growing conditions.
Keywords: Winter wheat (Triticum aestivum L.); Hyperspectral remote sensing; Monitoring model

S. Rieger, W. Richner, B. Streit, E. Frossard, M. Liedgens, Growth, yield, and yield components of winter wheat and the effects of tillage intensity, preceding crops, and N fertilisation, European Journal of Agronomy, Volume 28, Issue 3, April 2008, Pages 405-411, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.11.006.
(http://www.sciencedirect.com/science/article/B6T67-4RFKKR6-1/2/516b03866c5f7114e2848e426cfd7731)
Abstract:
Conservation tillage is widely practiced in semi-arid climates, mostly in small grain crop rotations. It is implemented to a much lesser extent in cool and humid climates of Europe, mainly due to a lack of knowledge about agronomic and ecological impacts. This study was conducted in light- to medium-textured soils in the Swiss midlands from 1995 to 2000. The aim was to determine whether tillage intensity impacted wheat yield and measure the effects of the preceding crop and the level of N fertilisation. Conventional tillage (CT) with ploughing, minimum tillage (MT) with a chisel, and no-tillage (NT) were studied in the following crop rotation: winter wheat (Triticum aestivum L.)-oilseed rape (Brassica napus L.)-winter wheat-maize (Zea mays L.). Winter wheat was grown at either 0 kg N ha-1 (N0) or at the recommended N supply (N1). Harvest residues of all the crops were left on the field. In the early stages wheat development under NT was slightly slower than under CT and MT, but at maturity the shoot biomass was 2% higher under NT than under the other tillages. The grain yield decreased by 3% under NT compared to CT and MT, mainly due to fewer ears per area and a significantly lower thousand-kernel weight. Wheat planted after oilseed rape had significantly higher shoot biomass and grain yield than wheat planted after maize. At the beginning of the vegetation season there were small but significant differences in the soil mineral N content among the tillage treatments. Accordingly, the level of N fertiliser applied was adjusted to ensure similar N availability in all tillage systems. The relative reduction in grain yield under NT compared to CT and MT was similar with and without N fertilisation. Thus, N availability was not a limiting factor for the yield of NT wheat in this study.
Keywords: Winter wheat; Tillage intensity; Yield; Crop rotation

Kingsley K. Agyare, Youling L. Xiong, Kwaku Addo, Influence of salt and pH on the solubility and structural characteristics of transglutaminase-treated wheat gluten hydrolysate, Food Chemistry, Volume 107, Issue 3, 1 April 2008, Pages 1131-1137, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.039.
(http://www.sciencedirect.com/science/article/B6T6R-4PRYG84-3/2/781513deb3f9b591af28013717483bca)
Abstract:
Hydrolyzed wheat gluten (GH, 77-85% protein) was prepared by limited chymotrypsin digestion at 37 [degree sign]C for 4 h (degree of hydrolysis = 6.4%) and 15 h (degree of hydrolysis = 10.3%). Microbial transglutaminase (MTGase) treatment (55 [degree sign]C for 1 h, or 5 [degree sign]C for 18 h) effect on the solubility and structural characteristics of GH was examined under selected food processing conditions (pH 4.0-7.0, 0-0.6 M NaCl). The MTGase treatment increased solubility of GH by 3-29-fold ($P < 0.05$) within pH 4.0-7.0. Addition of 0.6 M NaCl or changing the conditions of MTGase incubation did not significantly alter solubility characteristics of GH. The MTGase treatment decreased surface hydrophobicity, and increased carboxyl groups in GH, suggesting

cross-linking and deamidation. Fluorescence and UV spectra attributed the improved GH solubility to MTGase-induced polar environment, and partial masking of some nonpolar aromatic amino acids possibly due to high-molecular-weight polypeptides formed.
Keywords: Hydrolyzed wheat gluten; Structural properties; Solubility; Microbial transglutaminase

G.H. Gangadharappa, R. Ramakrishna, P. Prabhasankar, Chemical and scanning electron microscopic studies of wheat whole-meal and its streams from roller flour mill, Journal of Food Engineering, Volume 85, Issue 3, April 2008, Pages 366-371, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.07.018.
(http://www.sciencedirect.com/science/article/B6T8J-4PBDPT2-4/2/bdc365f5905f1885697c4482d5a5d569)
Abstract:
Wheat whole-meal (WWM) flour is commonly used in Asian breads such as roti and chapati. WWM has higher damaged starch and ash content. Unlike wheat flour, WWM contains the some amount of bran. This is due to during the milling process of WWM; larger bran particles are preferably sifted out, leaving smaller bran particles. Chemical and microstructure changes occurring during processing of wheat into WWM were evaluated by analyzing mill stream (C4, C5 and WWM) samples from a pilot mill. The ash content was 0.43%, 0.90% and 0.75%; while damaged starch content was 8.30%, 10.70% and 10.31% in C4, C5 and WWM streams, respectively. Ash and damaged starch contents were higher in C5 stream as compared to the C4 stream. However, both these parameters were lower in the case of WWM stream, which was a homogenized mixture of C4, and C5 streams. A similar trend was observed for the protein contents of C4, C5 and WWM streams. Scanning electron microscopy (SEM) studies showed A type (lenticular shaped) starch granules without much structural deformation in the C4 stream. On the other hand, deformed A-type and intact B-type (spherical shaped) starch granules were seen in the C5 stream. A WWM stream micrograph revealed a combination of deformed and intact starch granules embedded in the protein matrix. Hence, the present study indicated that there is a relationship between chemical characteristics and microstructure of WWM.
Keywords: Wheat whole meal; SEM; Millstream; Wheat; Damaged starch; Micrograph

Zhenghui Liu, Haiyan Wang, Xiu-E Wang, Hongyan Xu, Derong Gao, Guoping Zhang, Peidu Chen, Dajun Liu, Effect of wheat pearling on flour phytase activity, phytic acid, iron, and zinc content, LWT - Food Science and Technology, Volume 41, Issue 3, April 2008, Pages 521-527, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.04.001.
(http://www.sciencedirect.com/science/article/B6WMV-4NFXDRG-1/2/6100da0949eeeb459d1e4a937a6e5718)
Abstract:
This study examined the effect of wheat pearling on distribution of phytase, phytic acid, iron, and zinc in wheat fractions derived from pearling and roller milling. Grains of four wheat varieties were first pearled by a rice polisher at four levels, i.e. non-pearling (unpearled), 5% pearling (~5% of the original sample weight was pearled), 10% pearling, and 15% pearling, to produce pearling fines (PF) and pearled grains. The unpearled and pearled grains were then milled through a Buhler MLU-202 laboratory mill, producing eight milling fractions. Results showed that pearling had a positive effect on flour yield, which may be attributed to the reduced yield of coarse bran and the improved yield of first and second reduction fractions. PF had high levels of all the four components, indicating that they could be a valuable source of iron and zinc. In addition, the differences between flours from the pearled and unpearled wheat were slight in terms of these four components.
Keywords: Phytase; Phytic acid; Iron; Zinc; Pearling; Wheat

M. Ajmal Khan, M. Sarwar, M.S. Khan, M.S. Rehman, M. Nisa, W.S. Lee, H.S. Kim, Use of additives to capture nitrogen in ammoniated wheat straw: Intake, ruminal parameters, digestibility and nitrogen utilization in buffaloes, Livestock Science, Volume 114, Issues 2-3, April 2008, Pages 347-353, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.10.007.
(http://www.sciencedirect.com/science/article/B7XNX-4R5G6SX-1/2/20aeed33d3e525906c22b044c24a4f69)
Abstract:
This study examined the influence of urea treated wheat straw (UTWS) ensiled with additives on feed intake, digestibility, ruminal characteristics and N utilization in Nili-Ravi buffalo bulls (Babulus bubalis) fed ad libitum. Wheat straw was treated on large scale with 4% urea at a 50% moisture level. The UTWS was ensiled with 6% CSL, 6% acidified molasses, 2% acetic acid and 2% formic acid on DM basis in four different cemented trench silos for 15 days. Four diets each having 50% dry matter (DM) from UTWS ensiled with acetic acid (AD), formic acid (FD), acidified molasses (MD) or corn steep liquor (CD) and 50% DM from concentrate mixture were fed to ruminally cannulated bulls in a 4 x 4 Latin square design. Ruminal total VFA, acetate, cellulolytic ruminal bacterial count, DM and NDF degradability were significantly higher with MD and CD diets compared with AD and FD diets. Intake of different feed fractions was higher in bulls fed MD and CD diets. Total tract apparent digestibility of nutrients was similar across all treatments. Nitrogen retention was higher in bulls fed MD and CD diets than those fed AD and FD diets. Ensiling UTWS with fermentable carbohydrates sources having low pH compared to organic acids increased the N fixation in the matrix of cell wall fiber thus slowing its release at ruminal level that probably enhanced the N synchronization with carbon skeleton (fiber fermentation) and this consequently improved the N utilization.
Keywords: Ammoniation; Digestibility; Wheat straw; Nitrogen balance; Buffalo

S.K. Jalota, G.S. Buttar, Anil Sood, G.B.S. Chahal, S.S. Ray, S. Panigrahy, Effects of sowing date, tillage and residue management on productivity of cotton (Gossypium hirsutum L.)-wheat (Triticum aestivum L.) system in northwest India, Soil and Tillage Research, Volume 99, Issue 1, April 2008, Pages 76-83, ISSN 0167-1987, DOI: 10.1016/j.still.2008.01.005.
(http://www.sciencedirect.com/science/article/B6TC6-4S094V0-1/2/65ff9a0ba7c9332bb37b65042af23cde)
Abstract:
In southwestern region of Punjab in north India, sowing dates of cotton crop in cotton (Gossypium hirsutum L.)-wheat (Triticum aestivum L.) system are staggered from last week of April to mid of May depending upon the surface water supply from canal as ground water is not fit for irrigation. Further, farmers practice intensive cultivation for seedbed preparation and burning of wheat straw before sowing of cotton crop. With the present farmers' practices, yields have become static and system has become non-profitable. Field experiments were conducted on Entisols for two rotations of cotton-wheat system during the years of 2004-2005 and 2005-2006 in split plot design to study the direct and interactive effects of date of sowing and tillage-plus-wheat residue management practices on growth and yield of cotton and wheat and to increase the profitability by reducing the tillage operations, which costs about 50% of the sowing cost. The pooled analysis showed that in cotton crop, there was a significant interaction between year x dates of sowing. Among different tillage-plus-wheat residue management practices yields were 23-39% higher in tillage treatments than minimum-tillage. In wheat, grain yield in tillage treatments were at par. Water productivity amongst the tillage treatments in cotton was 19-27% less in minimum tillage than others tillage treatments. Similar trend was found in wheat crop. Remunerability of the cotton-wheat system was more with a combination of reduced tillage in cotton and minimum tillage in wheat than conventional tillage.
Keywords: Cotton-wheat; Sowing time; Tillage; Crop residue; Entisols; Punjab

J.J. Appelgryn, B. Visser, Evidence for volatile signalling between leaf-rust infected and uninfected wheat, South African Journal of Botany, Volume 74, Issue 2, April 2008, Page 360, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.01.027.
(http://www.sciencedirect.com/science/article/B7XN9-4S807WN-J/2/bdcb3ec00147b619606040ad2f1a8fd5)

C.H.J. Van der Merwe, B. Visser, J.C. Pretorius, A.J. Van der Westhuizen, Evaluation of gene expression in wheat upon treatment with a novel plant activator, South African Journal of Botany, Volume 74, Issue 2, April 2008, Page 380, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.01.116.
(http://www.sciencedirect.com/science/article/B7XN9-4S807WN-3R/2/b6b90a3ebd6d073e90c16ebb1895d239)

M.A. Kgatisho, L. Mohase, A.J. Van der Westhuizen, Biochemical components of Dn-1 and Dn-5 resistance to a new Russian wheat aphid biotype, South African Journal of Botany, Volume 74, Issue 2, April 2008, Page 388, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.01.148.
(http://www.sciencedirect.com/science/article/B7XN9-4S807WN-4W/2/1fc26b4d7323802d3a87a6a30e3bdd65)

S.A. Saheed, L. Liu, L. Jonsson, C.E.J. Botha, Erratum to 'Xylem - as well as phloem - sustains severe damage due to feeding by the Russian wheat aphid' [South African Journal of Botany 73(2007)593-599], South African Journal of Botany, Volume 74, Issue 2, April 2008, Page 393, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.11.010.
(http://www.sciencedirect.com/science/article/B7XN9-4RN48MP-1/2/4f25d1a620c56a1d850b66b487edcb47)

Maria Vardakou, Carmen Nueno Palop, Paul Christakopoulos, Craig B. Faulds, Michael A. Gasson, Arjan Narbad, Evaluation of the prebiotic properties of wheat arabinoxylan fractions and induction of hydrolase activity in gut microflora, International Journal of Food Microbiology, Volume 123, Issues 1-2, 31 March 2008, Pages 166-170, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.11.007.
(http://www.sciencedirect.com/science/article/B6T7K-4R4665C-1/2/a5ca279a4ec3963ef031809ee4a93c26)
Abstract:
Dietary supplementation with prebiotics may result in the stimulation of the growth of beneficial bacteria such as lactobacilli and bifidobacteria in the human gastrointestinal tract. The effect of water-unextractable arabinoxylans (WU-AX) derived from wheat on the modulation of gut bacterial composition was investigated using a mixed culture fermentation system. A prebiotic index (PI) score of 2.03 was obtained after addition of 1% (w/v) WU-AX to a pH-controlled stirred anaerobic fermentation vessel. Pretreatment of the WU-AX with endo-[beta]-1,4-xylanase resulted in significantly higher PI value (3.48) indicating that pretreatment provided oligomers that were better utilised by the gut bacteria. The extracellular hydrolytic enzymes xylanase and ferulic acid esterase are both required for bacterial metabolism of WU-AX and both activities were present in supernatants derived from the mixed batch cultures. Addition of the WU-AX substrates to the batch cultures produced several fold increases of bacterial synthesis of both enzymes, and these increases were greater when the WU-AX substrate was pretreated with xylanase.
Keywords: Arabinoxylan; Prebiotic; Xylanase; Ferulic acid esterase; Gut bacteria

L. Zhang, W. van der Werf, S. Zhang, B. Li, J.H.J. Spiertz, Temperature-mediated developmental delay may limit yield of cotton in relay intercrops with wheat, Field Crops Research, Volume 106, Issue 3, 20 March 2008, Pages 258-268, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.12.010.

(http://www.sciencedirect.com/science/article/B6T6M-4RW4JMT-2/2/88df977da52c03e730762e5a93ff4270)

Abstract:
In the Yellow River valley of China, more then 1.4 million ha of cotton are grown as relay intercrops with wheat. Cotton is sown in April when winter wheat is already in the reproductive phase; thus, a wheat crop with a fully developed canopy will compete for resources with cotton plants in the seedling stage. Yields of cotton are lower in relay intercropping systems than in a monocrop, but the aggregate yield of the cotton-wheat system is greater than of monocultures of the component crops. We study the hypothesis that the lower yield of intercropped cotton is a consequence of delayed development and fruit formation of the cotton as a result of a lowered temperature experienced by seedlings in the intercrop, compared to monoculture, due to shading by wheat.

Field experiments were conducted in 3 subsequent years in Anyang, Henan, China. Wheat and cotton were grown as monocrops and as strip intercrops. Four intercrop layouts were investigated, differing in number of wheat and cotton rows in a strip: 3:1, 3:2, 4:2 and 6:2. Developmental stage of the cotton was recorded at regular intervals during the growing cycle while air and soil temperatures were measured with thermocouples at several soil depths and cross-row positions in the canopy.

Temperatures at and near the soil surface were substantially (on average 3 [degree sign]C) lower in intercrops than in monoculture, especially on sunny days, thus lowering the rate of temperature accumulation of cotton seedlings in intercrops, compared to those in monocultures. Cotton in intercrops showed a pronounced delay in early development, e.g. attainment of the squaring stage, compared to monocrops. The period from planting to first square, expressed in thermal time (TT), lasted 531 [degree sign]C d in cotton monoculture and 638-670 [degree sign]C d in intercrops. There were no significant differences in developmental delay between different intercropping patterns. The formation of fruits in intercrops lagged behind by 9-15 d, compared to monoculture, while the number of fruit nodes per plant, averaged over 3 years, was reduced from 30.3 in monocrops to 19.9 in intercrops. The later formation of fruits thus results in a reduction in fruit number and also in a reduction in average age of the fruits, limiting their growth and the sink capacity of the plant as a whole.

A plastic film cover increased temperatures in a 3:2 intercrop at the soil surface by 1.9 [degree sign]C and at 5 cm soil depth by 2.7 [degree sign]C, thus restoring the thermal conditions to levels common in monoculture. A cover with straw, however, decreased the temperature at the soil surface by 2.9 [degree sign]C and at 5 cm depth by 1.3 [degree sign]C.

We conclude that the thermal climate in wheat-cotton intercrops is suboptimal for the cotton seedlings. The resulting delay in development of cotton culminates in a lower reproductive capacity and sink capacity. In combination with a reduced source strength, due to later and reduced canopy development in intercropped cotton, these effects result in a lint yield that is substantially lower than in monoculture cotton. This constraint can be ameliorated by measures that improve light capture and heat loading by the cotton, e.g. planting a semi-dwarf wheat or cultivation of cotton on ridges, or application of a plastic film mulch in the cotton seed bed. Early maturing cotton cultivars are at an advantage in intercropping systems.

Keywords: Air temperature; Soil temperature; Soil cover; Thermal time; Physiological time; Phenology

T.J. Purakayastha, L. Rudrappa, D. Singh, A. Swarup, S. Bhadraray, Long-term impact of fertilizers on soil organic carbon pools and sequestration rates in maize-wheat-cowpea cropping system, Geoderma, Volume 144, Issues 1-2, Antarctic Soils and Soil Forming Processes in a Changing Environment, 15 March 2008, Pages 370-378, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.12.006.

(http://www.sciencedirect.com/science/article/B6V67-4RKDHV8-3/2/74a0322f72b384f0f22c6019e81fc961)
Abstract:
We assessed the impact of long-term manuring and fertilization on changes in different SOC fractions over ten years period (1994-2003) in a Typic Haplustept under intensive cropping with maize (Zea mays L.) -- wheat (Triticum aestivum L.) -- cowpea (Vigna unguiculata) in semi-arid, sub-tropical India. The application of graded doses of NPK from 50% (130 kg N, 35 kg P and 41.5 kg K ha- 1) to 150% (390 kg N, 105 kg P and 124 kg K ha- 1) in the cropping system significantly enhanced SOC, particulate organic C (POC) and KMnO4 oxidizable C (KMnO4-C) fractions in soil. The increase in these C fractions was greater when farmyard manure (FYM) was applied conjointly with 100% NPK (260 kg N, 70 kg P and 83 kg K ha- 1). This treatment showed highest amount of SOC (58.3 Mg C ha- 1 in 1994 and 72.1 Mg C ha- 1 in 2003), POC (5.30 Mg C ha- 1 in 1994 and 6.33 Mg C ha- 1 in 2003) and KMnO4-C (10.05 Mg C ha- 1 in 1994 and 11.2 Mg C ha- 1 in 2003) in 0-45 cm soil depth. The C sequestration rate in SOC calculated over ten year period (1994-2003) was highest with 100% NPK + FYM (997 kg C ha- 1 yr- 1) followed by the 150% NPK (553 kg C ha- 1 yr- 1). It was estimated that 17.1 to 34.0% of the gross C input over ten year period contributed towards the increase in SOC content, while C sequestration efficiency (CSE) in POC (varied between 1.28 and 2.58%) was lower than KMnO4-C (varied between 1.42 and 3.72%). The CSE was highest in 150% NPK treatment, while 100% NPK + FYM showed the lowest CSE. By applying the values of humification constant (h) and decay constant (k) in Jenkinson's equation, it is possible to predict SOC level in the year 2003 and the C inputs required to maintain the SOC level in the year 1994 (AE) were calculated from Jenkinson's equation. The low k value in native SOC was responsible for lower requirements of C input required to maintain SOC in equilibrium. Thus increase in SOC concentration under long-term maize-wheat-cowpea cropping was due to the fact that annual C input by the system was higher than AE. In semi-arid sub-tropical India, continuous adoption of 100% NPK + FYM treatment in maize-wheat-cowpea cropping system might sequester 1.83 Tg C yr- 1 which corresponds to about 1% of the fossil fuel emissions by India.
Keywords: Carbon sequestration; Farmyard manure; Long-term fertilizer experiment; Microbial biomass C, NPK fertilizer; Particulate organic C; Root biomass; Soil organic C

Nobuyuki Mizuno, Atsushi Sugie, Fuminori Kobayashi, Shigeo Takumi, Mitochondrial alternative pathway is associated with development of freezing tolerance in common wheat, Journal of Plant Physiology, Volume 165, Issue 4, 13 March 2008, Pages 462-467, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.04.004.
(http://www.sciencedirect.com/science/article/B7GJ7-4PK89T9-5/2/7d737047eeaf4834a0dc15caa6c8e277)
Abstract: Summary
Cold acclimation is an adaptive process for acquiring cold/freezing tolerance in wheat. To clarify the cultivar difference of freezing tolerance, we compared mitochondrial respiration activity and the expression profile of alternative oxidase (AOX) genes under low-temperature conditions using two common wheat cultivars differing in freezing tolerance. During cold acclimation, the respiration capacity of the alternative pathway significantly increased in a freezing-tolerant cultivar compared with a freezing-sensitive cultivar. More abundant accumulation of the AOX and uncoupling protein gene transcripts was also observed under the low-temperature conditions in the tolerant cultivar than in the sensitive cultivar. These results suggest that the mitochondrial alternative pathway might be partly associated with the cold acclimation and freezing tolerance in wheat.
Keywords: Alternative oxidase; Alternative pathway; Cold acclimation; Low temperature; Triticum aestivum L.

Pham Van Hung, Tomoko Maeda, Di Miskelly, Rie Tsumori, Naofumi Morita, Physicochemical characteristics and fine structure of high-amylose wheat starches isolated from Australian wheat cultivars, Carbohydrate Polymers, Volume 71, Issue 4, 7 March 2008, Pages 656-663, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.07.015.
(http://www.sciencedirect.com/science/article/B6TFD-4P8SJ9S-1/2/a0ca5ab7e0697b7f447619a2508eb09e)
Abstract:
High-amylose starch is a source of resistant starch (RS) which have great impact on human health like dietary fiber. Nowadays, high-amylose wheat has been produced by genetic backcrossing, which enhances apparent amylose content and generates altered amylopectin. In this study, the high-amylose wheat starches isolated from various high-amylose wheat cultivars grown in Australia were characterized for understanding their physicochemical properties and fine structure of starch. The physicochemical characteristics of the high-amylose wheat starches are significantly different among the cultivars. Amylose contents of these cultivars were in a range of 28.0-36.9%, which is significantly higher than that of the normal wheat starch (25.6%). The high-amylose wheat starches also had higher blue value but lower [lambda]max than the normal wheat starch. Gelatinization temperature of the high-amylose wheat starches is higher than that of the normal wheat starch but transition enthalpy is lower. X-ray diffraction showed that the high-amylose wheat starch had C-type crystals close to A-type crystal. Pasting properties of the high-amylose wheat starches were varying depending on the cultivars. However, almost high-amylose wheat starches had lower peak and final viscosities and higher setback viscosity than did the normal wheat starch. Fine structure of amylose and amylopectin was different among the high-amylose wheat cultivars and related to the physicochemical properties of starch. These results help to understand well the characteristics of the high-amylose wheat starches before application for food processing.
Keywords: High-amylose wheat; Starch structure; Amylose content; Physicochemical property

Li-Ping XING, Hua-Zhong WANG, Zheng-Ning JIANG, Jin-Long NI, Ai-Zhong CAO, Ling YU, Pei-Du CHEN, Transformation of Wheat Thaumatin-Like Protein Gene and Analysis of Reactions to Powdery Mildew and Fusarium Head Blight in Transgenic Plants, Acta Agronomica Sinica, Volume 34, Issue 3, March 2008, Pages 349-354, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60014-0.
(http://www.sciencedirect.com/science/article/B94TW-4T5JDPF-1/2/14ca25a0cdcb8f36f4369a7aa57df7ad)
Abstract:
A thaumatin-like protein gene, Ta-Tlp, was cloned from wheat in previous studies, which was expressed in a high level in wheat (Triticum aestivum L.) 6VS/6AL translocation line with high resistance to powdery mildew (Erysiphe graminis f.sp. tritici Em. Marchal.), implying its close relation to the resistance of the disease. To further understand the gene's function, Ta-Tlp was constructed into an expression vector driven by the strong ubi promoter. The vector pAHC-TlP constructed was transformed into immature embryo-derived calli of common wheat cultivar Yangmai 158 through particle bombardment. After two rounds of herbicide bialaphos selection and regeneration, herbicide-resistance plants were obtained. The Ta-Tlp proved to be integrated into the wheat genome and was expressed in T1 and T2 generations by PCR, Southern blot, and RT-PCR analysis. The transgenic plants of T0, T1, and T2 generations were inoculated by E. graminis and Fusarium graminearum for resistance identification. All plants of T0, T1, and T2 generations were resistant to wheat powdery mildew by delaying disease development, but no distinct resistance to Fusarium head blight.
Keywords: wheat thaumatin-like protein gene (Ta-Tlp); particle bombardment; genetic transformation

Ti-Lin FANG, Ying CHENG, Gen-Qiao LI, Shi-Chang XU, Chao-Jie XIE, Ming-Shan YOU, Zuo-Min YANG, Qi-Xin SUN, Zhi-Yong LIU, Molecular Characterization of a Stripe Rust Resistance Gene from Wheat Line S2199 and Its Allelism with Yr5, Acta Agronomica Sinica, Volume 34, Issue 3, March 2008, Pages 355-360, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60015-2.
(http://www.sciencedirect.com/science/article/B94TW-4T5JDPF-2/2/2d82c7366f0bb15066e2b9c3ff7e5f06)
Abstract:
Yellow rust, caused by Puccinia striiformis f. sp. tritici (PST), is one of the most devastating diseases in common wheat (Triticum aestivum L.) worldwide. Molecular markers are powerful tools in marker-assisted selection, gene pyramiding, and gene cloning of important crop traits, especially for disease resistance. The objectives of this study were to develop tightly linked molecular marker of a yellow rust resistance gene against the prevalent Chinese races of PST in an improved wheat line S2199 and to characterize its allelism with Yr5. Genetic analysis indicated that a single dominant gene was responsible for the yellow rust resistance in S2199, which was temporarily designated as YrS2199. By screening 1,856 pairs of SSR primers, 2 markers, Xdp269 and Xgwm120, were linked to the yellow rust resistance gene with genetic distance of 0.7 and 11.0 cM, respectively. The SSR marker Xgwm120 has been genetically and physically mapped on 2BL chromosome arm in wheat. Using Chinese Spring nullisomic-tetrasomics, ditelosomics, and deletion lines of homoeologous group 2, Xdp269 was physically mapped on the terminal bin (0.89-1.0) of chromosome arm 2BL. Both allelism test of 700 F2 plants from the cross YrS2199/Yr5 and seedling tests of YrS2199 and Yr5 on 14 PST isolates indicated that YrS2199 and Yr5 were likely to be the same gene or allelic genes. The YrS2199 tightly linked to SSR marker Xdp269 can be used as a potential tool for cloning the yellow rust resistance gene or for marker assisted breeding program.
Keywords: wheat; stripe rust; simple sequence repeat (SSR); S2199; Yr5

Guo-yue CHEN, Li-hui LI, Genetic Analysis and Molecular Tagging a Novel Yellow Rust Resistance Gene Derived from Synthetic Hexaploid Wheat Germplasm M08, Agricultural Sciences in China, Volume 7, Issue 3, March 2008, Pages 266-271, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60065-6.
(http://www.sciencedirect.com/science/article/B82XG-4SM1NR4-2/2/d00f14c1dca1ce73fb98de0ac6154825)
Abstract:
Yellow rust of wheat (caused by Puccinia striiformis Westend. f. sp. tritici Eriks.) has been periodically epidemic and severely damaged wheat production in China. The development of resistant cultivars could be an effective way to reduce yield losses of wheat caused by yellow rust. Rust reaction tests and genetic analysis indicated that M08, the synthetic hexaploid wheat derived from hybridization between Triticum durum (2n = 6X = 28; genome AABB) and Aegilops tauschii (2n = 2X = 14; genome DD), showed resistance to current prevailing yellow rust races at seedling stage, which was controlled by a single dominant gene, designated as YrAm. Bulked segregant analysis was used to identify microsatellite markers linked to gene YrAm in an F2 population derived from cross M08 (resistant) x Jinan 17 (susceptible). Three microsatellite marker loci Xgwm77, Xgwm285, and Xgwm131 located on chromosome 3B were mapped to the YrAm locus. Xgwm131 was the closest marker locus and showed a linkage distance of 7.8 cM to the resistance locus. Thus, it is assumed that YrAm for resistance to yellow rust may be derived from Triticum durum and is located on the long arm of chromosome 3B.
Keywords: yellow rust resistance gene; chromosomal location; microsatellite marker; synthetic hexaploid wheat; Triticum durum

Xiao-ling JIANG, Ji-chun TIAN, Zhi HAO, Wei-dong ZHANG, Protein Content and Amino Acid Composition in Grains of Wheat-Related Species, Agricultural Sciences in China, Volume 7, Issue 3, March 2008, Pages 272-279, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60066-8.
(http://www.sciencedirect.com/science/article/B82XG-4SM1NR4-3/2/2e6df75b6c0c562a75ce62a9c5d39b7c)
Abstract:
The protein content and amino acid composition for 17 wheat-related species (WRS) and three common wheats (control) were determined and analyzed, and the essential amino acids (EAAs) in WRS were evaluated according to FAO/WHO amino acid recommendations. The results showed that the mean protein content for WRS was 16.67%, which was 23.21% higher than that for the control. The mean contents (g 100 g-1 protein) of most amino acids for WRS were lysine 2.74%, threonine 2.83%, phenylalanine 4.17%, isoleucine 3.42%, valine 3.90%, histidine 2.81%, glutamic acid 29.96%, proline 9.12%, glycine 3.59%, alanine 3.37%, and cysteine 1.57%, which were higher than those for the control. The contents of the other 6 amino acids for WRS were lower than those for the control. The materials (Triticum monococcum L., Triticum carthlicum Nevski, and Triticum turgidum L.) contained relatively high concentration of the most deficient EAAs (lysine, threonine, and methionine). Comparing with FAO/WHO amino acid recommendations, the amino acid scores (AAS) of lysine (49.8%), threonine (70.7%). and sulfur-containing amino acids (74.8%) were the lowest, which were considered as the main limiting amino acids in WRS. It was observed that the materials with Triticum urartu Tum. (AA) and Aegilops speltoides Tausch. (SS) genomes had relatively high contents of protein and EAA. The contents of protein (16.91%), phenylalanine (4.78%), isoleucine (3.53%), leucine (6.16%), and valine (4.09%) for the diploid materials were higher than those for the other materials. These results will provide some information for selecting parents in breeding about nutrient quality and utilization of fine gene in wheat.
Keywords: wheat-related species; protein content; amino add composition; amino acid score

Lindsay W. Bell, Felicity Byrne (nee Flugge), Mike A. Ewing, Len J. Wade, A preliminary whole-farm economic analysis of perennial wheat in an Australian dryland farming system, Agricultural Systems, Volume 96, Issues 1-3, March 2008, Pages 166-174, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.07.007.
(http://www.sciencedirect.com/science/article/B6T3W-4PMT5X7-1/2/7904f5715c5036fd7943600502cf957b)
Abstract:
The development of perennial wheat could have a number of advantages for improving the sustainability of Australian dryland agricultural systems. The profitability that might be expected from perennial wheat of different types was investigated using MIDAS (Model of an Integrated Dryland Agricultural System), a bioeconomic model of a mixed crop/livestock farming system. Although perennial wheat may produce a lower grain yield and quality than annual wheat, it is expected inputs of fertiliser, herbicide and sowing costs will be lower. Perennial wheat used solely for grain production was not selected as part of an optimal farm plan under the standard assumptions. In contrast, dual-purpose perennial wheat that produces grain and additional forage during summer and autumn than annual wheat can increase farm profitability substantially (AU$20/ha over the whole farm) and 20% of farm area was selected on the optimal farm plan under standard assumptions. Forage from perennial wheat replaced stubble over summer and grain supplement at the break of season and increased farm stock numbers. The additional value added by grazing also reduced the relative yield required for perennial wheat to be profitable. This analysis suggests perennial wheat used for the dual purposes of grain and forage production could be developed as a profitable option for mixed crop/livestock producers.
Keywords: Dual-purpose; Perennial crop; MIDAS; Profitability; Sustainability; Benefit-cost

C.P.S. Chauhan, R.B. Singh, S.K. Gupta, Supplemental irrigation of wheat with saline water, Agricultural Water Management, Volume 95, Issue 3, March 2008, Pages 253-258, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.10.007.
(http://www.sciencedirect.com/science/article/B6T3X-4RCW577-1/2/f55bcf9ca1f5f67ecd7a908bba6541e1)
Abstract:
In arid and semi-arid regions, both rainfall and surface irrigation water supplies are unreliable and inadequate to meet crop water requirement. Groundwater in these regions is mainly marginally saline (2-6 dS/m) to saline (>6 dS/m) and could be exploited to meet crop water requirement if no adverse effects on crops and land resource occur. The fear of adverse effects has often restricted the exploitation of naturally occurring saline water. The results reveal that substituting a part or all except pre-sowing irrigation with saline water having an electrical conductivity (ECiw) of 8 dS/m is possible for cultivation of wheat. Similarly, saline water with ECiw ranging between 8 and 12 dS/m could be used to supplement at least two irrigations to obtain 90% or more of the optimum yield. In low rainfall years, the use of such waters for all irrigations, except pre-sowing, produced more yield than skipping irrigations. Apparently, even at this level of osmotic salt stress, matric stress is more harmful. Thus, it would be interesting to use such waters for wheat production in monsoon climatic regions.
Keywords: Groundwater; Soil salinity; Wheat; Supplementary irrigation; Saline irrigation water

G. Izzi, H.J. Farahani, A. Bruggeman, T.Y. Oweis, In-season wheat root growth and soil water extraction in the Mediterranean environment of northern Syria, Agricultural Water Management, Volume 95, Issue 3, March 2008, Pages 259-270, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.10.008.
(http://www.sciencedirect.com/science/article/B6T3X-4R71DPS-3/2/1f5d5c51a48964173757b2ae71ef8c98)
Abstract:
Wheat is the most important cereal crop in the semi-arid eastern Mediterranean region that includes northern Syria. Knowledge of wheat root depth and the vertical distribution during the winter growing season is needed for sound scheduling of irrigation and efficient use of water. This article reports evaluation of root development for three winter-grown bread (Triticum aestivum L.) and durum (Triticum turgidum L.) wheat under four soil water regimes (rainfed and full irrigation with two intermediate levels of 33 and 66% of full irrigation). Roots were sampled by soil coring to a depth of 0.75 m at four occasions during 2005-2006 growing season. Two distinct phases of root development were identified, a rapid downward penetration from emergence to end tillering phase, followed by a substantial root mass growth along the profile from tillering to mid-stem-elongation phase. Roots were detected as deep as 0.75 m during the initial rapid penetration, yet only 29% of the total seasonal root mass was developed. This downward penetration rate averaged 7 mm d-1 and produced 10.8 kg ha-1 d-1 of root dry-biomass. The bulging of root mass from tillering to mid-stem-elongation coincided with vigorous shoot growth, doubling root dry-biomass at a rate of 52 kg ha-1 d-1, compared to the seasonal root growth rate of 18.3 kg ha-1 d-1. A second-degree equation described the total root dry-biomass as a function of days after emergence (r2 = 0.85), whereas a simpler equation predicted it as a function of cumulative growing degree days (r2 = 0.85). The final grain yield was a strong function of irrigation regimes, varying from 3.0 to 6.5 t ha-1, but showed no correlation with root biomass which remained similar as soil water regimes changed. This observation must be viewed with care as it lacks statistical evidence. Results showed 90% of root mass at first irrigation (15 April) confined in the top 0.60-0.75 m soil in bread wheat. Presence of shallow restricting soil layers limited root depth of durum wheat to 0.45 m, yet total seasonal root mass and grain yield were comparable with non-restricted bread wheat. Most root growth occurred during the cool rainy season and prior to the late irrigation season. The root sampling is short of rigorous, but results complement the limited field data in literature collectively

suggesting that irrigation following the rainy season may best be scheduled assuming a well developed root zone as deep as the effective soil depth within the top meter of soil.
Keywords: Rooting depth; Root distribution; Root zone; Root extraction; Wheat; Irrigation

V. Kumar, R.R. Bellinder, R.K. Gupta, R.K. Malik, D.C. Brainard, Role of herbicide-resistant rice in promoting resource conservation technologies in rice-wheat cropping systems of India: A review, Crop Protection, Volume 27, Issues 3-5, March-May 2008, Pages 290-301, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.05.016.
(http://www.sciencedirect.com/science/article/B6T5T-4PCH43H-1/2/82316c1d41fc3246fa28a5bcaf15547d)
Abstract:
Shortages of labor, water and the adverse effects of puddling on soil health are forcing farmers to switch rice production systems from puddled transplant to direct seeding. In recent years, resource conservation technologies (RCTs) like zero-tillage (ZT) and bed-planting are being promoted in the rice-wheat cropping systems of South Asia to address these concerns. However, weed control is a serious challenge in non-puddled, direct-seeded ZT/bed-planted rice. In the absence of weed control, rice yields are reduced by 35-100% in direct-seeded/RCTs systems. Herbicide-resistant rice (HR-rice) may facilitate adoption of RCTs by improving weed management options. The three major direct benefits of introducing HR-rice are to: (1) improve control of weeds specifically associated with rice, e.g. weedy Oryza species; (2) substitute currently used herbicides with new ones that are more efficient and that have better environmental profiles; and (3) provide new tools for managing weeds that have already developed resistance to current herbicides. In this paper, we discuss the current issues associated with the rice-wheat systems of India and role of HR-rice in addressing weed management constraints of direct-seeded rice. Direct-seeded ZT/bed-planted rice will save water, labor cost and drudgery involved in transplanting. Other potential benefits include improvement in soil health, timely sowing of wheat, and reduction in greenhouse gases.
Keywords: Rice-wheat system; Direct-seeded rice; Resource conservation technologies; Zero-tillage; Bed-planting

Tahsein Amein, Zahra Omer, Chris Welch, Application and evaluation of Pseudomonas strains for biocontrol of wheat seedling blight, Crop Protection, Volume 27, Issues 3-5, March-May 2008, Pages 532-536, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.08.007.
(http://www.sciencedirect.com/science/article/B6T5T-4PRRH4C-1/2/18eb5d9693cf547fefd6a40d631a1eed)
Abstract:
Microdochium nivale, the causal agent of snow mould, is a serious pathogen of many important cereal crops. This pathogen, like many related Fusarium species, causes seedling blight, foot rot and head blight diseases of cereals. Four bacterial strains showing good effect in increasing seedling emergence and in reducing disease severity in greenhouse screenings were tested in field experiments. One Pseudomonas fluorescens strain significantly improved plant establishment and harvest yield in infested winter wheat. Plant numbers were increased by up to 48% and yield by 26.5% in different field trials. Significant increases in head numbers were also observed. There was consistent and good plant protection for long periods of the growing seasons.
Keywords: Biological control; Microdochium nivale; Pseudomonas fluorescens; Seedborne pathogens; Seedling blight

J.J. Burke, B. Dunne, Investigating the effectiveness of the Thies Clima 'Septoria Timer' to schedule fungicide applications to control Mycosphaerella graminicola on winter wheat in Ireland, Crop Protection, Volume 27, Issues 3-5, March-May 2008, Pages 710-718, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.10.007.

(http://www.sciencedirect.com/science/article/B6T5T-4R71K7D-1/2/a6fce3d086175c7f63a1437749fae5d7)
Abstract:
The effectiveness of an in-crop decision support system, the Thies Clima 'Septoria Timer', to schedule fungicide applications for the control of Mycosphaerella graminicola in winter wheat was evaluated over five seasons, 2001-2005. Spray applications, based on the output from this instrument, were compared with routine two-spray fungicide programmes applied at growth stages 37 and 65, or three-spray programmes applied at growth stages 32, 39 and 65. Septoria infection periods, as defined by the 'Septoria Timer', varied from 12 in the 2002 season to two in 2004. There were 12 spray applications based on output from the 'Septoria Timer' over the 5-year period compared with 15 for the standard three-spray programme and six for the standard two-spray programme included in 2003-2005). Over the same period, there was a corresponding reduction of 41% in the load of active ingredient entering the environment. Pycnidia of M. graminicola were counted on infected leaves in 2002 and 2003. Scheduling fungicide applications according to the 'Septoria Timer' significantly reduced the number of pycnidia on the flag leaf compared with a three-spray programme in 2002, but there was no effect in 2003. There were no significant differences in values for the flag leaf area under the disease progress curve (AUDPC) between the three fungicide scheduling protocols in 2002 and 2005. Also, there was no significant difference in AUDPC values between the 'Septoria Timer' and the three-spray programme in 2003 and 2004. All fungicide programmes significantly increased grain yield each season. In 2001, applying fungicides scheduled by the 'Septoria Timer' protocol resulted in significantly lower yield compared with fungicide applications scheduled by crop growth stage. There was no significant yield difference between the three fungicide scheduling protocols in 2002 and 2004. In 2003 and 2005, there was no significant yield difference between fungicide programmes guided by the 'Septoria Timer' output and the standard three-spray programme. Grain-specific weight in all seasons, with the exception of 2004, was significantly enhanced by fungicide application compared with the untreated control. During 2001-2005, scheduling fungicides according to the 'Septoria Timer' provided grain of similar quality to that from plots receiving the three-spray standard programme.
Keywords: Mycosphaerella graminicola; Fungicides; Winter wheat; Spray timing; Yield

R.S. Chhokar, Samar Singh, R.K. Sharma, Herbicides for control of isoproturon-resistant Littleseed Canarygrass (Phalaris minor) in wheat, Crop Protection, Volume 27, Issues 3-5, March-May 2008, Pages 719-726, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.10.004.
(http://www.sciencedirect.com/science/article/B6T5T-4R8KSTK-1/2/8a6ad651ad9abf29879d1bf965b4a791)
Abstract:
Littleseed Canarygrass (Phalaris minor) is a problematic grass weed of wheat in the North-western and the North-eastern Indian plains regions. The P. minor problem has further worsened in the North-western plains owing to the evolution of isoproturon resistance. Infestation of isoproturon R population caused >65% wheat grain yield reduction with the recommended rate of isoproturon (1000 g ha-1) application. The preference of herbicides for the management of weeds in wheat has made the alternative herbicides as the main component of resistance management strategies. Post-emergence clodinafop (60 g ha-1), fenoxaprop (120 g ha-1), pinoxaden+S (30 g ha-1 plus 0.5% surfactant), mesosulfuron+S (12-15 g+625 ml surfactant ha-1) and sulfosulfuron+S (25 g ha-1+0.35% surfactant) and pre-emergence fluazolate (150 g ha-1) and pendimethalin (1250 g ha-1) were very effective in controlling isoproturon R P. minor and improving wheat yields. To prolong the effectiveness of these herbicides, their rotational use at optimum dose and time with proper application technology should be integrated with other weed control tactics.
Keywords: Clodinafop; Fenoxaprop; Fluazolate; Herbicide resistance; Mesosulfuron; Metribuzin; Pendimethalin; Pinoxaden; Sulfosulfuron

Yanhai Zheng, Zhenlin Wang, Xuezhen Sun, Aijun Jia, Gaoming Jiang, Zengjia Li, Higher salinity tolerance cultivars of winter wheat relieved senescence at reproductive stage, Environmental and Experimental Botany, Volume 62, Issue 2, March 2008, Pages 129-138, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.07.011.
(http://www.sciencedirect.com/science/article/B6T66-4PBDR13-4/2/0852d3b1bb410cbc4547144cc70119c6)
Abstract:
In order to probe into the potential of relieving senescence in the new cultivars, we have compared gas exchanges and related physiological parameters of two cultivars of winter wheat (DK961, salt-tolerant; JN17, salt-sensitive) under a series of NaCl concentrations. Through out the whole reproductive period, it was noted that net photosynthetic rate, stomatal conductance, pigment contents, ions contents, leaf area index, leaf area duration, leaf relative water content and dry matter accumulation of spikes decreased in both cultivars with saline concentrations increasing. However, the salt-tolerant cultivars showed none significant reductions in those parameters compared with control under 0.3% and 0.5% salt concentrations, with only considerable decrease happening when soil salt concentration exceeded to 0.7%. Sharply contrast to salt-tolerant cultivars, the salt-sensitive cultivars appeared linear reductions in physiological parameters under a series of salt concentrations (0.3%, 0.5% and 0.7%), with the photosynthetic duration being evidently shorter. Significantly positive correlations among K+/Na+, reproductive growth period and total growth period were noted in salt-sensitive cultivars, however, none significant relations appeared among those parameters in salt-tolerant cultivars, indicating a strong tolerant behavior happened. Our result suggested that higher salinity tolerance cultivars of winter wheat could relieve senescence at the reproductive stage.
Keywords: NaCl stress; Senescence; Gas exchanges; Photosynthetic pigments; Genotype; Wheat (Triticum aestivum L.)

Abdellatif Mohamed, Patricia Rayas-Duarte, Jingyuan Xu, Hard Red Spring wheat/C-TRIM 20 bread: Formulation, processing and texture analysis, Food Chemistry, Volume 107, Issue 1, 1 March 2008, Pages 516-524, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.08.065.
(http://www.sciencedirect.com/science/article/B6T6R-4PJM9T4-1/2/09c934fa6a6272e1e342550ff9aa64f9)
Abstract:
C-TRIM, a [beta]-glucan-rich fraction, was added to Hard Red Spring wheat (HRSW) flour to increase soluble fiber content of bread, and to obtain a minimum of 0.75 g/bread serving (0.75 g/30 g or 2.5%) required by FDA for health claim. Three treatments or blends FGT0 (100% wheat flour - control), FGT1 (58% flour, 25% gluten and 17% C-TRIM) and FGT2 (60% flour, 22.5% gluten, and 17% C-TRIM) were used in the study. The total amount of soluble fiber from C-TRIM in FGT1 and FGT2 was 4.07-4.17% which was more than the amount required by FDA. The presence of C-TRIM increased both, the Farinograph water absorption and the arrival time. The dough mixing tolerance index (MTI) was also increased by C-TRIM. The FGT1 had higher stability than FGT2, whereas, the loaf volume of FGT1-B was also significantly higher than FGT0-B control and FGT2-B bread. The DSC results indicated that the amount of freezable-water in C-TRIM treated bread (FGT1-B and FGT2-B) was significantly higher than the control wheat flour bread (FGT0-B). This may be attributed to the higher amount of water absorbed by C-TRIM during bread dough (FGT1-D and FGT2-D) preparation and trapped or bound within the bread matrix after baking as compared to the control. After storage of FGT0-B, FGT1-B, and FGT2-B breads 2, 5, and 7 days storage at 25 [degree sign]C, 4 [degree sign]C, and -20 [degree sign]C, the texture of bread were measured with a Texture Analyzer and the data analyzed statistically. The FTG0-B control bread firmness was significantly higher than FGT1-B and FGT2-B C-TRIM treated breads after 7 days storage at 25 [degree sign]C. The amount of 0.1 M acetic acid-extractable protein was lower in FGT1-B than the control wheat flour (FGT0-B) sample. In addition, more protein was

extracted at pH 7.0 than pH 4.5 because of less charges at neutral pH than pH 4.5. The free zone capillary electrophoresis analysis showed obvious differences in the protein charge and size between the dough and bread.
Keywords: [beta]-Glucan; Soluble fiber; Suspension rheology; Bread texture; Freezable water; DMA; DSC

N. Aoudia, E.K. Tangni, Y. Larondelle, Distribution of ochratoxin A in plasma and tissues of rats fed a naturally contaminated diet amended with micronized wheat fibres: Effectiveness of mycotoxin sequestering activity, Food and Chemical Toxicology, Volume 46, Issue 3, March 2008, Pages 871-878, ISSN 0278-6915, DOI: 10.1016/j.fct.2007.10.029.
(http://www.sciencedirect.com/science/article/B6T6P-4R1MF5P-1/2/f0fea2e33d212d3aa91d256559a95b4e)
Abstract:
The effectiveness of micronized wheat fibres (MWF) alone or in association with yeast cell walls (YCW) as active adsorbents to decrease, in vivo, the levels of ochratoxin A (OTA) was checked in a total of 48 rats, equitably distributed into four groups: (1) control; (2) OTA naturally contaminated diet (2.2 [mu]g/g); (3) OTA naturally contaminated diet (2.2 [mu]g/g) amended with MWF (2%); (4) OTA naturally contaminated diet (2 [mu]g/g) amended with MWF (1.8%) in association with YCW (0.2%). A 4 week experimental period corresponding to a daily intake in the range of 132.2-146.1 [mu]g OTA/kg bw decreased the rat body weight gains, as compared to the controls. The adsorbents did not significantly alleviate the growth depression caused by the contaminated diet. However, a significant protective effect of MWF was observed in terms of OTA concentration in plasma (40.5% decrease), kidney (28.1% decrease) and liver (38.8% decrease). Mixing this sorbent with the YCW did not significantly improve its protective activity against OTA. The faecal OTA concentrations were higher for the MWF and MWF + YCW treated animals, as compared to the positive control (group II). Taken together, these results suggest that MWF are a promising tool to counteract the toxic effects of OTA naturally contaminated diets.
Keywords: Mycotoxins; Ochratoxin A; Detoxification; Adsorption; Micronized wheat fibres; Yeast cell walls

S. Chillo, J. Laverse, P.M. Falcone, A. Protopapa, M.A. Del Nobile, Influence of the addition of buckwheat flour and durum wheat bran on spaghetti quality, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 144-152, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.004.
(http://www.sciencedirect.com/science/article/B6WHK-4NBBYRH-1/2/d5a503a084934390094f38e4c11a7379)
Abstract:
The quality of nine spaghetti typologies, produced by using wheat durum semolina as a base plus the addition of buckwheat and durum wheat bran, was investigated. The quality of the produced spaghetti was compared with that of spaghetti made only of durum semolina (CTRL). Tests were run on the samples to determine breakage susceptibility and colour of dry spaghetti, the cooking resistance, instrumental stickiness at optimal cooking time (OCT) and overcooking, the cooking loss and sensorial attributes at the optimal cooking time. Results suggest that the breakage susceptibility decreases with the addition of 15% and 20% bran, the spaghetti dry colour changes with the addition of buckwheat flour and bran compared to the spaghetti made only of durum semolina, while the cooking resistance, instrumental stickiness and the cooking loss, in general, were equal to that of the CTRL. However, the addition of buckwheat flour and bran affected the sensorial attributes differently.
Keywords: Buckwheat; Bran; Spaghetti; Breakage susceptibility; Cooking quality

S.J. Yue, H. Li, Y.W. Li, Y.F. Zhu, J.K. Guo, Y.J. Liu, Y. Chen, X. Jia, Generation of transgenic wheat lines with altered expression levels of 1Dx5 high-molecular weight glutenin subunit by RNA

interference, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 153-161, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.006.
(http://www.sciencedirect.com/science/article/B6WHK-4NCSGMJ-1/2/a9097d06f9fab510b1508f293a97106d)
Abstract:
In recent years, high molecular weight glutenin subunit (HMW-GS) null mutants have been found to be useful for studying the contribution of HMW-GS to the flour processing quality of wheat (Triticum aestivum L. em. Thell.). However, few reports have dealt with the development and characterization of such variants. In the present study, the RNA interference (RNAi) method was applied to Bobwhite wheat, which has five actively expressed HMW-GS genes (namely 1Ax2*, 1Dx5, 1Bx7, 1By9, 1Dy10), with the aim of silencing the expression of 1Dx5. Out of the six transgenic events characterized, 1Dx5 expression was completely blocked in four transgenic events (L1-L4), and partially reduced in the other two (L5, L6). In contrast, the protein levels of 1Ax2*, 1By9 and 1Dy10 were not significantly affected in any of the six transgenic events. Interestingly, 1Bx7 protein accumulation was negatively affected in all six events and their progenies. 1Dx5 transcript levels in developing seeds at 15 days after pollination (DAP) were undetectable in L1 and dramatically reduced in L5. The silencing of 1Dx5 expression caused a substantial decrease in flour processing quality based on Farinograph, gluten and Zeleny tests. Collectively, our data suggest that RNAi is useful for silencing HMW-GS genes. The resultant transgenic lines are of value for studying the contributions of specific HMW-GS to wheat flour processing quality.
Keywords: Wheat; RNAi; HMW-GS; Gene silencing

Emmie Dornez, Kurt Gebruers, Iris J. Joye, Bart De Ketelaere, Jonathan Lenartz, Carine Massaux, Bernard Bodson, Jan A. Delcour, Christophe M. Courtin, Effects of genotype, harvest year and genotype-by-harvest year interactions on arabinoxylan, endoxylanase activity and endoxylanase inhibitor levels in wheat kernels, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 180-189, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.008.
(http://www.sciencedirect.com/science/article/B6WHK-4NG3T9J-1/2/90488b837c663fd2894431dd95d24b73)
Abstract:
The effects of genotype, harvest year and their interaction on the levels of arabinoxylans (AX), endoxylanases and endoxylanase inhibitors in wheat were studied using 14 varieties grown in three successive growing periods with diverse climatological conditions. Relations with more commonly evaluated wheat characteristics such as yield, thousand kernel weight, specific weight, protein level, Hagberg falling number (HFN) and [alpha]-amylase activity level were examined. Water extractable arabinoxylan (WE-AX) levels in wheat varied much more than total arabinoxylan (TOT-AX) levels. This variability was mainly genetically determined, but harvest year also had an important effect. Total endoxylanase activity levels varied more than a factor of 20 between the different wheat samples. Endogenous endoxylanases typically accounted for only 10-15% of this activity, while wheat-associated microbial endoxylanases accounted for the remaining 85-90%. However, when preharvest sprouting occurred, the contribution of endogenous endoxylanases could sometimes amount to over 40% of this total activity. Endogenous endoxylanase activity levels were mainly determined by the interaction of genotype and harvest year, while wheat-associated microbial endoxylanase activity levels were predominantly determined by genotype alone. Endogenous and microbial endoxylanase activity levels were strongly correlated, suggesting that wheat varieties which are susceptible to preharvest sprouting are often also susceptible to microbial contamination. The TAXI and XIP-type endoxylanase inhibitor levels varied by a factor of 8 and 1.8, respectively. They were mainly determined by genotype and were rather similar in the different growing periods.
Keywords: Wheat; Arabinoxylan; Endoxylanase; TAXI; XIP

Emmie Dornez, Kurt Gebruers, Iris J. Joye, Bart De Ketelaere, Jonathan Lenartz, Carine Massaux, Bernard Bodson, Jan A. Delcour, Christophe M. Courtin, Effects of fungicide treatment, N-fertilisation and harvest date on arabinoxylan, endoxylanase activity and endoxylanase inhibitor levels in wheat kernels, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 190-200, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.009.
(http://www.sciencedirect.com/science/article/B6WHK-4NG3T9J-2/2/7cb6fb7e88cf62bfbfea738b667c6ba7)
Abstract:
Fungicide treatment had a significant impact on endoxylanase activity and XIP levels, but did not affect arabinoxylan (AX) and TAXI levels. The different response of TAXI and XIP type inhibitors to fungicide treatment is interesting. N-fertilisation did not affect AX levels, but significantly increased TAXI and XIP type inhibitor levels. Wheat-associated microbial endoxylanase activity levels were also affected by nitrogen supply, but levels of the endogenous enzyme did not change, except when sprouting occurred. The weather conditions before harvest had no influence on total AX (TOT-AX) and inhibitor levels, but had a large impact on both microbial and endogenous endoxylanase activity and water extractable AX (WE-AX) levels. Under most conditions, endoxylanase activity levels were related to those of [alpha]-amylases, liquefaction numbers (LN) and specific weights. WE-AX levels were often weakly but significantly correlated with endoxylanase activity levels, indicating that it is possible that part of the WE-AX in wheat originates from AX degradation by endoxylanases in the field. These results clearly indicate that agronomic circumstances significantly affect the levels of AX, endoxylanases and their inhibitors in wheat, and consequently could affect wheat quality.
Keywords: Wheat; Arabinoxylan; Endoxylanase; TAXI; XIP; Fungicide; N-fertilisation; Harvest date

S.B. Altenbach, K.M. Kothari, C.K. Tanaka, W.J. Hurkman, Expression of 9-kDa non-specific lipid transfer protein genes in developing wheat grain is enhanced by high temperatures but not by post-anthesis fertilizer, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 201-213, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.010.
(http://www.sciencedirect.com/science/article/B6WHK-4NG3T9J-3/2/000366dedb6db63e65c69609eabeb934)
Abstract:
A survey of EST databases identified 16 9-kDa non-specific lipid transfer proteins (nsLTPs) expressed in developing grain from the US spring wheat Butte 86. Two of the most abundant sequences encoded nsLTPs similar to proteins identified previously by two-dimensional gel electrophoresis/mass spectrometry (2-DE/MS). Quantitative reverse-transcriptase polymerase chain reaction (qRT-PCR) was used to examine the expression of these nsLTPs in developing grain or endosperm produced under controlled temperature and fertilizer regimens. Under a moderate (24 [degree sign]C/17 [degree sign]C day/night) temperature regimen, transcripts accumulated late in grain development and achieved highest levels as grain reached maximum dry weight. When high temperature regimens (37 [degree sign]C/28 [degree sign]C day/night) were imposed from anthesis or 15 days post-anthesis (DPA) until maturity, maximum transcript levels were as much as 9-fold higher. Post-anthesis fertilizer had relatively small effects on transcript levels. Accumulation profiles for 9-kDa nsLTPs generated by 2-DE were consistent with transcript profiles. The nsLTPs increased 2 to 3.5-fold in amount in endosperm in response to high temperatures but showed little change in response to fertilizer. Flour from grain produced under the high temperature regimens also contained greater amounts of nsLTPs. Increases in the levels of nsLTPs in flour as a result of environmental conditions during grain fill may have important implications for flour quality and allergenic potential.
Keywords: Abiotic stress; Allergens; Flour quality; Quantitative RT-PCR; Real time RT-PCR

M. Werteker, G. Kramreither, Relation between susceptibility to wheat bug attack and digestibility of glutenin, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 226-232, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.012.
(http://www.sciencedirect.com/science/article/B6WHK-4NGKVT9-1/2/a6a6151954698023db15d22192be0f77)
Abstract:
Two trials of winter wheat, embracing 17 varieties and 4 breeding lines, harvested in 2003 from locations in the semi-arid eastern part of Austria, were severely infested by naturally occurring bugs (Eurygaster sp.). In these trials bug damage was determined by selecting and weighing the infested kernels. Glutenin degradation was determined by the addition of meal from bug-infested kernels to meal from sound kernels from the same trials to reach sample mixtures representing a degree of bug attack of 6%. These mixtures and blanks made from sound meal were incubated in buffer solution (pH=8.5) at 37 [degree sign]C for 45 min. The reduction in glutenin content due to the activity of bug proteinases was measured by RP-HPLC analysis of the glutenin fraction and comparison of the results of damaged and sound samples. The results showed good correlations between the degree of bug attack and the digestibility of glutenin (location 1: $R2=0.69$, $P<0.01$; location 2: $R2=0.36$, $P<0.01$). Both parameters seem to be variety specific. The determination of digestibility of glutenins was repeated in material from a trial harvested in 2005 in another location in eastern Austria, with eight varieties being the same as used in the 2003 trials. A correlation with the degree of bug attack in location 1 from the 2003 harvest was found again ($R2=0.61$, $P<0.01$).
Keywords: Wheat bug; Glutenin degradation; Bug infestation

C. Desvignes, M. Chaurand, M. Dubois, A. Sadoudi, J. Abecassis, V. Lullien-Pellerin, Changes in common wheat grain milling behavior and tissue mechanical properties following ozone treatment, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 245-251, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.004.
(http://www.sciencedirect.com/science/article/B6WHK-4NKJ0F6-3/2/190493222ce3d5e480061c594265ebf7)
Abstract:
Ozone treatment (10 g/kg) of common wheat grains with a new patented process, Oxygreen(R), used before milling was found to significantly reduce (by 10-20%) the required energy at breaking stage whatever the grain hardness and without changes in the flour yield. Detailed study of each of the milling steps undertaken on a hard type cultivar showed that both the breaking and the reduction energy were decreased. Reduction of the coarse bran yield was also observed concomitantly with an increase in the yield of white shorts. Biochemical characterization of the milling fractions pointed out changes in technological flour properties as starch damage reduction, aleurone content enrichment and increase of insoluble glutenin polymers. Measurement of wheat grain tissue mechanical properties showed that ozone treatment leads to reduction of the aleurone layer extensibility and affects the local endosperm resistance to rupture. These data as well as the direct effect of ozone oxidation on biochemical compounds could explain the observed changes in milling energy, bran and shorts yield and flour composition.
Keywords: Aleurone; Common wheat; Mechanical properties; Milling; Ozone

Qian Zhang, Yanmin Dong, Xueli An, Aili Wang, Yanzhen Zhang, Xiaohui Li, Liyan Gao, Xianchun Xia, Zhonghu He, Yueming Yan, Characterization of HMW glutenin subunits in common wheat and related species by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS), Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 252-261, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.013.
(http://www.sciencedirect.com/science/article/B6WHK-4NS2GGG-2/2/39267dd82e9f63ae6ff0629aedae4988)
Abstract:

The sample preparation method of high molecular weight glutenin subunits (HMW-GS) for matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS) analysis, without a separation step, by high-performance liquid chromatography (HPLC) was established in this study. Three major factors influencing mass spectra--the ratio of components of the solvent, the resolving time, and the sample volume--were optimized using HMW-GS mixtures extracted from Chinese cultivar Jing 411. The results showed that the optimized method for sample preparation was to resolve HMW-GS from 20 mg in an hour with 50 [mu]l solvent of 0.4% TFA, 30.0% ACN and 69.6% H2O. The stable mass spectra and accurate molecular weights of 16 major HMW glutenin subunits from common wheat and related species were obtained using the optimized MALDI-TOF-MS method. Seven subunits, where each was from 2-5 cultivars, showed very similar molecular weights. The determined molecular weights of 11 subunits were close to those calculated from their coding sequences. In addition, no positive reaction between HMW-GS and GelCode(R) Glycoprotein Staining Reagent was observed. These results suggested that HMW-GS lack extensive post-translational modifications (PTMs), but low levels of glycosylation or phosphorylation present in some subunits cannot be ruled out. Because of its ability to obtain a rapid, complete and precise profile of HMW glutenin subunits without purifying procedures, MALDI-TOF-MS is expected to be a powerful technique for structural and functional studies of HMW glutenin subunits as well as other cereal proteins.
Keywords: HMW-GS; Molecular weight; Mass spectrometry; PTM

A.W. Peck, G.K. McDonald, R.D. Graham, Zinc nutrition influences the protein composition of flour in bread wheat (Triticum aestivum L.), Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 266-274, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.006.
(http://www.sciencedirect.com/science/article/B6WHK-4NSX00G-4/2/8f621d9013989084c20c922cd6b992c9)
Abstract:
Zinc (Zn) deficiency and heat stress during grain filling occur in a number of important wheat growing regions around the world. The changes in grain protein composition due to high temperature are well documented, but little is known about the effect of grain Zn and its interaction with heat stress. Six field experiments were conducted at sites differing in grain filling temperatures to examine these effects. Two varieties of bread wheat were grown at six rates of Zn, including foliar sprays of Zn. The relative amounts of gliadin and polymeric protein were measured by size exclusion HPLC. Applying Zn increased grain yield at three sites and altered protein quality at two of these. Foliar Zn applications doubled grain Zn concentration, reduced the proportion of gliadin and SDS-unextractable polymeric protein and increased the proportion of SDS-extractable polymeric protein. Heat stress during grain filling was associated with a high proportion of gliadin and low proportions of the polymeric protein in the grain. However, the proportions of gliadin and of SDS-extractable polymeric protein were less affected by high temperatures in grain with high Zn concentrations. The results demonstrate that Zn nutrition can alter protein composition and the effects of Zn may interact with grain filling temperatures.
Keywords: Zinc; Grain quality; Polymeric protein; Heat stress

Anne Repellin, Monica Baga, Ravindra N. Chibbar, In vitro pullulanase activity of wheat (Triticum aestivum L.) limit-dextrinase type starch debranching enzyme is modulated by redox conditions, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 302-309, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.015.
(http://www.sciencedirect.com/science/article/B6WHK-4NTB965-1/2/8afb6e6f945dfd497b8cfa80332b3a63)
Abstract:
Expression of a limit-dextrinase (LD) type starch debranching enzyme (EC 3.2.1.41) was observed in developing wheat (Triticum aestivum L.) endosperm and germinating grains, indicating a role for

the enzyme in both biosynthesis and degradation of starch. A full-length cDNA, TaLD1, encoding LD in wheat developing kernels was isolated and predicted to encode a 98.6 kDa mature protein active in amyloplasts. Isolated cDNA was expressed in Escherichia coli to produce a recombinant His-tagged LD, which mainly accumulated in inclusion bodies as an inactive enzyme. Extraction of His-tagged LD from the inclusion bodies followed by dialysis under thiol/disulphide redox conditions allowed partial refolding of the protein and detection of pullulanase specific activities by zymogram analysis and enzyme assays. Several active conformations were demonstrated by the recombinant TaLD1 and pullulanase activity could be modulated by redox conditions in vitro. The results suggest that cellular redox conditions may regulate the level of LD activity in wheat tissues.
Keywords: cDNA; Germination; Kernel development; Limit-dextrinase; Starch debranching enzyme; Wheat (Triticum aestivum L.)

M. Rakszegi, G. Pastori, H.D. Jones, F. Bekes, B. Butow, L. Lang, Z. Bedo", P.R. Shewry, Technological quality of field grown transgenic lines of commercial wheat cultivars expressing the 1Ax1 HMW glutenin subunit gene, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 310-321, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.010.
(http://www.sciencedirect.com/science/article/B6WHK-4NR18BF-1/2/4448ae4dd644e5704b3ba11ac1c6cd34)
Abstract:
Ten transgenic lines were studied which expressed a transgene encoding HMW subunit 1Ax1 in three elite spring wheat cultivars: Imp, Canon and Cadenza. These lines contained one to five copies of the transgene and the 1Ax1 subunit was expressed as 1-20% of the total glutenin protein. These lines were grown in field trials in a continental, arid climate (Martonvasar, Hungary) over two years (2004, 2005). The expression of the transgenes and their effects on the grain properties were stably inherited over the two years. Significant differences in yield were observed between three of the transgenic lines and the original genotypes, but no differences were found in their adaptiveness. Clear differences were found in the technological and rheological properties of four lines, with all the parameters characterising dough strength and extensibility (GI, W, G, Re, Ext, A) changing significantly. These differences were associated with increases in the ratio of HMW/LMW subunits and decreases in the ratios of 1Dx/1Dy and 1Bx/1By subunits. Two transgenic lines of cv Imp had high over-expression of the 1Ax1 subunit which in one line resulted in an overstrong type of dough, similar to that described previously for lines over-expressing HMW subunit 1Dx5. Transformation of cvs. Canon and Cadenza resulted in two lines with increased dough stability due to the significantly improved gluten quality. It is concluded that significant changes in the structure of the glutenin polymers caused by the altered ratio of x-type to y-type HMW subunits led to the changes in flour functional properties.
Keywords: Overexpression; Field experiment; GM wheat; 1Ax1 HMW glutenin subunit

Lanqin Xia, Hongwei Geng, Xinmin Chen, Zhonghu He, Morten Lillemo, Craig F. Morris, Silencing of puroindoline a alters the kernel texture in transgenic bread wheat, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 331-338, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.016.
(http://www.sciencedirect.com/science/article/B6WHK-4NVT9WR-1/2/c04c3d8e96a581379de623e7a33fc664)
Abstract:
Grain hardness is an important end-use quality parameter of bread wheat, and one of the most important characters for quality improvement. The objective of this study was to further understand the function of puroindolines and the underlying mechanism in the formation of kernel texture. The highly efficient expression vector pUBPa harboring puroindoline a (Pina) was introduced into the bread wheat cultivar Zhongyou 9507-60 via biolistic transformation and transgenic plants were obtained. The integration of the foreign Pina gene was confirmed by PCR and genomic DNA

Southern blot analysis. The levels of friabilin on the surface of water-washed starch granules varied among the transgenic lines. SDS-PAGE analysis of Triton X-114 extracted protein showed that the PINA protein was absent in three transgenic lines, indicating that the endogenous Pina gene most likely had been co-suppressed by the over-expression of the Pina transgene. SKCS kernel hardness and scanning electron microscopy analysis further confirmed the changes of kernel texture in these lines.
Keywords: Bread wheat; Grain hardness; Puroindolines; Over-expression; Transformation

Vincent Topin, Farhang Radjai, Jean-Yves Delenne, Abdelkrim Sadoudi, Frederic Mabille, Wheat endosperm as a cohesive granular material, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 347-356, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.05.005.
(http://www.sciencedirect.com/science/article/B6WHK-4NX2NHF-1/2/a9cadbcad7ec5e37a8b61aa766e7be30)
Abstract:
We introduce a cohesive granular model of the wheat endosperm involving a discrete phase composed of starch granules, a continuous phase representing the protein matrix and pores. The cohesion of the texture is governed by adherence between starch and protein, reflecting the biochemical nature of the interface, and the protein content that controls the connectivity between starch granules. We present a detailed parametric study of the stiffness, yield strength and regimes of crack propagation under tensile loading. We then show that starch damage, as a descriptor of wheat hardness, scales with the relative toughness between the starch and the starch-protein interface. The toughness appears therefore to be the control parameter governing transition from `soft' to `hard' behavior. Interestingly, this parameter combines the starch-protein adherence with protein content, two major quantities often assumed to underly wheat hardness.
Keywords: Wheat endosperm; Lattice model; Cohesive granular media; Hardness; Fracture

E. Maforimbo, G. Skurray, S. Uthayakumaran, C. Wrigley, Incorporation of soy proteins into the wheat-gluten matrix during dough mixing, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 380-385, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.003.
(http://www.sciencedirect.com/science/article/B6WHK-4N43RS0-1/2/8ca60682f7fb3c22c72ec8c156efd30d)
Abstract:
Farinograph methodology was used to evaluate the possible incorporation of soy proteins into a glutenin-soy complex during mixing and to study the contribution of soy proteins to the chemical and physical properties of the dough. To facilitate the interaction of soy and wheat proteins, a redox process was used, which allowed the partial reduction (using dithiothreitol, DTT) and subsequent reoxidation (using potassium iodate) of glutenin without changing its functionality in the dough (a composite of equal parts of wheat and soy flours, 300 g in total). Either raw soy flour (RSF) or physically modified soy flour (PMSF) was used as the soy component. Dough samples were taken at peak mixing time and at break time during mixing, and these were freeze dried for SE-HPLC analysis and capillary electrophoresis (Lab-on-a-chip).
SE-HPLC results showed that soy globulins interact with gluten proteins in the composite dough, forming aggregates of high molecular weight. Partial reduction and oxidation of these doughs at peak mixing time resulted in higher SE-HPLC polymeric protein profiles (HMW) compared to those of control composite doughs, based on extraction and SE-HPLC analyses. Unextractable polymeric protein (UPP%) increased from 21% to 27% (15-25% at break time) as a result of the reduction-reoxidation treatment for the PMSF-wheat doughs. In contrast, %UPP values were much lower for the doughs made from raw soy-wheat flours, with %UPP increasing from 6% to 9% (3-6% at break time) as a result of the reduction-reoxidation treatment. Capillary electrophoresis (Lab-on-a-chip) further revealed that the reduction-reoxidation treatment had facilitated the

interaction of glutenin subunits and soy proteins (11S subunits), probably through the oxidation of SH groups.
Keywords: Partial reduction; Reoxidation; Wheat and soy proteins; Composite dough; Unextractable polymeric proteins

Y.H. Zhang, Z.M. Wang, Q. Huang, W. Shu, Phosphoenolpyruvate carboxylase activity in ear organs is related to protein concentration in grains of winter wheat, Journal of Cereal Science, Volume 47, Issue 2, March 2008, Pages 386-391, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.04.011.
(http://www.sciencedirect.com/science/article/B6WHK-4NR18BF-3/2/5c97fbf83f25bc2080324262b7470c59)
Abstract:
The relationship between phosphoenolpyruvate carboxylase (PEPC) activities in flag leaf blade and ear organs (glume and grain) and protein content of grain as well as grain weight after flowering were studied in different winter wheat (Triticum aestivum L.) genotypes. Results showed higher PEPC activity in the developing grain than in flag leaf blade and glume during grain development. For 16 of the genotypes studied, the mean PEPC activity in the developing grain or glume at 15 and 25 days after flowering was significantly and positively correlated with final protein content of grain. Enzyme activities in glume and flag leaf blade were positively correlated with final grain weight but the activity in developing grain was weakly and negatively correlated with grain weight. The overall data suggest that PEPC may be involved in protein biosynthesis during grain development, and it may have an important role in regulating carbon and nitrogen metabolism in the ear of wheat.
Keywords: Ear organs; Phosphoenolpyruvate carboxylase; Protein content; Grain weight; Wheat

A. Riba, S. Mokrane, F. Mathieu, A. Lebrihi, N. Sabaou, Mycoflora and ochratoxin A producing strains of Aspergillus in Algerian wheat, International Journal of Food Microbiology, Volume 122, Issues 1-2, 29 February 2008, Pages 85-92, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.11.057.
(http://www.sciencedirect.com/science/article/B6T7K-4R7NPVT-5/2/c60f54fe1744a8e7895456e947dfcf40)
Abstract:
Wheat is a basic staple food for very large segments of the population of Algeria. The aim of this study is to analyse ochratoxin A (OTA)-producing mould and OTA-contaminated wheat. To evaluate the mycoflora and the potential for OTA production by Aspergillus strains, a total of 85 samples of wheat destined for human consumption were collected from two regions in Algeria (Tizi Ouzou and Setif) during the following phases: preharvest, storage in silos, and after processing. The mean value counts of fungi ranged from 275 to 1277 CFU g- 1. The dominant genus was Aspergillus, predominantly A. flavus, A. niger and A. versicolor. The other isolated species were A. ochraceus, A. alliaceus, A. carbonarius, A. terreus, A. fumigatus, A. candidus and Aspergillus spp. The occurrence and the levels of the genus Penicillium, Fusarium, Alternaria and Mucor were substantially lower than those of Aspergillus. The storage in silos shows high levels of Aspergillus (66 to 84%), especially A. flavus, but A. niger and other fungi were isolated at relatively low percentages. Equal distribution of the fungal contamination into the bran, flour and semolina fractions was observed from Flour Mill and Semolina Mill. The genus Aspergillus remained present at high levels at several phases of the production process. In addition, the ability to produce OTA by 135 isolates belonging to eleven species of Aspergillus and 23 isolates of Penicillium spp. was analyzed using fluorescent detection-based HPLC. Thus, it was found that 51 isolates (32.3%) were ochratoxigenic. All isolated strains of A. ochraceus (12) and A. alliaceus (6) produced OTA at concentrations ranging from 0.23 to 11.50 [micro sign]g g- 1. Most of the A. carbonarius strains (80%) were OTA producers (0.01 to 9.35 [micro sign]g g- 1), whereas A. terreus (50%), A. niger

(28%), A. fumigatus (40%), A. versicolor (18%) and Penicillium spp. (21.7%) were low level producers (0.01 to 0.07 [micro sign]g g- 1). The concentration of OTA was determined in 30 samples of wheat. OTA was detected in 12 (40%) of the samples at levels ranging from 0.21 to 41.55 [micro sign]g kg- 1.
Keywords: Wheat; Fungi; Aspergillus; Toxigenic; OTA; Algeria

B. Ehdaie, G.A. Alloush, J.G. Waines, Genotypic variation in linear rate of grain growth and contribution of stem reserves to grain yield in wheat, Field Crops Research, Volume 106, Issue 1, 27 February 2008, Pages 34-43, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.012.
(http://www.sciencedirect.com/science/article/B6T6M-4R8M5BC-1/2/924b71bbb182a119dcca2db3c1773004)
Abstract:
Grain growth in wheat depends on current photosynthesis and stem water-soluble carbohydrates (WSC). In semiarid regions with terminal drought, grain filling in wheat crops may depend more on stem WSC content than on current assimilates. Reduction in grain yield under drought is attributed to shorter duration of linear grain growth despite increased contribution of stem reserves to grain yield. The amount of stem reserves is measured either by changes in stem dry weight (indirect method) or by stem WSC content (direct method). Genotypic variation in the rate and duration of linear grain growth and in percent contribution of stem reserves to grain yield has not been evaluated in wheat. The objectives of this study were: (i) to quantify the relationship between the direct and indirect measurement of stem reserves during and across the grain-filling period and (ii) to measure the extent of genotypic variation in rate and duration of linear grain growth and in percent contribution of stem reserves to grain yield. Dry weight, WSC content and grain yield of the main stem were measured at 10-day intervals in 11 diverse wheat genotypes under well-watered and droughted-field conditions across 2 years. Drought reduced stem WSC content from 413 to 281 mg and grain yield from 4.6 to 2.5 t ha-1. Stem WSC content and dry weight were positively correlated. Genotypic differences in linear rate of grain growth were significant in well-watered (ranging from 48.9 to 72.4 mg spike-1 day-1) and in droughted-field (ranging from 33.2 to 59.9 mg spike-1 day-1) conditions. Drought, on average, reduced the linear rate and duration of grain growth by 20 and 50%, respectively. Reduction in linear rate ranged from 13 to 43%. The amount of current assimilates and stem reserves contributed to grain yield was reduced, respectively, by 54 and 11% under drought. Genotypic differences in percent contribution of stem reserves to grain yield were significant in well-watered (ranging from 19.1 to 53.6%) and in droughted-field (ranging from 36.6 to 65.4%) conditions. The wheat genotypes responded differently to drought. Main spike grain yield was reduced by 43% under drought due to 26 and 11% reduction in grain weight and number of grains, respectively. Grain yield was correlated with linear grain growth under well-watered (r = 0.96) and droughted (r = 0.83) conditions. The genotypic variation observed indicates that breeding for a higher rate of linear grain growth and greater contribution of stem reserves to grain yield should be possible in wheat to stabilize grain yield in stressful environments.
Keywords: Genotypic variation; Stem water-soluble carbohydrates; Grain growth; Wheat; Grain yield; Drought

E.A. Weber, S. Graeff, W.-D. Koller, W. Hermann, N. Merkt, W. Claupein, Impact of nitrogen amount and timing on the potential of acrylamide formation in winter wheat (Triticum aestivum L.), Field Crops Research, Volume 106, Issue 1, 27 February 2008, Pages 44-52, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.011.
(http://www.sciencedirect.com/science/article/B6T6M-4R8M9CR-1/2/10d034480428fcf2b6ec19bb355fdf71)
Abstract:

Acrylamide (AA), a potential human carcinogen, is formed in strongly heated carbohydrate-rich food as a part of the Maillard reaction. The amino acid asparagine (Asn) and reducing sugars are considered to be the main precursors for AA formation. In a 2-year field trial the impact of nitrogen (N) amount and timing on the content of AA precursors and the potential of AA formation in different winter wheat cultivars (cv.) were studied in association with respective grain yields and parameters of baking quality. Depending on year, cultivar and nitrogen treatment Asn contents ranged between 4 and 18 mg 100 g-1 flour dry-matter (DM). Nitrogen treatments affecting crude protein contents in flours above 13% caused a considerable increase in free Asn. Nitrogen amounts of 220 kg N ha-1 increased the contents of free Asn by between 130% and 270% depending on year and cultivar compared to the untreated controls. A close linear correlation between the content of free Asn and the potential of AA formation (2004: R2 = 0.89, 2005: R2 = 0.83) could be observed, whereas no correlation could be found between reducing sugars and the potential of AA formation, pointing to the importance of free Asn as the limiting and thus determining factor for the AA formation potential in wheat flours. To reach high crude protein contents and good sedimentation values demanded for breadstuffs, nitrogen amounts of at least 180 kg N ha-1 were necessary. Nitrogen fertilization measures resulting in high crude protein contents above 13% enhanced the potential of AA formation by increasing the content of free Asn in flours. As long as demands from traders and producers for flour with high crude protein contents are not revised, lowering Asn contents and thus the potential for AA formation by application of N amounts below 180 kg N ha-1 and abandoning the late application of N do not appear to be successful ways to reduce the risk of AA formation in breadstuffs.
Keywords: Acrylamide formation; Wheat; Nitrogen fertilization; Free asparagine; Reducing sugars; Crude protein

Francesco Giunta, Rosella Motzo, Giovanni Pruneddu, Has long-term selection for yield in durum wheat also induced changes in leaf and canopy traits?, Field Crops Research, Volume 106, Issue 1, 27 February 2008, Pages 68-76, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.018.
(http://www.sciencedirect.com/science/article/B6T6M-4RCNJ5G-3/2/3c5ab1f00edb0f5eac57c6fe9fca09fb)
Abstract:
Over the last century, most of the genetic gain in the grain yield of Italian durum has been achieved by an increase in the harvest index and promotion of flowering time. We report the indirect effects of this long-term selection on a number of leaf and canopy traits associated with photosynthesis. In a 2-year experiment, using different sowing dates and nitrogen regimes, these characters were assessed for a set of 20 cultivars released between 1900 and 2000. Leaf area, specific leaf area, specific leaf nitrogen content and stomatal resistance were all negatively correlated with year of release, whereas canopy temperature showed a positive correlation. The substantial reduction in plant height, by which the rise in harvest index was achieved, was partly responsible for the rise in canopy temperature, acting via its effect on aerodynamic resistance. Senescence, when expressed in thermal time after anthesis, was delayed for the modern cultivars, and this delay could be associated with a greater quantity of nitrogen allocated to the grain. The association of senescence onset with earliness suggests a likely role of increased earliness in delayed senescence. The yield increase over time was correlated with a decrease in stomatal resistance and in specific leaf nitrogen content.
Keywords: Breeding; Canopy temperature; Durum wheat; Specific leaf nitrogen content; Stomatal resistance; Senescence

Fei Li, Martin L. Gnyp, Liangliang Jia, Yuxin Miao, Zihui Yu, Wolfgang Koppe, Georg Bareth, Xinping Chen, Fusuo Zhang, Estimating N status of winter wheat using a handheld spectrometer in the North China Plain, Field Crops Research, Volume 106, Issue 1, 27 February 2008, Pages 77-85, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.11.001.

(http://www.sciencedirect.com/science/article/B6T6M-4RCNJ5G-4/2/ce16928957e2ee182f9259c09f97a4fd)

Abstract:
Excessive nitrogen (N) fertilizer application is very common in the North China Plain. Diagnosis of in-season N status in crops is critical for precision N management in this area. Remote sensing, as a timely and nondestructive tool, could be an alternative to traditional plant testing for diagnosing crop N status. The objectives of this study were to determine which vegetation indices could be used to estimate N status in winter wheat (Triticum aestivum L.) under high N input conditions, develop models to predict winter wheat N uptake using spectral vegetation indices and validate the models with data from farmers' fields. An N rate experiment and a variety-N experiment were conducted in Huimin, Shandong Province from 2005/2006 to 2006/2007 to develop the models. Positive linear relationships between simple ratio vegetation indices (red vegetation index, RVI and green vegetation index, GVI) and N uptake were observed independent of growth stages and varieties (R2, 0.48-0.74). In contrast, the relationships between normalized difference vegetation indices (NDVI and GNDVI), red and green normalized difference vegetation index (RGNDI), and red and green ratio vegetation index (RGVI) were exponentially related to N uptake (R2, 0.43-0.79). Subsequently, 69 farmers' fields in four different villages were selected as datasets to validate the developed models. The results indicated that the prediction using RVI had the highest coefficient of determination (R2, 0.60), the lowest root mean square error (RMSE, 39.7 kg N ha-1) and relative error (RE, 30.5%) across different years, varieties and growth stages. We conclude that RVI can be used to estimate nitrogen status for winter wheat in over-fertilized farmers' fields before heading.
Keywords: Vegetation indices; N uptake; Over-fertilization; Field spectrometer

Fanny Alvaro, Julio Isidro, Dolors Villegas, Luis F. Garcia del Moral, Conxita Royo, Old and modern durum wheat varieties from Italy and Spain differ in main spike components, Field Crops Research, Volume 106, Issue 1, 27 February 2008, Pages 86-93, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.11.003.
(http://www.sciencedirect.com/science/article/B6T6M-4RCNJ5G-5/2/e34e8dfa52f1253200d12b4dfd58ce7a)

Abstract:
Four field experiments comparing 24 durum wheat varieties grown at different periods during the 20th century in Italy and Spain were carried out to assess the changes caused by breeding activities on the number of grains per main spike and its determinants: number of spikelets per spike, number of grains per spikelet, fertile flowering and grain setting. Increases of 0.14 grains spike-1 year-1 (0.43% year-1 in relative terms) and 0.08 grains spike-1 year-1 (0.22% year-1) were observed in Italian and Spanish varieties, respectively. The overall change in the number of grains per spike in Italian germplasm (29.5%) was due to increases in both, the number of spikelets per spike (7.5%) and the number of grains per spikelet (20.3%), while in Spanish varieties the increase in the number of grains per spike (19.5%) was only attributed to the improvement of the number of grains per spikelet. The increase in the number of fertile florets per spike (about 12%) was similar in both countries, but while it explained more than 70% of the changes in the number of grains per spike in Spanish varieties, grain setting was responsible for most of the improvement in the number of grains per spike in the Italian germplasm. The percentage of florets setting grains was 68 and 64% in modern Italian and Spanish varieties, respectively. Most of the changes in the number of grains per spikelet were found in the upper part of the spike on Italian varieties, whilst they were more evenly distributed in the Spanish ones. The main achievement derived from the introduction of the Rht-B1 dwarfing gene was an increase in the number of grains per spikelet, but it did not have any effect on the number of spikelets on the main spike. The lack of genetic associations between grain setting and both the number of

spikelets per spike and the number of fertile florets per spike suggests that future yield gains may be obtained through increases in the three components independently.
Keywords: Number of grains per spike; Number of spikelets per spike; Number of grains per spikelet; Fertile florets; Grain setting; Rht genes

Jaroslav Blazek, Les Copeland, Pasting and swelling properties of wheat flour and starch in relation to amylose content, Carbohydrate Polymers, Volume 71, Issue 3, 8 February 2008, Pages 380-387, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.06.010.
(http://www.sciencedirect.com/science/article/B6TFD-4P06CG0-2/2/93b1ddcc13f49e45092966d87d57a5a9)
Abstract:
The influence of the content of total amylose, free amylose and lipid-complexed amylose, and amylopectin chain length distribution, on swelling behavior and pasting properties of wheat (Triticum aestivum L.) flour and starch from varieties with increased amylose content was investigated. These wheat starches displayed pasting properties that featured decreasing peak, breakdown and final viscosities with increasing total amylose content. Swelling power of flour was found to be a useful predictive tool of amylose content and pasting characteristics of the wheat starches. Amylopectin chains with degree of polymerization greater than 36 were correlated with increasing peak, minimum and final viscosities of starch pastes. No significant correlations were found between amylopectin chain length distribution and swelling behavior of flours and starches. The results are discussed in relation to the principles underlying swelling tests and pasting behavior of wheat starches.
Keywords: Wheat starch; Pasting; Swelling; Amylose content; Amylopectin chain length distribution

Su-Juan LI, Ji-Kang CHEN, Fu CHEN, Lin LI, Hai-Lin ZHANG, Characteristics of Growth and Development of Winter Wheat Under Zero Tillage in North China Plain, Acta Agronomica Sinica, Volume 34, Issue 2, February 2008, Pages 290-296, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60013-9.
(http://www.sciencedirect.com/science/article/B94TW-4T5JDPK-8/2/f66456463e9691fffbd979f64abdb23d)
Abstract:
To evaluate the growth and development of winter wheat under zero-tillage treatment in the North China Plain, an experiment using a winter wheat (Triticum aestivum L.) cultivar Kenong 9204, with 3 tillage treatments, including conventional tillage with stubble incorporation (CT), rotary tillage with residue returning (RT), and zero tillage with stubble direct drilling (ZT), was conducted in the Luancheng Ecological Experimental Station of the Chinese Academy of Sciences during the 2004-2006 growing seasons. For keeping a similar rate of seedling emergence in all treatments, the seeding rate was increased from 165.0 kg ha-1 (in CT and RT treatments) to 262.5 kg ha-1 in ZT treatment. In addition to the characteristics of growth and development of wheat, the plough layer temperature and soil water content were also measured. The basic seedling and tillers in the 3 treatments ranked significantly as ZT < RT < CT ($P <= 0.05$), but the percentage of seed-setting tillers in the ZT treatment was higher than that in the CT treatment. The number of basic seedlings in ZT was lower than that in CT by 28.9% and 11.7% in the 2004-2005 and 2005-2006 growing seasons, and lower than that in RT by 11.7% and 10.0%, respectively. The plant height, leaf area index, dry weight of wheat shoot, and grain yield were the lowest in the ZT treatment because of deficient population. In the ZT treatment, the maximum leaf area indices were 2.9 and 6.0, respectively, in both growing seasons. The grain yield of ZT reduced by 30.1% and 27.2% compared with that of CT and decreased by 15.3% and 25.2% when compared with that of RT, in the 2 growing seasons, respectively. In the ZT treatment, the water content in 0-30 cm soil layer was significantly higher ($P < 0.05$) than that in the CT treatment during the whole growing period.

The topsoil temperature was the lowest in the ZT treatment from seedling to revival stages, indicating that ZT had a 'lower temperature effect', which delayed the emergence and revival of seedlings and reduced the tillering rate in the winter wheat. The time of seedling emergence and revival in ZT was 1-3 and 4-5 d later than that in CT and RT, respectively.
Keywords: zero tillage; winter wheat; growth and development; North China Plain

Li-li ZHANG, Yan-bin ZHANG, Qing-jie SONG, Hai-bin ZHAO, Hai-yang YU, Chun-li ZHANG, Wen-li XIN, Zhi-min XIAO, Study on the Quality of NILs of Wheat cv. Longfumai 3 Possessing HMW-GS Null and 1 Subunits, Agricultural Sciences in China, Volume 7, Issue 2, February 2008, Pages 140-147, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60033-4.
(http://www.sciencedirect.com/science/article/B82XG-4S09P2M-2/2/f8c881f003214c48ef4b09f231eb1af5)
Abstract:
To determine the genetic differences between high molecular weigh glutenin subunits (HMW-GS) null and 1. HMW-GS 1 was introduced into Longfumai 3 (N, 7+8, 5+10) by 5 consecutive backcrosses with biochemical marker assisted selection. The near isogenic lines (NILs) of HMW-GS null and 1 were obtained and planted in the experimental field of Crop Breeding Institute of Heilongjiang Academy of Agricultural Science in 2004 and 2005. The field experiments were designed using the method of two-line contrast arrangement with four replicates. The result of two years experiment showed that the statistic differences of quality parameters between Longfumai 3 with subunit 1 and with null were not significant in flour protein content, dry gluten content, and water absorption. However the gluten index; Zeleny sedimentation, the ratio of sedimentation/dry gluten, the development time, stability, and the breakdown time in the NIL with 1 subunit were increased by 5.8% ($P<0.01$), 9.3% ($P<0.01$), 8.6% ($P=0.01$), 127.3% ($P<0.01$), 79.2% ($P<0.01$), and 53.6% ($P<0.01$), and the ratio of wet gluten/dry gluten and the degree of softening were decreased by 1.7% ($P = 0.05$) and 16.5% ($P = 0.13$), respectively. The impact of the HMW-GS 1 on the gluten strength was highly positive in NILs containing HMW-GS 5+10, suggesting that HMW-GS 1 can be an indispensable subunit for breeding strong gluten wheat.
Keywords: wheat; quality; gluten; near-isogenic lines (NILs)

Rui-guo CAI, Min ZHANG, Yan-ping YIN, Ping WANG, Ti-bin ZHANG, Feng GU, Zhong-min DAI, Tai-bo LIANG, Yun-hai WU, Zhen-lin WANG, Photosynthetic Characteristics and Antioxidative Metabolism of Flag Leaves in Responses to Nitrogen Application During Grain Filling of Field-Grown Wheat, Agricultural Sciences in China, Volume 7, Issue 2, February 2008, Pages 157-167, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60035-8.
(http://www.sciencedirect.com/science/article/B82XG-4S09P2M-4/2/0c1f4b8ddaa6465e25bacfa366bf2370)
Abstract:
A two-factorial experiment was conducted with two wheat cultivars, SN1391 (large spike and large grain) and GC8901 (multiple spike and medium grain), and two nitrogen (N) application rates (12 and 24 g N m-2), to investigate the responses of photosynthetic characteristics and antioxidative metabolism to nitrogen rates in flag leaves of field-grown wheat during grain filling. The results showed that the content of N and chlorophyll (Chl) in wheat flag leaves decreased after anthesis and the net photosynthetic rate (Pn), effective quantum yield of PS II ([Phi]PS II), efficiency of excitation capture by open PS II reaction centers (Fv'/Fm'), and photochemical quenching coefficient (qp) began to decrease at 14 days after anthesis. However, the maximal efficiency of PS II photochemistry (Fv/Fm) decreased slightly until the late period of senescence and the nonphotochemical quenching coefficient (NPQ) increased during flag leaves' senescence. As a result, a conflict came into being between absorption and utilization to light energy in flag leaves during senescence, which might accelerate the senescence of flag leaves. Compared with GC8901, the lower plant population of SN1391 during grain filling was helpful to maintain the

higher content of photosynthetic pigment, activity of PS II, and Pn in flag leaves during senescence. The delayed decrease in antioxidative enzyme activity and the lower degree of membrane lipid peroxidation in the senescing leaves of SN1391 were beneficial to protect the photosynthetic apparatus, which lead to the prolonged duration of CO2 assimilation. With the increase of N application, the Chl content of SN1391 flag leaves and the efficiency of excitation captured by open PS II centers increased. At the same time, the thermal dissipation in SN1391 flag leaves at high N (HN) treatment decreased and [Phi]PS II improved greatly, which were favorable to the increase of Pn. The SOD, POD, CAT and APX activities in the flag leaves of SN1391 increased markedly at HN treatment, indicating that these enzymes could clean more active oxygen and decrease the degree of membrane lipid peroxidation. In this way, the ability of SN1391 to protect photosynthetic apparatus was improved with the increase of N. In the HN treatment, the decreased activity of PS II and increased thermal dissipation resulted in the decline of Pn in flag leaves of GC8901. Meanwhile, the decreased antioxidative enzyme activities and the increased degree of membrane lipid peroxidation had indirect and unfavorable influences on CO2 assimilation. This implied that the conflict between absorption and utilization to energy in senescing leaves was an important reason which induced and accelerated the senescence of wheat leaves in the field. The photosynthetic characteristics and antioxidative metabolism of flag leaves during grain filling were markedly different among wheat cultivars. The effects of nitrogen rate on the photosynthetic and senescent characteristics of flag leaves also varied with wheat cultivars.

Keywords: wheat (Triticum aestivum L.); photosynthetic characteristics; antioxidative metabolism; nitrogen

Xiang-shun HU, Hui-yan ZHAO, Zu-qing HU, Dong-hong LI, Yu-hong ZHANG, EPG Comparison of Sitobion avenae (Fab.) Feeding Behavior on Three Wheat Varieties, Agricultural Sciences in China, Volume 7, Issue 2, February 2008, Pages 180-186, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60037-1.
(http://www.sciencedirect.com/science/article/B82XG-4S09P2M-6/2/0379879cf5d42a5eead3c441829f2209)

Abstract:
This article was to study the potential resistance mechanism of three different wheat varieties (Ww2730, Xiaoyan 22 and Batis) in the seedling stage to Sitobion avenae. The aphid feeding behavior was ascertained by stylet penetration activities monitoring using the electrical penetration graph (EPG) technique. When the aphids feed on Ww2730 seedlings, the time for the 1st duration probing was later than that on Xiaoyan 22 and Batis significantly, and the number of interrupted probing before the 1st duration probing was more than that on Xiaoyan 22 and Batis significantly, and the 1st duration probing was shorter than that on Xiaoyan 22 and Batis significantly. The durations of the stylet pierce from the extra- to the intra-cellular (pd II-1) on Ww2730 and Xiaoyan 22 were longer than those on Batis significantly. The duration of the potential drop (pd) in C wave on Ww2730 was longer than that on Xiaoyan 22 and Batis significantly. The times and duration of the G wave (ingestion in xylem) on Ww2730 were more and longer than those on Xiaoyan 22 and Batis significantly. The times of spot G wave on Batis was more than that on Ww2730 significantly, but the duration of spot G was shorter than that on Xiaoyan 22 and Ww2730 significantly. The total time of E1 wave, the longest duration of E1 fractions, and the mean duration time of E1 fractions that followed E2 wave on Xiaoyan 22 and Batis were all significantly longer than those on Ww2730. There was no difference of the mean duration of the 1st E1 wave on the 3 varieties, but the mean durations of other E1 wave on Ww2730 and Xiaoyan 22 were shorter than those on Batis significantly. The other wave parameters, including times and durations of F and E2 were all not different on the 3 wheat varieties. It is suggested that the resistance mechanism of wheat variety Ww2730 to S. avenae is a restriction factor of feeding in epidermis, the thicker cell wall in mesophyll, and secondary metabolites or nutrition unbalance in phloem in the seedling phase. The

resistance mechanism of Xiaoyan 22 is thicker cell wall and more cell layer in mesophyll in the seedling phase. The feeding strategy of S. avenae against the resistance of Ww2730 was to shorten the second duration of secrete watery salivation to xylem than the first.
Keywords: wheat; Sitobion avenae; resistance mechanism; electrical penetration graph (EPG); feeding behavior

Nasib Qureshi, Badal C. Saha, Ronald E. Hector, Stephen R. Hughes, Michael A. Cotta, Butanol production from wheat straw by simultaneous saccharification and fermentation using Clostridium beijerinckii: Part I--Batch fermentation, Biomass and Bioenergy, Volume 32, Issue 2, February 2008, Pages 168-175, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.07.004.
(http://www.sciencedirect.com/science/article/B6V22-4PFDPGN-2/2/f68284bdadf50a5e51069717129969f0)
Abstract:
Five different processes were investigated to produce acetone-butanol-ethanol (ABE) from wheat straw (WS) by Clostridium beijerinckii P260. The five processes were fermentation of pretreated WS (Process I), separate hydrolysis and fermentation of WS to ABE without removing sediments (Process II), simultaneous hydrolysis and fermentation of WS without agitation (Process III), simultaneous hydrolysis and fermentation with additional sugar supplementation (Process IV), and simultaneous hydrolysis and fermentation with agitation by gas stripping (Process V). During the five processes, 9.36, 13.12, 11.93, 17.92, and 21.42 g L-1 ABE was produced, respectively. Processes I-V resulted in productivities of 0.19, 0.14, 0.27, 0.19, and 0.31 g L-1 h-1, respectively. It should be noted that Process V resulted in the highest productivity (0.31 g L-1 h-1). In the control experiment (using glucose), an ABE productivity of 0.30 g L-1 h-1 was achieved. These results suggest that simultaneous hydrolysis of WS to sugars and fermentation to butanol/ABE is an attractive option as compared with more expensive glucose to ABE fermentation. Further development of enzymes for WS hydrolysis with optimum characteristics similar to fermentation would make conversion of WS to butanol/ABE even more attractive.
Keywords: Butanol; Acetone-butanol-ethanol (ABE); Wheat straw; Clostridium beijerinckii P260; Saccharification; Fermentation

Nasib Qureshi, Badal C. Saha, Michael A. Cotta, Butanol production from wheat straw by simultaneous saccharification and fermentation using Clostridium beijerinckii: Part II--Fed-batch fermentation, Biomass and Bioenergy, Volume 32, Issue 2, February 2008, Pages 176-183, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.07.005.
(http://www.sciencedirect.com/science/article/B6V22-4PF0X7R-4/2/f6caad9fbfa08dac09362f5f4289b481)
Abstract:
In these studies, Clostridium beijerinckii P260 was used to produce butanol (acetone-butanol-ethanol, or ABE) from wheat straw (WS) hydrolysate in a fed-batch reactor. It has been demonstrated that simultaneous hydrolysis of WS to achieve 100% hydrolysis to simple sugars (to the extent achievable under present conditions) and fermentation to butanol is possible. In addition to WS, the reactor was fed with a sugar solution containing glucose, xylose, arabinose, galactose, and mannose. The culture utilized all of the above sugars. It was noticed that near the end of fermentation (286-533 h), the culture had difficulties utilizing xylose. As a result of supplemental sugar feed to the reactor, ABE productivity was improved by 16% as compared with previous studies. In our previous experiment on simultaneous saccharification of WS and fermentation to butanol, a productivity of 0.31 g L-1 h-1 was observed, while in the present studies a productivity of 0.36 g L-1 h-1 was observed. It should be noted that a productivity of 0.77 g L-1 h-1 was observed when the culture was highly active. The fed-batch fermentation was operated for 533 h. It should be noted that C. beijerinckii P260 can be used to produce butanol from WS in integrated fermentations.

Keywords: Wheat straw; Butanol or acetone-butanol-ethanol (ABE) fermentation; Hydrolysis; Productivity; Yield; Clostridium beijerinckii P260

Andrea Maiorano, Massimo Blandino, Amedeo Reyneri, Francesca Vanara, Effects of maize residues on the Fusarium spp. infection and deoxynivalenol (DON) contamination of wheat grain, Crop Protection, Volume 27, Issue 2, February 2008, Pages 182-188, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.05.004.
(http://www.sciencedirect.com/science/article/B6T5T-4P2J2YN-1/2/1d249d233bd88619c3cf2de27e659c65)
Abstract:
Fusarium head blight (FHB) of small grains is a worldwide spread disease that reduces yield, causes mycotoxin production in grain and reduces seed quality. Previous crop residues such as maize stalks and grain, and straw of barley, wheat, and other cereals are considered the principal inoculum sources for Fusarium graminearum and Fusarium culmorum, the most important Fusarium spp. causing FHB in Europe. The residues present on the soil surface and in the first 10 cm of soil in tilled and not tilled fields were quantified and their relative influence on Fusaria infection and deoxynivalenol contamination was evaluated. The total amount of residues in the first layer of the soil (10 cm) and on its surface was found to be correlated with DON contamination (R2=0.848), but ANOVA showed that tillage was not significant (P>0.05) and that the major role in Fusarium spp. infection and DON contamination was played mainly by the residues lying on the surface of the soil (P<0.05). These results were used to evaluate management strategies of four different previous crop residues by comparing their effectiveness in reducing crop residues from the surface of the soil and the consequent contamination and their costs.
Keywords: Deoxynivalenol; Previous crop residues; Fusarium head blight; Wheat; Tillage

J. Ryan, M. Pala, S. Masri, M. Singh, H. Harris, Rainfed wheat-based rotations under Mediterranean conditions: Crop sequences, nitrogen fertilization, and stubble grazing in relation to grain and straw quality, European Journal of Agronomy, Volume 28, Issue 2, February 2008, Pages 112-118, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T67-4P7FHVP-1/2/d30b1057cb21361429cad4e64ca9871c)
Abstract:
Crop rotations have evolved as a strategy to obtain harvestable yields in stressed environments due to improved water-use efficiency, nitrogen (N) fixation, and breaking diseases cycles. While fallowing or growing legume crops in the alternate year have shown to consistently increase yields in semi-arid environments such as in the Mediterranean area, little emphasis has been given to cereal quality in rotation trials, especially with respect to N, and thus improved animal and human nutrition. This paper reports the effect of those treatments on cereal quality parameters, especially N, and thus protein, in wheat grain and straw in a long-term (14 years) rainfed cropping systems trial in the medium rainfall zone (300-400 mm year-1) in northern Syria that examined seven alternative-year options with durum wheat (Triticum turgidum var durum), i.e., vetch (Vicia sativa), medic (Medicago spp.), chickpea (Cicer arietinum), lentil (Lens culinaris), fallow, watermelon (Citrullus vulgaris) as a summer crop in the fallow year, and continuous wheat. Two ancillary treatments involved N fertilization (0, 30, 60, 90 kg N ha-1) in the cereal phase, and stubble grazing management (moderate and heavy grazing, and no grazing or stubble retention). Both the rotation and N treatments had a significant influence on all parameters (test weight, grain and straw N percentage, and total N uptake). By comparison, grazing management had little influence on quality parameters except test weight; however, the residue x N interaction was significant. Rotations such as those with medic and vetch enriched the N in grain and straw. These rotations thus improved the nutritional value in terms of protein of the grain, an important consideration as per capita consumption of bread is high in the Middle East and other sources of protein are limited.

Similarly, as grazed or fed straw is dominant in the diet of sheep, the enhanced nutrition is of significance. While fallow produced the highest yields, and is a hedge against the effects of drought, it produces grain and straw of low nutritional value with respect to protein, as a result of dilution of available soil N in the increased biomass. Though less obvious than yield, crop quality parameters should be considered in any cropping system involving rotations, especially those involving legumes.
Keywords: Mediterranean agriculture; Cereal cropping; Crop rotation; Grain/straw quality

Laura Ercoli, Leonardo Lulli, Marco Mariotti, Alessandro Masoni, Iduna Arduini, Post-anthesis dry matter and nitrogen dynamics in durum wheat as affected by nitrogen supply and soil water availability, European Journal of Agronomy, Volume 28, Issue 2, February 2008, Pages 138-147, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.06.002.
(http://www.sciencedirect.com/science/article/B6T67-4P6TH6M-2/2/f5e14834f3bd26bda712650791053408)
Abstract:
Durum wheat (Triticum durum Desf.) is commonly grown in dryland conditions, where environmental stress during grain filling can limit productivity and increase the dependency on stored assimilate. We investigated current assimilation and remobilization of dry matter and nitrogen during grain filling in N fertilized and unfertilized durum wheat subjected to different levels of water deficit during grain filling. Two durum wheat varieties, Appio and Creso, were grown in open-air containers with three rates of nitrogen fertilizer (not applied, N0; normal amount, NN; high amount, NH) and four water regimes during grain filling (fully irrigated treatment, FI; low, LWS, moderate, MWS and high water stress, HWS) across 2 years. Grain yield and dry matter and N accumulation and remobilization were positively affected by N availability and negatively by water stress during grain filling. The reduction of grain yield by severe post-anthesis water stress amounted to 27 and 37% for N0 and NN, respectively, and was associated with a decrease in kernel weight. There was also a small negative effect on the number of kernels per spike. Conversely, the duration of grain filling was not modified either by water stress or by nitrogen treatments. Severe water stress also reduced dry matter accumulation and remobilization by 36 and 14% in N0 plants and by 48 and 25% in NH plants. Similarly, N accumulation and N remobilization was reduced by 43% and by 16% in N0 plants and by 51% and by 15% in NH plants. Conversely, low and moderate water stress did not substantially modify the patterns of dry matter and nitrogen deposition in grain. Although remobilization of dry matter and N was less affected by water stress than accumulation, it was not able to counterbalance the reduction of assimilation and consequently it was not able to stabilize grain yield under drought.
Keywords: Accumulation; Remobilization; Water stress

Markus Herndl, Jeffrey W. White, L.A. Hunt, Simone Graeff, Wilhelm Claupein, Field-based evaluation of vernalization requirement, photoperiod response and earliness per se in bread wheat (Triticum aestivum L.), Field Crops Research, Volume 105, Issue 3, 1 February 2008, Pages 193-201, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.002.
(http://www.sciencedirect.com/science/article/B6T6M-4R5G86N-1/2/8f151b69cb7a9f80224e5a2b7eaa939a)
Abstract:
Vernalization requirement, photoperiod response and earliness per se (EPS) of bread wheat cultivars are often determined using controlled environments. However, use of non-field conditions may reduce the applicability of results for predicting field performance as well as increase the cost of evaluations. This research was undertaken, therefore, to determine whether field experiments could replace controlled environment studies and provide accurate characterization of these three traits among winter wheat cultivars. Twenty-six cultivars were evaluated under field conditions using two natural photoperiod regimes (from different transplanting dates) and vernalization pre-

treatments. Relative responses to vernalization (RRVGDD) and photoperiod (RRPGDD) were quantified using the reciprocal of thermal time to end of ear emergence, whereas earliness per se was estimated by calculating thermal time from seedling emergence until end of ear emergence for fully vernalized and lately planted material. An additional index based on final leaf numbers was also calculated to characterize response to vernalization (RRVFLN). To test whether the obtained indices have predictive power, results were compared with cultivar parameters estimated for the CSM-Cropsim-CERES-Wheat model Version 4.0.2.0. For vernalization requirement, RRVGDD was compared with the vernalization parameter P1V, for photoperiod (RRPGDD), with P1D, and for earliness per se, EPS was compared with the sum of the component phase durations. Allowing for variation in EPS in the calibration improved the relation between observed versus simulated data substantially: correlations of RRPGDD with P1D increased from r2 = .34 ($p < .01$), to .82 ($p < .001$), and of RRVGDD with P1V, from r2 = .88 ($p < .001$), to .94 ($p < .001$). In comparisons of observed versus simulated anthesis dates for independent field experiments, the estimated model coefficients resulted in an r2 of .98 ($p < .001$) and root mean square error of 1d. Overall, the results indicated that combining planting dates with vernalization pre-treatments can permit reliable, quantitative characterization of vernalization requirement, photoperiod response and EPS of wheat cultivars. Furthermore, emphasize the need for further study to clarify aspects that determine EPS, including whether measured EPS varies with temperature or other factors.
Keywords: Earliness per se; Anthesis; Modeling; Photoperiod; Vernalization

M.J. Robertson, G. Lyle, J.W. Bowden, Within-field variability of wheat yield and economic implications for spatially variable nutrient management, Field Crops Research, Volume 105, Issue 3, 1 February 2008, Pages 211-220, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.005.
(http://www.sciencedirect.com/science/article/B6T6M-4R70BRY-1/2/b7ccdd8f009db140e38c19179e7a37df)
Abstract:
Economic justification for varying fertiliser inputs to match crop yield potential of different areas or zones in fields is limited by lack of understanding of the relationship between the extent of within-field yield variation and economic gains from zone versus uniform management. We conducted a survey of yield monitor data from 199 fields on the northern sandplain of the wheatbelt in Western Australia in order to document the extent of sub-field yield variation and test if variation is related to attributes such as yield and field area. The economic significance to zone management of the yield variation found in the survey along with variation in size of management zones, costs and prices, and soil fertility status was then assessed using a simple nutrient response model.
Considerable variation occurred in yield within fields. Standard deviation varied from 0.2 to 1.2 t/ha and the difference in yield between the highest and lowest yielding thirds of each field varied from 0.5 t/ha in the least to 3.3 t/ha in the most variable field. Both small and large (10-172 ha), and low and high (0.6-4.9 t/ha) yielding fields exhibited variation that was potentially worth managing from an economic standpoint. Model results showed that the larger the difference in potential yield between zones, the greater the economic benefit from zone management. While yield contrast within fields can be increased with more zones, the economic advantage of more zones was small for the cases studied here. The potential economic benefits (from <$5 to $44/ha) increased with higher grain and fertiliser prices and depended on levels of soil nutrients in the different zones. Capturing the full value of the economic benefits in practice requires an accurate indication of yield potential in the different zones at the time when the fertiliser decision is being made. Yield maps can be utilised by growers to give estimates of within-field variation in yield potential and hence potential economic gains from variable rate application of fertiliser.
Keywords: Precision agriculture; Zone management; Yield potential; Economics; Nutrient requirement; Nitrogen; Phosphorus; Model

Olaf Erenstein, Umar Farooq, R.K. Malik, Muhammad Sharif, On-farm impacts of zero tillage wheat in South Asia's rice-wheat systems, Field Crops Research, Volume 105, Issue 3, 1 February 2008, Pages 240-252, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.10.010.
(http://www.sciencedirect.com/science/article/B6T6M-4R7F449-1/2/235d24b7ea5defae8c7ea54ffa67466a)
Abstract:
The recent slow down in productivity growth in the irrigated areas of the Indo-Gangetic Plains of South Asia has led to a quest for resource-conserving technologies that can reduce production costs, save water and improve production. Findings from farm surveys are used to evaluate the on-farm impacts of zero tillage (ZT) wheat in the rice-wheat systems of India's Haryana state and Pakistan's Punjab province. ZT-induced effects primarily apply to the establishment and production costs of the wheat crop. Both study sites confirmed significant ZT-induced resource-saving effects in farmers' fields in terms of diesel, tractor time and cost savings for wheat cultivation. Water savings are, however, less pronounced than expected from on-farm trial data. It was only in Haryana, India that there were significant ZT-induced water savings in addition to significant yield enhancement. The higher yield and water savings in Haryana, India result in significantly higher water productivity indicators for ZT wheat. In both sites, there are limited implications for the overall wheat crop management, the subsequent rice crop and the rice-wheat system as a whole. The combination of a significant 'yield effect' and 'cost-saving effect' makes adoption worthwhile and provide a much needed boost to the returns to wheat cultivation in Haryana, India. In Punjab, Pakistan, ZT is primarily a cost-saving technology for wheat cultivation. The prime driver for ZT adoption is not water savings or natural resource conservation but monetary gain in both sites. Water savings are only a potential added benefit.
Keywords: Zero tillage; Wheat; Rice-wheat systems; Impact; Survey; Indo-Gangetic Plains; India; Pakistan

C.L. Gerez, S. Cuezzo, G. Rollan, G. Font de Valdez, Lactobacillus reuteri CRL 1100 as starter culture for wheat dough fermentation, Food Microbiology, Volume 25, Issue 2, February 2008, Pages 253-259, ISSN 0740-0020, DOI: 10.1016/j.fm.2007.10.011.
(http://www.sciencedirect.com/science/article/B6WFP-4R2RMVF-1/2/b48adae060c1e3acd6f90f769a33e0d9)
Abstract:
The effect of sucrose on the fermentation balance of Lactobacillus reuteri CRL 1100 and the invertase activity of this strain in wheat dough and culture medium (MRSs) was evaluated. The enzyme activity was dependent on the environmental pH releasing glucose and fructose from sucrose hydrolysis. Glucose was used as carbon source, while fructose was mainly used as electron acceptor to produce mannitol up to 10 h of fermentation. Thereafter, fructose seemed to be metabolized by the heterofermentative pathway, which determined an increase in the concentration of acetate (6 mmol l-1), lactate (2 mmol l-1) and ethanol (1 mmol l-1) and the lack of mannitol formation after glucose depletion. The fermentation balance of Lb. reuteri CRL 1100 during the dough fermentation resulted in lower (63%) ethanol, higher (75%) acetate production and soluble carbohydrates concentrations, like MRSs cultures. This fermentation profile would be important to obtain an optimal growth of yeast and the optimal bread flavor and taste.
Keywords: Lactobacillus reuteri; Sucrose fermentation; Wheat dough

Maria Consuelo Palacios, Monica Haros, Cristina M. Rosell, Yolanda Sanz, Selection of phytate-degrading human bifidobacteria and application in whole wheat dough fermentation, Food Microbiology, Volume 25, Issue 1, February 2008, Pages 169-176, ISSN 0740-0020, DOI: 10.1016/j.fm.2007.06.001.
(http://www.sciencedirect.com/science/article/B6WFP-4P47GGM-1/2/34b815bfe71586433a05091883a5ba92)

Abstract:
Lately, whole wheat products are highly recommended from their healthy properties. However, the presence of phytic acid (InsP6) could partly limit their benefits because it decreases the mineral bioavailability due to its chelating properties. The objective of this work was to select strains with high phytate-degrading activity from human feces, and evaluate their suitability for the bread making process. Twenty-three different bifidobacterial strains (13 from infants and 10 from adults) were isolated, belonging to the species Bifidobacterium longum, Bifidobacterium breve and Bifidobacterium catenulatum. The phosphatase and phytase activities of these strains were evaluated as well as their ability to degrade InsP6 during growth. Then, the fermentative ability of the strain showing the highest phytate-degrading activity (B. longum. BIF307) was determined in whole wheat breadmaking. The use of the selected bifidobacterial strain as starter during whole wheat fermentation resulted in bread with similar technological quality than the control (in absence of bifidobacteria) and crumb with lower levels of inositol phosphates. Therefore, the used of the selected Bifidobacterium strain in whole wheat breadmaking process could provide potential nutritional benefits by decreasing the antinutrient content of the product.
Keywords: Whole wheat bread; Bifidobacterium; Fermentation; Phytic acid

Valentijn R.N. Pauwels, Wim Timmermans, Alexander Loew, Comparison of the estimated water and energy budgets of a large winter wheat field during AgriSAR 2006 by multiple sensors and models, Journal of Hydrology, Volume 349, Issues 3-4, 1 February 2008, Pages 425-440, ISSN 0022-1694, DOI: 10.1016/j.jhydrol.2007.11.016.
(http://www.sciencedirect.com/science/article/B6V6C-4R6B2WH-1/2/7c50f13e6fcd437894a8146682dd0cbe)
Abstract: Summary
An accurate understanding of the behavior of the water and energy balance terms in agricultural areas is of interest for a number of different disciplines. The objective of this paper is to use a multi-sensor and multi-model approach to study the water and energy budget of a winter wheat field in North-Eastern Germany. The study has been performed as part of the AgriSAR 2006 campaign. A Large Aperture Scintillometer (LAS) and a Bowen-Ratio Energy Balance (BREB) installation have been used to analyze the energy balance. Soil moisture profiles were continuously monitored at a number of depths. It has been found that the LAS and BREB estimates of the sensible heat flux are consistent during daytime, but that during nighttime the LAS estimates are approximately 100 Wm-2 lower than the BREB estimates. This may be explained by the effect of the uncertainty in the stability functions for stable conditions on the LAS results. Further, generally low Bowen ratio values, in the order of 0.5, were obtained, even during very hot, dry days. This implies that the evapotranspiration rates are determined by the moisture content of the deeper soil layers. The soil moisture values of the upper and lower soil layers become decoupled under dry conditions. Two commonly used hydrologic models, PROMET and TOPLATS, were applied during the study period. PROMET reproduces the soil moisture profile slightly better than TOPLATS, while the latter model simulates the partitioning of the energy balance slightly better. This can be explained by the manner in which the energy and water balances are solved by both models. Overall, the results suggest that the evapotranspiration rates of the winter wheat field are not correlated with the surface soil moisture values, that these surface soil moisture values are not correlated with the lower soil moisture values under dry conditions, and that commonly used hydrologic models can reproduce these observations.
Keywords: Energy balance; Soil moisture; TOPLATS; PROMET; Bowen ratio; Scintillometer

Zoran Ristic, Urska Bukovnik, Ivana Momcilovic, Jianming Fu, P.V. Vara Prasad, Heat-induced accumulation of chloroplast protein synthesis elongation factor, EF-Tu, in winter wheat, Journal of Plant Physiology, Volume 165, Issue 2, 1 February 2008, Pages 192-202, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.03.003.

(http://www.sciencedirect.com/science/article/B7GJ7-4NP9K6V-2/2/54c8805a3dbd4f9f91ea36f72e78b4c3)
Abstract: Summary
Chloroplast protein synthesis elongation factor, EF-Tu, has been implicated in heat tolerance in maize (Zea mays). Chloroplast EF-Tu is highly conserved, and it is possible that this protein may be of importance to heat tolerance in other species including wheat (Triticum aestivum). In this study, we assessed heat tolerance and determined the relative levels of EF-Tu in mature plants (at flowering stage) of 12 cultivars of winter wheat experiencing a 16-d-long heat treatment (36/30 [degree sign]C, day/night temperature). In addition, we also investigated the expression of EF-Tu in young plants experiencing a short-term heat shock (4 h at 43 [degree sign]C). Heat tolerance was assessed by examining the stability of thylakoid membranes, measuring chlorophyll content, and assessing plant growth traits (shoot dry mass, plant height, tiller number, and ear number). In mature plants, relative levels of EF-Tu were determined after 7 d of heat stress. High temperature-induced accumulation of EF-Tu in mature plants of all cultivars, and a group of cultivars that showed greater accumulation of EF-Tu displayed better tolerance to heat stress. Young plants of all cultivars but one did not show significant increases in the relative levels of EF-Tu. The results of the study suggest that EF-Tu protein may play a role in heat tolerance in winter wheat.
Keywords: Chloroplast EF-Tu; Heat stress; Heat tolerance; Triticum aestivum

Fuminori Kobayashi, Shigeo Takumi, Chiharu Nakamura, Increased freezing tolerance in an ABA-hypersensitive mutant of common wheat, Journal of Plant Physiology, Volume 165, Issue 2, 1 February 2008, Pages 224-232, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.11.004.
(http://www.sciencedirect.com/science/article/B7GJ7-4MW900N-2/2/1ef002fcce8e830a7f705c1032ced4e6)
Abstract: Summary
To study role of abscisic acid (ABA) in cold acclimation and cold/freezing tolerance in wheat, we analyzed an ABA-hypersensitive mutant of Triticum aestivum, named ABA27. ABA-hypersensitivity in ABA27 was confirmed by bioassays involving germination and seedling growth and expression analysis of ABA-responsive genes in comparison with the parental cultivar `Chihoku-komugi' (Chihoku). ABA27 showed significantly increased freezing tolerance in seedlings without cold acclimation. ABA-treated seedlings of ABA27 accumulated more transcripts of ABA-responsive genes Cor/Lea and their putative transcription factor (TF) genes than Chihoku under both normal and low-temperature (LT) conditions. Non-ABA-regulated Cor/Lea transcripts showed higher accumulation in ABA27 also under normal temperature. These results suggest that the elevated ABA sensitivity in ABA27 contributes to the improved freezing tolerance through increased expression of the ABA-regulated LT signal pathway. Based on these and previous results obtained in an ABA-less-sensitive mutant, it is suggested that both positive and negative regulation of ABA response is involved in the basic mechanism of freezing tolerance in wheat.
Keywords: ABA; Cold acclimation; Cor/Lea; Freezing tolerance; Wheat (Triticum aestivum)

Shigeo Takumi, Chisa Shimamura, Fuminori Kobayashi, Increased freezing tolerance through up-regulation of downstream genes via the wheat CBF gene in transgenic tobacco, Plant Physiology and Biochemistry, Volume 46, Issue 2, February 2008, Pages 205-211, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2007.10.019.
(http://www.sciencedirect.com/science/article/B6VRD-4R0CK2W-2/2/06cdbbc258a7b0ad58fc1ba031d64d74)
Abstract:
The wheat (Triticum aestivum L.) CBF gene family is assumed to play important roles in development of low-temperature and freezing tolerance through activation of the downstream Cor/Lea genes. However, no direct evidence shows association of the wheat CBF genes with stress tolerance or any interaction between wheat CBF transcription factors and Cor/Lea gene

activation. Here, we introduced Wcbf2, one of the wheat CBF genes, into the tobacco (Nicotiana tabacum L.) genome. Expression of Wcbf2 significantly increased the level of freezing tolerance in the transgenic tobacco plants without phenotypic retardation, and altered the expression patterns of tobacco genes, including cold-responsive genes. A transgenic tobacco plant expressing Wcbf2 was crossed to other transgenic plants expressing a GUS reporter gene under control of the wheat Cor/Lea gene promoter. Analysis of the F1 plants showed that the WCBF2 protein positively regulated at least the expression of Wdhn13 and Wrab17. These results strongly indicate that WCBF2 functions as a transcription factor in the development of freezing tolerance in common wheat.
Keywords: CBF transcription factor; Cor/Lea genes; Differential display; Freezing tolerance; Transgenic plant; Triticum aestivum L

Zong-Bo Qiu, Xiao Liu, Xiang-Jun Tian, Ming Yue, Effects of CO2 laser pretreatment on drought stress resistance in wheat, Journal of Photochemistry and Photobiology B: Biology, Volume 90, Issue 1, 30 January 2008, Pages 17-25, ISSN 1011-1344, DOI: 10.1016/j.jphotobiol.2007.09.014.
(http://www.sciencedirect.com/science/article/B6TH0-4PWSYBC-1/2/7962d8719583651dd3e4b074ed483c09)
Abstract:
In order to determine the role of laser in drought stress resistance of spring wheat (Triticum aestivum L.), seed embryos were exposed to CO2 laser radiation for 0 min, 1 min, 3 min and 5 min, respectively, and when the seedlings were 12 days old they were treated with 10% (w/v) PEG6000 solution for 10 days. Changes in the concentration of malondialdehyde (MDA), hydrogen peroxide (H2O2), glutathione (GSH), ascorbate (AsA), oxidized glutathione (GSSG), carotenoid, zeaxanthin, the production rate of superoxide radical , the activities of ascorbate peroxidase (APX), peroxidase (POD), catalase (CAT), superoxide dismutase (SOD), glutathione reductase (GR), glutathione peroxidase (GP), glutathione-S-transferase (GST) and the growth parameters of seedlings (plant height, leaf area and dry weight) were measured to test the effects of laser pretreatment. The results showed that suitable laser pretreatment of embryos enhanced drought stress resistance in wheat seedlings by decreasing the concentration of MDA and H2O2, GSSG, the production rate of , leaf area and increasing the activities of APX, GST, GP and POD and AsA, carotenoid and zeaxanthin concentration. It is suggested that those changes in MDA, H2O2, anti-oxidative enzymes and anti-oxidative compounds were responsible for the increase in drought stress resistance observed in the experiments. The results also showed that the laser had a long-term positive physiological effect on the growth of drought stress seedlings. This is the first investigation reporting the use of CO2 laser pretreatment to enhance drought stress resistance of spring wheat.
Keywords: CO2 laser; Wheat (Triticum aestivum L.); Drought stress; Anti-oxidative enzymes; Anti-oxidative compounds

Faqir Muhammad Anjum, Ijaz Ahmad, Masood Sadiq Butt, Muhammad Umair Arshad, Imran Pasha, Improvement in end-use quality of spring wheat varieties grown in different eras, Food Chemistry, Volume 106, Issue 2, 15 January 2008, Pages 482-486, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.06.011.
(http://www.sciencedirect.com/science/article/B6T6R-4P1G9SN-1/2/aba552ff002ca19474cc4062a7a72df9)
Abstract:
Evaluation of wheat cultivars from different eras allows scientists to determine changes in agronomic and end-use quality characteristics associated with grain yield and end-use quality improvement over time. Forty-four spring wheat cultivars introduced or released since 1933 were evaluated for quality improvement using canonical variant analysis. It was observed that there was a considerable improvement in protein content from 1933 to 1964 whereas the genetic potential for

straight grade flour protein from 11.34% in 1933-1964 to 12.13% in 1991-1996. Crude protein increased by 6.95% from 1933 to 1996. Ash content and flour yield declined by 9.55% and 5.51%, respectively. Total chapati scores of modern cultivars were 8.97% higher than those of cultivars grown earlier. The average spread ratio and overall cookie scores increased almost 5.53% and 4.44%, respectively from 1933 to 1996. It was also observed that overall cookie scores were highest during the period 1981-1990. The average dry gluten and total chapati scores of varieties grown since 1991 were approximately 10.20% and 74.72% respectively, which were 4.72% and 8.97% higher than those of cultivars grown since 1933. Average spread ratio and overall cookie scores increased almost 5.53% and 4.44% from 1933 to 1996, respectively. The era (1991-1996) containing the modern varieties showed a substantial improvement in lysine content than the era containing the oldest wheat varieties. Similarly amino acid score was also found to be 4.26% higher than the varieties released during the period 1933-1964.
Keywords: Improvement; End-use quality; Spring wheat varieties; Canonical variant analysis

Jing Wang, Baoguo Sun, Yanping Cao, Yuan Tian, Xuehong Li, Optimisation of ultrasound-assisted extraction of phenolic compounds from wheat bran, Food Chemistry, Volume 106, Issue 2, 15 January 2008, Pages 804-810, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.06.062.
(http://www.sciencedirect.com/science/article/B6T6R-4P4FV90-1/2/721931b5a5f8b3bdfb55bf44dfa29b09)
Abstract:
Wheat bran, an important by-product of the cereal industry, is rich in potentially health-promoting phenolic compounds. In this paper, the phenolic compounds from wheat bran were extracted by ultrasound-assisted extraction technology. The experiments were carried out according to a five level, three variable central composite rotatable design (CCRD), and the best possible combination of solvent concentration, extraction temperature and extraction time with the application of ultrasound, for maximum extraction of phenolic compounds from wheat bran, was obtained, through response surface methodology (RSM). The optimum extraction conditions were as follows: ethanol concentration, 64%; extraction temperature, 60 [degree sign]C; and extraction time, 25 min; and the extraction time was the most significant parameter for the process. Under the above-mentioned conditions, the experimental total phenolic content was 3.12 mg gallic acid equivalents/g of wheat bran tested, which is well matched with the predicted content.
Keywords: Central composite rotatable design; Phenolic compounds; Ultrasound extraction; Wheat bran

Carine Massaux, Marianne Sindic, Jonathan Lenartz, Georges Sinnaeve, Bernard Bodson, Andre Falisse, Pierre Dardenne, Claude Deroanne, Variations in physicochemical and functional properties of starches extracted from European soft wheat (Triticum aestivum L.): The importance to preserve the varietal identity, Carbohydrate Polymers, Volume 71, Issue 1, 5 January 2008, Pages 32-41, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.05.012.
(http://www.sciencedirect.com/science/article/B6TFD-4NTB974-1/2/3e74759e91b4a8b91eff85b6746fe3cc)
Abstract:
The quality valuation of wheat is based on characteristics like yield, specific weight, protein content and protein quality. Until now, the starch properties are rarely considered as a quality criterion. In this study, we showed the influence of wheat cultivars (Triticum aestivum L.) and culture year on the intrinsic properties of starch, extracted from European wheat grown in the same conditions. For example, starch damage varied from 13.2 to 19.9 CDU in function of the cultivars and contribution of the B-type starch granules (<10 [mu]m) to the total volume ranged from 11.6% to 29.9%. Starch viscosity at 95 [degree sign]C, characterized with [alpha]-amylase inactivation by 2 mM AgNO3 addition, varied from 276.5 to 351.5 BU with the wheat cultivars. It is apparent from this study that starch properties were principally influenced by the wheat cultivar and slightly by the

culture year. A good relationship between the pasting properties of whole flour and starch were finally established, showing the important role of starch in the whole flour viscosity. A thorough working knowledge of starch properties could lead to an appropriate selection of wheat cultivar, well-adapted to industrial end uses, without encountering processing or end-products quality problems and with most cost-competitive production.
Keywords: BU, Brabender units; CDU, Chopin-Dubois units; cP, Centipoise units; LSD, least significant differences; NSP, non-starch polysaccharide; RVA, rapid visco analyser; UDMSO, urea-dimethyl sulfoxide; Wheat starch; Extraction; Functional properties; Whole flour

R.A. Fischer, The importance of grain or kernel number in wheat: A reply to Sinclair and Jamieson, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 15-21, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.002.
(http://www.sciencedirect.com/science/article/B6T6M-4NP9KDN-1/2/2abaf0574111f6a52c26ac8d0712c739)
Abstract:
This paper is a response to Sinclair and Jamieson [Sinclair, T.R., Jamieson, P.D., 2006. Grain number, wheat yield, and bottling beer: an analysis. Field Crops Res. 98, 60-67] who propose that bulk carbon and nitrogen accumulation are fundamental to grain yield determination in wheat (Triticum aestivum L.), while challenging the common approach to yield through the separate processes of grain number determination, followed by grain filling, as governed by source-sink balance then. The response focuses on yield determination under potential conditions for which genetic and agronomic progress is clearly associated with increased grain number, herein abbreviated to KNO (kernels m-2). It argues that grain yield in modern cultivars is still limited by post-anthesis sink (KNO) and that understanding KNO determination is therefore useful for predicting physiological routes to higher yield. KNO determination appears to be strongly related to dry matter accumulation in spikes at anthesis (g m-2), governed by events in the last 20-30 days before anthesis, while some modern cultivars show higher grain number per unit spike weight. Post-anthesis photosynthesis and crop dry weight accumulation have increased as KNO has increased with breeding. There is no evidence for effects of N on KNO apart from those operating via dry matter accumulation, or for grain N demand limiting post-anthesis photosynthesis. Beyond this simple model, several other linkages that might exist between the pre- and post-anthesis periods are explored. Such linkages could help maintain the balance between the post-anthesis sink and the source required to fill the sink, and constitute common underlying processes which to some extent reconcile the model of Sinclair and Jamieson (2006) with current mainstream thinking about grain yield in wheat. Reports of an increasing amount of pre-anthesis carbohydrate reserves in the crop with breeding progress is a good example, but overall it is concluded that at least under potential conditions, the commonly accepted approach to grain yield determination is not invalidated by Sinclair and Jamieson (2006).
Keywords: Wheat; Kernel number; Grain number; Grain yield; Source-sink

T.R. Sinclair, P.D. Jamieson, Yield and grain number of wheat: A correlation or causal relationship?: Authors' response to 'The importance of grain or kernel number in wheat: A reply to Sinclair and Jamieson' by R.A. Fischer, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 22-26, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.07.003.
(http://www.sciencedirect.com/science/article/B6T6M-4PK8G0M-1/2/305b55598f312663a42085353578d9f6)
Abstract:
R.A. Fischer offered a spirited defense of the concept that grain number is a basic cause in determining wheat yield. While grain number is often well correlated with yield, we interpret grain number as a consequence of the ability of a crop to accumulate resources, particularly carbon and nitrogen. In this response paper, we clarify points of agreement and disagreement with Fischer. A

basic point of agreement is that resource accumulation prior to anthesis is critical to determining grain number. On the other hand, an important point of disagreement is the hypothesis that after anthesis a key regulation of yield formation somehow passes to a dependence on grain number. Experimental evidence shows that yield is fundamentally driven by carbon and nitrogen resource accumulation essentially independent of grain number.
Keywords: Carbon accumulation; Grain number; Grain yield; Nitrogen accumulation; Photosynthesis

Pierre Bancal, Positive contribution of stem growth to grain number per spike in wheat, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 27-39, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.06.008.
(http://www.sciencedirect.com/science/article/B6T6M-4PKP4CJ-1/2/c042308db5ba21714f8673be485e87b1)
Abstract:
This paper challenges the common belief that spike:stem competition determines grain number in wheat. A field experiment was conducted using three contrasting treatments (high shoot density, shading, and extended photoperiod) and six genotypes of varying earliness and spike:stem ratio. Floret primordia were counted in medium and top spikelets of main spikes throughout stem elongation. Floret death occurred simultaneously in both spikelets, and the corresponding critical time was used for comparison with growth analysis. Whole shoot growth rate was highest at the time of floret death, but both stem and spike growth continued to accelerate for a period of time thereafter. Spike respiration measurements did not indicate special requirements at the critical time. Spike carbohydrate concentration started to decline more or less before floret death, depending on genotype, but exactly at the inflexion time for spike elongation, thus suggesting a developmental process rather than a trophic limitation. Multiple correlation indicated that grain number positively correlated not only with spike growth rate at the time of floret death, but with both growth rates of spike and non-spike (stem + leaves) shoot parts. Grain number was poorly predicted by partitioning to spike of either shoot dry mass or shoot growth rate at critical time. In contrast, floret surviving proportion was highly correlated to partitioning and multiple correlation did not indicate a significant effect on survival of non-spike growth rate. It is concluded that even though spike:stem competition decreased floret survival, it was only loosely correlated to grain number.
Keywords: Floret death; Grain number; Spike:stem competition; Wheat

Shou-Chen Ma, Bing-Cheng Xu, Feng-Min Li, Wen-Zhao Liu, Zhan-Bin Huang, Effects of root pruning on competitive ability and water use efficiency in winter wheat, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 56-63, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.07.005.
(http://www.sciencedirect.com/science/article/B6T6M-4PMT5MK-1/2/dbd4d127b813e228d2a68199725bfde2)
Abstract:
This study was conducted to assess the effect of root system size and vertical distribution on competitive ability and water use efficiency (WUE) by root pruning at the stem elongation stage. The field experiments were carried out from 2004 to 2005 and 2005 to 2006 in the Loess Plateau regions, China. Root pruning succeeded in reducing root dry weight in the upper soil (0-20 cm soil layer), resulting in diminished total root weight in root pruned wheat ($p < 0.05$). Root pruning restrained stomatal conductance and transpiration of wheat at the stem elongation stage. However, both stomatal conductance and transpiration in root pruned plants were higher than those in control plants at the anthesis and grain filling stages. Root pruned wheat plants had a higher photosynthetic and lower root respiration rate than wheat plants in the control plot at the anthesis and grain filling stages, which resulted in a higher proportion of photosynthate being

allocated to the shoots and an increased harvest index. Competitive ability was investigated using de Wit replacement series. There were no significant differences in shoot dry weight and grain yield between root pruned and control plots, but the root pruned wheat was less productive and had a lower relative yield compared with the control in the mixture field. The relative spike number of root pruned wheat decreased significantly in the mixture plots. Root pruned wheat had significantly higher dry mass per stem than control in the monoculture plot. In the mixture plot, the dry mass per stem of root pruned wheat tended to decrease with increase in plant density of the control wheat. The differences between root pruned and control wheat plants mentioned above showed that the competitive ability of root pruned wheat was lower than that of control wheat in mixture plots. It is an important result in this study that root pruning lowered water consumption significantly and improved the WUE of winter wheat. In conclusion, the current study showed that root pruning improved the WUE of winter wheat significantly by lowering the root biomass in the upper soil layer, which further demonstrated the speculation from different wheat cultivars that breeding of wheat varieties has unknowingly increased WUE and harvest index by reducing the root system size in the upper soil layer.
Keywords: Winter wheat (Triticum aestivum); Root pruning; Root system size; Competitive ability; Water use efficiency (WUE)

S. Asseng, S.P. Milroy, M.L. Poole, Systems analysis of wheat production on low water-holding soils in a Mediterranean-type environment: I. Yield potential and quality, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 97-106, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.08.003.
(http://www.sciencedirect.com/science/article/B6T6M-4PSJT09-1/2/8f0cd630dba03f58c9b79eb32565b82c)
Abstract:
Wheat grain yields, grain protein and grain size are often variable in a Mediterranean-type environment due to large rainfall variability. Grain yields are often low due to low N inputs as a result of large uncertainties of rainfall, particularly during the latter part of the season. Larger amounts of N fertiliser might increase yields and also grain protein in such environments but could have negative effects on grain size. A systems analysis approach was taken, using the APSIM-Nwheat crop model, to assess potential yield, grain protein concentration and grain size of wheat across a range of conditions. Rainfall and temperature varied with location. Soil type, different amounts of initial stored water and a range of management options, including varying sowing dates and N fertiliser applications, were also considered. In Australia, penalties for small grain size are based on `screenings': the percentage of grain to pass through a 2 mm sieve. A new routine was developed for the model describing the relationship between screenings percentage and average simulated grain size.
At low rainfall locations, 30 mm of plant-available soil water at seeding gave a significant increase in grain yield (>20%) above that for no soil water. At high rainfall locations there was little effect (<7%). Three typical coarse textured soils had similar yields at low N supplies but soils with higher plant-available water-holding capacity responded more to N applications and thus at high N applications achieved higher grain yields. Above average rainfall from May to September in combination with below average temperatures resulted in the highest simulated yields. However, seasons with an average amount of in-seasonal rainfall but with rainfall well distributed throughout the season also had above average yields. Applications of small amounts of N (30 kg N/ha) caused a slight reduction in grain protein concentration, but higher N applications (>30 kg N/ha) resulted in increased protein and screenings. Nevertheless, with moderate N (60 kg N/ha) applications and early sowing, the proportion of years with low grain protein (<10%) and low screenings (<2%) was still more than two-thirds.
Simulated average yields of a location increased with average rainfall but declined with increasing average temperature of a location. This allowed the development of a simple rule of thumb in

which average grain yields can be related to the rainfall/temperature index of a location. The simulation analysis showed that there is potential to increase current farmer yields through higher and split N applications on light soils in Mediterranean-type environments without increasing average screenings above 3%. However, grain protein concentrations are likely to be low in most seasons on low water-holding soils.
Keywords: APSIM; Rainfall; Soil water; Sandy soils; Simulation; Screenings; Variability

K.M. Murphy, J.C. Dawson, S.S. Jones, Relationship among phenotypic growth traits, yield and weed suppression in spring wheat landraces and modern cultivars, Field Crops Research, Volume 105, Issues 1-2, 2 January 2008, Pages 107-115, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.08.004.
(http://www.sciencedirect.com/science/article/B6T6M-4R008J8-1/2/f2ce37079a072d7c6c70f6a84e40f2fe)
Abstract:
Economic costs and the potential for unintended environmental effects of herbicides have led to an increasing emphasis by crop breeders on selecting for weed suppression ability (WSA). Genetic variation for traits conducive to crop competitiveness against weeds may be concentrated in historical cultivars and landraces that were selected before the widespread use of crop protection chemicals. We evaluated 63 spring wheat landraces and modern cultivars for 5 potential competition traits, including plant height, leaf area index (LAI), juvenile growth habit (JGH), coleoptile length and 1000 kernel weight (TKW), and for the ability of these cultivars to achieve high yields, suppress weeds and withstand mechanical cultivation. Differences were found among the 63 spring wheat cultivars for grain yield, weed weight and all 5 growth habit traits ($P < 0.001$). Yield was negatively correlated with coleoptile length ($P < 0.001$), and positively correlated with plant height, JGH, TKW and LAI ($P < 0.01$). Negative associations were found between weed weight and plant height ($P < 0.001$) and weed weight and coleoptile length ($P < 0.05$). Multiple regression analyses showed that plant height was responsible for 7% of the variation in weed weight, while coleoptile length, JGH, TKW and LAI had no direct effect on weed weight. Plant height, TKW and LAI were responsible for 38% of the variation in yield. There was no genotype x treatment effect for mechanical cultivation on yield; however, a genotype x treatment interaction existed for effect of mechanical cultivation on weed weight ($P < 0.05$). Ten cultivars showed reduced yield, six cultivars showed improved WSA, and three cultivars showed reduced WSA under the mechanical tillage treatment. Regression analysis showed an increase in yield ($r2 = 0.52$) and a slight decrease in WSA ($r2 = 0.10$) over the past 150 years. The top five cultivars for WSA reduced weed weight by 573% over the bottom five cultivars. Our results indicate that direct selection would be most effective for tolerance to mechanical tillage, while indirect selection on plant height may be effective in improving WSA.
Keywords: Weed suppression ability; Genotype x tillage interaction; Low-input farming; Plant breeding; Historical cultivars; Landraces

Yan YANG, Xian-Lin ZHAO, Yong ZHANG, Xin-Min CHEN, Zhong-Hu HE, Zhuo YU, Lan-Qin XIA, Evaluation and Validation of Four Molecular Markers Associated with Pre-harvest Sprouting Tolerance in Chinese Wheat, Acta Agronomica Sinica, Volume 34, Issue 1, January 2008, Pages 17-24, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60002-4.
(http://www.sciencedirect.com/science/article/B94TW-4T5JDPH-2/2/5a463c3f41444a3809ca522fee9c69c0)
Abstract:
Four preharvest sprouting (PHS) tolerance-associated markers MST101, wmc104, Xgwm155, and Vp1B3, were used to screen 95 Chinese landraces and historical varieties of wheat (Triticum aestivum L.), and aimed at assessing the efficiency of these markers in selecting genotypes with higher PHS tolerance. Among the 95 genotypes tested, 57, 19, and 19 accessions had

germination indexes (GI) of less than 30%, 30-60%, and over 60%, respectively. The relationships between the variation of the PCR products of the 4 markers and germination indexes of the tested materials were analyzed. Variations at Vp1B3 and Xgwm155 were associated with PHS response, but the sequence-tagged site (STS) marker MST101 and sequence-tagged microsatellite site (STMS) marker wmc104 were not. Vp1B3 was more effective than Xgwm155 for selecting PHS resistant varieties. The selection efficiency will be improved if both markers are used.
Keywords: bread wheat; pre-harvest sprouting; molecular marker; Vp1B3; Xgwm155; MST101; wmc104

Dong-Wei GUO, Gan HU, Mao-Yun SHE, Lian-Cheng LI, Ming CHEN, Zhao-Shi XU, You-Zhi MA, Identification of Wheat Chromosomes Sorted by Flow Cytometry, Acta Agronomica Sinica, Volume 34, Issue 1, January 2008, Pages 89-94, ISSN 1875-2780, DOI: 10.1016/S1875-2780(08)60004-8. (http://www.sciencedirect.com/science/article/B94TW-4T5JDPH-4/2/a2fb177f2667773f35407ddeb71486a8)
Abstract:
Construction of chromosome-specific BAC library plays an important role for simplifying sequencing, physical mapping, and gene cloning of plant with complex genome such as common wheat (Triticum aestivum L.), and identification of sorted chromosomes is a vital step of library construction. Based on previous studies, the identification of chromosomes (arms) 6VS, 3B, and 7BL sorted from ditelosomic and normal wheat were performed through fluorescence in situ hybridization (FISH), primed in situ DNA labeling (C-PRINS), and PCR amplification methods, respectively. The results indicated that all these methods could efficiently identify the flow sorted chromosomes. Chromosome staining before flow sorting and chromosome damage from physical shear force during suspension of chromosome preparation and flow sorting did not impact obviously the results of identification. Amongst the 3 methods, PCR is the fastest one with good repetition, and better for rapid determination of the constitution of chromosomal peaks on the univariate flow karyotype histogram, but there are no visible signals hybridized on the sorted chromosomes and the purity of sorted chromosomes cannot be determined in this method. FISH can provide a visible and repetitive result and is suitable for identifying the purity of the sorted chromosomes, but it is time-consuming, complex, and obligatory for special probes. C-PRINS, combining the advantages of FISH and PCR, has the potential for chromosomes identification, although the hybridization signal was not stable enough and its repetition was not satisfactory at present. If combined with in situ hybridization in suspension, C-PRINS is probably a new way for chromosome flow sorting.
Keywords: wheat chromosome; flow sorting; PCR; C-PRINS; FISH

Sven Marhan, Dmitry Demin, Martin Erbs, Yakov Kuzyakov, Andreas Fangmeier, Ellen Kandeler, Soil organic matter mineralization and residue decomposition of spring wheat grown under elevated CO2 atmosphere, Agriculture, Ecosystems & Environment, Volume 123, Issues 1-3, January 2008, Pages 63-68, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.04.001. (http://www.sciencedirect.com/science/article/B6T3Y-4NVK1ND-1/2/b55c1fe556f5f1695a0c3e1bf93531a7)
Abstract:
The influence of elevated atmospheric CO2 concentrations ([CO2]) on the decomposition of spring wheat (Triticum aestivum L. cv. Triso) residues remaining in the soil after harvest was simulated in a microcosm incubation experiment in the lab. Undisturbed soil cores with and without visible wheat residues were taken in the third year after establishment from a Mini-free-air carbon dioxide enrichment (FACE) system, in which we used 13C-depleted CO2 to determine the contribution of plant-derived carbon to overall carbon mineralization. The Mini-FACE system is located on a Gleyic Cambisol near Hohenheim (Baden-Wurttemberg, Germany). Carbon dioxide production and leaching of nitrogen and inorganic and organic carbon were measured during 191 days of

incubation. Rates of CO2 production were generally highest in all treatments during the first two weeks of the incubation and this was followed by a steady decrease until day 58. After this day mineralization rates declined only weakly until the end of the incubation. Cumulative carbon mineralization was similar in the two treatments without visible wheat residues, but significantly lower in the elevated (-19.0%) versus ambient [CO2] treatment with visible plant residues (significant [CO2] x residue interaction; F1,13 = 7.17; P = 0.019). This result demonstrated reduced decomposition of wheat residues grown under elevated [CO2]. The contribution of plant-derived carbon to soil respiration was highest in the beginning, followed by a steady decrease until the end of the incubation. Irrespective of incubation time, the amount of mineralized, plant-derived carbon was higher in the treatment with visible wheat residues. Leaching of inorganic carbon (DIC) tended to be affected by [CO2] (F6,8 = 4.50; P = 0.057), with more DIC leached in the elevated [CO2] treatment without (+47.2%) and with visible plant residues (+29.5%) than in the respective ambient CO2 treatments. The amount of carbon potentially sequestered as DIC in the wheat cropping system was small compared to the effects of elevated [CO2] on the amounts and decomposition of plant residues. Increased input of plant residues and reduced decomposition of plant-derived carbon are discussed as possible mechanisms for enhanced carbon sequestration under elevated atmospheric CO2 concentration.
Keywords: Soil respiration; Litter decomposition; FACE; Agroecosystems

Y. Lan, F.O. Opapeju, C.M. Nyachoti, True ileal protein and amino acid digestibilities in wheat dried distillers' grains with solubles fed to finishing pigs, Animal Feed Science and Technology, Volume 140, Issues 1-2, 1 January 2008, Pages 155-163, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2007.02.004.
(http://www.sciencedirect.com/science/article/B6T42-4NCK298-1/2/1de1d33f2f19bcefb65f7c6fe8033e4f)
Abstract:
As wheat dried distillers' grains with solubles (WDDGS) become increasingly available in western Canada, there is currently a great interest in evaluating its potential as a feedstuff for pigs. Thus, the apparent, standardized and true ileal crude protein (CP) and amino acid (AA) digestibilities in WDDGS were determined. Six finishing pigs (~82 kg initial BW) fitted with a simple T-cannula at the distal ileum were fed diets containing either 400 g/kg WDDGS or 50 g/kg casein as the sole protein source in a simple crossover design. Chromic oxide (3 g/kg) and acid insoluble ash (AIA, 10 g/kg) were included in the diets as indigestible markers. The casein diet was used to quantify endogenous protein and AA losses. Standardized ileal CP and AA digestibilities were estimated using published basal endogenous protein and AA losses. Pigs were acclimatized to their diets for 5 days followed by a continuous 12-h digesta collection period on days 6 and 7. Ileal CP and AA digestibility coefficients obtained with AIA as a marker were similar to those obtained with Cr2O3 (P>0.05). Endogenous losses, coefficient of apparent ileal digestibility and coefficient of true ileal digestibility in g/kg dry matter intake were 22.81, 0.64 and 0.79 for CP, 0.94, 0.73 and 0.89 for arginine, 0.41, 0.68 and 0.79 for histidine, 0.46, 0.73 and 0.81 for isoleucine, 0.59, 0.78 and 0.83 for leucine, 0.54, 0.36 and 0.56 for lysine, 0.10, 0.71 and 0.77 for methionine, 0.32, 0.82 and 0.86 for phenylalanine, 0.89, 0.62 and 0.78 for threonine and 0.59, 0.71 and 0.79 for valine. Of all the essential AA analyzed, lysine had the lowest digestibility value, which suggests reduced availability of this AA.
Keywords: Amino acids; Digestibility; Wheat dried distillers' grains with solubles; Pigs

Nico Eisenhauer, Sven Marhan, Stefan Scheu, Assessment of anecic behavior in selected earthworm species: Effects on wheat seed burial, seedling establishment, wheat growth and litter incorporation, Applied Soil Ecology, Volume 38, Issue 1, January 2008, Pages 79-82, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.07.002.

(http://www.sciencedirect.com/science/article/B6T4B-4PF0X8C-1/2/4060356f5a192ec95b2e45075391119d)
Abstract:
Anecic earthworm species function as ecosystem engineers by structuring the soil environment, incorporating large amounts of litter and seeds into soil and, thereby influence the composition of plant communities. The aim of the present greenhouse experiment was to investigate the effects of three apparently anecic earthworm species on wheat seed burial, seedling establishment, wheat growth and litter incorporation. The three species differed substantially in their behavior and effect on plant establishment. Aporrectodea longa did not incorporate litter into the soil while Lumbricus terrestris (-69%) and Lumbricus rubellus friendoides (-75%) reduced the litter layer considerably during 9 weeks of incubation. Moreover, L. terrestris and L. rubellus friendoides buried more wheat seeds than A. longa. Fewer seeds germinated when buried by A. longa compared to L. terrestris. The behavior of L. terrestris and L. rubellus friendoides was characteristic for anecic earthworm species whereas that of A. longa rather resembled that of endogeic species. The present study is the first experimental evidence for anecic behavior in L. rubellus friendoides.
Keywords: Anecic earthworms; Lumbricus terrestris; Lumbricus rubellus friendoides; Aporrectodea longa; Plant seeds; Ecological earthworm group

Erbil Kalmis, Nuri Azbar, Hasan Yildiz, Fatih Kalyoncu, Feasibility of using olive mill effluent (OME) as a wetting agent during the cultivation of oyster mushroom, Pleurotus ostreatus, on wheat straw, Bioresource Technology, Volume 99, Issue 1, January 2008, Pages 164-169, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.11.042.
(http://www.sciencedirect.com/science/article/B6V24-4MVDVFC-3/2/58d314980a64255f5e17416277392249)
Abstract:
In this study, cultivation of oyster mushroom, Pleurotus ostreatus, on wheat straw substrate containing tap water and olive mill effluent (OME) mixture containing varying volume of OME was studied in order to investigate the feasibility of using OME as an alternative wetting agent and OME's impact on some fundamental food quality characteristics of mushrooms. Time period for mycelial colonization, primordium initiation and first harvest were comparatively evaluated with the control group. It was shown that the use of OME and tap water mixture consisting of OME up to 25% volumetrically was possible for the purpose of commercial mushroom production. Experimental results obtained from substrate containing 25% OME mixture showed no statistically significant difference compared to control group. The negative effects of increasing volume of OME in the mixture were also indicated by bioefficiency, which was found to be 13.8% for substrates wetted with 100% OME, whereas bioefficiency was 53.6% for control group. Increasing volume of OME in the mixture resulted in deformation of fruit body shape, whereas no significant difference in food quality was observed due to the higher amount of OME. This work suggested that the use of OME up to 25% as moisturizer could be considered, especially for the locations having significant number of olive mills and mushroom producers, both as an environmentally friendly solution for the safe and ecological disposal of OME and a practical way for recovering OME's economic value thereby.
Keywords: Pleurotus ostreatus; Olive mill effluent; Waste water; Food quality

Hengkui Li, Yamei Diao, Jianxin Wang, Changjun Chen, Juping Ni, Mingguo Zhou, JS399-19, a new fungicide against wheat scab, Crop Protection, Volume 27, Issue 1, January 2008, Pages 90-95, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.04.010.
(http://www.sciencedirect.com/science/article/B6T5T-4NW1H49-4/2/6c7072ce43219b92f8dd37a9f0d0df6d)
Abstract:

JS399-19, 2-cyano-3-amino-3-phenylancryic acetate, belongs to the cyanoacrylate fungicide group. The antifungal properties of this compound were tested against 12 economically important plant pathogens. Although JS399-19 strongly inhibited the mycelial growth of Fusarium graminearum, Fusarium moniliforme and Fusarium oxysporum with EC50 values of 0.126+/-0.027 [mu]g ml-1 (mean+/-standard deviation, SD), 0.459 and 3.565 [mu]g ml-1, respectively, it demonstrated little or no bioactivity against mycelial growth of other tested fungal pathogens. JS399-19 did not express cross-resistance with other well-known fungicides belonging to different chemical groups, such as benzimidazoles, ergosterol biosynthesis inhibitors, strobilurins, dithiodicarbamates and aromatic hydrocarbons, which implied that JS399-19 probably acted through a different biochemical mechanism. Results from field experiments showed that the efficacy of JS399-19 in controlling wheat scab at a treatment concentration of 562.5 g ai ha-1 was better than that of carbendazim treatment at 750 g ai ha-1. Meanwhile, in pots treated with JS399-19, the frequency of carbendazim-resistant isolates in the pathogen population was only 1.39%, while in pots treated with carbendazim, resistance frequency increased to 13.37%, and resistant isolates formed 2.91% of the population in pots that were not chemically treated. The effectiveness of JS399-19 makes it suited for controlling FHB in the field, especially in areas of China where a MBC-resistant fungal population has developed.
Keywords: Cyanoacrylate fungicide; Fusarium graminearum; Wheat scab

Mohammad Ali Baghestani, Eskandar Zand, Saeid Soufizadeh, Mohsen Beheshtian, Abdolaziz Haghighi, Alireza Barjasteh, Daryoush Ghanbarani Birgani, Reza Deihimfard, Study on the efficacy of weed control in wheat (Triticum aestivum L.) with tank mixtures of grass herbicides with broadleaved herbicides, Crop Protection, Volume 27, Issue 1, January 2008, Pages 104-111, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.04.013.
(http://www.sciencedirect.com/science/article/B6T5T-4P00RTF-1/2/fab9c7c631f00d4df7938551f801a417)
Abstract:
Field experiments were conducted in 2004-2005 to study weed control and winter wheat response to tank mixtures of a wide range of broadleaved herbicides currently applied in wheat in Iran with grass herbicides clodinafop propargyl and fenoxaprop-p-ethyl. These experiments were conducted at Gonbad, Shahroud and Dezfoul as a randomized complete block design with four replications. Herbicides were applied at wheat tillering. Results indicated that herbicide mixtures rarely resulted in antagonistic effects. Conversely, in some cases synergistic reactions were more distinct and better performance was achieved when herbicides were applied in mixture. It was found that clodinafop propargyl acted better than fenoxaprop-p-ethyl when tank mixed with broadleaved herbicides. Also, bromoxynil plus MCPA included treatments almost acted well with regard to the broadleaved weed control. Dual purpose herbicide iodosulfuron-methyl-sodium plus mesosulfuron-methyl at 21 g ai/ha was also a good option in controlling weeds. Overall, tank mixture bromoxynil plus MCPA at 600 g ai/ha with clodinafop propargyl at 96 g ai/ha resulted in the highest grain yield.
Keywords: Dual purpose herbicide; Broadleaved herbicide; Grass herbicide; Grain yield; Weed biomass; Weed population

A. Levent Tuna, Cengiz Kaya, David Higgs, Bernardo Murillo-Amador, Salih Aydemir, Ali R. Girgin, Silicon improves salinity tolerance in wheat plants, Environmental and Experimental Botany, Volume 62, Issue 1, January 2008, Pages 10-16, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.06.006.
(http://www.sciencedirect.com/science/article/B6T66-4P1G9N6-1/2/974ed80e57a8095588910f990057b483)
Abstract:
Durum wheat (Triticum durum cv. Gediz-75) and bread wheat (Triticum aestivum cv. Izmir-85) were grown in a complete nutrient solution in a growth room to investigate effect of silicone

supplied to the nutrient solution on plants grown at salt stress. The experiment was a 2 x 2 factorial arrangement with two levels of NaCl in nutrient solution, 0 and 100 mM, and two levels of silicone (Si) in nutrient solution, 0.25 and 0.50 mM, as Na2SiO3. The plants grown at 100 mM NaCl produced less dry matter and chlorophyll content than those without NaCl. Supplementary Si at both 0.25 and 0.5 mM ameliorated the negative effects of salinity on plant dry matter and chlorophyll content. Membrane permeability and proline content in leaves increased with addition of 100 mM NaCl and these increases were decreased with Si treatments. Sodium (Na) concentration in plant tissues increased in both leaves and roots of plants in the high NaCl treatment and Si treatments lowered significantly the concentrations of Na in both leaves and roots. Bread wheat was more tolerant to salinity than durum wheat. The accumulation of Na in roots indicates a possible mechanism whereby bread wheat copes with salinity in the rooting medium and/or may indicate the existence of an inhibition mechanism of Na transport to leaves. Concentrations of both Ca and K were lower in the plants grown at high NaCl than in those in the control treatment and these two element concentrations were increased by Si treatments in both shoots and roots but remained lower than control values in most cases.
Keywords: Sodium silicate; Wheat; Sodium chloride

Schahram Banedjschafie, Sharyar Bastani, Peter Widmoser, Konrad Mengel, Improvement of water use and N fertilizer efficiency by subsoil irrigation of winter wheat, European Journal of Agronomy, Volume 28, Issue 1, January 2008, Pages 1-7, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.03.004.
(http://www.sciencedirect.com/science/article/B6T67-4NVSX26-1/2/518e606b5114906f54fda31348111030)
Abstract:
Fresh water is a limited resource and its efficient use in agriculture represents a great challenge. The objective of the investigation was, to test a new subsoil irrigation technique for obtaining high grain yields and water use efficiency in comparison with furrow irrigation still used in Middle East. Clay pipes of the subsoil irrigation had a particular porosity which allowed a controlled diffusion of water out of the pipe into the soil. The pipes were imbedded into the soil at a depth of 0.3 m. The technique was tested in field trials with winter wheat (Triticum aestivum L.) in the 1992/1993 and 1993/1994 season under arid, continental climatic conditions of Persia on a representative silty loam soil. Plot size was 5 m2.
Yields were nearly twice as high under subsoil irrigation compared with furrow irrigation. With subsoil irrigation maximum grain yield (>10 Mg/ha) was already obtained with a N fertilizer rate of 50 kg N/ha. Water use efficiency (WUE) ranged from 1.64 to 3.34 in subsoil irrigation and from 0.46 to 1.2 g grain/kg water in furrow irrigation ($p < 0.001$). N release from soil was much higher under subsoil irrigation (111-216 kg N/ha) than under furrow irrigation (-11 to 33 kg N/ha). There were no significant differences between the irrigation techniques for the harvest index, single grain weight and the nitrogen fertiliser agronomic efficiency (AE). The apparent nitrogen recovery (ANR%) was high particularly in the subsoil irrigation treatments and decreased with N fertiliser rates. The question is raised whether this subsoil irrigation technique can be developed for the application on a large enough scale for crop production.
Keywords: Irrigation; Water use efficiency; Arid climate; Wheat; Grain yield

Ranjan Bhattacharyya, S. Kundu, Ved Prakash, H.S. Gupta, Sustainability under combined application of mineral and organic fertilizers in a rainfed soybean-wheat system of the Indian Himalayas, European Journal of Agronomy, Volume 28, Issue 1, January 2008, Pages 33-46, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.04.006.
(http://www.sciencedirect.com/science/article/B6T67-4NY4RXM-1/2/53ea938ead6c36a1c3b823f9f7466e8a)
Abstract:

Soybean (Glycine max L.)-wheat (Triticum aestivum L.) rotation is one of the profitable cropping systems under rainfed conditions in the sub-temperate agro-ecosystem of the Indian Himalayas. We measured the long-term sustainability of the system for farmyard manuring and mineral fertilizer input practices utilizing the trends in grain yield, partial factor productivity (PFP), agronomic efficiency (AE), benefit:cost ratio (B:C ratio), soil organic C (SOC), total N content, available nutrient (P and K) status, microbial biomass C, dehydrogenase activity, selected soil physical properties (bulk density, soil water retention and infiltration rate) and sustainable yield index (SYI). The long-term (30 years) soybean-wheat experiment was conducted at Hawalbagh, Almora, India in a sandy loam soil (Typic haplaquept) under sub-temperate climatic conditions. Every year, the nutrients were applied to the soybean crop and wheat was grown without addition of any external sources of nutrients (residual wheat). The unfertilized plot supported a 0.56 Mg soybean yield ha-1 and a 0.71 Mg wheat yield ha-1 (mean yield of 30 years). Soybean responded to inorganic NPK application and the yield increased to 0.87 Mg ha-1 with NPK. Maximum yields of soybean (2.84 Mg ha-1) and subsequent wheat (1.88 Mg ha-1) were obtained in the plots under NPK + farmyard manure (FYM) treatment.

Soybean and residual wheat yields and PFP in the plots under the unfertilized and the inorganic fertilizer treatments decreased with time, whereas they increased in the plots under N + FYM and NPK + FYM treatments for both crops. The data revealed that SYI and AE of fertilizers were also greater in plots receiving fertilizer N or NPK along with 10 Mg ha-1 FYM. Benefit:cost ratio of fertilization increased in both soybean and residual wheat for the plots under N + FYM and NPK + FYM, indicating that the benefit accruing from fertilization improved with time. After 30 years, total SOC and total N concentrations were increased in all treatments. Soils under NPK + FYM-treated plots contained higher total SOC and total N by 104% and 86% in the 0-15 cm soil layer, respectively, over that of initial soil. These differences in the total C content caused profound differences in soil physical properties. Available water capacity and water transmission characteristics in the soil were highest in the NPK + FYM treatment and lowest in the unfertilized treatments, with the mineral fertilizer treatments showing intermediate results. Combined use of NPK and FYM increased SOC, total N, Olsen P and ammonium acetate exchangeable K by 47%, 31%, 13% and 73%, respectively, in the 0-15 cm soil layer, compared to application of NPK through inorganic fertilizers. The application of NPK + FYM also showed the highest levels of soil microbial-biomass C and dehydrogenase activity. As total SOC and total N were increased after 30 years of the experiment in all the treatments, the decline in yields was probably due to a decline in available soil P and/or K. The results clearly reveal that current mineral-fertilizer recommendations are inadequate, whereas annual application of FYM along with NPK fertilizers sustains yield and soil productivity.

Keywords: Soybean-wheat; Rainfed cropping system; Sustainability index; Mineral fertilizer; Farmyard manure; Indian Himalayas

E.F. Caires, F.J. Garbuio, S. Churka, G. Barth, J.C.L. Correa, Effects of soil acidity amelioration by surface liming on no-till corn, soybean, and wheat root growth and yield, European Journal of Agronomy, Volume 28, Issue 1, January 2008, Pages 57-64, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.05.002.
(http://www.sciencedirect.com/science/article/B6T67-4P18BK3-1/2/7090d7d761dd1d92c9e136dc1ddfedfd)

Abstract:

No-till management has rapidly increased the cultivated area in Brazil. To control soil acidity in no-till systems, lime is broadcast on the surface without incorporation. The effectiveness of surface application of lime to soils under a no-till system, particularly with regard to subsoil acidity, is uncertain. Crop root growth and grain yield can be affected by chemical modifications in the soil profile due to surface lime application. A 3-year field trial examined the effect of newly and previously surface-applied lime in a long-term no-till system on the root growth and crop yield of

corn (Zea mays L.), soybean (Glycine max L. Merrill), and wheat (Triticum aestivum L.) on a loamy, kaolinitic, thermic Typic Hapludox in Parana State, Brazil. The experiment consisted of four lime treatments: (i) no lime (control); (ii) liming at 3 t ha-1 in 2000; (iii) liming at 6 t ha-1 in 1993; (iv) liming in 1993 and re-liming in 2000. Corn was grown in 2000-2001 and soybeans were grown in 2001-2002 and 2002-2003 without rainfall limitation. Wheat was grown in 2003 with a water deficit during the vegetative stage and soon after flowering.
Liming in 2000 increased pH and the content of exchangeable Ca2+, and decreased the exchangeable Al3+ level mainly in the surface layer of the soil (0-5 cm). Compared with the no lime control, liming in 1993 ameliorated soil acidity and decreased aluminum toxicity to a 60 cm depth. Liming in 2000 on the previously limed plots compared with the liming in 1993 increased pH to a 10 cm depth about 1 year after application and to a 60 cm depth 3 years after application, indicating that the surface-applied lime in 2000 moved deeper when the topsoil was only slightly acidic. Root length density and grain yields of corn and soybean were not influenced by surface liming treatments. Liming in 2000 on the previously limed plots provided increases >=100% in length density of wheat roots at 0-10 and 10-20 cm depths, and increased the wheat grain yield by over 210%. A soil exchangeable Al3+ level of 3 mmol(+) dm-3 was considered critical for wheat root growth. Wheat grain yield was well correlated with root length per soil surface area. The results suggest that aluminum toxicity is low in no-till systems during cropping seasons that have adequate and well-distributed rainfall, but in unfavorable rainfall conditions, the toxicity of aluminum severely compromises root growth and yield.
Keywords: Subsoil acidity; Aluminum toxicity; Calcium; Dolomitic lime; Root length; Conservation tillage; Tropical soil

Carlos Miralbes, Discrimination of European wheat varieties using near infrared reflectance spectroscopy, Food Chemistry, Volume 106, Issue 1, 1 January 2008, Pages 386-389, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.05.090.
(http://www.sciencedirect.com/science/article/B6T6R-4NXHCH5-1/2/645f89a0c836d07dfef7e24e70b44a6b)
Abstract:
Near infrared reflectance (NIR) spectroscopy combined with chemometrics was used to discriminate wheat varieties. A total of 249 samples of different wheat varieties from the 2003-2004 harvest were used to develop the best discriminant equation, by applying various scatters and mathematical treatments in the range of 400-2500 nm. Wheat varieties from Spain were `Sarina', `Bolero', `Berdun', `Soisson', `Chamorro', `Artur Nick', `Berdun', `Marius', `Anza', `Kalifa', and wheat varieties from France were `Galibier' and `Quality'. The equation developed with the highest accuracy had an applied scatter of weighted multiplicative scatter correction, a math treatment of 2, 15, 8 (order of derivative, gap data points over which the derivative was taken, number of data points used in performing average smoothing). The percentage of correctly identified varieties was 99.5% for the calibration sample set and 94% for the validation sample set. The results demonstrated the usefulness of NIRS combined with chemometrics as a rapid method for discrimination of European wheat varieties. Although the application of the discriminant equation developed for the 2003-2004 harvest yielded a high rate, further test measurements are necessary to evaluate the robustness of the equation.
Keywords: NIRS; Discrimination; Wheat; Varieties

Daryl Mares, Kolumbina Mrva, Late-maturity [alpha]-amylase: Low falling number in wheat in the absence of preharvest sprouting, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 6-17, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.005.
(http://www.sciencedirect.com/science/article/B6WHK-4N49VJR-3/2/11df50598d44f39b52ec766f7a2f5239)
Abstract:

Late maturity [alpha]-amylase (LMA), or prematurity [alpha]-amylase (PMAA) as it has been termed in the UK, in wheat involves the untimely synthesis of high pI [alpha]-amylase during the middle to later stages of grain development and ripening. The enzyme activity is retained in the grain at harvest ripeness, resulting in low falling number and failure to meet receival standards and customer specifications. This phenomenon, which is restricted to specific genotypes, appears to be controlled by 1 or 2 recessive genes acting alone or in combination and in most cases appears to be triggered by a temperature shock. This shock is only effective if it occurs during a window of sensitivity around 25-30 days postanthesis. Expression of LMA is reduced in the presence of dwarfing genes such as Rht1, Rht2 and Rht3 that confer insensitivity to gibberellin. Screening technologies, including molecular markers and high pI-specific ELISA, have been developed to assist wheat breeders and will be required to meet new challenges posed by novel germplasm such as primary synthetic wheats.
Keywords: Wheat; Late maturity [alpha]-amylase; Falling number

R. Haraszi, O.R. Larroque, B.J. Butow, K.R. Gale, F. Bekes, Differential mixing action effects on functional properties and polymeric protein size distribution of wheat dough, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 41-51, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.007.
(http://www.sciencedirect.com/science/article/B6WHK-4N49VJR-2/2/934b45e09d2409f3ce994a87b7d13b59)
Abstract:
A micro Z-arm mixer and a 2g-Mixograph were used to compare the effect of pin and Z-arm-type mixing actions on mixing properties of wheat flour dough. Although the two mixing curves obtained with pin- and Z-arm-type mixing action showed a very similar mixing trace, no significant correlation was found between the two mixers other than the number of revolutions required for optimal dough consistency (peak resistance). Mixing requirement was described by a rate-independent parameter, the number of revolutions to peak dough development and was found to be greater in a Z-arm mixer than in a pin mixer. Mixing requirement showed significant correlation with stability, which is therefore a dough strength parameter. The change in the polymeric structure of gluten proteins of dough as indicated by %UPP (unextractable polymeric protein percentage) was monitored and showed a smaller decrease with Z-arm mixing than with pin mixing. Therefore, pin-mixing action is more energetic than Z-arm mixing. At peak resistance, Z-arm mixing gives a larger quantity of polymeric protein content in the dough relative to pin mixing. The degree of dough development at maximum resistance in the different mixers was shown to be different. A new parameter, delta-UPPMZ (the difference between %UPP of dough obtained with pin vs Z-arm mixing actions) was identified and proposed to have some relationship to the stability of the polymeric proteins in the dough.
Keywords: Dough mixing; %UPP; Size-exclusion HPLC; Wheat gluten proteins; Mixing action; Micro Z-arm mixer; 2g-Mixograph; Mixing requirement

L. Gazza, F. Taddei, M. Corbellini, P. Cacciatori, N.E. Pogna, Genetic and environmental factors affecting grain texture in common wheat, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 52-58, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.004.
(http://www.sciencedirect.com/science/article/B6WHK-4N43RS0-2/2/65ea8a2b07288441a96b1caa3a933172)
Abstract:
Thirteen wheat cultivars grown in six locations were compared for kernel weight, protein content and grain texture, as determined by the Single Kernel Characterization System (SKCS). Moreover, puroindolines a (Pin-A) and b (Pin-B) bound to starch were quantified by densitometric scanning of A-PAGE fractionations. All cultivars shared allele Pina-D1a coding for wild-type Pin-A, and differed from each other in allele composition at Pinb-D1 coding for Pin-B. Cultivars with Pinb-D1a

exhibited soft grain and high amounts of Pin-A and Pin-B compared to cultivars with Pinb-D1b or Pinb-D1d. Significant genetic variation for grain hardness and Pin-A level was detected in soft cultivars. The ratio between Pin-A and Pin-B levels in soft cultivars was approximately 6:5, whereas it varied between 9:5 and 10:1 in hard cultivars. Protein content was significantly correlated with Pin-B content (r=0.34) and SKCS value (r=0.36) in soft wheats. Significant correlations (0.68 and 0.73 for soft and hard wheats, respectively) were observed between Pin-A and Pin-B levels. Grain hardness was not correlated with puroindoline levels and Pin-A/Pin-B ratio in both textural classes. By contrast, kernel weight was found to act as a major environmental factor affecting grain texture in both soft and hard wheats.
Keywords: Common wheat; Kernel texture; Kernel weight; Puroindolines

Gulay Mann, Simon Diffey, Helen Allen, Jennifer Pumpa, Zena Nath, Matthew K. Morell, Brian Cullis, Alison Smith, Comparison of small-scale and large-scale mixing characteristics: Correlations between small-scale and large-scale mixing and extensional characteristics of wheat flour dough, Journal of Cereal Science, Volume 47, Issue 1, January 2008, Pages 90-100, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.03.001.
(http://www.sciencedirect.com/science/article/B6WHK-4N7XP7M-2/2/850f0452fda4159c100ce0ba02eefaf8)
Abstract:
Mixing measurements provide valuable information about dough strength and stability (STAB) traits. These measurements are important in milling and baking operations, and for varietal selection in wheat breeding programmes. There are several techniques with different sample sizes used for measuring these traits so there is interest in examining the agreement between methods in terms of genotypic (varietal) rankings. This issue has been investigated by using two different mixing methods, a small-scale Mixograph (2 g) and large-scale Farinograph (50 g) using data from a doubled haploid population (190 lines) from a Chara (excellent dough strength)xWW2449 (poor dough strength) cross. The cross was grown in a field trial at the Wagga Wagga Agricultural Institute (WWAI) in 2000. Eleven mixing traits were measured and compared according to a statistical design. The estimated genetic correlation matrix for six of the 11 mixing traits, dough development time (DDT), STAB, mixing tolerance index (MTI), maximum bandwidth (MBW), bandwidth at peak resistance (BWPR) and peak resistance (PR) revealed that for these dough-strength-related parameters, both methods were measuring equivalent traits, although individual parameters had widely different coefficients of variation. In this population, PR was correlated with the extensibility trait length determined by large-scale extension testing. None of the large-scale or small-scale mixing traits was an effective predictor of the small-scale extensibility parameter extensibility at Rmax (Ext_Rmax). The data verified that small-scale Mixograph tests are a robust and efficient alternative to large-scale Farinograph tests for both commercial breeding and research.
Keywords: Small-scale Mixograph; Farinograph; Dough mixing characteristics; Dough strength traits; Rheology; Mixing; Small-scale extensibility; Statistics; Glutenin; Wheat; Genetic correlation matrix; Heritability; Wheat breeding; Rmax; Ext_Rmax

Richard H. Shukle, Mikio Yoshiyama, Philip K. Morton, Alisha J. Johnson, Brandon J. Schemerhorn, Tissue and developmental expression of a gene from Hessian fly encoding an ABC-active-transporter protein: Implications for Malpighian tubule function during interactions with wheat, Journal of Insect Physiology, Volume 54, Issue 1, January 2008, Pages 146-154, ISSN 0022-1910, DOI: 10.1016/j.jinsphys.2007.08.012.
(http://www.sciencedirect.com/science/article/B6T3F-4PKPH36-1/2/261584710120d8231bb424f4da9d7a72)
Abstract:

We report on the transcriptional patterns of a putative white (w) gene encoding an ABC-active-transporter protein during development in Hessian fly, Mayetiola destructor. The deduced amino acid sequence for the Hessian fly white showed 74-77% similarities to white/ATP-binding-cassette proteins and 52-57% similarities to scarlet/ATP-binding-cassette proteins from other dipterans. Conserved ATP-binding motifs and transmembrane [alpha]-helix segments were identified in the Hessian fly white protein further supporting its function as an ABC-active-transporter similar to the Drosophila white protein. Spatial analysis of transcript levels for white in larval Hessian fly tissues by quantitative real-time PCR revealed the greatest level of transcript in the Malpighian tubules, while analysis of temporal expression during development revealed the highest transcript levels in late 2nd- and early 3rd-instar larvae. Analysis of transcript levels for white in Hessian fly larvae feeding on susceptible and resistant wheat showed greater levels of the transcript in larvae feeding on resistant plants. We speculate the increased transcript level for white in larvae feeding on resistant wheat could be correlated with stress and increased Malpighian tubule activity associated with the metabolism and detoxification of toxic substrates generated either endogenously or encountered exogenously from the host plant.
Keywords: Mayetiola destructor; White gene; ABC-active-transporter protein; Insect/plant interactions; Malpighian tubules

YongLin Ren, Daphne Mahon, Jan van Someren Graver, Matthew Head, Fumigation trial on direct application of liquid carbonyl sulphide to wheat in a 2500 t concrete silo, Journal of Stored Products Research, Volume 44, Issue 2, 2008, Pages 115-125, ISSN 0022-474X, DOI: 10.1016/j.jspr.2007.08.001.
(http://www.sciencedirect.com/science/article/B6T8Y-4R2HKR1-7/2/111003de06fbb7182d8260b9b35a2982)
Abstract:
Wheat (Australian Standard White) with a moisture content of 10.2% was fumigated with carbonyl sulphide (COS) at a calculated application rate of 24.14 g m-3, in a sealed concrete vertical silo (3512 m3, 2500 t wheat) located at Nevertire, NSW, Australia. The COS was applied as a liquid via the top of the silo and released 2 m below the grain surface. The application of 84.5 kg of COS was completed within 30 min. With 2 h of recirculation using a 0.4 kW fan, the in-silo concentrations of COS achieved equilibrium with a concentration variation less than 5% of the mean. After a two-day exposure period, the COS concentration in the silo remained at 29 g m-3. The concentrationxtime product (Ct) was then 1900 g h m-3, and this achieved complete kill of all life stages of mixed-age cultures of Sitophilus oryzae, Rhyzopertha dominica, Tribolium castaneum and Trogoderma variabile. After 2-days exposure, the silo was aired overnight with an aeration fan (25 kW) resulting in a COS in-silo concentration of below 4 ppm. This is 2.5 times lower than the Australian Experimental Threshold Limit Value (TLV) of 10 ppm. Residues of COS in the wheat declined to below the Australian Experimental Maximum Residue Limit (MRL) of 0.2 mg kg-1 after overnight aeration. The COS was not detected in any outloading samples at concentrations above the detection limit (0.05 mg kg-1). The workspace and environmental levels of COS were monitored during application, fumigation, aeration and outloading. The levels of COS and hydrogen sulphide (H2S) were less than the detection limit of 0.1 ppm, which was 100 times lower than the TLV of 10 ppm. The treatment with COS had no affect on the wheat germination and seed colour when compared with untreated controls. Oil quality tests showed that COS had no effect on total lipid (made from treated wheat) content or the lipid colour.
Keywords: Fumigant; Fumigation; Carbonyl sulphide; Wheat; Insect; Grain storage; Residue

D. Silhacek, C. Murphy, Moisture content in a wheat germ diet and its effect on the growth of Plodia interpunctella (Hubner), Journal of Stored Products Research, Volume 44, Issue 1, 2008, Pages 36-40, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.03.004.

(http://www.sciencedirect.com/science/article/B6T8Y-4PK8MN3-1/2/651d1b796507362742f4b1dd71a1d1d2)
Abstract:
The growth rate of Plodia interpunctella larvae feeding on wheat germ was highly dependent upon the water content in the diet. The water content in a cereal diet is established by the hygroscopicity of the dietary components and the relative humidity (r.h.) in the equilibrating atmosphere. The larval growth rates on wheat germ increased with corresponding increases in r.h. over the range of 40-85%. Similar changes in r.h. had a measurable, albeit minimal, impact on the time required for embryonic development and egg hatch. The water content of wheat germ was further increased by supplementing the germ with the humectant, glycerol. The larval growth rate increased with each incremental increase in dietary water content irrespective of whether it resulted from increases in r.h. or glycerol. However, glycerol supplementation provided an additional boost to the growth rate that was in addition to and distinct from the dietary water increase.
Keywords: Moisture; Wheat germ; Diet; Growth; Plodia interpunctella

David Aldred, Victoria Cairns-Fuller, Naresh Magan, Environmental factors affect efficacy of some essential oils and resveratrol to control growth and ochratoxin A production by Penicillium verrucosum and Aspergillus westerdijkiae on wheat grain, Journal of Stored Products Research, Volume 44, Issue 4, 2008, Pages 341-346, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.03.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4SSGCMG-2/2/31be28e00dd9d581d4a3f189573462d0)
Abstract:
This study determined the efficacy of three essential oils (bay, clove and cinnamon oil) and the antioxidant resveratrol (0-500 [mu]g g-1) on the control of growth and ochratoxin A (OTA) production by Penicillium verrucosum and Aspergillus westerdijkiae (=A. ochraceus) under different water activity (aw, 0.90, 0.95, 0.995), and temperature (15, 25 [degree sign]C) conditions on irradiated wheat grain. The most effective treatment (resveratrol) was then tested on natural grain. The ED50 values for growth inhibition by the oils were 200-300 [mu]g g-1 at the aw and the temperatures tested. For resveratrol, this varied from <50 [mu]g g-1 at 0.90-0.95 aw to >350 at 0.995aw at both temperatures. The ED50 values for the control of OTA were slightly lower than for control of growth, with approx. 200 [mu]g g-1 required for the oils and 50-100 [mu]g g-1 of the antioxidant, at 0.90/0.95aw and both temperatures. In wet grain (0.995aw), higher concentrations were required. For growth there were statistically significant effects of single-, two- and three-way interactions between treatments except for concentrationxtemperature and concentrationxtemperaturexessential oil/antioxidant treatment. For OTA control, statistically significant treatments were aw, temperaturexaw, concentrationxtemperature, treatmentxconcentration, and three-way interaction of concentrationxawxtreatment for P. verrucosum and A. westerdijkiae. Subsequent studies were done with the best treatment (resveratrol, 200 [mu]g g-1) on natural wheat grain with either P. verrucosum or A. westerdijkiae at 0.85-0.995aw and 15/25 [degree sign]C over 28 days storage. This showed that the populations of the mycotoxigenic species and OTA contamination could be reduced by >60% by this treatment at the end of the storage period.
Keywords: Essential oils; Antioxidants; Water activity; Temperature; Ochratoxin; Fungal growth; Wheat grain; Environment

Christos G. Athanassiou, Nickolas E. Palyvos, Thomae Kakouli-Duarte, Insecticidal effect of Steinernema feltiae (Filipjev) (Nematoda: Steinernematidae) against Tribolium confusum du Val (Coleoptera: Tenebrionidae) and Ephestia kuehniella (Zeller) (Lepidoptera: Pyralidae) in stored wheat, Journal of Stored Products Research, Volume 44, Issue 1, 2008, Pages 52-57, ISSN 0022-474X, DOI: 10.1016/j.jspr.2007.04.002.

(http://www.sciencedirect.com/science/article/B6T8Y-4R2HKR1-1/2/ef3ea24ade177f9c73bc6fc8b602ecad)
Abstract:
The confused flour beetle, Tribolium confusum, and the Mediterranean flour moth, Ephestia kuehniella, are important pests of stored grain products. The insecticidal effect of three strains (UK 76 [=Nemasys], USA/SC, and Hawaii) of the entomopathogenic nematode Steinernema feltiae was determined in the laboratory, in wheat, against these pests. The nematodes were applied at three dose rates: 100, 300 and 900 nematodes/insect individual. The Hawaii strain was most virulent against T. confusum adults and larvae, with a significant dose effect in the case of the larvae. Larval mortality of this species reached 79% and 100% after 7 and 14 d of exposure to the nematodes, respectively, at the highest dose applied. On the other hand, adult mortality of T. confusum did not exceed 66%. In the case of E. kuehniella larvae, USA/SC performed best causing 52% and 69% mortality after 7 and 14 d exposure, respectively, at the highest dose tested. Since very few data are available on the effect of entomopathogenic nematodes against these pests, it is concluded that the Hawaii and USA/SC strains of S. feltiae should be further investigated as promising biological control agents for T. confusum and E. kuehniella.
Keywords: Biological control; Steinernema feltiae; Entomopathogenic nematodes; Tribolium confusum; Ephestia kuehniella; Stored wheat

Daria P. Locatelli, Lidia Limonta, Massimiliano Stampini, Effect of particle size of soft wheat flour on the development of Ephestia kuehniella Zeller (Lepidoptera: Pyralidae), Journal of Stored Products Research, Volume 44, Issue 3, 2008, Pages 269-272, ISSN 0022-474X, DOI: 10.1016/j.jspr.2008.02.004.
(http://www.sciencedirect.com/science/article/B6T8Y-4S9FH66-1/2/e7980dfc7514564e8251bc13849dc2dd)
Abstract:
The effect of soft wheat flours, characterized by different particle size, protein and starch content, on the development of Ephestia kuehniella was studied. The attractiveness of the substrata to first and third instar larvae was also considered.
The different protein content of the flours did not significantly affect the development of E. kuehniella, nor did it affect the ability of the flours to attract larvae. In tests with soft wheat flours with the same nutritional value but different particle size, the highest mean number of adults and the shortest developmental period were recorded on samples with greatest particle size (250-419 [mu]m).
In order to test the attractiveness of soft wheat flour to larvae, a one-way olfactometer was used. There were no significant differences observed in the number of first and third instar larvae found on flours with different protein composition and particle size. Larvae of this species show limited mobility, in fact few individuals of either instar can reach the flour from a distance of 2 m. No larvae of either instar contacted the different substrata from a distance of 2.5 m.
Keywords: Ephestia kuehniella Zeller; Flour moth; Refined flour; Particle size; Attractiveness

A. Manickavasagan, D.S. Jayas, N.D.G. White, Thermal imaging to detect infestation by Cryptolestes ferrugineus inside wheat kernels, Journal of Stored Products Research, Volume 44, Issue 2, 2008, Pages 186-192, ISSN 0022-474X, DOI: 10.1016/j.jspr.2007.10.006.
(http://www.sciencedirect.com/science/article/B6T8Y-4RM8998-1/2/538c9100ecb4e03fb914a245291b9ce9)
Abstract:
Canada's zero tolerance for live insects in grain received from farmers, and shipped to domestic and export buyers, has necessitated the development of an accurate insect detection method. An infrared thermal imaging system was developed to detect infestation by six developmental stages (four larval instars, pupae and adults) of Cryptolestes ferrugineus under the seed coat on the germ

of the wheat kernels. The artificially infested wheat kernels were removed from the incubation room (30 [degree sign]C), refrigerated (5 [degree sign]C) for 60 s, maintained at ambient conditions for 20 s, and imaged using a thermal camera to identify each developmental stage (n=283). The means of the highest 5% and 10% of all temperature values on the surface of the grain were significantly higher ([alpha]=0.05) for grains having young larvae inside and lower for grains having pupae inside. Temperature distribution on the surface of the infested kernels with different stages of C. ferrugineus was highly correlated with the respiration rate of each developmental stage (r=0.83-0.91). The overall classification accuracy for a quadratic function was 83.5% and 77.7% for infested and sound kernels, respectively, and for a linear function, it was 77.6% and 83.0% for infested and sound kernels, respectively, in pairwise discriminations. Thermal imaging has the potential to identify whether the grain is infested or not, but is less effective in identifying which developmental stage is present.
Keywords: Thermal imaging; Insect detection; Cryptolestes ferrugineus; Heat production by respiration

Emma Chiavaro, Elena Vittadini, Marilena Musci, Federica Bianchi, Elena Curti, Shelf-life stability of artisanally and industrially produced durum wheat sourdough bread ('Altamura bread'), LWT - Food Science and Technology, Volume 41, Issue 1, January 2008, Pages 58-70, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.01.018.
(http://www.sciencedirect.com/science/article/B6WMV-4N25W0J-3/2/e8319e4974edf2047be6ed6455bcde0f)
Abstract:
Physico-chemical properties and volatile compounds of three commercial Altamura breads were evaluated during storage at 25 [degree sign]C. Two protected denomination of origin (PDO) artisanally produced Altamura breads (Bari, Italy), characterized either by high (High A) or low (LowA) loaf, and an industrial product, commercialized as 'Altamura like' (IndA), were studied.
HighA and LowA breads had a tick crust that was also detached from the crumb creating an air cushion between crust and crumb. IndA products had a thinner crust, a more homogeneous crumb structure as well as a more homogeneous water distribution among the different portion of the bread loaf than HighA and LowA. A more pronounced water gradient characterized the artisanal breads. Crust and under crust portion of all breads, and crumb for IndA product, underwent a significant reduction of moisture content and aw during storage. Both artisanal breads were subjected to a more significant crumb hardening than IndA sample. Fresh crusts of artisanally produced breads were also significantly harder than IndA. Fresh IndA samples were significantly less cohesive and less springy than artisanal products; cohesiveness significantly decreased in all samples during storage. A more complex gas chromatographic profile was found in the artisanal bread as a larger amount of volatile compounds was present as compared to the IndA bread. Volatile compounds originated both from microbial activity and non-enzymatic browning. Larger amount of volatile compounds characteristics of yeast fermentation was found in IndA. Volatiles decreased over storage in both samples, more significant in the IndA product.
Keywords: Altamura bread; Shelf life; Texture; Moisture content; Volatile compounds

Maria Consuelo Palacios, Monica Haros, Yolanda Sanz, Cristina M. Rosell, Selection of lactic acid bacteria with high phytate degrading activity for application in whole wheat breadmaking, LWT - Food Science and Technology, Volume 41, Issue 1, January 2008, Pages 82-92, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.02.005.
(http://www.sciencedirect.com/science/article/B6WMV-4N61G09-1/2/6fface7be369e696ff43dde0b5baf36e)
Abstract:
Whole wheat products although highly recommended from the nutritional point of view, contain high levels of phytic acid, an antinutrient that decrease the mineral bioavailability. The objective of

this study was to select strains with high phytate-degrading activity from different parts of the gastrointestinal tract of chickens following a phytate-rich diet and to test their suitability for the breadmaking process of whole wheat bread. Different lactobacilli and bifidobacteria strains were isolated and individually assayed for phosphatase and phytase activities, since both enzymes could contribute to the degradation of phytate. The isolates showing the highest phytate degrading activity belonged to the species Bifidobacterium dentium, Lactobacillus reuteri (L-M15) and Lactobacillus salivarius (L-ID15). The two lactobacilli L-M15 and L-ID15 were selected and tested their fermentative ability in whole wheat breadmaking. Whole wheat breads in the presence of the selected lactobacilli had similar technological quality than the control (in absence of lactobacilli) and extended freshness; moreover, their presence resulted in bread crumbs with lower levels of inositol phosphates. Overall, the two intestinal lactobacilli strains showing high phytate degrading activity were proven to have good properties for being used as starters in whole wheat breadmaking process.
Keywords: Whole wheat bread; Lactobacilli; Fermentation; Starters; Phytic acid; Phytate intermediates

S. Naruenartwongsakul, M.S. Chinnan, S. Bhumiratana, T. Yoovidhya, Effect of cellulose ethers on the microstructure of fried wheat flour-based batters, LWT - Food Science and Technology, Volume 41, Issue 1, January 2008, Pages 109-118, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.02.004.
(http://www.sciencedirect.com/science/article/B6WMV-4N4YMT1-1/2/bc93a0c1cfed3f1b81b388ec48e0971f)
Abstract:
The effect of type, molecular weight, and concentration of cellulose ethers on the microstructure of fried batter-coated potatoes in two batter systems: controlled viscosity batters (CVB) at 1200 cP and controlled initial moisture content batters (CIMB) at 134 g/100 g flour, were studied by coating cylindrical potatoes (10 mm diameter and 50 mm long) with treatment batters and fried at 160 [degree sign]C for 3 min. The coatings were separated and their structures were viewed by scanning electron microscopy technique. The micrographs of fried batters showed that different types of cellulose ethers with the same molecular weight and concentration did not affect the microstructures of batters. The viscosity and water content of batters as well as the molecular weight and concentration of cellulose ethers altered the microstructure of fried batters. For CVB, the structure of fried batter containing methylcellulose of higher molecular weight and concentration with simultaneous higher moisture content showed greater hole-size which allowed higher amount of oil penetration through the batter into the food substrate. In contrast, the structure of CIMB with a higher molecular weight and concentration of methylcellulose was relatively more continuous; therefore, it might help in preventing oil penetration into the food substrate.
Keywords: Wheat flour batter; Methylcellulose; Hydroxypropyl methylcellulose; Microstructure; Scanning electron microscopy; Deep-fat frying

M.M. Nemat Alla, A.M. Badawi, N.M. Hassan, Z.M. El-Bastawisy, E.G. Badran, Effect of metribuzin, butachlor and chlorimuron-ethyl on amino acid and protein formation in wheat and maize seedlings, Pesticide Biochemistry and Physiology, Volume 90, Issue 1, January 2008, Pages 8-18, ISSN 0048-3575, DOI: 10.1016/j.pestbp.2007.07.003.
(http://www.sciencedirect.com/science/article/B6WP8-4P9SNBN-1/2/b215b17ae176b473cce7341a16f980b5)
Abstract:
Application of the recommended field dose of metribuzin, butachlor and chlorimuron-ethyl to 10-days-old wheat and maize seedlings differentially reduced shoot fresh and dry weights during the following 16 days. Metribuzin was the most reductive while butachlor was the least. The herbicides

slightly affected the activities of nitrate reductase (NR, EC 1.6.6.1) and nitrite reductase (NiR, EC 1.7.7.1) but greatly inhibited glutamine synthetase (GS, EC 6.3.1.2) and glutamate synthase (GOGAT, EC 1.4.7.1) activities. Meanwhile, there were significant accumulations of ammonia and soluble-N accompanied by diminutions in total-N and protein contents; metribuzin exerted the greatest changes. Additionally, aliphatic, aromatic and total amino acids in both species were mostly elevated by the three herbicides; however, valine, leucine and isoleucine were decreased by only chlorimuron-ethyl. These results could conclude that herbicides, particularly metribuzin, cause a shortage in ammonia assimilation and subsequently a decrease in protein formation. Moreover, the elevation of soluble-N and amino acids appeared to result from breakdown of the pre-existing protein, a state that seemed consistent in seedlings treated with metribuzin and, to some extent chlorimuron-ethyl but recovered in those treated with butachlor.
Keywords: Wheat; Maize; Herbicides; Nitrogen metabolism; Nitrogen-related enzymes

Noureddine Bouras, Stephen E. Strelkov, The anthraquinone catenarin is phytotoxic and produced in leaves and kernels of wheat infected by Pyrenophora tritici-repentis, Physiological and Molecular Plant Pathology, Volume 72, Issues 1-3, January-March 2008, Pages 87-95, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2008.06.001.
(http://www.sciencedirect.com/science/article/B6WPC-4SVC5M4-1/2/c04ec3677b03a098f02e2bc55f364a82)
Abstract:
The fungus Pyrenophora tritici-repentis causes tan spot, an important foliar disease of wheat, and can also infect the kernels, leading to the development of black point and red smudge on affected seeds. Production of the anthraquinones catenarin and emodin by P. tritici-repentis was evaluated in host tissues after inoculation of susceptible wheat genotypes. Catenarin is a bioactive red pigment hypothesized to cause the red smudge symptom; emodin has been classified as a diarrheagenic and genotoxic mycotoxin. Kernels harvested at maturity contained approximately 0.05 [mu]g catenarin and 0.06 [mu]g emodin per g tissue, whilst leaves harvested 7 days after inoculation contained 0.4 [mu]g catenarin per g tissue. No anthraquinones were detected in non-inoculated tissues. The detection of catenarin in kernels indicates that the pigment may cause the reddish discoloration associated with red smudge, while the identification of emodin suggests that P. tritici-repentis is a mycotoxigenic fungus. Catenarin also induced necrosis of leaves in a non-specific manner, suggesting that it contributes to non-specific symptom development by P. tritici-repentis. The pigment was also moderately active against some of the fungi associated with P. tritici-repentis during its saprophytic and parasitic phases of growth, indicating a possible role in the life strategy of the pathogen.
Keywords: Pyrenophora tritici-repentis; Triticum aestivum; Triticum turgidum subsp. durum; Tan spot; Red smudge; Black point; Anthraquinones; Catenarin; Emodin; Wheat quality; Mycotoxin contamination

Maria C. Blassioli Moraes, Michael A. Birkett, Ruth Gordon-Weeks, Lesley E. Smart, Janet L. Martin, Barry J. Pye, Richard Bromilow, John A. Pickett, cis-Jasmone induces accumulation of defence compounds in wheat, Triticum aestivum, Phytochemistry, Volume 69, Issue 1, January 2008, Pages 9-17, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.06.020.
(http://www.sciencedirect.com/science/article/B6TH7-4PB75G2-1/2/297bfe3bace62a104dd5c22785d39cbc)
Abstract:
Liquid phase extraction (LPE) and vapor phase extraction (VPE) methodologies were used to evaluate the impact of the plant activator, cis-jasmone, on the secondary metabolism of wheat, Triticum aestivum, var. Solstice. LPE allowed the measurement of benzoxazinoids, i.e. 2,4-dihydroxy-7-methoxy-2H-1,4-benzoxazin-3(4H)-one (DIMBOA), 2-hydroxy-7-methoxy-1,4-benzoxazin-3-one (HMBOA) and 6-methoxy-benzoxazolin-2-one (MBOA), and phenolic acids such

as trans-p-coumaric acid, syringic acid, p-hydroxybenzoic acid, vanillic acid and cis- and trans-ferulic acid. Using LPE, a significantly higher level of DIMBOA was found in aerial parts and roots of T. aestivum following treatment with cis-jasmone, when compared with untreated plants. Similar results were obtained for phenolic acids, such as trans-ferulic acid and vanillic acid in roots. Using VPE, it was possible to measure levels of 2-hydroxy-7-methoxy-(2H)-1,4-benzoxazin-3(4H)-one (HBOA), benzoxazolin-2(3H)-one (BOA), ferulic acid, syringic acid and coumaric acid. The levels of HBOA in aerial parts and roots were significantly greater in cis-jasmone treated plants compared to untreated plants. cis-Jasmone is known to be a plant activator in terms of production of defence-related volatile semiochemicals that repel aphids and increase the foraging activity of aphid parasitoids. These results show, for the first time, that cis-jasmone also induces selective production of secondary metabolites that are capable of directly reducing development of pests, diseases and weeds.
Keywords: Triticum aestivum; Gramineae; Wheat; Liquid phase extraction; Vapor phase extraction; cis-Jasmone; Allelochemicals; Benzoxazinoids; Phenolic acids

N.P.S. Yaduvanshi, D.R. Sharma, Tillage and residual organic manures/chemical amendment effects on soil organic matter and yield of wheat under sodic water irrigation, Soil and Tillage Research, Volume 98, Issue 1, January 2008, Pages 11-16, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.010.
(http://www.sciencedirect.com/science/article/B6TC6-4R4DFRH-1/2/64ac5c1fe25dc78a54bde0ebfd3e1b5b)
Abstract:
The effect of no-tillage (NT) and conventional tillage (CT) practices applied either with NP fertilizer alone or in conjunction with gypsum or farm yard manure (FYM) or sulphitation pressmud (SPM) were evaluated on soil organic carbon (SOC), soil pH, sodium absorption ratio (SAR), infiltration rate, water saving and grain yield of wheat grown with sodic water in rice (Oryza sativa L.)-wheat (Triticum aestivum L.) rotation at Central Soil Salinity Research Institute Research Farm, Kaithal, India. In NT treatment the residue of previous rice (15 cm height) crop was left on the surface whereas in CT treatment no crop residue was involved. NT practice increased SOC and infiltration rate in all treatments. The mean organic carbon in 0-15 cm soil layer at the end of study was 3.17 g kg-1 in NT treatment against 2.84 g kg-1 in CT treatment. Organic carbon improvement in NT treatment was reflected in grain yield increament. Soil pH was lower in NT than CT treatment. In general, wheat yield increased with the increase in nitrogen (N) and phosphorus (P) fertilizer doses. The grain yield in the NT treatment remained below the CT treatment during the first year (2001) but was greater than CT treatment during the next two years (2002 and 2003). However, the average yields data for the three years remained statistically non significant. In NT practice, 32.44 cm irrigation water was used each year as compared to 39.66 cm in CT practice. No-tillage, thus, saved 7.22 cm of irrigation water. The results emphasized the necessity of using N120P26 kg ha-1 fertilizers dose with FYM or SPM or gypsum under NT practice for improving soil organic matter and sustaining wheat production under condition of sodic water irrigation.
Keywords: Soil organic carbon; Infiltration rate; Soil pH; No-tillage; Conventional tillage; Rice-wheat system; Sodic water

V.K. Arora, Harbakhshinder Singh, Bijay Singh, Analyzing wheat productivity responses to climatic, irrigation and fertilizer-nitrogen regimes in a semi-arid sub-tropical environment using the CERES-Wheat model, Agricultural Water Management, Volume 94, Issues 1-3, 16 December 2007, Pages 22-30, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.07.002.
(http://www.sciencedirect.com/science/article/B6T3X-4R34F0C-1/2/d0d2654d921fa5d9e5adfceef5f9daf4)
Abstract:

In order to enhance crop productivity in water-limited environments, there is a need to evaluate and apply water-saving management practices. This study examined the applicability of the CERES-Wheat model under variable climatic, irrigation, and fertilizer-nitrogen (N) regimes. The objective was to analyze wheat yield responses to water- and N-application for optimizing crop productivity under water limitations in a semi-arid sub-tropical irrigated environment. Evaluation analysis showed that performance of the model was reasonable as indicated by close correspondence of simulated crop phenology, biomass accumulation, grain yield, and soil water and N use with measured data. The normalized root mean square of deviations ranged between 10 and 20% for most of the parameters. Cumulative probability distribution of simulated grain yield and ET showed that for a given irrigation regime, fertilizer N had greater effect on yield than on ET and caused greater water productivity. Scenario analysis also demonstrated that grain yield and water productivity response to irrigation were influenced by extractable water capacity of soils. Soil effects on grain yield were more pronounced under I0 regime, and the effect decreased with increase in irrigation. Post-sown irrigation was more effective under conditions of low initial soil water. Initial soil mineral-N status influenced the amount of fertilizer N for a given initial soil water and post-sown irrigation scenario.
Keywords: Water limitations; Simulation modeling; Evapotranspiration; Water productivity

Danica E. Goggin, Timothy D. Colmer, Wheat genotypes show contrasting abilities to recover from anoxia in spite of similar anoxic carbohydrate metabolism, Journal of Plant Physiology, Volume 164, Issue 12, 3 December 2007, Pages 1605-1611, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.01.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4N6Y5BR-4/2/e37a04b1f8514d8e0912c16e8ac3278c)
Abstract: Summary
Physiological and metabolic responses to anoxia and reaeration were compared for 4-7-day-old seedlings of 11 genotypes of wheat (Triticum aestivum) with reputed differences in waterlogging tolerance. Genotypes differed in seminal root elongation, and recovery of root tissue K+ concentration, during reaeration following 72 h anoxia. Post-anoxic recovery ranged from complete (100% retention of seminal root elongation potential) to almost nil (death of all seminal root apices and inability to recover K+ concentration). The anoxia tolerance ranking of the genotypes based on these parameters corresponded with that of their reputed waterlogging tolerance, but with some exceptions. However, the differences in anoxia tolerance of the seedlings could not be explained by differences in capacity for ethanol production. A decreased ability to utilise seed starch reserves under anoxia, due to inadequate levels of [alpha]-amylase activity at the time anoxia was imposed, was apparent in all genotypes.
Keywords: [alpha]-Amylase; Anaerobic metabolism; Flooding tolerance; Recovery

Guo-yue CHEN, Li-hui LI, Detection of Genetic Diversity in Synthetic Hexaploid Wheats Using Microsatellite Markers, Agricultural Sciences in China, Volume 6, Issue 12, December 2007, Pages 1403-1410, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60001-2.
(http://www.sciencedirect.com/science/article/B82XG-4RJBPV7-1/2/cd86d535727b9ae8c7639e5b4c906cbc)
Abstract:
Ninety-five synthetic hexaploid wheats (2n = 6x = 42, AABBDD) were analyzed using 45 microsatellite markers to investigate the potential genetic diversity in wheat breeding programs. A total of 326 alleles were detected by these microsatellite primer pairs, with an average of 6.65 alleles per locus. The polymorphic information content (PIC), Simpson index (SI), and genetic similarity (GS) coefficient showed that the D genome is of the highest genetic diversity among the A, B, and D genomes in the synthetic hexaploid wheats. The results also indicated that the synthetic hexaploid wheat is an efficient way to enrich wheat genetic backgrounds, especially to

use the genetic variations of the D genome from Aegilops squarrosa for wheat improvement. The UPGMA dendogram, based on a similarity matrix by a simple matching coefficient algorithm, delineated the above accessions into 5 major clusters and was in accordance with the available pedigree information. The results demonstrated the utility of microsatellite markers in detecting DNA polymorphism and estimating genetic diversity.
Keywords: synthetic hexaploid wheats; SSRs; genetic diversity

Markus Herndl, Cheng-gang SHAN, Pu WANG, Simone Graeff, Wilhelm Claupein, A Model Based Ideotyping Approach for Wheat Under Different Environmental Conditions in North China Plain, Agricultural Sciences in China, Volume 6, Issue 12, December 2007, Pages 1426-1436, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60004-8.
(http://www.sciencedirect.com/science/article/B82XG-4RJBPV7-4/2/d7066af5625400643f079b5f3aa82dba)
Abstract:
Before starting a breeding program for a specific crop or variety, it can be helpful to know how traits behave in determining yield under different conditions and environments. Crop growth models can be used to generate valuable information on the relevance of specific traits for an environment of interest. In this paper, the simulation model CMS-Cropsim-CERES-Wheat was used to test the performance of input parameters which describe cultivar differences concerning plant development and grain yield. In so-called ideotyping sequences, the specific cultivar parameters were varied and the model was run with the same management information in four different scenarios. The scenarios consisted of two locations, Wuqiao (37.3[degree sign]N, 116.3[degree sign]E) and Quzhou (36.5[degree sign]N, 115[degree sign]E) in Hebei Province (North China Plain), and a dry and a wet growing season for each location. The input parameter G1 (corresponding trait: kernel number per spike) followed by G2 (corresponding trait: kernel weight) had the biggest influence on yield over all scenarios. The input parameters P1V (corresponding trait: vernalization requirement) and P1D (corresponding trait: photoperiod response) also played an important role in determining yield. In the dry scenarios a low response in vernalization and photoperiod generated a higher yield compared to a high response. The lower responses caused earliness and the period of late water stress was avoided. The last relevant parameter that affected yield was PHINT (corresponding trait: leaf area of first leaf). The simulation showed that with an increasing PHINT, yield was enhanced over all scenarios. Based on the results obtained in this study, plant breeders could carefully select the relevant traits and integrate them in their breeding program for a specific region.
Keywords: ideotyping; model; CMS-Cropsim-CERES-Wheat; breeding; North China Plain

Peng YANG, Wen-bin WU, Hua-jun TANG, Qing-bo ZHOU, Jin-qiu ZOU, Li ZHANG, Mapping Spatial and Temporal Variations of Leaf Area Index for Winter Wheat in North China, Agricultural Sciences in China, Volume 6, Issue 12, December 2007, Pages 1437-1443, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60005-X.
(http://www.sciencedirect.com/science/article/B82XG-4RJBPV7-5/2/52e8d0e9392c509ac1fce248564d7fbd)
Abstract:
Leaf area index (LAI) is an important parameter in a number of models related to ecosystem functioning, carbon budgets, climate, hydrology, and crop growth simulation. Mapping and monitoring the spatial and temporal variations of LAI are necessary for understanding crop growth and development at regional level. In this study, the relationships between LAI of winter wheat and Landsat TM spectral vegetation indices (SVIs) were analyzed by using the curve estimation procedure in North China Plain. The series of LAI maps retrieved by the best regression model were used to assess the spatial and temporal variations of winter wheat LAI. The results indicated that the general relationships between LAI and SVIs were curvilinear, and that the exponential

model gave a better fit than the linear model or other nonlinear models for most SVIs. The best regression model was constructed using an exponential model between surface-reflectance-derived difference vegetation index (DVI) and LAI, with the adjusted R2 (0.82) and the RMSE (0.77). The TM LAI maps retrieved from DVI-LAI model showed the significant spatial and temporal variations. The mean TM LAI value (30 m) for winter wheat of the study area increased from 1.29 (March 7, 2004) to 3.43 (April 8, 2004), with standard deviations of 0.22 and 1.17, respectively. In conclusion, spectral vegetation indices from multi-temporal Landsat TM images can be used to produce fine-resolution LAI maps for winter wheat in North China Plain.
Keywords: leaf area index (LAI); winter wheat; spectral vegetation index (SVI); Landsat TM; North China Plain

Fernando J. Menendez, Emilio H. Satorre, Evaluating wheat yield potential determination in the Argentine Pampas, Agricultural Systems, Volume 95, Issues 1-3, December 2007, Pages 1-10, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.03.004.
(http://www.sciencedirect.com/science/article/B6T3W-4P9KD1J-1/2/fe4f944851fcf8bc5e1f28bbab031a10)
Abstract:
The Argentinean Pampas are considered among the most productive areas of the world. However, few research has been done to explore its potential and constraining factors for wheat production. The objective of this paper was to evaluate variability of wheat yield and yield components potential in the Pampas. For this purpose, a modelling approach was used using 30 years climatic series of various locations distributed along the Pampas. Two biologically founded assumptions related to wheat yield determination were used: (1) potential grain number (GN) is associated with a photothermal quotient (PTQ); and (2) potential grain weight (GW) depends on mean temperature during the grain filling period (TGF). Mean wheat yield potential in the Pampas varied between 5000 kg ha-1 in northern locations to 7300 kg ha-1 in southern ones. GN showed greater variability than GW both, among locations (spatial scale) and years (temporal scale). Anthesis date appeared as a strong yield potential determinant factor; A 10-day delay in anthesis date produce substantial changes in GN and GW, depending on location latitude. This was related to the specific combination of crop phenological development and radiation and temperature changes in the region. A temporal decrease in PTQ during the period 1971-2002 was observed. This decrease was more associated with a radiation decrease than with a temperature increase during this period. TGF did not show any trend during the same period. The importance of estimating wheat yield potential yield and yield-gap reduction is discussed.
Keywords: Wheat; Pampas; Photothermal quotient; Yield potential; Temperature; Radiation; Grain number; Grain weight

Claudia M.d.S. Cordovil, Fernanda Cabral, Joao Coutinho, Potential mineralization of nitrogen from organic wastes to ryegrass and wheat crops, Bioresource Technology, Volume 98, Issue 17, December 2007, Pages 3265-3268, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.07.014.
(http://www.sciencedirect.com/science/article/B6V24-4KMYM21-3/2/ffaedb47693c9352553286837fabf7d2)
Abstract:
Two-pot experiments with ryegrass and wheat plants were conducted in a Cambic Arenosol to test the reliability of N fate predicted by incubation experiments previously performed, with the same soil, to assess potentially mineralizable nitrogen from six organic wastes (municipal solid waste compost, secondary pulp mill sludge, horn meal, poultry manure, solid phase from pig slurry and composted pig manure). Two treatments, corresponding to 80 and 160 kg N/ha were tested, with or without mineral N fertilization. Experimental data obtained in the pot trials was consistent with nitrogen net mineralization trend observed in the aerobic incubations with all the wastes tested. Values of potentially mineralizable nitrogen (N0) from the equations obtained by model fitting, to

the incubation data, were well correlated to ryegrass and wheat N uptake. Poultry manure was the most efficient N supplier to crops.
Keywords: Biological experiment; Nitrogen net mineralization; Organic waste; Ryegrass; Wheat

Mohammad Ali Baghestani, Eskandar Zand, Saeid Soufizadeh, Naser Bagherani, Reza Deihimfard, Weed control and wheat (Triticum aestivum L.) yield under application of 2,4-D plus carfentrazone-ethyl and florasulam plus flumetsulam: Evaluation of the efficacy, Crop Protection, Volume 26, Issue 12, December 2007, Pages 1759-1764, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.03.007.
(http://www.sciencedirect.com/science/article/B6T5T-4NNYFVJ-1/2/3f613519c8acb50eccf64fffb19f5209)
Abstract:
Three field experiments were conducted at the research fields of Plant Protection Research Institute, Iran, at different locations in 2004-2005 to study the efficacy of different broadleaved herbicides to control weeds in wheat. Treatments were the full-season hand weeded and weed-infested controls, and post-emergence applications of florasulam plus flumetsulam at 8.75, 10.50, and 12.25 g a.i./ha, 2,4-D plus carfentrazone-ethyl at 210, 245, 280, and 490 g a.i./ha, bromoxynil plus MCPA at 75, 100, and 150 g a.i./ha, 2,4-D at 560, 720, and 1120 g a.i./ha, tribenuron methyl, and 2,4-D plus MCPA. Herbicides were applied at wheat tillering stage. Naturally occurring broadleaved weed populations were used in experiments. Results indicated that bromoxynil plus MCPA at 150 g a.i./ha, 2,4-D plus MCPA, and 2,4-D plus carfentrazone-ethyl at 490 g a.i./ha were the best options to control weeds. Bromoxynil plus MCPA at 150 g a.i./ha and 2,4-D plus MCPA also resulted in the highest wheat yield. Overall, it could be concluded that rotational application of bromoxynil plus MCPA at 150 g a.i./ha, 2,4-D plus MCPA, and 2,4-D plus carfentrazone-ethyl at 490 g a.i./ha would be the best option to achieve satisfactory weed control, high grain yield and prevention of evolution of herbicide-resistant weeds.
Keywords: Broadleaved weed; Herbicide efficacy; Weed population; Wheat

Yihu Song, Qiang Zheng, Zheng Wang, Equibiaxial extensional flow of wheat gluten plasticized with glycerol, Food Hydrocolloids, Volume 21, Issue 8, December 2007, Pages 1290-1295, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.10.007.
(http://www.sciencedirect.com/science/article/B6VP9-4MFJTJT-1/2/051c79d48689986140d3629e9a058a88)
Abstract:
The aim of the present work has been to study the equibiaxial extensional flow of gluten/glycerol (60/40) mixture under lubricated squeezing flow with four different crosshead speeds at room temperature. The hyperelastic model with a strain energy potential of the Mooney-Rivlin form is applied to describe the biaxial stress as a function of strain at strains below 0.7. The strain rate thinning behavior of biaxial viscosity at constant strains is revealed.
Keywords: Wheat gluten; Equibiaxial extensional deformation; Lubricated squeeze flow; Hyperelastic model

Valentina Stojceska, Francis Butler, Eimear Gallagher, Denise Keehan, A comparison of the ability of several small and large deformation rheological measurements of wheat dough to predict baking behaviour, Journal of Food Engineering, Volume 83, Issue 4, December 2007, Pages 475-482, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.02.043.
(http://www.sciencedirect.com/science/article/B6T8J-4N49VCY-4/2/604a3dd4920250991ccf64634945d642)
Abstract:
The rheological characteristics of twenty wheat flour samples obtained from four organic flour blends and a non-organic control were compared in relation to their ability to predict subsequent

loaf volume in the baked bread. The flour samples considered had protein contents that varied between 11-14 g/100 g. Four different rheological methods were employed. Oscillatory stress rheometry on the protein gel extracted from the wheat flour, oscillatory stress rheometry and creep measurement on undeveloped dough samples and biaxial extensional measurements on simple flour-water doughs. None of the fundamental rheological parameters correlated with loaf volume. There was a correlation between the storage modulus of the gel protein and storage modulus for the undeveloped dough (r = 0.85). There was a weak negative correlation between protein content and biaxial extensional viscosity (r = -0.62). Stepwise multiple regression related loaf volume to dough stability time (measured on the Farinograph) and tan (phase angle) for the undeveloped dough samples (overall model r2 = 0.54). The results indicate that the four rheological tests considered could not be used as predictors of subsequent loaf volume when the bread is baked.
Keywords: Wheat dough; Oscillatory stress rheometry; Wheat protein gel; Undeveloped dough; Biaxial extension; Loaf volume

W.J. Wang, S.P. Wang, Y.S. Gong, J.Q. Wang, Z.L. Tan, Effects of vitamin A supplementation on growth performance, carcass characteristics and meat quality in Limosin x Luxi crossbreed steers fed a wheat straw-based diet, Meat Science, Volume 77, Issue 4, December 2007, Pages 450-458, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2007.04.019.
(http://www.sciencedirect.com/science/article/B6T9G-4NKXWRM-4/2/ffb6f4941a38efafc8a1a586fe00f89c)
Abstract:
Three experiments were conducted to examine the effects of dietary vitamin A supplementation on performance and carcass parameters in Limosin x Luxi crossbreed finishing steers fed a wheat straw-based diet. Sixteen 12-month old (301 +/- 22 kg) steers, 16 12-month old (309 +/- 15 kg) steers and 16 24-month old (411 +/- 20 kg) steers were used in experiment 1 for 6 months feeding period, in experiment 2 for three months feeding period and in experiment 3 for three months feeding period, respectively. Sixteen steers of each experiment were randomly divided into the four groups of four animals. Treatments consisted of four vitamin A supplementation levels (0, 1100, 2200 and 4400IU/kg DM). The growth rate was affected by dietary vitamin A level in experiment 1 and 2, revealing that the suitable amount of vitamin A supplementation increased the growth rate; excessive vitamin A in the ration decreased the growth rate of 12-month-old finishing steers. The marbling deposition decreased with the increment of vitamin A supplementation level, but possibly associated with vitamin A supplementing duration. Furthermore, the suitable dietary vitamin A level probably decreased lipid and pigment oxidation, and increased the tenderness of beef meat. Vitamin A supplementation had no significant effect on chemical composition of gluteus medius muscle and longissimus dorsi muscle.
Keywords: Steers; Vitamin A; Meat quality; Performance

Bing-Zi ZHAO, Jia-Bao ZHANG, M. FLURY, An-Ning ZHU, Qi-Ao JIANG, Jin-Wei BI, Groundwater Contamination with NO3-N in a Wheat-Corn Cropping System in the North China Plain, Pedosphere, Volume 17, Issue 6, December 2007, Pages 721-731, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60087-3.
(http://www.sciencedirect.com/science/article/B82XV-4R17R7M-6/2/a78796b11a064f91002148e508de236c)
Abstract:
The North China Plain, where summer corn (Zea mays L.) and winter wheat (Triticum aestivum L.) are the major crops grown, is a major agricultural area in China. Permeable soils make the region susceptible to groundwater pollution by NO3-N, which is applied to fields in large amounts of more than 400 kg NO3-N ha-1 as fertilizer. A field experiment was established in 2002 to examine the relationship among N fertilization rate, soil NO3-N, and NO3-N groundwater contamination. Two adjacent fields were fertilized with local farmers' N fertilization rate (LN) and double the normal

application rate (HN), respectively, and managed under otherwise identical conditions. The fields were under a traditional summer corn/winter wheat rotation. Over a 22-month period, we monitored NO3-N concentrations in both bulk soil and soil pore water in 20{40 cm increments up to 180 cm depth. We also monitored NO3-N concentrations in groundwater and the depth of the groundwater table. No significant differences in soil NO3-N were observed between the LN and HN treatment. We identified NO3-N plumes moving downward through the soil profile. The HN treatment resulted in significantly higher groundwater NO3-N, relative to the LN treatment, with groundwater NO3-N consistently exceeding the maximum safe level of 10 mg L-1, but groundwater NO3-N above the maximum safe level was also observed in the LN treatment after heavy rain. Heavy rain in June, July, and August 2003 caused increased NO3-N leaching through the soil and elevated NO3-N concentrations in the groundwater. Concurrent rise of the groundwater table into NO3-N- rich soil layers also contributed to the increased NO3-N concentrations in the groundwater. Our results indicate that under conditions of average rainfall, soil NO3-N was accumulated in the soil profile. The subsequent significantly higher-than-average rainfalls continuously flushed the soil NO3-N into deeper layers and raised the groundwater table, which caused continuous groundwater contamination with NO3-N. The results suggest that under common farming practices in the North China Plain, groundwater contamination with NO3-N was likely, especially during heavy rainfalls, and the degree of groundwater contamination appeared to be proportional to the N application rates. Decreasing fertilization rates, splitting fertilizer inputs, and optimizing irrigation scheduling had potential to reduce groundwater NO3-N contamination.
Keywords: field experiment; groundwater contamination; NO3-N; wheat-corn cropping system

Gurpreet Singh, Mukesh Jain, Ritu Kulshreshtha, Jitendra P. Khurana, Sanjay Kumar, Prabhjeet Singh, Expression analysis of genes encoding translation initiation factor 3 subunit g (TaeIF3g) and vesicle-associated membrane protein-associated protein (TaVAP) in drought tolerant and susceptible cultivars of wheat, Plant Science, Volume 173, Issue 6, December 2007, Pages 660-669, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.09.004.
(http://www.sciencedirect.com/science/article/B6TBH-4PNM456-1/2/3a96c2e7daf54c3b343081cf9ddd9d5f)
Abstract:
The present study deals with the characterization of genes encoding translation initiation factor 3 subunit g (TaeIF3g) and vesicle-associated membrane protein associated-protein (TaVAP), and how their expression is altered during water stress in the drought tolerant (C-306) and susceptible (HD-2329) cultivars of wheat. Bioinformatics analysis revealed that the TaeIF3g gene consists of an open reading frame (ORF) of 870 nucleotides encoding for a protein of 290 amino acid residues, with a likely molecular mass and pI of 31.47 kDa and 6.89, respectively. The TaVAP cDNA consists of an ORF of 714 nucleotides encoding for a protein of 238 amino acid residues having deduced molecular mass and pI of 25.75 kDa and 7.56, respectively. The changes in expression of the two genes in flag leaf and developing grains were studied in response to drought stress at 15 days post anthesis (DPA). The expression of TaeIF3g and TaVAP in the flag leaf, after increasing in response to mild drought stress, decreased under severe stress conditions in C-306, whereas on the contrary, it persisted in cv. HD-2329. Furthermore, the expression of TaeIF3g and TaVAP in response to drought stress was affected in a coordinated manner in leaf of both the cultivars. The effect of drought on expression of TaeIF3g and TaVAP was also different in the grains of the two cultivars thus implying that the adaptive mechanisms operating in the tissues of tolerant and susceptible cultivars are different.
Keywords: Abiotic stress; Translation initiation factor 3 subunit g; Vesicle-associated membrane protein-associated protein; Wheat

Marc Marx, Franz Buegger, Andreas Gattinger, Bernd Marschner, Adam Zsolnay, Jean Charles Munch, Determination of the fate of 13C labelled maize and wheat rhizodeposit-C in two

agricultural soils in a greenhouse experiment under 13C-CO2-enriched atmosphere, Soil Biology and Biochemistry, Volume 39, Issue 12, December 2007, Pages 3043-3055, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2007.06.016.
(http://www.sciencedirect.com/science/article/B6TC7-4P8H76C-2/2/3842070e15a5540d8a56d43163e152ae)
Abstract:
A deeper understanding of the contribution of carbon (C) released by plant roots (rhizodeposition) to soil organic matter (SOM) can help to increase our knowledge of global C-cycling. These insights can eventually lead to sustainable management of SOM especially in agricultural systems. This study was conducted to determine the fate of 13C labelled rhizodeposit-C of maize and wheat plants. They were grown in a greenhouse in permeable nylon bags filled with upper soil material from two agricultural soils of the same location, but with different crop yields. The bags were placed into pots, which were also filled with soil surrounding the bags. Soil inside the bags was considered as rhizosphere soil, wheras the one outside the bags represented bulk soil. The contributions of rhizodeposits to water extractable organic carbon (WEOC), microbial biomass-C (MB-C), CO2-C evolution, and total organic carbon (Corg) were investigated during a 7-week growing period. The WEOC, MB-C, CO2-C, Corg contents and the respective [delta]13C values were determined regularly, and a newly developed method for determining [delta]13C values in soil extracts was applied.
In both soils, regardless of crop yield potential, significant incorporation of rhizodeposition-derived C was observed in the MB-C, CO2-C, and Corg pool, but not in the WEOC. The pattern of C incorporation into the different pools was the same for both soils with both plants, and rhizodeposit-derived C was recovered in the order MB-C<Corg<CO2-C. This showed that rhizodeposits were mainly respired, but since Corg was the second largest pool of the overall balances, they were also stabilized in the soils at least in the short term. It is suggested that the increased SOM mineralization observed in this study (positive priming effects) was probably induced by C exchange processes between the soil matrix and soluble rhizodeposits. Moreover, soluble rhizodeposit-C was detected in MB-C and CO2-C evolved outside the direct root zone, showing the availability of these C-components in the bulk soil.
Keywords: Rhizodeposit; 13C; WEOC; Microbial biomass; Adsorption; Exchange processes; Priming effect

Antonio Costa, Ciro A. Rosolem, Liming in the transition to no-till under a wheat-soybean rotation, Soil and Tillage Research, Volume 97, Issue 2, December 2007, Pages 207-217, ISSN 0167-1987, DOI: 10.1016/j.still.2007.09.014.
(http://www.sciencedirect.com/science/article/B6TC6-4R2H1NK-3/2/1153273c8247def89f3d37bae8fd7629)
Abstract:
Soil and subsoil aluminium toxicity has been one of the main limiting factors for soybean and wheat yields in tropical soils. Usually liming is the most effective way to deal with soil acidity and Al toxicity, but in no-till systems the soil is not disturbed making it impossible to incorporate lime in the arable layer, and lime has been usually applied on the soil surface. In this paper soybean and wheat responses to lime applied on the soil surface and/or incorporated in the soil arable layer were evaluated during the transition from conventional tillage to a no-till system. The experiment was conducted for 3 years in Parana, Brazil, using a wheat-soybean rotation. Lime rates ranging from 0.0 to 9.0 t ha-1 were incorporated down to 20 cm and 4.5 t ha-1 were spread or not on the soil surface. Soil samples were taken down to 60 cm, 39 months after the first lime application. Soil chemical characteristics were affected by lime application down to 60 cm deep in the profile. Soybean responded to lime irrespective of application method, but the highest accumulated yield was obtained when lime was incorporated into the arable layer. For wheat, the more sensitive the

cultivar, the greater was the response to lime. During the introduction of a no-till system, lime must be incorporated into the arable layer when the wheat cultivar is Al-sensitive.
Keywords: Aluminium; Base leaching; Calcium; Magnesium; Organic acids

Adam Bertl, Ralf Kaldenhoff, Function of a separate NH3-pore in Aquaporin TIP2;2 from wheat, FEBS Letters, Volume 581, Issue 28, 27 November 2007, Pages 5413-5417, ISSN 0014-5793, DOI: 10.1016/j.febslet.2007.10.034.
(http://www.sciencedirect.com/science/article/B6T36-4R10JYW-4/2/b2ddcee74562d9939e032ee1ef78d47c)
Abstract:
Functional analysis of heterologously expressed TaTIP2;2 by means of stopped-flow spectrometric studies provide evidence for water and ammonia conductivity. A series of experiments under increasing pH indicate that the gaseous NH3, rather than the ammonium ion was transported. Results from inhibitor studies strongly suggest that NH3 is not transported in file with water, but through a separate pathway, which could be supplied by the 5th central pore in a tetramer conformation.
Keywords: Aquaporin; Gas-conductivity; Ammonia; Stopped- flow spectrometry

Feng-Hua Zhao, Gui-Rui Yu, Sheng-Gong Li, Chuan-You Ren, Xiao-Min Sun, Na Mi, Jun Li, Zhu Ouyang, Canopy water use efficiency of winter wheat in the North China Plain, Agricultural Water Management, Volume 93, Issue 3, 16 November 2007, Pages 99-108, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.06.012.
(http://www.sciencedirect.com/science/article/B6T3X-4PDSYT5-1/2/61e4484013cd812f82cc886d7e060681)
Abstract:
Canopy water use efficiency (W), the ratio of crop productivity to evapotranspiration (ET), is critical in determining the production and water use for winter wheat (Triticum aestivum L.) in the North China Plain, where winter wheat is a major crop and rainfall is scarce and variable. With the eddy covariance (EC) technique, we estimated canopy W of winter wheat at gross primary productivity (WG) and net ecosystem productivity (WN) levels from revival to maturing in three seasons of 2002/2003, 2003/2004 and 2004/2005 at Yucheng Agro-ecosystem Station. Meanwhile we also measured the biomass-based water use efficiency (WB). Our results indicate that WG, WN and WB showed the similar seasonal variation. Before jointing (revival-jointing), WG, WN and WB were obviously lower with the values of 2.09-3.54 g C kg-1, -0.71 to 0.06 g C kg-1 and 1.37-4.03 g kg-1, respectively. After jointing (jointing-heading), the winter wheat began to grow vigorously, and WG, WN and WB significantly increased to 5.26-6.78 g C kg-1, 1.47-1.86 g C kg-1 and 6.41-7.03 g kg-1, respectively. The maximums of WG, WN and WB occurred around the stage of heading. Thereafter, WG, WN and WB began to decrease. During the observed periods, three levels of productivity: GPP, NEP and aboveground biomass (AGB) all had fairly linear relationships with ET. The slopes of GPP-ET, NEP-ET and AGB-ET were 4.67-6.12 g C kg-1, 1.50-2.08 g C kg-1 and 6.87-11.02 g kg-1, respectively. Generally, photosynthetically active radiation (PAR) and daytime vapor pressure deficit (D) had negative effects on WG, WN and WB except for on some cloudy days with low PAR and D. In many cases, WG, WN and WB showed the similar patterns. While there were still some obvious differences between them besides in magnitude, such as their significantly different responses to PAR and D on cloudy and moist days.
Keywords: Winter wheat; Water use efficiency; Gross primary productivity; Net ecosystem productivity; Evapotranspiration; North China Plain

M. Pala, J. Ryan, H. Zhang, M. Singh, H.C. Harris, Water-use efficiency of wheat-based rotation systems in a Mediterranean environment, Agricultural Water Management, Volume 93, Issue 3, 16 November 2007, Pages 136-144, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.07.001.

(http://www.sciencedirect.com/science/article/B6T3X-4PK8MJH-1/2/d5910637b5f8228d710a89baf3e856d8)
Abstract:
Crop production in Mediterranean-type environments is invariably limited by low and erratic rainfall (200-600 mm year-1), and thus soil moisture, and by high evapotranspiration resulting from high temperature. Consequently, a major research challenge is to devise cropping systems that maximize water-use efficiency (WUE). In a long-term trial in northern Syria (1986-1998) we compared the effects of seven wheat-based rotations on soil water dynamics and WUE in both the wheat and non-wheat phase. The cropping systems were durum wheat (Triticum turgidum L.) in rotation with fallow, watermelon (Citrullus vulgaris), lentil (Lens culinaris), chickpea (Cicer arietinum), vetch (Vicia sativa), medic pasture (Medicago spp.), and wheat. Seasonal recharge/discharge were identified using the neutron probe. Depth of wetting varied with seasonal rainfall (233-503 mm). Based on crop yields, WUE was calculated for each cropping option in relation to the durum wheat crop.

The greatest limitation to growth was the supply of water and not the soil moisture storage potential. Wheat grain yield was dictated by the extent to which the alternative crops in the rotation dried out the soil profile, in addition to seasonal rainfall and its distribution. Chickpea and medic extracted as much water as continuous wheat. Wheat after these crops was solely dependent on current seasonal rainfall, but fallow, lentil, watermelon, and vetch did not deplete soil moisture to the same extent, leaving some residual soil moisture for the succeeding wheat crop. This difference in soil water resulted in a significant difference in wheat yield and hence WUE, which decreased in the following crop rotation sequence: fallow, medic, lentil, chickpea, and continuous wheat. However, on the system basis, the wheat/lentil or wheat/vetch systems were most efficient at using rainfall, producing 27% more grain than the wheat/fallow, while the wheat/chickpea system was as efficient as wheat/fallow system, with continuous wheat being least efficient. With N added to the cereal phase, system WUE of the system increased, being least for continuous wheat and greatest for wheat/lentil. Wheat-legume rotation systems with additional N input in the wheat phase not only can maintain sustainable production system, but also are more efficient in utilizing limited rainfall.
Keywords: Wheat; Cereals; Food/forage; Legumes; Fallow; Water-use efficiency; Water productivity; Cereal-legume rotations

Vittorio Marletto, Francesca Ventura, Giovanna Fontana, Fausto Tomei, Wheat growth simulation and yield prediction with seasonal forecasts and a numerical model, Agricultural and Forest Meteorology, Volume 147, Issues 1-2, 12 November 2007, Pages 71-79, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2007.07.003.
(http://www.sciencedirect.com/science/article/B6V8W-4PG2KKC-1/2/ff4763ca211e574415b6c2fdba58bd3f)
Abstract:
Wheat is a major winter crop in northern Italy. Italian agricultural markets and government agencies would undoubtedly benefit from the early availability of wheat yield forecasts at the regional and national scales as useful support in decision making. In this study we tested the skill of seasonal weather forecasts, in combination with observed weather data, as input to a crop model working in water limited conditions. The observations were used to simulate wheat growth from sowing up to 2 months before harvest, while seasonal forecasts were used afterwards to predict final yields. Observations included climatic variables and water table levels from a location in the Po river plain (Bologna, Italy), while seasonal forecasts came from the Demeter EU project and consisted of a dataset of downscaled multi-model ensemble hindcasts.

The Criteria/Wofost simulation model used for this work includes a new numerical scheme for the soil water balance (Criteria) and incorporates a modified version of the Wofost crop growth model. Median wheat yield forecasts were compared with field data collected at the experimental farm of

Bologna University during 1977-1987. Forecast yields showed satisfactory agreement with observed ones (MBE 816 kg ha-1, RMSE 1185 kg ha-1, R2 0.65**). In our view, with this result there is a good prospect for extending the proposed methodology to the regional and national scale for the production of operational seasonal forecasts of agricultural yields.
Keywords: Crop model; Soil water flow model; Ensemble prediction; Downscaling; Northern Italy

Yingli Yang, Shijian Xu, Lizhe An, Nianlai Chen, NADPH oxidase-dependent hydrogen peroxide production, induced by salinity stress, may be involved in the regulation of total calcium in roots of wheat, Journal of Plant Physiology, Volume 164, Issue 11, 9 November 2007, Pages 1429-1435, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.08.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4MV19M3-1/2/30afc87f984159dea4f59c287df7e4a8)
Abstract: Summary
Hydrogen peroxide (H2O2) is often generated by cells and tissues under environmental stress. In this work, we provide evidence that plasma membrane (PM) NADPH oxidase-dependent H2O2 production might act as an intermediate step in the NaCl-induced elevation of calcium (Ca) in roots of wheat. Remarkable increases in the content of total Ca were observed not only in roots exposed to NaCl but also in roots of seedlings exposed to exogenous H2O2. In roots, H2O2 production increased upon exposure to salt stress. PM vesicles were isolated from roots, and NADPH oxidase activity was determined by measuring superoxide anion (O2-) production. NADPH oxidase-dependent O2- production was 11.6 nmol mg-1 protein min-1 in control vesicles, but 19.6 nmol after NaCl treatment (24 h), indicating that salt stress resulted in the activation of the PM NADPH oxidase. Furthermore, the NaCl-induced increase in total Ca was partially abolished by the addition of 150 U/mL catalase (CAT), a H2O2 scavenger, and also by 10 [mu]M diphenylane iodonium (DPI), a NADPH oxidase inhibitor. This data suggest that NADPH oxidase-dependent H2O2 production might be involved in the modulation of the Ca content in wheat roots. In conclusion, our results show that salinity stress increases the total Ca content of wheat roots, which is partly due to PM NADPH oxidase-dependent H2O2 generation.
Keywords: H2O2; NADPH oxidase; Salt stress; Total Ca content; Wheat

Willie Jones B. Saliling, Philip W. Westerman, Thomas M. Losordo, Wood chips and wheat straw as alternative biofilter media for denitrification reactors treating aquaculture and other wastewaters with high nitrate concentrations, Aquacultural Engineering, Volume 37, Issue 3, November 2007, Pages 222-233, ISSN 0144-8609, DOI: 10.1016/j.aquaeng.2007.06.003.
(http://www.sciencedirect.com/science/article/B6T4C-4P40KMF-1/2/287c009907b7f14ffaa0e4f787d45b19)
Abstract:
This study evaluated wood chips and wheat straw as inexpensive and readily available alternatives to more expensive plastic media for denitrification processes in treating aquaculture wastewaters or other high nitrate waters. Nine 3.8-L laboratory scale reactors (40 cm packed height x 10 cm diameter) were used to compare the performance of wood chips, wheat straw, and Kaldnes plastic media in the removal of nitrate from synthetic aquaculture wastewater. These upflow bioreactors were loaded at a constant flow rate and three influent NO3-N concentrations of 50, 120, and 200 mg/L each for at least 4 weeks, in sequence. These experiments showed that both wood chips and wheat straw produced comparable denitrification rates to the Kaldnes plastic media. As much as 99% of nitrate was removed from the wastewater of 200 mg NO3-N/L influent concentration. Pseudo-steady state denitrification rates for 200 mg NO3-N/L influent concentrations averaged (1360 +/- 40) g N/(m3 d) for wood chips, (1360 +/- 80) g N/(m3 d) for wheat straw, and (1330 +/- 70) g N/(m3 d) for Kaldnes media. These values were not the maximum potential of the reactors as nitrate profiles up through the reactors indicated that nitrate reductions in the lower half of the reactors were more than double the averages for the whole

reactor. COD consumption per unit of NO3-N removed was highest with the Kaldnes media (3.41-3.95) compared to wood chips (3.34-3.64) and wheat straw (3.26-3.46). Effluent ammonia concentrations were near zero while nitrites were around 2.0 mg NO2-N/L for all reactor types and loading rates. During the denitrification process, alkalinity and pH increased while the oxidation-reduction potential decreased with nitrate removal.
Wood chips and wheat straw lost 16.2% and 37.7% of their masses, respectively, during the 140-day experiment. There were signs of physical degradation that included discoloration and structural transformation. The carbon to nitrogen ratio of the media also decreased. Both wood chips and wheat straw can be used as filter media for biological denitrification, but time limitations for the life of both materials must be considered.
Keywords: Wheat straw; Wood chips; Denitrification; Aquaculture; Media degradation; Biofilter

Guolin Huang, Jeffrey X. Shi, Tim A.G. Langrish, A new pulping process for wheat straw to reduce problems with the discharge of black liquor, Bioresource Technology, Volume 98, Issue 15, November 2007, Pages 2829-2835, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.09.029.
(http://www.sciencedirect.com/science/article/B6V24-4M93P4X-3/2/0e7dc3923b63c325670d1943d818d86a)
Abstract:
Aqueous ammonia mixed with caustic potash as wheat straw pulping liquor was investigated. The caustic potash did not only reduce the NH3 usage and cooking time, but also provided a potassium source as a fertilizer in the black liquor. Excess NH3 in the black liquor was recovered and reused by batch distillation with a 98% recovery rate of free NH3. The black liquor was further treated for reuse by coagulation under alkaline conditions. The effects of different flocculation conditions, such as the dosage of 10% aluminium polychloride, the dosage of 0.1% polyacrylamide, the reaction temperature and the pH of the black liquor on the flocculating process were studied. The supernatant was recycled as cooking liquor by adding extra NH4OH and KOH. The amount of delignification and the pulp yield for the process remained steady at 82-85% and 48-50%, respectively, when reusing the supernatant four times. The coagulated residues could be further processed as solid fertilizers. This study provided a new pulping process for wheat straw to reduce problems of discharge black liquor.
Keywords: Pulping process; Wheat straw; Black liquor; Delignification

N. Wang, N. Zhang, J. Wei, Q. Stoll, D.E. Peterson, A real-time, embedded, weed-detection system for use in wheat fields, Biosystems Engineering, Volume 98, Issue 3, November 2007, Pages 276-285, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.08.007.
(http://www.sciencedirect.com/science/article/B6WXV-4PYRKF7-1/2/a30feeef41983682bbb68bfcca3fb37f)
Abstract:
Two optical weed sensors and their control modules (a central-control module, a global positioning system unit, and a spray-control module) were successfully integrated into a real-time, embedded system. The system components were networked using a controller area network. The system was tested extensively in two wheat fields. With good training, the system generally reached weed-detection accuracies greater than 70%. The addition of a light-blocking screen and artificial lights facilitated use of the system at night or under variable light conditions. Classification models trained with multiple weed species improved classification accuracy. Classification accuracy was also affected by the position of the sensor relative to the targets during training.

J.L. Ren, R.C. Sun, C.F. Liu, Z.N. Cao, W. Luo, Acetylation of wheat straw hemicelluloses in ionic liquid using iodine as a catalyst, Carbohydrate Polymers, Volume 70, Issue 4, 1 November 2007, Pages 406-414, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.04.022.

(http://www.sciencedirect.com/science/article/B6TFD-4NR18CX-2/2/99c0a4bcb02c08627e22fdccdfbf4a7e)
Abstract:
Wheat straw hemicelluloses were acetylated with acetic anhydride using iodine as a novel catalyst in 1-butyl-3-methylimidzolium chloride ([C4mim]Cl) ionic liquid (IL). Acetylated hemicelluloses with yield and degree of substitution (DS) from 70.5% to 90.8% and between 0.49 and 1.53, respectively, are accessible in a complete homogeneous procedure by changing the reaction temperature, reaction duration, the dosage of catalyst, and the dosage of acetic anhydride. The preferred reaction parameters that resulted in the highest DS were follows: 20:1 reactant molar ratio, 100 [degree sign]C, 30 min, 15% iodine, in which about 83% hydroxyl groups in native hemicelluloses were esterified. The structural features of the acetylated hemicelluloses were characterized by 13C NMR and FT-IR spectroscopy. The thermal stability of the acetylated hemicelluloses increased upon chemical modification. It is the first time that we have demonstrated that ILs could be used as an environmentally friendly solvent for the chemical modification of hemicelluloses.
Keywords: Hemicelluloses; Acetylation; Ionic liquid; Homogeneous system; Iodine

T. Jensen, A. Apan, F. Young, L. Zeller, Detecting the attributes of a wheat crop using digital imagery acquired from a low-altitude platform, Computers and Electronics in Agriculture, Volume 59, Issues 1-2, November 2007, Pages 66-77, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.05.004.
(http://www.sciencedirect.com/science/article/B6T5M-4P1272G-1/2/da1cb8e60263518c26d6288e4b141d3b)
Abstract:
A low-altitude platform utilising a 1.8-m diameter tethered helium balloon was used to position a multispectral sensor, consisting of two digital cameras, above a fertiliser trial plot where wheat (Triticum spp.) was being grown. Located in Cecil Plains, Queensland, Australia, the plot was a long-term fertiliser trial being conducted by a fertiliser company to monitor the response of crops to various levels of nutrition. The different levels of nutrition were achieved by varying nitrogen application rates between 0 and 120 units of N at 40 unit increments. Each plot had received the same application rate for 10 years. Colour and near-infrared images were acquired that captured the whole 2 ha plot. These images were examined and relationships sought between the captured digital information and the crop parameters imaged at anthesis and the at-harvest quality and quantity parameters. The statistical analysis techniques used were correlation analysis, discriminant analysis and partial least squares regression. A high correlation was found between the image and yield (R2 = 0.91) and a moderate correlation between the image and grain protein content (R2 = 0.66). The utility of the system could be extended by choosing a more mobile platform. This would increase the potential for the system to be used to diagnose the causes of the variability and allow remediation, and/or to segregate the crop at harvest to meet certain quality parameters.
Keywords: Grain protein; Grain yield; Low altitude; Digital camera

R.S. Chhokar, R.K. Sharma, G.R. Jat, A.K. Pundir, M.K. Gathala, Effect of tillage and herbicides on weeds and productivity of wheat under rice-wheat growing system, Crop Protection, Volume 26, Issue 11, November 2007, Pages 1689-1696, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.01.010.
(http://www.sciencedirect.com/science/article/B6T5T-4NHV6SD-2/2/2cae6c9b34138d1946b27e5f1e75a15e)
Abstract:
Field experiments were carried out to evaluate the effect of tillage and herbicides on weeds and wheat (Triticum aestivum L. emend. Fiori and Paol.) productivity under rice (Oryza sativa L.)-wheat

growing system. Rumex dentatus was significantly higher (12.1 plants/m2) under zero tillage (ZT) compared to conventional tillage (CT) (1.9 plants/m2). CT favored Phalaris minor. The average P. minor dry-weight under ZT and CT was 234.7 and 386.5 g/m2, respectively. This differential response reflected was due to variation in seed distribution during puddling performed for rice transplanting. The lower density of R. dentatus seeds led to its concentration in upper soil layer particularly on the surface, under ZT. Of the total seed found in upper 12.5 cm soil layer on the soil surface, about 0.02% and 1.24% were of P. minor and R. dentatus, respectively. Among the three tillage crop establishment methods, ZT and CT drill provided about 0.3 t/ha higher wheat grain yield over farmer's practice of CT-broadcast sowing. The reduced expenditure on tillage and higher yield, provided additional profit of about US $ 161.3 ha-1 for ZT over farmer's practice. In CT, the performance of sulfosulfuron at 25 g/ha, clodinafop at 60 g/ha and sulfosulfuron+metsulfuron at 25+1.6 g/ha was similar, where fields were dominated by P. minor. However, in ZT, overall tank mix application of sulfosulfuron+metsulfuron was the most effective treatment for control of the weed flora and improving wheat yield. Metsulfuron alone due to its effectiveness against broad-leaved weeds only was inferior. Considering the benefits of ZT in reducing the cost of cultivation and lowering the infestation of P. minor, this technology should be integrated with other weed control measures for economic and sustainable wheat production.
Keywords: Clodinafop; Metsulfuron; Phalaris minor; Puddling; Rumex dentatus; Seed distribution; Soil strength; Sulfosulfuron

Juan M. Palazzini, Maria L. Ramirez, Adriana M. Torres, Sofia N. Chulze, Potential biocontrol agents for Fusarium head blight and deoxynivalenol production in wheat, Crop Protection, Volume 26, Issue 11, November 2007, Pages 1702-1710, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.03.004.
(http://www.sciencedirect.com/science/article/B6T5T-4NMTYT6-1/2/f2b850d8b6c4e019340a0346af0dc37c)
Abstract:
Fusarium head blight (FHB) caused by Gibberella zeae (anamorph=Fusarium graminearum) is a devastating disease that causes extensive yield and quality losses to wheat in humid and semi-humid regions of the world. During the last 50 years, several epidemics of FHB of varying degrees of severity have occurred in Argentina. Besides the economic losses due to reduction in grain quality, the main problem is the potential mycotoxin contamination of wheat mainly with deoxynivalenol (DON). Biological control offers an additional strategy that can be used as part of an integrated management to control FHB. A survey was done to search for potential biocontrol agents (BCA) isolated from wheat anthers in Argentina. A total of 354 bacterial strains were screened in two selection steps using a index of dominance (ID) assay considering environmental parameters such as temperature and water activity in the interaction between pathogen and antagonist. Among the evaluated strains, 22 strains (6%) were able to reduce the growth of F. graminearum. The 22 selected strains reduced the production of DON on irradiated wheat grains by 60-100%. The ability of these strains to control FHB and DON production was evaluated under greenhouse conditions. Nine strains (40.9%) significantly reduced the disease severity by 49-71% (P[less-than-or-equals, slant]0.05). The DON content in spikes, produced by plants in the greenhouse trial, was significantly reduced by 32-100% compared with the control. Five strains decreased mycotoxin content to undetectable levels. From this study we identified two strains, Brevibacillus sp. BRC263 and Streptomyces sp. BRC87B, to be tested in combination for potential control of FHB.
Keywords: Biocontrol; FHB; Wheat; Deoxynivalenol

Marco Beyer, Melanie B. Klix, Joseph-Alexander Verreet, Estimating mycotoxin contents of Fusarium-damaged winter wheat kernels, International Journal of Food Microbiology, Volume 119,

Issue 3, 1 November 2007, Pages 153-158, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.007.
(http://www.sciencedirect.com/science/article/B6T7K-4P6M5X1-2/2/2be8cc64e0d72dd28d7c2b61f50e3504)
Abstract:
Winter wheat (Triticum aestivum L., cultivars Ritmo and Dekan) grain was sampled in Northern Germany between 2001 and 2006. Kernels damaged by fungi of the genus Fusarium were separated from sound grain by visual assessment. Samples containing 0%, 20%, 40%, 60%, 80% and 100% of Fusarium-damaged kernels were compiled and analyzed for the Fusarium type B trichothecenes deoxynivalenol (DON, 2001-2006), nivalenol (NIV, 2006), 3-acetyl-deoxynivalenol (3AcDON, 2006) and 15-acetyl-deoxynivalenol (15AcDON, 2006). The relationship between mycotoxin contents and the percentage of Fusarium-damaged kernels was calculated for each lot of grain. Apart from one exception, relationships between the percentage of Fusarium-damaged kernels and NIV, 3AcDON or 15AcDON were non-significant. In contrast, close relationships between the percentage of Fusarium-damaged kernels and the DON content were observed (r2 = 0.93-0.99). The y-axis intercepts were not significantly different from zero, but the DON content of the damaged kernels varied by a factor of 11.59 between years and by a factor of 1.87 between cultivars. Fusarium-damaged kernels contained between 0.21 and 2.39 [mu]g DON kernel- 1. The overall average DON content of a Fusarium-damaged wheat kernel was 1.29 +/- 0.11 [mu]g. The DON content of diseased kernels was affected by environment and wheat genotype but not by genotype x environment interaction. On average, Fusarium-damaged kernels contained 9.7-fold more DON than 15AcDON, 19.5-fold more DON than NIV, and 26.9-fold more DON than 3AcDON. 3AcDON and 15AcDON contents per wheat kernel were not significantly different between cultivars. On average, 4.27% of Fusarium-damaged kernels were sufficient to reach the 1.25 mg DON kg- 1 grain limit for unprocessed cereals in the EU. Given the low percentages of Fusarium-damaged kernels that are equivalent to current legal DON limits, grading accuracies > 96% would be needed when using automatic grading systems for separating sound from damaged kernels.
Keywords: Breeding; Deoxynivalenol; Fusarium culmorum; Fusarium graminearum; Grading

A. Patriarca, M.P. Azcarate, L. Terminiello, V. Fernandez Pinto, Mycotoxin production by Alternaria strains isolated from Argentinean wheat, International Journal of Food Microbiology, Volume 119, Issue 3, 1 November 2007, Pages 219-222, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.055.
(http://www.sciencedirect.com/science/article/B6T7K-4PCGRPS-3/2/9f0046c5e42addb0c9ceee089e9a7c2a)
Abstract:
The toxigenic potential of Alternaria strains isolated from Argentinean wheat was investigated. A total of 123 strains were assayed for the production of tenuazonic acid (TA), alternariol (AOH) and alternariol monomethyl ether (AME). All but one of the isolates were able to produce at least one of the three mycotoxins. TA was produced by 72% of the strains (1-14782 mg/kg), AOH by 87% (4-622 mg/kg) and AME by 91% (7-2625 mg/kg). The average level of TA detected for all strains (1757 mg/kg) was higher than the average level of both alternariols (162 mg/kg for AOH and 620 mg/kg for AME). TA was the toxin produced at the highest concentration but in lower frequency. Most of the strains were able to synthesize more than one toxin: 74 isolates (60%) were positive for all three toxins, 30 (24%) for both AOH and AME, 5 (4%) for both TA and AME, and 2 (2%) for TA and AOH. The widespread occurrence of Alternaria in wheat and its ability to produce mycotoxins suggests the possible occurrence of its toxins in wheat naturally infected with this fungus.
Keywords: Alternaria; Mycotoxins; Wheat; Tenuazonic acid; Alternariol; Alternariol monomethyl ether

Luc Saulnier, Pierre-Etienne Sado, Gerard Branlard, Gilles Charmet, Fabienne Guillon, Wheat arabinoxylans: Exploiting variation in amount and composition to develop enhanced varieties, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 261-281, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.014.
(http://www.sciencedirect.com/science/article/B6WHK-4P59X6X-1/2/e3db89cccd977e372e88c8761fe5530b)
Abstract:
Arabinoxylans (AX) are the major polymers of wheat grain cell walls. The content and the structure of AX polymers show large differences between tissues and between wheat cultivars that affect the end-use properties and nutritional quality of the grain. The development of new wheat cultivars with enhanced quality, therefore, requires methods to exploit this variation and it is essential to understand and modulate the mechanisms controlling the key events of cell-wall polymer synthesis.
This paper summarises recent knowledge on the structure and physicochemical properties of AX including variation between cultivars and tissues, methods for analysis and screening, biosynthetic mechanisms and approaches to identifying key genes. This knowledge is essential to understand AX properties and defined possible targets for plant breeding.
Keywords: Biosynthesis; Cell wall; Cereal; Ferulic acid; Grain; Pentosans; Viscosity; QTL; Plant breeding

Malcolm J. Hawkesford, Fang-Jie Zhao, Strategies for increasing the selenium content of wheat, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 282-292, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.02.006.
(http://www.sciencedirect.com/science/article/B6WHK-4N9P4KK-1/2/68f5e74a837c066f20740583e6c075d4)
Abstract:
Selenium (Se) is essential for humans and animals but has no known function in plants. Excess accumulation is toxic to both plants and animals. Dietary intake of Se is low in a large number of people worldwide. This is due to low bioavailability of Se in some soils and consequently low concentrations of Se in plant tissues.
Both selenate and selenite are taken up by plants and subsequently translocated around the plant. Selenate, an analogue of sulphate, is transported by the sulphate transporter family. Some plants are able to accumulate high internal concentrations of Se (hyperaccumulators); however, genetic variation in accumulation ability amongst non-accumulators such as cereals, is relatively small.
Within plant tissues, Se enters the pathways for sulphate assimilation and metabolism and will replace cysteine and methionine in proteins, often with detrimental effect. Alternatively, Se may be accumulated as methylated derivatives or lost from the plant following volatilisation.
Agronomic biofortification of crops with Se-containing fertilisers, which is practised in some countries, provides the best short-term solution for improving Se content of wheat. Longer-term genetic improvement, particularly by targeting substrate discrimination of transporters between selenate and sulphate, for example, may provide a means to enhance uptake and promote accumulation.
Keywords: Wheat; Selenium; Diet; Health; Sulphate transporter

J.I. Ortiz-Monasterio, N. Palacios-Rojas, E. Meng, K. Pixley, R. Trethowan, R.J. Pena, Enhancing the mineral and vitamin content of wheat and maize through plant breeding, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 293-307, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.06.005.
(http://www.sciencedirect.com/science/article/B6WHK-4P1P6VC-3/2/6e2d2dbdef2dc4dd795c834514f4d9bb)
Abstract:

More than half of the world's population suffers micronutrient undernourishment. The main sources of vitamins and minerals (iron, zinc, and vitamin A) for low-income rural and urban populations are staple foods of plant origin that often contain low levels or low bioavailability of these micronutrients. Biofortification aims to develop micronutrient-enhanced crop varieties through conventional plant breeding. HarvestPlus, the CGIAR's biofortification initiative, seeks to breed and disseminate crop varieties with enhanced micronutrient content that can improve the nutrition of the 'hard to reach' (by fortification or supplementation programmes) rural and urban poor in targeted countries/regions. In attempting to enhance micronutrient levels in maize and wheat through conventional plant breeding, it is important to identify genetic resources with high levels of the targeted micronutrients, to consider the heritability of the targeted traits, to explore the availability of high throughput screening tools and to gain a better understanding of genotype by environment interactions. Biofortified maize and wheat varieties must have the trait combinations which encourage adoption such as high yield potential, disease resistance, and consumer acceptability. When defining breeding strategies and targeting micronutrient levels, researchers need to consider the desired micronutrient increases, food intake and retention and bioavailability as they relate to food processing, anti-nutritional factors and promoters. Finally, ex ante studies are required to quantify the burden of micronutrient deficiency and the potential of biofortification to achieve a significant improvement in human micronutrient status in the deficient target population in order to determine whether a biofortification program is cost-effective.
Keywords: Micronutrient breeding; Maize and wheat; Iron, zinc, and provitamin A carotenoids

Youna Hemery, Xavier Rouau, Valerie Lullien-Pellerin, Cecile Barron, Joel Abecassis, Dry processes to develop wheat fractions and products with enhanced nutritional quality, Journal of Cereal Science, Volume 46, Issue 3, The Contribution of Cereals to a Healthy Diet, November 2007, Pages 327-347, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.09.008.
(http://www.sciencedirect.com/science/article/B6WHK-4PRYFYP-1/2/10e6861717412a96b781d05c49d6145a)
Abstract:
Numerous epidemiological studies have investigated the potential health benefits of consuming more wholegrain foods. However, in Europe, most wheat-based food products are made with refined endosperm from which the germ and peripheral layers (bran) are excluded, although these tissues have considerable nutritional potential and contain most of the micronutrients, phytochemicals and fibre of the grain. Dry fractionation technologies allow these peripheral tissues to be separated and recovered to efficiently separate valuable from detrimental components (i.e. contaminants, antinutrient compounds, irritants), in order to develop nutritionally enhanced ingredients and products. The rational development of efficient processes requires the ability to monitor the fractionation and understand the fate of grain tissues, and to take into account the various properties of the different parts of the grain in order to design an appropriate fractionation protocol. This review provides an overview of the existing processes that can be used for the production of wheat products and fractions with enhanced nutritional interest. The grain composition and properties are briefly introduced with emphasis on nutritionally interesting compounds. Tissue markers and their application in process monitoring are presented, and the physical properties that influence the fractionation properties of grain tissues are developed. The main wheat dry fractionation processes are then reviewed, including pretreatments, degerming, debranning, and bran fractionation.
Keywords: Wheat; Bran; Aleurone; Whole grain; Dry-processing; Fractionation; Milling; Debranning; Ingredient; Nutritional quality

F. Meng, Z. Ni, L. Wu, Q. Sun, Identification of 17 differentially expressed cDNAs between wheat reciprocal cross-fertilized kernels and their parents, South African Journal of Botany, Volume 73, Issue 4, November 2007, Pages 522-529, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.04.062.

(http://www.sciencedirect.com/science/article/B7XN9-4NX8RRF-1/2/38fc7dff3908254f42cbb468d7da22af)
Abstract:
In order to provide an insight into molecular basis of cross-fertilized kernel advantage and heterosis, we performed screening of differentially expressed genes between reciprocal cross-fertilized kernels and their parents at 2, 6, and 12 days after pollination (DAP) by using differential display technique. Seventeen differentially expressed cDNAs were verified by reverse-northern blot. Sequence analysis and database search revealed that differentially expressed genes between reciprocal cross-fertilized kernels and their parents included genes involved in metabolism, signal transduction, transcription factor and so on. In silico expression analysis of the 9 differential expressed genes in crown, flower, leave, root, stem, inflorescence and seed tissues, and indicated that they are expressed in various tissue-specific patterns. These results indicated that diverse pathways may involve in wheat heterosis formation.
Keywords: Differential display; Gene expression; Heterosis; Seed development; Wheat

S.A. Saheed, L. Liu, L. Jonsson, C.E.J. Botha, Xylem - as well as phloem - sustains severe damage due to feeding by the Russian wheat aphid, South African Journal of Botany, Volume 73, Issue 4, November 2007, Pages 593-599, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.05.008.
(http://www.sciencedirect.com/science/article/B7XN9-4P3TYPM-1/2/af2f585528578959b1a94e9e4cfa55ec)
Abstract:
Investigation of comparative effects of feeding damage by the Russian wheat aphid (RWA, biotype SA1, Diuraphis noxia Mordvilko) on leaf blades of susceptible and resistant wheat cultivars (Triticum aestivum L. var Betta and Betta-Dn1 respectively) were carried out to establish the level of ultrastructural damage caused by this aphid and the possible limitation of damage induced which could be ascribed to the resistance gene Dn1 over the susceptible cultivar. Ultrastructurally, Betta-Dn1 sustained less damage to the vascular tissue as well as to the mesophyll during the experimental period. Both inter- and intracellular probes resulted in considerable saliva deposition as the aphids probed for suitable feeding sites. Salivary tracks were observed between and within mesophyll, bundle sheath cells as well as the vascular tissue, including the xylem. Disruption of organelles and cytoplasm resulted from cell probing and sheath deposition. Cell and organelle damage was more evident in the non-resistant Betta cultivar. The aphids probed for and fed from thin-walled sieve tubes preferentially. Few thick-walled sieve tubes showed evidence of either aphid probing or feeding-related damage. Saliva was deposited when the aphids probed inter- and intracellularly for feeding sites. The aphids appeared preferentially to probe for and feed from thin-walled sieve tubes, as few thick-walled sieve tubes showed evidence of damage. Vessels, apparently probed for water, contained watery saliva that encased the secondary walls and sealed pit membranes between probed vessels and xylem parenchyma. The xylem probed by the RWA was rendered non-functional, probably contributing to symptoms of leaf roll, chlorosis and necrosis, which were observed within two weeks of infestation in the susceptible Betta cultivar. This damage was limited in the resistant Betta-Dn1 cultivar during the same time frame.
Keywords: Aphids; Phloem feeding; Resistance; Russian wheat aphid (RWA); Susceptibility; Ultrastructural damage; Wheat; Xylem probes

Aldo Corsetti, Luca Settanni, Clemencia Chaves Lopez, Giovanna E. Felis, Mario Mastrangelo, Giovanna Suzzi, A taxonomic survey of lactic acid bacteria isolated from wheat (Triticum durum) kernels and non-conventional flours, Systematic and Applied Microbiology, Volume 30, Issue 7, 1 November 2007, Pages 561-571, ISSN 0723-2020, DOI: 10.1016/j.syapm.2007.07.001.
(http://www.sciencedirect.com/science/article/B7GVX-4PB162R-1/2/4629f02b8abd19457f013c993d54f0df)
Abstract:

In order to explore the correspondence between raw material- and mature sourdough-lactic acid bacterial (LAB) communities, 59 Italian wheat (Triticum durum) grain samples, one bran and six non-conventional flour samples were analyzed through a culture-dependent approach. The highest cell count by an agar medium specific for LAB was 2.16 log CFU/g. From about 2300 presumptive LAB (Gram-positive and catalase-negative) colonies collected, a total of 356 isolates were subjected to identification by a genetic polyphasic strategy consisting of RAPD-PCR analysis, partial 16S rRNA gene sequencing, species-specific and multiplex PCRs. The isolates were recognized as 137 strains belonging to Aerococcus, Enterococcus, Lactobacillus, Lactococcus and Pediococcus genera and a phylogram based on partial 16S rRNA genes was constructed. The species most frequently found were Enterococcus faecium, Enterococcus mundtii and Lactobacillus graminis, which are not generally reported to be typical in mature sourdoughs.
Keywords: Culture-dependent methods; Genetic polyphasic approach; Lactic acid bacteria; Non-conventional flours; Sourdough; Triticum durum

James A. Anderson, Marker-assisted selection for Fusarium head blight resistance in wheat, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 51-53, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.025.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-B/2/16b6b303484eb9f6f630f44c208f47e3)
Abstract:
The cultivation of wheat varieties resistant to Fusarium head blight (FHB) is recognized as one of the most important components to diminish losses due to this disease. Although there is no known immunity to this disease in wheat germplasm, considerable improvements in genetic resistance have been achieved by concentrated breeding efforts that have relied primarily upon repeated field and greenhouse-based screening. DNA markers are a relatively new technology that can be used to increase breeding progress, especially for traits such as FHB that are difficult to select for under field conditions and that are controlled by multiple genes. Marker-assisted selection (MAS) uses markers to select for particular DNA segments that are genetically linked to genes that provide incremental resistance to FHB. One particular gene, designated Fhb1, provides a 20-25% average reduction in FHB symptoms. This gene and its associated markers have been validated in numerous breeding programs and is widely used to more precisely breed for resistance. About a dozen other genes affecting FHB reaction have been identified, but they have smaller and more inconsistent effects compared with Fhb1. Nevertheless, breeders are discovering which of these markers can be combined with Fhb1 in their genetic backgrounds to enhance resistance. The establishment of the USDA-ARS Regional Small Grains Genotyping Centers and similar facilities around the world have increased the capacity for wheat breeders to utilize this powerful technology. More efficient DNA extraction technologies and marker platforms will allow breeders to more fully implement MAS in the future.
Keywords: Wheat; Triticum aestivum; Fusarium head blight; Scab; Disease resistance; Marker-assisted selection; Quantitative trait loci

A.W. Schaafsma, D.C. Hooker, Climatic models to predict occurrence of Fusarium toxins in wheat and maize, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 116-125, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.08.006.
(http://www.sciencedirect.com/science/article/B6T7K-4PFW629-3/2/0422b70c2105c5d7e641782059b2aab6)
Abstract:
Although forecasting Fusarium infections have useful implications, it may be argued that forecasting Fusarium toxins is more useful to help reduce their entry into the food chain. Several

disease incidence models have been commercialized for wheat, but only one toxin prediction model from Ontario, Canada, 'DONcast', has been validated extensively and commercialized to date for wheat, and another has been proposed for maize. In the development of these predictive tools, the variation in toxin levels associated with year and agronomic effects was estimated from simple linear models using wheat and maize samples taken from farm fields. In wheat, environment effects accounted for 48% of the variation in deoxynivalenol (DON) across all fields, followed by variety (27%), and previous crop (14 to 28%). In maize, hybrid accounted for 25% of the variation of either DON or fumonisin, followed by environment (12%), and when combined 42% of the variability was accounted for. The robust site-specific, DON forecast model accounted for up to 80% of the variation in DON, and has been used commercially for 5 years in Canada. Forecasting DON and fumonisins in maize is more difficult, because of its greater exposure to infection, the role of wounding in infection, the more important role of hybrid susceptibility, and the vast array of uncharacterized hybrids available in the marketplace. Nevertheless, using data collected from controlled experiments conducted in Argentina and the Philippines, a model was developed to predict fumonisin concentration using insect damage and weather variables, accounting for 82% of the variability of fumonisins. Using mycotoxins as a measure of disease outcome, as opposed to disease symptoms, offers a more robust prediction of mycotoxin risk, and it accounts for mycotoxin accumulation that occurs frequently in the absence of any change in Fusarium symptoms.
Keywords: Weather; Forecast; Mycotoxin; Deoxynivalenol; Fumonisin; Corn

Gary Y. Yuen, Susan D. Schoneweis, Strategies for managing Fusarium head blight and deoxynivalenol accumulation in wheat, International Journal of Food Microbiology, Volume 119, Issues 1-2, Mycotoxins from the Field to the Table, 20 October 2007, Pages 126-130, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.07.033.
(http://www.sciencedirect.com/science/article/B6T7K-4P9SN8X-C/2/adf6fa2a7bcaadf384429315e91b3a74)
Abstract:
Many mycotoxigenic fungi infect plant hosts and cause disease in the field. Therefore, control of field infection by these fungi is a critical step in managing mycotoxin accumulation in the harvested product. Fusarium graminearum, also known as Gibberella zeae, is the causal agent of Fusarium head blight (FHB), or scab, in cereals and is also the primary agent responsible for contamination of grain with deoxynivalenol (DON). Research efforts worldwide are devoted to the development of strategies to control field infection of wheat and barley by this pathogen. Strategies include the use of fungicides and biological control agents to protect flowering heads from infection. There is extensive effort in breeding for host resistance to infection and spread of the pathogen within the heads. Scientists are also seeking exogenous traits to introduce into cereals to enhance resistance. Cultural practices are also being examined, primarily as measures to reduce pathogen survival and inoculum production in crop residues. The successes and limitations of these strategies in the management of Fusarium head blight and deoxynivalenol are discussed.
Keywords: Barley; Deoxynivalenol; Fusarium head blight; Scab; Vomitoxin; Wheat

Eliane Cristina Gruszka Vendruscolo, Ivan Schuster, Marcos Pileggi, Carlos Alberto Scapim, Hugo Bruno Correa Molinari, Celso Jamil Marur, Luiz Gonzaga Esteves Vieira, Stress-induced synthesis of proline confers tolerance to water deficit in transgenic wheat, Journal of Plant Physiology, Volume 164, Issue 10, 19 October 2007, Pages 1367-1376, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.05.001.
(http://www.sciencedirect.com/science/article/B7GJ7-4P3M21N-1/2/16a88abf671dc2ef63c95beb1d200cb7)
Abstract: Summary

Water deficit is one of the main abiotic factors that affect spring wheat planted in subtropical regions. Accumulation of proline appears to be a promising approach to maintain the productivity of plants under stress condition. However, morphological alterations and growth reduction are observed in transgenic plants carrying genes coding for osmoprotectants controlled by constitutive promoters. We report here the effects of water deficit on wheat plants transformed with the Vigna aconitifolia [Delta]1-pyrroline-5-carboxylate synthetase (P5CS) cDNA that encodes the key regulatory enzyme in proline biosynthesis, under the control of a stress-induced promoter complex--AIPC. Transgenic wheat plants submitted to 15 days of water shortage presented a distinct response. We have found that drought resulted in the accumulation of proline. The tolerance to water deficit observed in transgenic plants was mainly due to protection mechanisms against oxidative stress and not caused by osmotic adjustment.
Keywords: Drought tolerance; P5CS; Proline; Wheat; Transformation

B. Benli, M. Pala, C. Stockle, T. Oweis, Assessment of winter wheat production under early sowing with supplemental irrigation in a cold highland environment using CropSyst simulation model, Agricultural Water Management, Volume 93, Issues 1-2, 16 October 2007, Pages 45-53, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.06.014.
(http://www.sciencedirect.com/science/article/B6T3X-4PKG5W0-1/2/9899f0ebad0d07bd0b36a006f593f44f)
Abstract:
The most important question in supplemental irrigation management is when and how much water to apply. It is a laborious and expensive task to develop supplemental irrigation schedules solely by conventional field experimentation. A cropping system simulation model (CropSyst) was evaluated for its ability to simulate growth, biomass, grain yield and evapotranspiration (ET) of wheat sown early with supplemental irrigation (SI). This was computed under rainfed conditions in a semiarid climate with cold winters in the highlands of Turkey. Experimental data from three growing seasons (1998-2001) were used. The experimental design incorporates Bezostia bread wheat cultivar tested under two main treatments: no irrigation at sowing (rainfed-A1) and irrigation at sowing with 50 mm of water (A2); and two sub treatments: rainfed (B1) and spring supplemental irrigation to replenish the total water requirement at 0-90 cm soil profile (B2) at the Ankara Research Institute of Rural Services. Crop input parameters were selected from the model documentation and experimental data. A few cultivar-specific parameters were adjusted within a narrow range of typical fluctuations by model calibration. Results showed that CropSyst was able to simulate yield, biomass and evapotranspiration as observed in the field experiments. Overall, the Willmott Index of agreement between simulated and observed values of grain yield, biomass and ET were 0.98, 0.76 and 0.91, respectively. CropSyst model predicted better the seasonal evapotranspiration under full supplemental irrigated conditions (A2B2) than under rainfed conditions (A1B1), with values of the Willmott index of agreement being 0.97 and 0.89, respectively. The model was run for 20 years (1982-2001) including the 4-year experimental period. Data showed that wheat grain yield could be improved by 15, 19 and 25% with applying only 50 mm of water at the sowing time of 15 October, 1 October and 15 September, respectively. In 80% of the cases, the respective SI applications would give 2.75, 2.7 and 2.95 t ha-1, of the long-term average rainfed yield of 2.1 t ha-1, respectively.
Keywords: CropSyst model; Supplemental irrigation; Bread wheat; Early sowing; Highland; Turkey

Naveen Kalra, Debashis Chakraborty, P. Ramesh Kumar, Monica Jolly, P.K. Sharma, An approach to bridging yield gaps, combining response to water and other resource inputs for wheat in northern India, using research trials and farmers' fields data, Agricultural Water Management, Volume 93, Issues 1-2, 16 October 2007, Pages 54-64, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.06.004.

(http://www.sciencedirect.com/science/article/B6T3X-4PG2KV6-1/2/6c7f1b06b9a40a7edd114307acaf5ca4)
Abstract:
This paper deals with growth and yield of wheat with respect to varying agronomic and resource management practices. Variability of inputs like fertilizer and irrigation as well as differential response of cultivars to these inputs and other agri-management practices coupled with various biotic and abiotic stresses need to be understood in view of current yield stagnation of wheat in the north India, the wheat belt on the country. The reduction in yield arising due to delay in sowing, limited inputs of water and nitrogen, interaction among various biotic and abiotic stresses are discussed on the basis of historic datasets or by using simulation models. Agri-production functions to assess the grain yield of wheat under various biotic and abiotic stresses were developed, which may subsequently help in developing simple crop growth model. Simulated datasets of biomass production and yield indicate that the water production functions based on seasonal evapo-transpiration and transpiration are rather site specific and do not reflect inter-seasonal weather variability. The variabilities in terms of inputs and agronomic management practices and yield of wheat in farmers' fields in selected locations in north India have been quantified. The possibility of using the wheat growth simulator WTGROWS and InfoCrop has been explored to understand the cultivar diversity of wheat in the study areas. Impact of climatic variability, mainly the variations in the winter rains and abrupt changes in the temperatures during critical growth stages, are different in different production environments. There is a need to collate the information of growth response behaviour for Indian wheat, so that the productivity can be enhanced either by breaking the yield barriers through evolving suitable ideotypes or adopting suitable resource and agronomic management practices.
Keywords: Water; Production function; Wheat; Resource inputs; Yield gap; India; Simulation; WTGROWS

T.F.A. Bishop, R.M. Lark, A landscape-scale experiment on the changes in available potassium over a winter wheat cropping season, Geoderma, Volume 141, Issues 3-4, 15 October 2007, Pages 384-396, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.07.004.
(http://www.sciencedirect.com/science/article/B6V67-4PG2S10-1/2/3af4037f19513ba82664f4030af74b1e)
Abstract:
We present an approach for analyzing experiments which uses cokriging to map treatment responses as coregionalized variables. This geostatistical approach enables us to predict treatment responses or contrasts at points or regular blocks across a landscape, or estimate averages over the whole landscape. We use cokriging as it gives coherent estimates of the individual responses and their linear combinations, or contrasts.
The method is illustrated with an experiment performed across 4 arable fields (42.1 ha) in southern England where the response is the change in exchangeable potassium over a winter wheat season. The three treatments are different rates of K-fertilization, a control where no fertilizer was applied, a standard agronomic rate, and a high rate.
We found that the response varied spatially for all treatments which implies that uniform K-fertilization may be inappropriate. Furthermore, the results for the standard treatment indicate that over time exchangeable potassium will decrease if current management practices are continued. In terms of differences between treatments, for most locations in the landscape, the standard and high rate resulted in a significantly larger increase in potassium than the control treatment. 82.2% of the experimental area showed no significant difference in the response between the standard and high treatments. We believed this mainly due to the large nugget effect in the auto-semivariograms which results in a large kriging variance of the contrast relative to kriged estimate of the contrast.
Keywords: Potassium; Cokriging; Orthogonal contrasts; Experimentation

Cedric Naud, David Makowski, Marie-Helene Jeuffroy, Application of an interacting particle filter to improve nitrogen nutrition index predictions for winter wheat, Ecological Modelling, Volume 207, Issues 2-4, 10 October 2007, Pages 251-263, ISSN 0304-3800, DOI: 10.1016/j.ecolmodel.2007.05.003.
(http://www.sciencedirect.com/science/article/B6VBS-4P4820N-1/2/f08484c29fba9f27a7c4a4b349996c11)
Abstract:
Dynamic crop models predict several state variables at a daily time step and thus provide useful information for optimizing agricultural techniques. But the prediction errors of these models are often large due to uncertainties in parameters, initial state values, and equations. Monte Carlo sequential methods, like the interacting particle filter [Del Moral, 1996. Nonlinear filtering: interacting particle solution. Markov Process. Relat. Fields 2, 555-580], can be used to update the state variable values predicted by nonlinear dynamic models from a set of measurements and thus reduce the prediction errors. An interesting feature of these methods is that they do not require a linearization of the original nonlinear model. Up to now, these methods have never been applied to complex dynamic crop models. In this paper, the interacting particle filter was used to update the Azodyn model, a dynamic winter wheat crop model, at 10 or 11 dates, from biomass and nitrogen uptake measurements, and to predict a variable of practical interest, the nitrogen nutrition index. We showed that the implementation of this method can reduce the root mean squared error by 66.7-79.7% for the nitrogen nutrition index, but that the filter is highly sensitive to the assumptions made about the probability distribution of the model errors. We also showed that the particle filter gives stable results with 10,000 Monte Carlo simulations and that this number of simulations can be performed in a very reasonable calculation time.
Keywords: Data assimilation; Dynamic crop model; Interacting particle filter; Nitrogen nutrition index; Sensitivity analysis

Peng QIN, Shun-he CHENG, Chuan-xi MA, Effect of Waxy Wheat Flour Blends on the Quality of Chinese Steamed Bread, Agricultural Sciences in China, Volume 6, Issue 10, October 2007, Pages 1275-1282, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60173-4.
(http://www.sciencedirect.com/science/article/B82XG-4R8H6TS-H/2/80de0bd422c686e30e2f880feb2494a4)
Abstract:
Steamed bread is very popular in the East and Southeast Asian regions, and its quality is affected by some physicochemical properties. Chinese steamed bread was made by adding waxy flour into normal wheat flour in the present study. The results showed that specific volume was not affected by the proportions of waxy flour, whereas, adding waxy flour decreased the appearance, color, texture, elasticity, stickiness, and the total score of Chinese steamed bread. However, there were no significant differences in all values when the proportions of waxy flour were below 10%. All evaluations but specific volume of Chinese steamed bread were positively influenced by the peak viscosity, resistance, and maximum resistance. When the waxy flour proportions were below 25%, the firmness of Chinese steamed bread stored at - 18[degree sign]C for 3 days gradually decreased with the increase of waxy flour. It was revealed that the qualities of Chinese steamed bread cannot be improved by waxy flour but it can be widely used in frozen storing food in the future.
Keywords: waxy wheat; Chinese steamed bread; quality

Veronica Acosta-Martinez, Maysoon M. Mikha, Merle F. Vigil, Microbial communities and enzyme activities in soils under alternative crop rotations compared to wheat-fallow for the Central Great Plains, Applied Soil Ecology, Volume 37, Issues 1-2, October 2007, Pages 41-52, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2007.03.009.

(http://www.sciencedirect.com/science/article/B6T4B-4NP9KBX-1/2/699d3dc0c5eb7dd2e0e59bf0f5152539)
Abstract:
Winter wheat-fallow (W-F) rotation is the predominant cropping system in the Central Great Plains. However, other cropping systems are being suggested because reduced tillage and fallow can provide more residues that can increase soil organic carbon (SOC) content and other parameters related to soil quality and functioning. This study compared the microbial biomass and community composition and enzyme activities under native pasture and research plots under grass and different crop intensities (CI) established for 15 years in Akron, CO. The soil (Weld loam; fine, smectitic, mesic Aridic Paleustolls) was under alternative CI rotations (100 and 67%) of winter wheat (Triticum aestivum L.) (W), corn (Zea mays L.) (C), proso millet (Panicum miliaceum L.) (M), and fallow (F) under no-tillage (nt) compared to the typical 50% CI rotation (W-F) under either conventional tillage (ct) and nt. Relative to F-Wct, the 100% (C-M-W) and 67% (C-F-W) CI rotations increased soil microbial biomass C (MBC) and N (MBN) but only at the 0-5 cm depth. Native pasture and 15 years of undisturbed grass plots showed higher soil MBC up to 2-5-fold and 1.4-3-fold when compared to the cropping systems at 0-5 cm, respectively. Similar trends were found for MBN and several enzyme activities. Enzyme activities of C ([beta]-glucosaminidase, [beta]-glucosidase, and [alpha]-galactosidase) and P cycling (alkaline phosphatase, acid phosphatase and phosphodiesterase) as a group separated the 100 and 67% CI rotations from the 50% CI rotation (W-Fct) at 0-5 and 5-15 cm of soil. Separation in these enzyme activities was observed for rotations sampled under a crop (W-C-F) compared to when sampled under fallow (F-W-C). Principal component analyses (PCA) of fatty acids methyl esters (FAME) suggested a shift in the microbial community structure with greater fungal populations in pasture, grass, and CI rotations of 100 and 67% compared to W-Fct. The sum of fungal indicators (18:2[omega]6c, 18:3[omega]6c, 18:1[omega]9c, 16:1[omega]5c) was significantly correlated ($r > 0.60$; $P < 0.05$) to [beta]-glucosaminidase, [beta]-glucosidase, acid phosphatase and [alpha]-galactosidase activities. After 15 years, our results show that the combination of no-tillage and continuous cropping with reduced fallow frequency in two alternative (100 and 67% CI) rotations for the Central Great Plains have had a positive effect on soil quality parameters such as the microbial populations and community composition but only at 0-5 cm depth, and in several enzyme activities at both 0-5 and 5-15 cm.
Keywords: Enzyme activities; Cropping systems; Soil management; FAME; Tillage; Semiarid soils

Recep Kulcu, Osman Yaldiz, Composting of goat manure and wheat straw using pine cones as a bulking agent, Bioresource Technology, Volume 98, Issue 14, October 2007, Pages 2700-2704, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.09.025.
(http://www.sciencedirect.com/science/article/B6V24-4M93P4X-B/2/1617e64af3d22d78ca572fed465d8bec)
Abstract:
This study aimed to determine the optimum mixture ratio of pine cones, goat manure and wheat straw and obtained optimal Free Air Space (FAS) values for composting. For this aim, pine cones were added at different ratios into goat manure and wheat straw mixtures. So, the FAS value of mixtures was fixed at four different levels. According to the results, the highest organic matter degradation and temperature value were obtained at the mixture ratio of 10% pine cones, 45% goat manure and 45% wheat straw. FAS value of this mixture was 32.8.
Keywords: Composting; Pine cones; Goat manure; FAS

Jose F.C. Barros, Gottlieb Basch, Mario de Carvalho, Effect of reduced doses of a post-emergence herbicide to control grass and broad-leaved weeds in no-till wheat under Mediterranean conditions, Crop Protection, Volume 26, Issue 10, October 2007, Pages 1538-1545, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.12.017.

(http://www.sciencedirect.com/science/article/B6T5T-4N4S61N-1/2/e5c7dc2ef99ebdc6d22c2461c105ad33)
Abstract:
A study was carried out over two years (2004/2005 and 2005/2006) on a private farm in the Alentejo region (Evora), in the South of Portugal where rainfed wheat is sown at the start of the winter rainfall season. The wheat crop was established using no-till as this technology provides the necessary machine bearing capacity of the soil to assure the post-emergence application of herbicides at different weed development stages. Mesosulfuron-methyl (3%) and iodosulfuron-methyl-sodium (0.6%) and mefenpyr-diethyl (9%) were used at three doses and two dates with three different application volumes.
The results of this study indicate that using lower doses than recommended (0.4 kg ha-1) this herbicide controls the annual grass weeds (Avena sterilis L. and Lolium rigidum G.) better than some broad-leaved weeds. For all doses and volume combinations, the application at the first weed development stage (beginning of tillering for grass weeds and 3-4 pairs of leaves for broad-leaved weeds) provided higher grain yields. The lower efficiency of control of more developed grass and broad-leaved weeds and a longer period of competition between crop and weeds for the second application date (complete tillering for grass weeds and 5-6 pairs of leaves for broad-leaved weeds) were responsible for the significantly lower crop yields for this application date. Within each application date no significant differences were obtained between all dose/volume combinations, indicating that the reduction of dose is possible. At the later application date, the lower herbicide dose seems to require a lower application volume to provide maximum grain yield.
Keywords: Weed control; Weed development stage; Herbicide dose; Application volume; Application date

Jairo A. Palta, Ian R.P. Fillery, Greg J. Rebetzke, Restricted-tillering wheat does not lead to greater investment in roots and early nitrogen uptake, Field Crops Research, Volume 104, Issues 1-3, `Ground-breaking Stuff'- Proceedings of the 13th Australian Society of Agronomy Conference, 10-14 September 2006, Perth, Western Australia, October-December 2007, Pages 52-59, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.015.
(http://www.sciencedirect.com/science/article/B6T6M-4PBG1GD-2/2/1c13bad4d4394e7b3278faade7153ec6)
Abstract:
Improving the ability of wheat root systems to capture soil nitrate (NO3-) before it moves below the rooting depth offers the potential to improve crop productivity in deep sandy soils. This dictates that roots grow fast, proliferate early and profusely. The root growth characteristics and the early nitrogen (N) uptake of double haploid lines from an intervarietal cross between restricted-tillering and vigorous wheat were investigated in two glasshouse experiments. In the first experiment double haploid lines B25 and A35 were compared with the cultivar Janz and the line Vigor 18, while in the second experiment the double haploid lines F20 and F25 were compared with the same two genotypes. In each experiment the genotypes were grown in glass-walled boxes. The restricted-tillering gene reduced the number of tillers produced in the double haploid lines, but this did not necessarily result in greater root biomass, root length and root number. Furthermore, root mass per unit of root length, total root biomass and root length were not related to the number of tillers produced. No differences in the root-to-total biomass among genotypes were found so there was no evidence that a surplus of photoassimilates was invested in enlarging, expanding or thickening the root system. F20, the least restricted-tillering double haploid line, had root biomass, root length and root number as high as the vigorous line Vigor 18. It also exhibited the characteristic early and more abundant root branching of Vigor 18. These below-ground parameters were strongly correlated with leaf area, shoot biomass and N uptake, suggesting that enlarging and expanding of the root system and hence improving N capture by roots might be under the control of vigor gene(s) rather than under the control of restricted-tillering gene(s). The

implications of this control on improving the acquisition of N in deep sandy soils with high-leaching potential is discussed.
Keywords: Triticum aestivum; Root mapping; Root length density; Root number; Root proliferation

Adam K. Tilling, Garry J. O'Leary, Jelle G. Ferwerda, Simon D. Jones, Glenn J. Fitzgerald, Daniel Rodriguez, Robert Belford, Remote sensing of nitrogen and water stress in wheat, Field Crops Research, Volume 104, Issues 1-3, `Ground-breaking Stuff'- Proceedings of the 13th Australian Society of Agronomy Conference, 10-14 September 2006, Perth, Western Australia, October-December 2007, Pages 77-85, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.023.
(http://www.sciencedirect.com/science/article/B6T6M-4PFDPJC-1/2/2156f4b644bb272874f6e9e865892dba)
Abstract:
Nitrogen (N) is the largest agricultural input in many Australian cropping systems and applying the right amount of N in the right place at the right physiological stage is a significant challenge for wheat growers. Optimizing N uptake could reduce input costs and minimize potential off-site movement. Since N uptake is dependent on soil and plant water status, ideally, N should be applied only to areas within paddocks with sufficient plant available water. To quantify N and water stress, spectral and thermal crop stress detection methods were explored using hyperspectral, multispectral and thermal remote sensing data collected at a research field site in Victoria, Australia. Wheat was grown over two seasons with two levels of water inputs (rainfall/irrigation) and either four levels (in 2004; 0, 17, 39 and 163 kg/ha) or two levels (in 2005; 0 and 39 kg/ha N) of nitrogen. The Canopy Chlorophyll Content Index (CCCI) and modified Spectral Ratio planar index (mSRpi), two indices designed to measure canopy-level N, were calculated from canopy-level hyperspectral data in 2005. They accounted for 76% and 74% of the variability of crop N status, respectively, just prior to stem elongation (Zadoks 24). The Normalised Difference Red Edge (NDRE) index and CCCI, calculated from airborne multispectral imagery, accounted for 41% and 37% of variability in crop N status, respectively. Greater scatter in the airborne data was attributable to the difference in scale of the ground and aerial measurements (i.e., small area plant samples against whole-plot means from imagery). Nevertheless, the analysis demonstrated that canopy-level theory can be transferred to airborne data, which could ultimately be of more use to growers. Thermal imagery showed that mean plot temperatures of rainfed treatments were 2.7 [degree sign]C warmer than irrigated treatments ($P < 0.001$) at full cover. For partially vegetated fields, the two-Dimensional Crop Water Stress Index (2D CWSI) was calculated using the Vegetation Index-Temperature (VIT) trapezoid method to reduce the contribution of soil background to image temperature. Results showed rainfed plots were consistently more stressed than irrigated plots. Future work is needed to improve the ability of the CCCI and VIT methods to detect N and water stress and apply both indices simultaneously at the paddock scale to test whether N can be targeted based on water status. Use of these technologies has significant potential for maximising the spatial and temporal efficiency of N applications for wheat growers.
Keywords: Hyperspectral; Multispectral; Thermal; Remote sensing; Wheat

Maarten van Ginkel, Francis Ogbonnaya, Novel genetic diversity from synthetic wheats in breeding cultivars for changing production conditions, Field Crops Research, Volume 104, Issues 1-3, `Ground-breaking Stuff'- Proceedings of the 13th Australian Society of Agronomy Conference, 10-14 September 2006, Perth, Western Australia, October-December 2007, Pages 86-94, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.02.005.
(http://www.sciencedirect.com/science/article/B6T6M-4PC4KPM-1/2/4621af34cb0db484efb3a3b4d9c8a8db)
Abstract:
Bread wheat, the most widely cultivated and consumed food crop, developed in two stages through natural intercrossing among diploid grass species. About 10,000 years ago the cross

between Aegilops speltoides and Triticum urartu resulted in T. dicoccoides (wild emmer). In about 6000 bc the domesticated version of this latter species, T. dicoccum (cultivated emmer) intercrossed naturally with Aegilops tauschii (goat grass). This cross resulted in T. aestivum (modern hexaploid bread wheat), while T. dicoccum itself evolved into T. turgidum ssp. durum (modern tetraploid durum wheat). Bread wheat can be artificially recreated by intercrossing modern tetraploid durum wheat with present-day derivatives of goat grass, with synthetic hexaploids developed in the USA, Mexico and at the Department of Primary Industries, Victoria, Australia now available in large numbers. A number of these hexaploids have shown resistance to major wheat diseases and tolerance to abiotic stresses such as drought, heat, waterlogging, salinity and pre-harvest sprouting. High end-use quality derivatives that meet industry standards have also been developed, while recent experiments have identified synthetic wheat derivatives that outyield commercial varieties under rainfed conditions by 18-30%. At the molecular level these new synthetic derivatives have been shown to boost genetic diversity.
Keywords: Hexaploid wheat; Triticum species; Genetic diversity; Adaptation to drought; Salinity; Abiotic stresses; Biotic stresses

Muhuddin Rajin Anwar, Garry O'Leary, David McNeil, Hemayet Hossain, Roger Nelson, Climate change impact on rainfed wheat in south-eastern Australia, Field Crops Research, Volume 104, Issues 1-3, `Ground-breaking Stuff'- Proceedings of the 13th Australian Society of Agronomy Conference, 10-14 September 2006, Perth, Western Australia, October-December 2007, Pages 139-147, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.020.
(http://www.sciencedirect.com/science/article/B6T6M-4PGXF9D-1/2/29074625a7775e6f590b2f42109f9bfb)
Abstract:
Low, mid and high daily climate scenarios (2000-2070), as per the International Panel on Climate Change (IPCC) were generated using the Australian Commonwealth Scientific and Industrial Research Organisation's (CSIRO's) global atmosphere models. These scenarios based on IPCC's 21st century emission scenarios that combine a variety of assumptions about demographic, economic and technological driving forces likely to influence such emissions in the future, were used as input to a crop model to predict the impact of climate change on wheat yield at a location in south-eastern Australia. At this locality there are important likely changes in the primary climatic variables of temperature, rainfall and solar radiation. Generally, we found a strong and consistent positive trend in mean diurnal temperature range, followed by a significant negative trend in wheat yield under three climate scenarios with and without elevated CO2 concentration. It is possible that negative trends identified over the future decades may be artefacts of the method of substituting historical variance for future variance. We observed that from present climate to projected low, mid and high global warming scenarios, median wheat yield may decrease by about 29%. Under these scenarios, but with an elevated atmospheric CO2 climate, median wheat yield may decrease by about 25%. The effect of elevated CO2 reduces the severity of the warmer air temperatures and lower rainfall but the effect is small (4%). Advances in agronomy and breeding must boost crop yields by around 25% over the coming decades, to keep in step with predicted climate change.
Keywords: CropSyst; CCAM outputs; Carbon dioxide; Global warming; Simulation

Shaomin Sun, Yihu Song, Qiang Zheng, Morphologies and properties of thermo-molded biodegradable plastics based on glycerol-plasticized wheat gluten, Food Hydrocolloids, Volume 21, Issue 7, October 2007, Pages 1005-1013, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.03.004.
(http://www.sciencedirect.com/science/article/B6VP9-4JKJGJ6-2/2/e3e3bae52bd39a253f6dc2c1aef9ab52)
Abstract:

The aim of the present work was to study the influences of aldehydes and l-cysteine on the morphology and the properties of thermo-molded biodegradable plastics based on glycerol-plasticized wheat gluten. The aldehydes and l-cysteine in 10% aqueous solution were incorporated with gluten and glycerol by mixing at room temperature and the resultant mixtures were thermo-molded at 100 [degree sign]C for 12 min.Morphology, moisture absorption, dynamic mechanical properties, tensile properties (tensile strength and elongation at break), and thermal degradation behavior of the plastics produced were evaluated in relation to the crosslinking type. Experimental results showed that the morphology, the glass transition of gluten and the tensile properties were closely linked to the type of the crosslinking reaction that led to the formation of a protein network. Crosslinking through disulfide bonding led to a high degree of phase separation and a high glass transition temperature of the gluten-rich phase while aldehyde-induced crosslinking restricted the phase separation in a low degree and lowered the glass transition temperature of the gluten-rich phase. Aldehyde-induced crosslinking improved tensile strength whereas lowered elongation at break and Young's modulus in comparison with crosslinking via disulfide bonding in the crosslinker-free and the l-cysteine-containing plastics.
Keywords: Wheat gluten; Thermo-molding; Chemical crosslinking; Morphology; Mechanical properties

A.A. Karim, P.S. Oo, C.C. Seow, Pulsed NMR measurements of freeze/thaw-induced retrogradation of corn and wheat starch gels: Correlation with rheological measurements, Food Hydrocolloids, Volume 21, Issue 7, October 2007, Pages 1041-1045, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.08.001.
(http://www.sciencedirect.com/science/article/B6VP9-4KXVD46-2/2/c655b2b1625fb46e3cfadd79e37d5bb6)
Abstract:
The suitability of using pulsed-nuclear magnetic resonance (pulsed NMR) as a convenient method to evaluate the freeze/thaw stability of starch gels has been investigated. The changes in the NMR 'solid-like' component (reflective of freeze/thaw-induced retrogradation) were correlated with concomitant changes in uniaxial compression properties of maize and wheat starch gels after freeze/thaw cycling. The content of 'solid-like' component of the starch gels increased non-linearly as the number of freeze/thaw cycles increased, a pattern which is indicative of starch retrogradation induced by freezing/thawing. Maximum force (reflective of the hardness or strength of the gel) was found to have the best correlation with % solids as determined by the pulsed NMR method, followed by modulus and fracturability. Correlations between pulsed NMR readings and rheological measurements would not be expected to be very good, unless such correlations were made using data only up to the point when structural disruption occurred.
Keywords: Freeze/thaw stability; Starch gels; Retrogradation; Pulsed NMR; Rheological properties

A. Torbica, M. Antov, J. Mastilovic, D. Knezevic, The influence of changes in gluten complex structure on technological quality of wheat (Triticum aestivum L.), Food Research International, Volume 40, Issue 8, October 2007, Pages 1038-1045, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.05.009.
(http://www.sciencedirect.com/science/article/B6T6V-4NT9G9K-3/2/c498ef1d5d04172e8f8b2f44bbd6f29c)
Abstract:
The influence of changes in glutenin-gliadin complex of grain on technological quality of the wheat variety (Triticum aestivum L.) was studied. It was shown that wheat-bug attack caused differences in electrophoregram pattern of glutenins and gliadins concerning their number, intensities and molecular weights. The environmental influence had detrimental effect on rheological properties of dough. Expected heat-stress effect - the increase of gliadin-glutenin ratio was not detected. The

modified method for gluten index was introduced and it was proven as superior to the standard method in predicting technological quality of wheat.
Keywords: Glutenins; Gliadins; Technological quality; Wheat variety; Gluten index

Hongmei Zhang, Jun Wang, Xiaojing Tian, Huichun Yu, Yong Yu, Optimization of sensor array and detection of stored duration of wheat by electronic nose, Journal of Food Engineering, Volume 82, Issue 4, October 2007, Pages 403-408, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.02.005.
(http://www.sciencedirect.com/science/article/B6T8J-4N2KT65-4/2/e1cd9410a9084b9dc40460c144e0594b)
Abstract:
An electronic nose (PEN 2) comprising ten metal oxide semiconductor sensors (W1C, W5S, W3C, W6S, W5C, W1S, W1W, W2S, W2W, W3S) were used to detection of five different stored duration wheats (wheats were harvested from 2000 to 2004, and named as W00, W01, W02, W03, and W04, respectively). A few of sensors were switched-off by multivariate analysis of variance and loading analysis. The responses signals of sensor W5C, W1S, W1W, W2S, W2W and W3S were chose for the pattern recognition. Principal component analysis (PCA) was applied to the signal of optimized sensor array, the five different stored duration of wheat were discriminated well and each group has strong convergence. The results obtained by network I (for optimized sensor array) presented the higher percent of correct classifications in comparison to network II (for original sensor array). The optimization of sensor array can improve the recognition performance of the electronic nose. The results obtained indicated that the electronic nose could discriminate successfully wheat of different age.
Keywords: Analysis of variance; Principal component analysis; Electronic nose; Wheat

Leaelaf Hailemariam, Martin Okos, Osvaldo Campanella, A mathematical model for the isothermal growth of bubbles in wheat dough, Journal of Food Engineering, Volume 82, Issue 4, October 2007, Pages 466-477, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.03.006.
(http://www.sciencedirect.com/science/article/B6T8J-4N8M80K-1/2/fb117144ba9a5c01d914927ff3bbd021)
Abstract:
The objective of this research is to develop a set of mathematical relations that can describe the dynamics of a bubble inside an expanding viscoelastic fluid mass. The specific case of isothermal growth of a CO2 bubble in bread dough as the dough exits an extruder with a circular die and expands, is modeled. Inertia, mass transfer to the bubble, mass transfer to the atmosphere, viscoelasticity and surface tension were considered. The Cell Model proposed by Amon and Denson [Amon, M. & Denson, C. (1984). A study of the dynamics of foam growth: Analysis of the growth of closely spaced spherical bubbles. Polymer Engineering and Science, 24(13), 1026-1034] to consider the growth of a bubble in close proximity to other bubbles was modified and applied. The mathematical relations developed were solved by a commercial solver and the result compared to the model and experimental results of Alavi et al. [Alavi, S. H., Rizvi, S. S. H., & Harriot, P. (2003). Process dynamics of starch based microcellular foams produced by supercritical fluid extrusion. I: Model development and II: Numerical simulation and experimental evaluation. Food Research International, 36, 309-330]. During the solution process, a characteristic time was defined in terms of system parameters. It was found that the model developed in this research fit the available data better while considering more phenomena in the analysis.
Keywords: Bubble growth; Dough; Extrusion; Cell Model; Viscoelastic; Memory function

Li-Hong XUE, Wei-Xing CAO, Lin-Zhang YANG, Predicting Grain Yield and Protein Content in Winter Wheat at Different N Supply Levels Using Canopy Reflectance Spectra, Pedosphere,

Volume 17, Issue 5, October 2007, Pages 646-653, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60077-0.
(http://www.sciencedirect.com/science/article/B82XV-4PK8XJ0-F/2/9fa4d62dbb35c7e561b0dfa155d2978a)
Abstract:
A field experiment using a split-plot randomized complete block design with three replications was carried out to determine relationships between spectral indices and wheat grain yield (GY), to compare the performance of four vegetation indices (VIs) for GY prediction, and to study the feasibility of VI to estimate grain protein content (GPC) in winter wheat. Two typical winter wheat (Triticum aestivum L.) cultivars `Xuzhou 26' (high protein content) and `Huaimai 18' (low protein content) were used as the main plot treatments and four N rates, i.e., 0, 120, 210, and 300 kg N ha-1, as the sub-plot treatments. Increasing soil N supply Significantly increased GY and GPC (P <= 0.05). For the two cultivars combined, Significant and positive correlations were found between four VIs and GY, with the strongest relationship observed when using the green ratio vegetation index (GRVI) at mid-filling. Cumulative VI estimates improved yield predictions substantially, with the best interval being heading to maturity stage. Similar results were found between VI and grain protein yield. However, when using cumulative VI, GPC showed no Significant improvement. The strong relationship between leaf N status and GPC (R2 = 0.9144 for `Xuzhou 26' and R2 = 0.8285 for `Huaimai 18') indicated that canopy spectra could be used to predict GPC. The strong fit between estimated and observed GPC (R2 = 0.7939) indicated that remote sensing techniques were potentially useful predictors of grain protein content and quality in wheat.
Keywords: grain protein content; grain yield; soil N supply; vegetation index; wheat

Chen-Fang Wang, Li-Li Huang, Heinrich Buchenauer, Qing-Mei Han, Hong-Chang Zhang, Zhen-Sheng Kang, Histochemical studies on the accumulation of reactive oxygen species (O2- and H2O2) in the incompatible and compatible interaction of wheat--Puccinia striiformis f. sp. tritici, Physiological and Molecular Plant Pathology, Volume 71, Issues 4-6, October-December 2007, Pages 230-239, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2008.02.006.
(http://www.sciencedirect.com/science/article/B6WPC-4S01WJ9-1/2/621876b93d426e33d9edcb1216773dc0)
Abstract:
The generation and accumulation of reactive oxygen species (ROS), superoxide anion (O2-) and hydrogen peroxide (H2O2), were studied in the interaction between wheat cv. `Suwon 11' and two races of Puccinia striiformis f. sp. tritici (avirulent and virulent). Generation of O2- and H2O2 was analyzed histochemically using nitroblue tetrazolium (NBT) and 3,3-diamino-benzidine (DAB), respectively. At the pre-penetration stage during appressorium formation both stripe rust races induced H2O2 accumulation in guard cells. In the incompatible interaction, a rapid increase of O2- and H2O2 generation at infection sites was detected. The percentage of infection sites showing NBT and DAB staining was 36.1% and 40.0%, respectively, 12 h after inoculation (hai). At extended incubation time until 24 hai, percentage of infection sites showing H2O2 accumulation further increased, whereas those exhibiting O2- accumulation declined. The early infection stage from 12 to 24 hai coincided with primary haustoria formation in mesophyll cells. In contrast, in the compatible interaction, O2- and H2O2 generation could not be detected in most of the infection sites. In the incompatible interaction, intensive DAB staining was also determined in mesophyll cells, especially in cell walls, surrounding the infected cells 16-24 hai; thereafter, these cells contained fluorescing compounds and underwent hypersensitive response (HR). The number of necrotic host cells surrounding the infection sites increased continuously from 20 to 96 hai. It might be concluded that H2O2 accumulation during the early infection stage is associated with the occurrence of hypersensitive cell death and that resistance response is leading to arrest the avirulent race of the obligate stripe rust pathogen. In the compatible interaction at 96 hai, H2O2 accumulation was observed in mesophyll cells surrounding the rust lesion.

Keywords: Wheat; Puccinia striiformis Westend f. sp. tritici Erikss.; O2-; H2O2

Osman Bozkurt, Turgay Unver, Mahinur S. Akkaya, Genes associated with resistance to wheat yellow rust disease identified by differential display analysis, Physiological and Molecular Plant Pathology, Volume 71, Issues 4-6, October-December 2007, Pages 251-259, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2008.03.002.
(http://www.sciencedirect.com/science/article/B6WPC-4S3G3WB-1/2/e18f8e45c3ac08cd093822b018570788)
Abstract:
This study is focused on the identification of early response genes involved in the resistance mechanism of one of the most important diseases of wheat, yellow rust. The strategy undertaken was to use differential display reverse transcriptase-PCR method (DDRT-PCR) on two of the yellow rust differential lines of wheat, were infected with the virulent and the avirulent Puccinia striiformis f. sp. tritici races together with appropriate control inoculations. Upon infection of the plant materials (resistant and/or susceptible), different time points were evaluated on DDRT-PCR banding profiles. The expression level differences of 33 genes in DDRT-PCR were further analyzed using quantitative real-time PCR (qRT-PCR). Among which only those (14 gene fragments) resulting reproducible induction or repression levels were reported with measured fold changes. Based on the sequence similarity analysis, all but one were absent in NCBI databank, thus they are newly found wheat sequences. Among those, two genes were identified as full ORF, including 5' and 3' end untranslated regions (UTR); namely cyclophilin like protein (putative antifungal activity) and ubiquitin-conjugating enzyme (E2) or Rad6. The sequence homology analysis of the cloned gene fragments revealed that the genes detected may have roles in ubiquitinylation, programmed cell death (apoptosis), putative antifungal activities, disease resistance responses, pathogenesis related responses, and including a few with no known function.
Keywords: Differential display (DD); DDRT-PCR; Quantitative real-time PCR; Disease resistance; Puccinia striiformis f. sp. tritici; Yellow rust; Wheat

Rehana Rasool, S.S. Kukal, G.S. Hira, Soil physical fertility and crop performance as affected by long term application of FYM and inorganic fertilizers in rice-wheat system, Soil and Tillage Research, Volume 96, Issues 1-2, October 2007, Pages 64-72, ISSN 0167-1987, DOI: 10.1016/j.still.2007.02.011.
(http://www.sciencedirect.com/science/article/B6TC6-4NBXVB6-2/2/3e95abd1d7c90f890ac9524acd1546eb)
Abstract:
Soil fertility, one of the important determinants of agricultural productivity, is generally thought to be supplemented through the application of nutrients mainly through inorganic fertilizers. The physical fertility of the soil, which creates suitable environment for the availability and uptake of these nutrients, is generally ignored. The present study aims to characterize the soil physical environment in relation to the long term application of farm yard manure (FYM) and inorganic fertilizers in rice-wheat. The treatments during both rice and wheat crops were (i) farm yard manure @ 20 t ha-1 (FYM); (ii) nitrogen @ 120 kg ha-1 (N120); (iii) nitrogen and phosphorus @ 120 and 30 kg ha-1 (N120P30) and (iv) nitrogen, phosphorus and potassium @ 120, 30 and 30 kg ha-1 (N120P30K30) in addition to (iv) control treatment, i.e. without any fertilizer and/or FYM addition. The treatments were replicated four times in randomized block design in a sandy loam (typic Ustipsament, non-saline, slightly alkaline). Bulk density, structural stability of soil aggregates and water holding capacity of 0-60 cm soil layer were measured.
The average mean weight diameter (MWD) was highest in FYM-plots both in rice (0.237 mm) and wheat (0.249 mm) closely followed by that in N120P30K30 plots. The effect of FYM in increasing the MWD decreased with soil depth. The addition of both FYM and N120P30K30 increased the

organic carbon by 44 and 37%, respectively in rice. The total porosity of soil increased with the application of both FYM and N120P30K30 from that in control plots. In 0-15 cm soil layer, the total porosity increased by 25% with FYM from that in control plots. This difference decreased to 13% in 15-30 cm soil layer. The average water holding capacity (WHC) was 16 and 11% higher with FYM and N120P30K30 application from that in control plots. The MWD, total porosity and WHC improved with the application of balanced application of fertilizers. The grain yield and uptake of N, P and K by both rice and wheat were higher with the application of FYM and inorganic fertilizers than in control plots. The carbon sequestration rate after 32 years was maximum (0.31 t ha-1 year-1) in FYM-plots, followed by 0.26 t ha-1 year-1 in N120P30K30-plots, 0.19 t ha-1 year-1 in N120P30 and minimum (0.13 t ha-1 year-1) in N120-plots.
Keywords: Bulk density; Carbon sequestration; FYM; Inorganic fertilizers; Mean weight diameter; Water holding capacity

F.U. Hassan, M. Ahmad, N. Ahmad, M. Kaleem Abbasi, Effects of subsoil compaction on yield and yield attributes of wheat in the sub-humid region of Pakistan, Soil and Tillage Research, Volume 96, Issues 1-2, October 2007, Pages 361-366, ISSN 0167-1987, DOI: 10.1016/j.still.2007.06.005.
(http://www.sciencedirect.com/science/article/B6TC6-4PPFT1X-1/2/0eddf51f8530f0c6222cd5e197a7a98b)
Abstract:
The prolonged use of vehicular traffic for farming creates subsoil compaction, which reduces crop yield and deteriorates the physical conditions of the soil. Field experiments were conducted during 2002-2003 and 2003-2004 in Pakistan to study subsoil compaction effects on soil bulk density, total porosity, yield and yield components of wheat. Soil compaction was artificially created at the start of the experiment using 7.0 t roller having length of 1.5 m and diameter of 1.22 m. Treatments consisted of T1 = control (no compaction), T2 = two passes of roller, T3 = four passes of roller, T4 = six passes of roller. The experiments were arranged in randomised complete block with four replications. Results indicated that subsoil compaction adversely affected the bulk density, total porosity of soil and root length during both the years. Soil compaction increased the bulk density (BD) from 1.37 for T1 to 1.57, 1.61 and 1.72 Mg m-3 whereas decreased the total porosity from 47.3% for T1 to 40.0, 37.4 and 34.5% for T2, T3 and T4, respectively. Similarly grain yield decreased from 4141.7 for T1 to 3912.8, 3364.5 and 3010.3 kg ha-1 for T2, T3 and T4, respectively. The deteriorating effect of compaction depended upon the degree of compaction. Subsoil compaction adversely affected the yield and yield attributes of wheat during both years of experiments. The subsoil compaction adversely affected soil physical conditions, which substantially decreased the yield of wheat. Therefore, appropriate measures of periodic chiselling, controlled traffic, conservation tillage, and incorporating of crops with deep tap root system in rotation cycle is necessary to minimize the risks of subsoil compaction.
Keywords: Compaction; Subsoil; Wheat; Yield components; Yield

M.H. Ali, M.R. Hoque, A.A. Hassan, A. Khair, Effects of deficit irrigation on yield, water productivity, and economic returns of wheat, Agricultural Water Management, Volume 92, Issue 3, 16 September 2007, Pages 151-161, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.05.010.
(http://www.sciencedirect.com/science/article/B6T3X-4P6MBX7-1/2/2b87f09f7456bf29ea117e530d7aec08)
Abstract:
A field experiment was conducted for 3 consecutive years to study the effects of water deficit on yield, water productivity and net return of wheat. Yield attributes were affected by deficit irrigation treatments although they are not statistically different in all cases. The grain and straw yields were significantly affected by treatments. The highest grain yield was obtained with the no-deficit treatment. Differences in grain and straw yield among the partial- (single- or two-stage deficit) and no-deficit treatments are small and statistically insignificant in most cases. The highest water

productivity and productivity of irrigation water were obtained in the alternate deficit treatment (T7), where deficits were imposed at maximum tillering (jointing to shooting) and flowering to soft dough stages of growth period, followed by single irrigation at crown root initiation stage. Under both land- and water-limiting conditions, the alternate deficit strategy (T7) showed maximum net financial return. The results will be helpful in policy planning regarding irrigation management for maximizing net financial returns from limited land and water resources.
Keywords: Opportunity cost; Marginal productivity; Water-limiting condition; Land-limiting condition

Jing Fang, Bei Wen, Xiao-Quan Shan, Huan-hua Wang, Jin-ming Lin, Shu-zhen Zhang, Evaluation of bioavailability of light rare earth elements to wheat (Triticum aestivum L.) under field conditions, Geoderma, Volume 141, Issues 1-2, 15 September 2007, Pages 53-59, ISSN 0016-7061, DOI: 10.1016/j.geoderma.2007.05.014.
(http://www.sciencedirect.com/science/article/B6V67-4P3TYJS-1/2/bead21be1a59c5733ec4dc12c2dc19e6)
Abstract:
Current bioavailability assessments of light rare earth elements (LREEs) are often carried out under greenhouse conditions. This work was to identify which soil properties are mostly related to LREE bioavailability and what extraction method is the most promising approach for assessing bioavailability of LREEs to wheat under field conditions. A comparison was made between four commonly used extractants (DTPA, EDTA, CaCl2 and CH3COOH), and the results suggested that the LREE concentrations in wheat roots significantly correlated with soil pH and amorphous Fe oxide contents in soils, but were independent of soil organic matter (SOM), crystalline Fe and Mn oxide contents, and cation exchange capacity (CEC). The contents of LREEs in shoots were independent of any soil properties. Both DTPA- and EDTA-extractable LREEs were significantly correlated to LREE concentrations in wheat roots and shoots. DTPA extractable LREEs were comparable to LREEs in wheat roots, however, the EDTA exctractable LREEs overestimated the LREE accumulation in wheat roots. Neither root nor shoot LREEs showed significant correlation with CH3COOH extractable LREEs, suggesting that the CH3COOH extraction method was not suitable for predicting LREE bioavailability. CaCl2 method was unable to estimate the LREE bioavailability due to poor data distribution in correlation analysis. Overall, DTPA extraction method was preferred to other extraction methods for estimating bioavailability of LREEs to wheat.
Keywords: Light rare earth elements; Extraction method; Bioavailability; Wheat; Field study; Soil properties

L. Zhang, W. van der Werf, S. Zhang, B. Li, J.H.J. Spiertz, Growth, yield and quality of wheat and cotton in relay strip intercropping systems, Field Crops Research, Volume 103, Issue 3, 13 September 2007, Pages 178-188, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.06.002.
(http://www.sciencedirect.com/science/article/B6T6M-4P903BM-1/2/41c10e86963207c7aa4cc9e0c7ea8a4b)
Abstract:
Intercropping of wheat and cotton is practiced at a large scale in northern China, but the productivity of intercrops, compared to monoculture, and the productivity and growth patterns of different alternative intercropping patterns have not been quantitatively documented. In this study, four typical wheat-cotton intercropping patterns were examined as to their growth and productivity in field experiments over three growing seasons in Anyang, Henan Province, China. The systems varied in the number of wheat and cotton rows in the alternating strips of either crop, and were labeled accordingly as 3:1, 3:2, 4:2 and 6:2. Dry matter accumulation, yield, land equivalence ratio (LER) and lint quality were determined.
Grain yield of wheat, averaged over three seasons, ranged from 4600 to 5200 kg ha-1 in intercropping, corresponding to 70-79% of the yield in the monoculture (6550 kg ha-1). The 3:1 system gave the highest wheat yield (79% of monoculture), followed by the 6:2 (73%), 3:2 (70%)

and 4:2 (70%) systems. Cotton lint yield, averaged over three seasons, ranged from 590 to 740 kg ha-1 in intercropping, corresponding to 54-69% of the yield in cotton monoculture (1085 kg ha-1). The 3:2 and 4:2 systems gave the highest lint yields (69% and 68% of monoculture, respectively), which was significantly lower than in monoculture but significantly higher than in the 3:1 (58%) and 6:2 (54%) systems. The land equivalent ratio was 1.39 in the 3:1, 3:2 and 4:2 systems, and significantly lower, 1.28, in the 6:2 system. All systems provide a substantial land use advantage.
Cotton growth patterns in monocultures and intercrops were characterized by fitting expolinear growth equations to periodic harvest data. Fitted parameters indicate a growth delay, compared to cotton monoculture, of 11.8 d in the 3:1 system, 6.3 d in the 3:2 system, 6.9 d in the 4:2 system and 5.6 d in the 6:2 system. Estimated growth rate during the linear growth phase was lowest in the 6:2 system (5.9 g m-2 d-1), significantly greater in the 3:1 (7.0 g m-2 d-1), 4:2 (7.7 g m-2 d-1) and 3:2 (8.4 g m-2 d-1) systems, and greatest, but not significantly different from 3:2 and 4:2 systems, in the monoculture (8.9 g m-2 d-1). These results are interpreted in terms of the competitive effect of wheat during the seedling phase of cotton, which is strongest in the 3:1 system, causing a comparatively long growth delay, and the ability of the cotton leaf canopy to intercept radiation after wheat harvest, which is diminished in the 6:2 system due to the large distance between cotton rows, resulting in a comparatively low rate of linear growth.
Effects of intercropping on the quality of cotton were minor and mostly below detection threshold.
Keywords: Crop growth analysis; Grain yield; Lint yield; Land equivalence ratio (LER); Fiber quality; Expolinear growth equation; Competition; Growth delay

Cristina Sgherri, Mike Frank Quartacci, Flavia Navari-Izzo, Early production of activated oxygen species in root apoplast of wheat following copper excess, Journal of Plant Physiology, Volume 164, Issue 9, 5 September 2007, Pages 1152-1160, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.05.020.
(http://www.sciencedirect.com/science/article/B7GJ7-4KPN9N2-1/2/60b6bfa6fdf432fbd066d761b32e1efb)
Abstract: Summary
Wheat seedlings (Triticum durum Desf.) were incubated in a solution containing 100 [mu]M CuSO4 for increasing time ranging from 1 min to 6 h. Copper rapidly accumulated into the roots, and its amount increased significantly until 360 min. During the experiment, copper did not cause any lipid peroxidation and K+ leakage. Up to 60 min of copper treatment the superoxide (O2-) production in root apoplast decreased concomitantly with increase in superoxide dismutase (SOD) activity. In contrast, after 60 min of incubation, SOD decreased and this facilitated an increase in O2- production. In the presence of the SOD inhibitor diethyldithiocarbamic acid, O2- production was more than two times higher and showed a biphasic increase. Very high SOD activity in the apoplast, due to the presence of three different isozymes, one Mn-SOD and two CuZn-SODs, dismutated the radical giving rise, at least in part, to an increase in hydrogen peroxide. The highest value of H2O2 was detected at 15 min, when peroxidase (POD) activity reached the lowest value. Root apoplast showed the presence of at least five different isoforms of PODs, whose pattern did not change during the entire treatment.
Keywords: Root apoplast; Copper; Hydrogen peroxide; Superoxide; Triticum durum

Celestino Ruggiero, Giovanna Angelino, Albino Maggio, Developmental regulation of water uptake in wheat, Journal of Plant Physiology, Volume 164, Issue 9, 5 September 2007, Pages 1170-1178, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.06.017.
(http://www.sciencedirect.com/science/article/B7GJ7-4KXF2MS-1/2/2a597b53130e6f443fd9734740b4ecc7)
Abstract: Summary
The discovery of aquaporins has provided a new basis for studying and interpreting water relations in plants. However, slow progress has been made in elucidating the functional facets of the

aquaporin-mediated water pathway in whole plant systems. While increasing experimental evidence suggests that these proteins are directly involved in mediating water homeostasis at varying environmental conditions, only a few attempts have been made to understand their contribution to overall water transport at different developmental stages. By using a chemical inhibitor (HgCl2) of aquaporins function, here we present in planta evidence for both diurnal and developmental regulation of aquaporin activity in wheat. We demonstrate that the greatest sensitivity of water flux to pharmacological blockage occurs at the stage of ear emergence and does not coincide with the phenological stage at which the greatest plant water uptake occurs (milky ripeness). The relationship transpiration flux (Q) vs. soil-leaf water potential difference ([Delta][Psi]soil-leaves) revealed a gradual decrease of plant resistance to water flux from tillering to milky ripeness, both in HgCl2-treated and untreated control plants. However, the mercury-inhibition of water flux began to gradually increase at ear emergence, suggesting that a larger portion of water moves through aquaporins from this developmental stage on. Although the intercept of the [Delta][Psi]soil-leaves/Q regression line, i.e. the [Delta][Psi] required to initiate the water flux through the soil-plant-air continuum, was generally not affected by mercury treatment, a significant mercury effect on the intercept was observed at the stage of ear formation. These findings may have important implications for predicting which strategy plants utilize to optimize water use during their life cycle.
Keywords: Triticum durum Desf.; Plant resistance to water flux; Trans-cellular water flux; Water potential

Pavel Vitamvas, Gerhard Saalbach, Ilja Tom Prasil, Vera Capkova, Jana Opatrna, Jahoor Ahmed, WCS120 protein family and proteins soluble upon boiling in cold-acclimated winter wheat, Journal of Plant Physiology, Volume 164, Issue 9, 5 September 2007, Pages 1197-1207, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.06.011.
(http://www.sciencedirect.com/science/article/B7GJ7-4KVXHCM-1/2/67616970d9e39a2b2f1d41bcfa047571)
Abstract: Summary
The amount of proteins soluble upon boiling (especially WCS120 proteins) and the ability to develop frost tolerance (FT) after cold acclimation was studied in two frost-tolerant winter wheat cultivars, Mironovskaya 808 and Bezostaya 1. Protein gel blot analysis, mass spectrometry (MS) and image analysis of two-dimensional gel electrophoresis (2-DE) gels were used to identify and/or quantify the differences in protein patterns before (non-acclimated, NA) and after 3 weeks of cold acclimation (CA) of the wheats, when FT increased from -4 [degree sign]C (lethal temperature (LT50), for both cultivars) to -18.6 [degree sign]C in Bezostaya 1 and -20.8 [degree sign]C in Mironovskaya 808. Only WCS120 protein was visible in NA leaves while all five WCS120 proteins were induced in the CA leaves. Mironovskaya 808 had higher accumulation of three members of WCS120 proteins (WCS120, WCS66 and WCS40) than Bezostaya 1. MS analysis of total sample of proteins soluble upon boiling showed seven COR proteins in the CA samples and only three COR proteins in the NA samples of cultivar Mironovskaya 808 (MIR). In conclusion, the level of the accumulation of WCS120, WCS66 and WCS40 distinguished our two frost-tolerant winter wheat cultivars. Moreover, the differences of CA and NA samples of the MIR were shown by liquid chromatography (LC)-tandem mass spectrometry (MS/MS).
Keywords: Cold acclimation; COR proteins; Frost tolerance; Triticum aestivum; Winter wheat

Guo-liang LI, Hui CHANG, Ren-gang ZHOU, Characterization of a TaJ Gene from Wheat, Agricultural Sciences in China, Volume 6, Issue 9, September 2007, Pages 1043-1050, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60145-X.
(http://www.sciencedirect.com/science/article/B82XG-4PXFY2X-3/2/a08db57bd51a218aa94b56f52d873374)
Abstract: Abstract

A novel J-domain protein gene was cloned from wheat (Triticum aestivum L.) using RT-PCR technology and named as TaJ. The J-domain protein is defined by the presence of a J-domain. The cDNA of T. aestivum gene, TaJ (GenBank accession number: DQ789026), was 1263 bp and contained a complete open reading frame (ORF) encoding a J-domain protein of 420 amino acid residues. The predicted amino acid sequence of TaJ possesses three functionally essential domains: the Nterminal J-domain which includes the highly conserved HPD tripeptide, an adjacent domain that is rich in glycine and phenylalanine residues (G/F) and a Cysteine-rich zinc-finger domain with four repeats of CxxCxGxG that is important for protein interactions. The C-terminal of TaJ was -CAQQ, a farnesylation motif. The full-length deduced amino acid sequence of TaJ is highly homologous to J-domain proteins from various plant species. Southern blot analysis indicated that a single copy of TaJ existed in wheat genome. The expression pattern of TaJ performed by real-time PCR demonstrated that heat shock (HS) at 37[degree sign]C induced the expression of TaJ rapidly and strongly, but the response of the TaJ gene to cold stress was much slower than that to HS. Tissue-specific expression analysis showed that the expression level of TaJ gene was much higher in leaves than that in roots.
Keywords: wheat; J-domain protein; cloning; gene expression; heat shock

M.T. Sulak, E. Demirbas, M. Kobya, Removal of Astrazon Yellow 7GL from aqueous solutions by adsorption onto wheat bran, Bioresource Technology, Volume 98, Issue 13, September 2007, Pages 2590-2598, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.09.010.
(http://www.sciencedirect.com/science/article/B6V24-4M81C0T-2/2/2ac8bffc2317d95c835633d96cb4a539)
Abstract:
Adsorption kinetic and equilibrium of a basic dye (Astrazon Yellow 7GL) from aqueous solutions at various initial dye concentration (50-300 mg/l), pH (4-10), adsorbent dosage (2-8 g/l), particle size (354-846 [mu]m) and temperature (30-50 [degree sign]C) on wheat bran were studied in a batch mode operation. The result showed that the amount adsorbed of the dye increased with increasing initial dye concentration and contact time, whereas particle size and pH had no significant affect on the amount of dye adsorbed by the adsorbent. A comparison of kinetic models on the overall adsorption rate showed that dye/adsorbent system was best described by the pseudo second-order rate model. The removal rate was also dependent on both external mass transfer and intra-particle diffusion. The low value of the intraparticle diffusivity, 10-11 cm2/s, indicated the significant influence of intraparticle diffusion on the kinetic control. The adsorption capacity (Q0) calculated from the Langmuir isotherm was 69.06 mg/g for at pH 5.6, 303 K for the particle size of 354 [mu]m. The experimental data yielded excellent fits with Langmuir and Tempkin isotherm equations. Different thermodynamic parameters showed that the reaction was spontaneous and endothermic in nature.
Keywords: Wheat bran; Astrazon yellow; Adsorption kinetics; Diffusion; Thermodynamic parameters

Eskandar Zand, Mohammad Ali Baghestani, Saeid Soufizadeh, Ali Eskandari, Reza PourAzar, Mozhgan Veysi, Karim Mousavi, Alireza Barjasteh, Evaluation of some newly registered herbicides for weed control in wheat (Triticum aestivum L.) in Iran, Crop Protection, Volume 26, Issue 9, September 2007, Pages 1349-1358, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.011.
(http://www.sciencedirect.com/science/article/B6T5T-4MJC1T8-2/2/65d010818b8a042d6999143c0d870707)
Abstract:
Field experiments were conducted at the research fields of Plant Protection Research Institute, Iran, at six locations in 2005-2006 to examine the weed suppressive ability of some newly registered herbicides in wheat compared with some current herbicides. Treatments consisted of post-emergence applications of chlorsulfuron at 10.5 and 15 g a.i./ha, metsulfuron methyl plus

sulfosulfuron at 32 and 36 g a.i./ha, both as dual purpose herbicides, pinoxaden at 45 and 60 g a.i./ha as a grass weed herbicide, pinoxaden at 45 g a.i./ha plus non-ionic surfactant at 0.2% (v/v), tribenuron methyl at 18.75 g a.i./ha plus clodinafop propargyl at 64 g a.i./ha, clodinafop propargyl, bromoxynil plus MCPA, bromoxynil plus MCPA at 600 g a.i./ha plus clodinafop propargyl at 64 g a.i./ha, pre-emergence applications of dual purpose herbicide prosulfocarb at 2400 and 3200 g a.i./ha, and a weed infested check. Post-emergence herbicides were applied at wheat tillering. Results showed that metsulfuron methyl plus sulfosulfuron at 36 g a.i./ha is a suitable option for the post-emergence control of broadleaved and grass weeds in wheat. This treatment almost resulted in the highest grain yield at different locations too. The results also showed the importance of different wheat varieties and environmental conditions on herbicide efficacy; that is the best control option may vary based on variety and location. Chlorsulfuron and prosulfocarb also did not have a significant priority over older herbicides at these experiments, so further investigations are needed to examine their efficacy.
Keywords: Wheat; Dual purpose herbicide; Grain yield; Weed population; Weed biomass

Mohammad Ali Baghestani, Eskandar Zand, Saeid Soufizadeh, Mohammad Jamali, Fariba Maighany, Evaluation of sulfosulfuron for broadleaved and grass weed control in wheat (Triticum aestivum L.) in Iran, Crop Protection, Volume 26, Issue 9, September 2007, Pages 1385-1389, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.11.011.
(http://www.sciencedirect.com/science/article/B6T5T-4MY0THG-1/2/30cc332ad6e3231df25ce93631ab936e)
Abstract:
Three experiments were conducted during 2003-2004 at different locations in Iran to compare the efficacy of sulfosulfuron at 15, 19.95, and 24.90 g ai/ha as a new dual purpose herbicide with some currently applied herbicides including tribenuron methyl, clodinafop propargyl, diflufenican plus isoproturon as a dual purpose herbicide, and tank mix of clodinafop propargyl plus tribenuron methyl. Herbicides were sprayed during wheat tillering. Results indicated that sulfosulfuron at 19.95 and 24.90 g ai/ha were suitable options for broadleaved and grass weed control in wheat, so that currently applied herbicides (clodinafop propargyl and tribenuron methyl) could be replaced by these two options.
Keywords: Wheat; Dual purpose herbicide; Weed population; Weed biomass; Yield

Tehmina Anjum, Rukhsana Bajwa, The effect of sunflower leaf extracts on Chenopodium album in wheat fields in Pakistan, Crop Protection, Volume 26, Issue 9, September 2007, Pages 1390-1394, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.11.012.
(http://www.sciencedirect.com/science/article/B6T5T-4P9036G-1/2/d0bf4bc4c0c3145c24745d95ab1991cf)
Abstract:
In search of natural alternatives for weed management against Chenopodium album L., extracts of sunflower leaves (var. Suncross-42) were tested in two aqueous concentrations. The activity of a crude aqueous extract was evaluated taking MCPA as internal reference. Sunflower leaf extracts allelochemicals showed substantial potential to be used as natural herbicide for broadleaved weeds such as C. album. In comparison with synthetic herbicides the crude extract failed to eradicate this weed completely, but the highest tested concentration successfully killed the weed and overcame weed crop competition and consequently increased wheat yield significantly.
Keywords: Chenopodium album; Wheat; Allelochemicals

P. Fustier, F. Castaigne, S.L. Turgeon, C.G. Biliaderis, Semi-sweet biscuit making potential of soft wheat flour patent, middle-cut and clear mill streams made with native and reconstituted flours, Journal of Cereal Science, Volume 46, Issue 2, September 2007, Pages 119-131, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.011.

(http://www.sciencedirect.com/science/article/B6WHK-4N3P04B-1/2/dc2e85cf94fbd9f24c9f6d262b3f2bbb)
Abstract:
The influence of patent, middle-cut and clear flour grades as native or reconstituted flour blends on both the rheological properties of the dough and the quality of semi-sweet biscuit (flour/sugar/fat/water ratio of 100/30/8/36) was studied. Moving from the central portion (patent) to the peripheral portion (clear) of the grain endosperm increased the dough hardness from 3.77 to 4.84 N, consistency from 19.3 to 25.5 N s, elongational viscosity from 4.13x10-5 to 5.54x10-5 Pa s, half-relaxation time from 0.45 to 0.59 s, but decreased the rate of relaxation from 4.51 to 3.09 s-1 of the biscuit's dough produced with the native flours due to the wide variation in the physico-chemical properties of these fractions. Quantitatively, the fractionation/reconstitution procedure reduced moderately these rheological parameters, and the flour functionality could not be restored completely. Biscuits produced with the patent flour showed the largest length and lowest thickness, whilst the clear fraction led to production of denser biscuits with greater cohesion (mean tearing force) of the biscuit inner structure and also contain more grains or group of grains per unit of penetration (number of spatial ruptures). The biscuits made with the reconstituted flour fractions had almost equivalent dimensional characteristics, and excellent surface appearance, but were also darker in colour than their native flour counterparts.
The half-relaxation time (Tla) and the rate of relaxation (k) obtained from the biscuit's dough relaxation curves were excellent predictors of the biscuit's quality (length, density, structural cohesion and resistance to solicitation). Dough hardness was correlated positively with elongational viscosity, half-relaxation time and consistency and negatively with the rate of relaxation, whilst some of the biscuit's characteristics such as density correlated positively with structural cohesion and resistance to solicitation.
Keywords: Flour mill streams; Physico-chemical properties; Fractionation/reconstitution; Semi-sweet biscuit; Dough rheology; Stress relaxation; Cone penetrometry

Lene Pedersen, Johannes Ravn Jorgensen, Variation in rheological properties of gluten from three biscuit wheat cultivars in relation to nitrogen fertilisation, Journal of Cereal Science, Volume 46, Issue 2, September 2007, Pages 132-138, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.001.
(http://www.sciencedirect.com/science/article/B6WHK-4N4J305-1/2/214cb8538320b1ecc51fa1561a700a73)
Abstract:
Rheological properties of gluten from three biscuit wheat cultivars (Triticum aestivum, L., cv. Reaper, Ritmo, Encore) were studied. The cultivars were grown in two seasons (1997-1999) with three different nitrogen levels, and nitrogen fertiliser was applied using three different strategies. Protein and gluten contents were significantly affected by the N level ($P<0.001$), but inter-cultivar differences were only significant in 1999, when growing conditions were restricted by environmental factors. The viscoelastic properties of gluten were characterised by creep recovery and oscillation testing. The results showed a significant inter-cultivar effect ($P<0.001$), with an additional effect from the N level ($P<0.001$). Increasing levels of nitrogen fertiliser increased the viscous properties of gluten, through an increase of maximum strain and recovery strain, and through a decrease of the storage (G') and loss modulus (G''), whereas the phase angle, [delta], increased. This increase in viscous behaviour is suggested to be attributed to a higher gliadin/glutenin ratio in the gluten. The fertiliser application strategy did not influence the rheological properties significantly. Thus, high N fertiliser application in biscuit wheat cultivation may be beneficial to obtain rheological properties, which are suitable for biscuit making.
Keywords: Biscuit wheat; N fertiliser; Gluten; Creep recovery; Oscillation

Hamid A. Naeem, Harry D. Sapirstein, Ultra-fast separation of wheat glutenin subunits by reversed-phase HPLC using a superficially porous silica-based column, Journal of Cereal Science,

Volume 46, Issue 2, September 2007, Pages 157-168, ISSN 0733-5210, DOI: 10.1016/j.jcs.2007.01.002.
(http://www.sciencedirect.com/science/article/B6WHK-4N4YMJ6-1/2/b00bc13c01dfef0015e3e596b64dc182)
Abstract:
A relatively new, unique column packing material for reversed-phase high-performance liquid chromatography (RP-HPLC) was evaluated for rapid separation of wheat glutenin protein subunits. The product named 'Poroshell' by the manufacturer consists of a solid core and a porous coat instead of solid silica spheres used in conventional RP-HPLC column packing. This architecture favours rapid mass transfer, facilitating faster reversed-phase separations of biomolecules compared to conventional silica columns. The main objective of this study was to evaluate the quality of separations of glutenin subunits (GS), as well as to optimize conditions to produce the fastest possible run times without sacrificing resolution using a Poroshell 300SB-C8 2.1x75 mm column. The stability of GS separations over time was also assessed. Two different bread wheat genotypes were used for optimization of separation conditions and six more common and durum wheat genotypes possessing different subunit combinations were used for further evaluation. Glutenin protein was extracted with 0.08 M Tris-HCl buffer (pH 7.5) containing 50% 1-propanol under reducing conditions after pre-extraction of soluble proteins with 50% 1-propanol. Optimization of GS resolution and sample throughput by RP-HPLC was assessed in response to variation in eluent flow rate, acetonitrile (ACN) gradient, and column temperature. The best resolution of both HMW- and LMW-GS was obtained in 13 min using a 23-44% ACN gradient with a flow rate of 0.7 mL/min at 65 [degree sign]C. Subunit elution times and integrated areas were highly repeatable even after several hundred injections. Highly satisfactory separation of HMW-GS and quantification of ratio of HMW- to LMW-GS were achieved in less than 4 min per sample using a modified HPLC gradient. Ratio of HMW- to LMW-GS was unaffected by the speed of the separations. As well, the elution order of HMW- and LMW-GS was unaffected by the rapid analysis, compared to conventional RP-HPLC separations, so no new learning was required for interpreting chromatograms and classification of subunits. The rapid RP-HPLC method using the Poroshell column appears to be very well suited for routine quantification of HMW-GS and LMW-GS especially for purposes of wheat quality screening and wheat cultivar development activities where large numbers of samples are typically encountered.
Keywords: Chromatography; Poroshell; Reversed-phase HPLC; Superficially porous silica; Wheat glutenin subunits

Rikard Landberg, Estera Szwajcer Dey, Jose Da Cruz Francisco, Per Aman, Afaf Kamal-Eldin, Comparison of supercritical carbon dioxide and ethyl acetate extraction of alkylresorcinols from wheat and rye, Journal of Food Composition and Analysis, Volume 20, Issue 6, September 2007, Pages 534-538, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.02.009.
(http://www.sciencedirect.com/science/article/B6WJH-4N7RW6H-1/2/7dab90804402021e42563ab43fa4fb05)
Abstract:
In this study, the application of supercritical carbon dioxide extraction of alkylresorcinols (AR) was quantitatively and qualitatively compared to a commonly used ethyl acetate extraction procedure. No difference in total AR content, relative homolog composition or total extract yield was found between the two extraction methods. Ethyl acetate extraction of intact wheat and rye kernels yielded only 9-20% of the total extract weight obtained with milled samples, but the same amount of alkylresorcinols, showing the benefit of analyzing intact grains whenever it is possible. The major compounds in all extracts (Rf=0.8) were fatty acids in esterified form, most probably fatty acid alcohol esters. The two different extraction techniques produced comparable results under the conditions used, which suggests that issues other than performance need to be considered when choosing an appropriate technique.

Keywords: Alkylresorcinols; Wheat; Rye; Supercritical carbon dioxide; Ethyl acetate; Extraction; TLC

Ivan W. Mott, Richard R.-C. Wang, Comparative transcriptome analysis of salt-tolerant wheat germplasm lines using wheat genome arrays, Plant Science, Volume 173, Issue 3, September 2007, Pages 327-339, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.06.005.
(http://www.sciencedirect.com/science/article/B6TBH-4P192CS-2/2/dc6471a60e2ea2514ec81641a6180133)
Abstract:
Salt-tolerant wheat lines W4909 and W4910 were derived from a cross between AJDAj5 (a disomic addition line carrying a pair of Eb chromosomes from Thinopyrum junceum) and PhI (a line having the PhI allele from Aegilops speltoides, which promotes homoeologous recombination). Both lines have greater salt tolerance than their parental lines, which are more salt-tolerant than the common wheat background, Chinese Spring (CS). Genomic constitution of W4909 and W4910 wheat has been estimated at 1.9% and 2.4% non-CS, respectively. Affymetrix GeneChip(R) Wheat Arrays were used to identify differentially expressed genes in roots and leaves of the above-mentioned five lines under salt stress at electrical conductivity (EC) of 30 dS/m. Based on expression polymorphisms in AJDAj5 and PhI, differentially expressed genes in W4909 and W4910 were attributed to one or the other parental lines when possible. The PhI parent contributed nearly twice as many expression polymorphisms as AJDAj5 to both W4909 and W4910. Nine transcripts in W4910 showed transgression gene expression significantly higher or lower than either parent. The majority of expression polymorphisms exhibited very low expression levels compared to the control and mapped to three distinct chromosomal locations, 2S, 4L and 2L. Salt treatment responsive gene expression profiles common to all five tested lines provide a short list of candidate salt-tolerance genes in wheat. A gene for tonoplast aquaporin that was transferred from PhI and a gene for putative potassium channel protein that was attributable to AJDAj5 are identified as candidate genes for the tissue salt tolerance in W4909 and W4910.
Keywords: Salt tolerance; Wheat; Microarray; Gene expression

S. Neethirajan, D.S. Jayas, C. Karunakaran, Dual energy X-ray image analysis for classifying vitreousness in durum wheat, Postharvest Biology and Technology, Volume 45, Issue 3, September 2007, Pages 381-384, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.03.009.
(http://www.sciencedirect.com/science/article/B6TBJ-4NN1TFW-3/2/e17e2c804b056413719a755462d4a3e3)
Abstract:
Dual energy X-ray imaging technique is an alternative to simple transmission X-ray imaging. The former has the ability to reveal the internal density changes of a scanned object by exploiting differences in how the scanned material interacts with X-rays at different energies. The feasibility of dual energy X-ray image analysis to classify vitreousness in durum wheat was assessed at 12, 14 and 16% moisture content (m.c.). Algorithms were developed for the logarithmic subtraction of images and for extraction of features. Histogram groups and total gray values were extracted from the dual energy subtracted images. Statistical and neural network classifiers were used for identifying vitreous and non-vitreous kernels from the sample images. Neural network classifiers correctly classified vitreous and non-vitreous kernels with 93% accuracy. The statistical classifiers provided 89% accuracy for vitreous and non-vitreous kernels. The over all classification accuracy for differentiating vitreous and non-vitreous kernels is higher using dual energy X-ray imaging than the simple transmission X-ray imaging.
Keywords: Dual energy X-ray images; Vitreous kernels; Non-vitreous kernels; Statistical classifiers; Neural network classifiers

M.J. Pringle, R.M. Lark, Scale- and location-dependent correlations of soil strength and the yield of wheat, Soil and Tillage Research, Volume 95, Issues 1-2, September 2007, Pages 47-60, ISSN 0167-1987, DOI: 10.1016/j.still.2006.10.010.
(http://www.sciencedirect.com/science/article/B6TC6-4MJRYWK-1/2/50ca862ee6f073ce7f5b952c22be436b)
Abstract:
The relationship between soil strength and crop yield may be summarized by a linear correlation coefficient (usually negative). It is likely, however, that this over-simplifies a complex situation in which the relationship between these variables depends on spatial scale and location. We used the wavelet transform to assess this scale- and location-dependence. We established a transect on an arable field in Eastern England, and studied the correlations of soil strength (top- and subsoil) with crop yield. The transect comprised 267 contiguous 0.72 m x 0.72 m plots. Measurements were taken during two consecutive growing seasons of winter wheat (harvest dates of August 2004 and 2005). Soil strength was measured with a penetrometer in the spring of each growing season. As expected, the overall correlation of soil strength with yield was negative but weak. Wavelet analysis revealed that, at fine spatial scales, topsoil and subsoil strength were correlated more or less equally with yield; however, at coarse spatial scales, topsoil strength had a stronger correlation with yield than did subsoil strength. The correlation of topsoil strength with yield at fine spatial scales (corresponding to about 1 m on the ground) was negative. A likely source of this fine-scale variation was the soil compaction associated with tractor wheelings. The correlation of topsoil strength with yield at the coarsest spatial scale (corresponding to about 50 m on the ground) was positive. This correlation was temporally stable, and might have reflected how soil strength can act as a proxy for other soil attributes. In the 2005 growing season, we found evidence that, at intermediate spatial scales, the correlation of soil strength with yield changed depending on the position on the transect. This was probably due to an interaction between the compaction associated with tractor wheelings and the local soil conditions. There was no evidence of such location-dependence in the correlation of soil strength with yield in the 2004 growing season. In summary, the effect of soil strength on crop yield was not expressed in a constant negative correlation across all spatial scales and locations: the negative correlation occurred mainly at fine spatial scales, and the correlation changed according to the position in the landscape and the prevailing local soil conditions.
Keywords: Soil strength; Penetrometer; Wheat yield; Spatial variation; Wavelets

Humberto Blanco-Canqui, R. Lal, Soil structure and organic carbon relationships following 10 years of wheat straw management in no-till, Soil and Tillage Research, Volume 95, Issues 1-2, September 2007, Pages 240-254, ISSN 0167-1987, DOI: 10.1016/j.still.2007.01.004.
(http://www.sciencedirect.com/science/article/B6TC6-4N4S61Y-1/2/9009189f55bbfc4cc9f528d402e32a4e)
Abstract:
Crop residue retention is important for sequestering soil organic carbon (SOC), controlling soil erosion, and improving soil quality. Magnitude of residue management impacts on soil structural properties and SOC sequestration is, however, site specific. This study assessed long-term (10 year) impacts of three levels (0, 8, and 16 Mg ha-1 on a dry matter basis) of wheat (Triticum aestivum L.) straw applied annually on SOC concentration and physical properties of the bulk soil and individual 5- to 8-mm aggregates for the 0- to 50-cm soil depth under no-till (NT) on a Crosby silt loam (fine, mixed, active, mesic Aeric Epiaqualfs) in central Ohio. This study also quantified relationships between soil properties and straw-induced changes in SOC concentration. Changes in soil properties due to straw mulching were mostly confined to the upper 5 cm of the soil. Mulching increased SOC concentration, but it did not significantly change cone index (CI) and shear strength (SHEAR). Within the upper 0-5-cm soil depth, mulching decreased bulk density ([rho]b) by 40-50%, aggregate density ([rho]agg) by 30-40%, and particle density ([rho]s) by 10-

15%, and increased tensile strength (TS) of aggregates by up to 14 times as compared to unmulched soil. At the same depth, soil with mulch retained >30% more water than soil without mulch from 0 to -1500 kPa potentials. The SOC amount was 16.0 Mg ha-1 under no straw, 25.3 Mg ha-1 under 8 Mg ha-1 straw, and 33.5 Mg ha-1 under 16 Mg ha-1 straw in the 0- to 10-cm depth. Below 10 cm, differences in SOC pool between mulched and unmulched soil were not significant. Overall, SOC from 0- to 50-cm depth was 82.5 Mg ha-1 for unmulched soil, 94.1 Mg ha-1 for 8 Mg ha-1 mulch, and 104.9 Mg ha-1 for 16 Mg ha-1. About 33% of C added with straw over the 10-year period was sequestered in soil. This means that 2/3 of the wheat straw applied was not converted to SOC and most probably was lost as emissions of CO2 and CH4. The annual rate of total C accrual was 1.2 Mg ha-1 in soil mulched with 8 Mg ha-1 and 2.2 Mg ha-1 in soil mulched with 16 Mg ha-1 of straw in the 0- to 50-cm depth. The percentage of macroaggregates (>5-mm) was six times higher under 8 Mg ha-1 of straw and 12 times higher under 16 Mg ha-1 compared to unmulched treatments. Macroaggregates contained greater SOC than microaggregates in mulched soil. The SOC concentration explained the variability in aggregate properties by as much as 96%. Overall, long-term straw mulching increased SOC concentration and improved near-surface aggregate properties.
Keywords: Straw mulch; Soil organic carbon; Soil structure; Aggregate properties; Macroaggregates; Microaggregates; Tensile strength

M. Becker, F. Asch, S.L. Maskey, K.R. Pande, S.C. Shah, S. Shrestha, Effects of transition season management on soil N dynamics and system N balances in rice-wheat rotations of Nepal, Field Crops Research, Volume 103, Issue 2, 30 August 2007, Pages 98-108, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.002.
(http://www.sciencedirect.com/science/article/B6T6M-4NWW6K2-2/2/4f882b79c2349e7f9d37691efbe6c29d)
Abstract:
In the low-input rice-wheat production systems of Nepal, the N nutrition of both crops is largely based on the supply from soil pools. Declining yield trends call for management interventions aiming at the avoidance of native soil N losses. A field study was conducted at two sites in the lowland and the upper mid-hills of Nepal with contrasting temperature regimes and durations of the dry-to-wet season transition period between the harvest of wheat and the transplanting of lowland rice. Technical options included the return of the straw of the preceding wheat crop, the cultivation of short-cycled crops during the transition season, and combinations of both. Dynamics of soil Nmin, nitrate leaching, nitrous oxide emissions, and crop N uptake were studied throughout the year between 2004 and 2005 and partial N balances of the cropping systems were established. In the traditional system (bare fallow between wheat and rice) a large accumulation of soil nitrate N and its subsequent disappearance upon soil saturation occurred during the transition season. This nitrate loss was associated with nitrate leaching (6.3 and 12.8 kg ha-1 at the low and high altitude sites, respectively) and peaks of nitrous oxide emissions (120 and 480 mg m-2 h-1 at the low and high altitude sites, respectively). Incorporation of wheat straw at 3 Mg ha-1 and/or cultivation of a nitrate catch crop during the transition season significantly reduced the build up of soil nitrate and subsequent N losses at the low altitude site. At the high altitude site, cumulative grain yields increased from 2.35 Mg ha-1 with bare fallow during the transition season to 3.44 Mg ha-1 when wheat straw was incorporated. At the low altitude site, the cumulative yield significantly increased from 2.85 Mg ha-1 (bare fallow) to between 3.63 and 6.63 Mg ha-1, depending on the transition season option applied. Irrespective of the site and the land use option applied during the transition season, systems N balances remained largely negative, ranging from -37 to -84 kg N ha-1. We conclude that despite reduced N losses and increased grain yields the proposed options need to be complemented with additional N inputs to sustain long-term productivity.
Keywords: Denitrification; Mucuna; Nitrate leaching; Oryza sativa; Triticum aestivum

R.C. Sharma, E. Duveiller, G. Ortiz-Ferrara, Progress and challenge towards reducing wheat spot blotch threat in the Eastern Gangetic Plains of South Asia: Is climate change already taking its toll?, Field Crops Research, Volume 103, Issue 2, 30 August 2007, Pages 109-118, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.004.
(http://www.sciencedirect.com/science/article/B6T6M-4P2JD0H-2/2/0f59cd830946901186dc37c3aaf11bee)
Abstract:
Spot blotch, caused by Cochliobolus sativus, is a serious constraint to wheat production (Triticum aestivum L.) in the warmer plains of South Asia. Fourteen genotypes were tested in Bangladesh, India and Nepal during 6 years (2000-2005) to determine disease severity and resistance stability over these years. We analyzed the area under the disease progress curve per day (AUDPC/day) to assess spot blotch severity, and examined grain yield, 1000-kernel weight (TKW), days to heading, and plant height. Disease severity differed in the 6 years and several genotypes showed low disease severity in all years. A few genotypes had high grain yield and low disease severity in all years. Genotype Altar-84/Ae. Sq. (224)//Yaco, with the lowest disease severity and highest 1000-kernel weight (TKW) and grain yield was also the most stable for spot blotch resistance, TKW and grain yield. Results demonstrated that wheat genotypes with improved spot blotch resistance, high grain yield, acceptable TKW, and plant height are available as a result of the regional and international collaboration in South Asia. Despite this progress, the challenge lies ahead because of an apparent tendency of increasing spot blotch overall severity in the region and decreasing TKW over 6 years (2000-2005). Higher, average night time temperature during the month of March is an indicator showing that wheat crop performance is challenged in two ways--increasing spot blotch severity and decreasing TKW causing lower yield. The results underline the possible effect of changing climatic factors on disease pressure and the continuous need to identify new resistance sources to develop more spot blotch resistant wheat for the warmer Eastern Gangetic Plains of South Asia.
Keywords: Cochliobolus sativus; Eastern Gangetic plains; Genetic stability; Helminthosporium leaf blight; Resistance; Spot blotch; Wheat

Thomas B. Biddulph, Julie A. Plummer, Tim L. Setter, Daryl J. Mares, Influence of high temperature and terminal moisture stress on dormancy in wheat (Triticum aestivum L.), Field Crops Research, Volume 103, Issue 2, 30 August 2007, Pages 139-153, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.005.
(http://www.sciencedirect.com/science/article/B6T6M-4P5YK4H-1/2/0a3508c964c1922d95b60ee8ed79cc91)
Abstract:
Preharvest sprouting is common in cereals that lack grain dormancy if maturing grain is exposed to rain. Over three successive seasons wheat genotypes with a range of dormancy levels, were exposed to moisture stress and periods of high temperature stress (>30 [degree sign]C) in controlled field trials. Dormancy assessments were based on a germination index of hand threshed grain throughout grain filling. There were three main results. First, moisture stress combined with consistently high temperature during grain filling was associated with induced dormancy in Cunderdin, (germination index of 0.41) in a normally non-dormant genotype (germination index normally >0.80), but no additional dormancy in DM 2001, a dormant genotype (germination index normally <0.10). In contrast sudden heat shocks (>30 [degree sign]C max. for >12 days) at 30-50 days post-anthesis reduced dormancy, germination index increase of 0.42 on average across five genotypes. Secondly, whilst dormancy was affected by moisture and heat stress, genotypes maintained their relative rankings across environments and genotype had the most effect on dormancy (70-92% of the variation in germination index) with DM 2001 and DH 22 more dormant than DH 56, DH 45 and Cunderdin. Finally, the effect of environment was different for different genotypes; those with partial dormancy (germination index usually 0.20-0.50, DH 56

and DH 45) were most influenced by the environmental conditions with germination indexes ranging from 0.06 to 0.85 depending on environment. Consequently avoidance of high temperatures, moisture stress, and maturity x stress interactions, are important prerequisites in screening for genotypes with genetic differences in dormancy.
Keywords: Preharvest sprouting; Germination index; Drought; Temperature

Jiyang Zhang, Jingsheng Sun, Aiwang Duan, Jinglei Wang, Xiaojun Shen, Xiaofei Liu, Effects of different planting patterns on water use and yield performance of winter wheat in the Huang-Huai-Hai plain of China, Agricultural Water Management, Volume 92, Issues 1-2, 16 August 2007, Pages 41-47, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.04.007.
(http://www.sciencedirect.com/science/article/B6T3X-4P0VD39-1/2/4c3713c345c68655aabc2b2c419a8fa3)
Abstract:
Field experiments were conducted at an experimental station of Farmland Irrigation Research Institute of Chinese Academy of Agricultural Sciences in the Huang-Huai-Hai plain of China (HPC) during 2005-2006. The experiment comprised planting winter wheat in three patterns, namely, furrow irrigated raised bed-planting (FIRB), mulched ridge and furrow planting (MRFP) and conventional flat planting (FP). The study indicated that the FIRB and MRFP patterns had lower water consumption than the FP pattern due to decrease of irrigation amount and control of evaporation from topsoil. The water consumption was 354.5 mm for FIRB and 323.6 mm for MRFP, which were 12.3 and 20.0% lower than that in FP, respectively. The yield of FIRB and MRFP were respectively, 5.2% higher and 7.8% lower than FP. The water use efficiency (WUE) for FIRB and MRFP was 2.26 and 2.16 kg m-3, which was 20.2 and 14.9% higher over FP, respectively. Combining water consumption yield and WUE, it could be concluded that the FIRB system had higher yield than WUE, MRFP and FP, which will offer a sound opportunity for sustainable farming in HPC.
Keywords: Winter wheat; Yield; Water use efficiency; Furrow irrigated raised bed-planting; Mulched ridge and furrow planting

Anil Gunaratne, Somathilaka Ranaweera, Harold Corke, Thermal, pasting, and gelling properties of wheat and potato starches in the presence of sucrose, glucose, glycerol, and hydroxypropyl [beta]-cyclodextrin, Carbohydrate Polymers, Volume 70, Issue 1, 2 August 2007, Pages 112-122, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.03.011.
(http://www.sciencedirect.com/science/article/B6TFD-4NCJCRC-1/2/7ef6ec276edd477e9163ca9e0a290f9d)
Abstract:
Thermal, pasting, and gelling properties of wheat and potato starches were studied in the presence of sucrose, glucose, glycerol, and hydroxypropyl [beta]-cyclodextrin (HP[beta]-CD). Swelling factor of both starches slightly increased up to 20% sucrose and glucose but decreased at 40% concentration (sucrose > glucose). Glycerol did not affect swelling factor of wheat starch even at 40% concentration but decreased it in potato starch. Amylose leaching of wheat and potato starches tends to decline above 5% and 1% concentration of sucrose and glucose, respectively. However, similar to swelling factor the extent of amylose leaching in wheat starch was unaffected in the presence of glycerol. Gelatinization temperature and enthalpy of both starches were increased by sucrose, glucose and glycerol in the order of sucrose > glucose > glycerol. Glucose increased peak viscosity of the two starches more than other polyols. Cold paste viscosity increased in wheat starch following the order: glucose > sucrose > glycerol but sucrose was most effective in potato starch. Gel hardness of wheat starch was increased following the order glucose > sucrose > glycerol but sucrose was more effective in potato starch. All above results indicate the occurrence of starch-polyhydroxy interaction which reinforces the starch granules depending on the botanical source of starch and the type and concentration of

polyhydroxy compound. The influence of HP[beta]-CD on the swelling factor, amylose leaching, and dissociation parameters of amylose-lipid complex in wheat starch is consistent with the disruption of amylose-lipid complex. This greatly affects the gelatinizing, pasting, and gelling properties of wheat starch.
Keywords: Polyhydroxy compounds; Starch properties; Amylose-lipid complex

Ling-li ZHANG, Xiu-quan LI, Xin-ming YANG, Hong-jie LI, Hui WANG, Li-hui LI, High-Molecular-Weight Glutenin Subunit Composition of Chinese Wheat Germplasm, Agricultural Sciences in China, Volume 6, Issue 8, August 2007, Pages 899-907, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60128-X.
(http://www.sciencedirect.com/science/article/B82XG-4PM8WN0-1/2/5f7e805d36c2dca314af97a58495e57a)
Abstract: Abstract
The objective of the present study was to characterize the high molecular glutenin subunits (HMW-GS) composition and the presence of 1B/1R translocation in newly developed wheat (Triticum aestivum L.) germplasm, which have one or more traits that are useful in wheat improvement. Sodium dodecyl sulphate polyacrylamide-gel electrophoresis (SDS-PAGE) and acid polyacrylamide-gel electrophoresis (A-PAGE) were used to detect HMW-GS composition and the presence of 1B/1R wheat-rye (Secale cereale L.) chromosome translocation in the wheat germplasm. Bread-making quality scores of these lines were determined. A high level of variations in HMW-GS encoded by Glu-1 locus was observed. Sixteen major HMW-GS, with 30 combinations, were detected. The percentage of cultivars with more than two desirable subunits was 38.7%. Thirteen cultivars had bread-making quality scores of 10 in combination with one or two desirable agronomical traits, such as high-yield potential, dwarfing stem, resistance to diseases, and/or tolerance to abiotic stress. Sixty-eight (36.6%) cultivars possessed 1B/1R translocation. The newly developed germplasm with HMW-GS for good quality can be promising resources for improving bread-making quality of wheat.
Keywords: bread wheat; high-molecular-weight glutenin subunits (HMW-GS); 1B/1R translocation

Alan L. Wright, Fugen Dou, Frank M. Hons, Soil organic C and N distribution for wheat cropping systems after 20 years of conservation tillage in central Texas, Agriculture, Ecosystems & Environment, Volume 121, Issue 4, August 2007, Pages 376-382, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.11.011.
(http://www.sciencedirect.com/science/article/B6T3Y-4MNRMWH-2/2/7d6a80bec780198096a349d4271a3a41)
Abstract:
Long-term conservation tillage and cropping intensity may alter the depth distribution of soil organic C and N. The objectives of this study were to investigate the impacts of conventional tillage (CT), no tillage (NT), and wheat cropping sequences on the depth distribution of dissolved organic C (DOC), soil organic C (SOC), and total N in a central Texas soil after 20 years. Soil was sampled for six depth intervals ranging from 0 to 105 cm. Conventional tillage consisted of disking, chiseling, ridging, and residue incorporation into soil, while residues remained on the soil surface for NT. The depth distribution of DOC was similar to SOC. Tillage impacts on DOC, SOC, and total N were primarily observed in surface soil (0-5 cm) under continuous wheat but also in subsurface soil depth intervals down to 55 cm for more intensive cropping sequences. On average, NT increased SOC, DOC, and total N compared to CT by 28, 18, and 33%, respectively. Soil organic C and total N were highest at 0-5 cm and decreased with depth to 30-55 cm, below which few tillage or cropping sequence effects were observed. The depth distribution of SOC and total N indicated treatment effects below levels of the maximum tillage depth, while intensive cropping increased SOC and total N for NT compared to CT to a greater depth than for monoculture wheat. High intensity cropping sequences, coupled with NT, resulted in the highest soil organic matter

levels in subsurface soils, demonstrating the importance of subsurface C and N storage for potential mitigation of greenhouse gases.
Keywords: C sequestration; Dissolved organic C; Soil organic matter; Tillage

K.B. Duguid, M.D. Montross, C.W. Radtke, C.L. Crofcheck, S.A. Shearer, R.L. Hoskinson, Screening for sugar and ethanol processing characteristics from anatomical fractions of wheat stover, Biomass and Bioenergy, Volume 31, Issue 8, August 2007, Pages 585-592, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.03.002.
(http://www.sciencedirect.com/science/article/B6V22-4NNPH4B-2/2/e6e67211ca56fd55b5fbddf42bc8263d)
Abstract:
Due to concerns with stover collection systems, soil sustainability, and processing costs to produce ethanol, there are opportunities to investigate the optimal plant fractions to collect. Wheat stover fractions were separated by hand and analyzed for glucan, xylan, acid-soluble lignin, acid-insoluble lignin, and ash composition. Internodes had the highest glucan content (38.2% zero percent moisture basis) and the other fractions varied between 29.9% and 33.4%. The stover fractions were pretreated with either 0%, 0.4%, or 0.8% NaOH for 2 h at room temperature, washed, autoclaved, and saccharified. In addition, acid pretreated samples underwent simultaneous saccharification and fermentation (SSF) to ethanol. In general, the acid and alkaline pretreatments produced similar trends with leaves requiring very little pretreatment to achieve high conversion rates (greater than 80%). Chaff responded very well to pretreatment and high conversion efficiencies resulted when pretreated under alkaline or acidic conditions. Nodes and internodes were more recalcitrant than the other anatomical fractions. Pretreatment with 0.8% sulfuric acid (0.24 g sulfuric acid/g biomass) did not result in a significantly higher conversion of glucan to ethanol as the native material. Pretreatment with 0.8% NaOH (0.06 g NaOH/g biomass) at room temperature for 2 h resulted in high conversion efficiencies for all plant fractions, greater than 73% of the available glucan. These differences in pretreatment susceptibilities suggest that a biomass collection system that removes specific portions of wheat stover could result in significant differences in ethanol production costs.
Keywords: Biomass; Cellulase; Straw; Digestibility; Botanical; Pretreatment; Internodes; Nodes; Leaves; Chaff; Triticum aestivum

Daniel J. Royse, Jose E. Sanchez, Ground wheat straw as a substitute for portions of oak wood chips used in shiitake (Lentinula edodes) substrate formulae, Bioresource Technology, Volume 98, Issue 11, August 2007, Pages 2137-2141, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.08.023.
(http://www.sciencedirect.com/science/article/B6V24-4M5WHTY-1/2/98c51befdf19cc7a6b36c0c42dbb1ec5)
Abstract:
Oak woodchips, used for production of shiitake Lentinula edodes (Berk) Pegler, are increasingly difficult to obtain due to dwindling supplies. We investigated the effect of adding ground wheat straw as a substitute for portions of oak woodchips in substrate formulae on mushroom yield and size. We also determined the effect of mushroom cropping on relative feed value (RFV) by chemical analysis of the substrate at spawning (AS) and after cropping (AC). Three formulae containing 0%, 8% and 16% ground wheat straw and 52%, 44% and 36% oak sawdust, respectively, were bulk pasteurized (111 [degree sign]C for 20 min) in an autoclaving mixer, subjected to spawn run (21 d), browning (28 d) and a production cycle of three breaks (38 d). Mean (4 crops) mushroom yields were 11% higher when 8% wheat straw was used in the medium and 19% higher when 16% wheat straw was substituted for portions of oak sawdust. There were no significant differences in mushroom sizes between any of the treatments. Relative feed values of shiitake substrates AC increased more dramatically as more wheat straw was added to the formulae. Using mature alfalfa (full bloom) as a base value of 100%, RFVs for substrate AS were

98%, 92%, and 92% for 0%, 8% and 16% straw, respectively; RFVs AC were 118%, 120% and 133%, respectively. Substrate AC containing 16% straw had a RFV comparable to corn silage (well-eared). Fat contents of the substrates decreased by 50-62% AC, whereas potassium contents decreased by 40%. Use of ground wheat straw in synthetic medium would not only increase mushroom yield by up to 19%, but may help alleviate periodic shortages of oak sawdust. In addition, growers would avoid the added expense of aging the wheat straw (for 8-12 week) as is typically done for oak sawdust in the industry. This is the first report of RFVs for spent shiitake substrate (SSS) predicting its excellent potential for use as animal feed.
Keywords: Lentinula edodes; Shiitake; Wheat straw; Oak sawdust; Relative feed value

R.G. Bongiovanni, C.W. Robledo, D.M. Lambert, Economics of site-specific nitrogen management for protein content in wheat, Computers and Electronics in Agriculture, Volume 58, Issue 1, Precision Agriculture in Latin America, August 2007, Pages 13-24, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.01.018.
(http://www.sciencedirect.com/science/article/B6T5M-4NJP3FX-1/2/bd4ab12b5de05c1a1694a3a931ef10a6)
Abstract:
Wheat fields in the semiarid region of Argentina are spatially variable in soil nitrogen (N) fertility and crop productivity. By accounting for spatial variation in soil N levels, variable-rate fertilizer application may improve crop yield, protein content, and N use efficiency within fields. Therefore, there is interest in applying variable rates of N fertilizer across the landscape. The general objectives of this research are to determine relationships among yield, protein and N rates, using spatial regression analysis of yield monitor data; and to optimize variable-rate application (VRA) of nitrogen fertilizer for wheat. The data were drawn from an on-farm N trial of 10.2 ha within a 44 ha field conducted in Manfredi, Cordoba, Argentina, in 2003. The experimental design was a complete block strip trial that included two different types of soils in terms of landscape (Hilltop and Lowland) and two different antecessor crops (Corn and Soybeans). The fertilized strips were wider than the combine platform width, with zero N application as the control, and five other rates of elemental N (12, 37, 62, 88 and 112 kg ha-1). Yield data were obtained with a combine grain monitor, and grain samples for quality analysis were manually collected from the grain flow of a combine harvester, analyzed for quality in the laboratory and converted into a geographical information system (GIS) layer, together with the yield monitor data. Yield and grain quality variability was observed across the field, and among treatments. The combination of yield maps, soil moisture and protein content can help to determine management zones in order to maximize economic benefit. This approach offers opportunities to optimize grain protein on a site-specific basis by accounting for spatial variability of N fertility within individual fields.
Keywords: Wheat; Yield monitor; Protein; Economically optimal nitrogen rates; Spatial econometrics

M.E. Thorne, F.L. Young, J.P. Yenish, Cropping systems alter weed seed banks in Pacific Northwest semi-arid wheat region, Crop Protection, Volume 26, Issue 8, August 2007, Pages 1121-1134, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.021.
(http://www.sciencedirect.com/science/article/B6T5T-4MK0HG0-1/2/935593bc1fd34832c082ef560cdc75a1)
Abstract:
Arable land weed seed banks are dynamic and reflect cropping history, current management, and environment. Changes in crop rotation and tillage system can alter weed seed density and species composition. In the semi-arid region of the Pacific Northwest, USA, no-till spring cropping is being studied as an alternative to the traditional winter wheat (Triticum aestivum L.)/dust-mulch fallow (WWF) rotation. Weed seed bank density and species composition were assessed during the first 6 years of an ongoing cropping system study comparing WWF with three no-till rotations; spring

wheat (Triticum aestivum L.)/chemical fallow (SWF), continuous spring wheat (CSW), and spring wheat/spring barley (Hordeum vulgare L.) (SWSB). Soil cores were collected at depths of 0-8, 8-15, and 15-23 cm in all plots during August each year following crop harvest. Weed seeds were washed from the soil, dried, and germinated in a glasshouse. Weed species most associated with the 0-8 cm depth was Bromus tectorum L., the major winter annual grass weed in WWF. Species most associated with 8-15 cm depth was Chenopodium leptophyllum (Moq.) Nut. ex S. Wats, a native warm season broadleaf weed that may have long seed bank persistence. An initial high density of B. tectorum was reduced with no-till spring crops and in WWF with intensive management strategies. In comparison an initial low weed seed density of B. tectorum remained low with no-till but increased in WWF with less management. Broadleaf weed species did not become management problems in no-till; however, seed bank weed shifts occurred where winter annual broadleaf species remained following reduction of high densities of B. tectorum. Summer annual broadleaf weed seeds such as C. leptophyllum and Salsola tragus L. were present but not at high densities. Summer annual grass weed seeds were not present and are not typical in this region. In this research, no-till spring cereal based systems did not result in an increase in total seed density at the soil surface. Results from this research show that no-till spring crop rotations are effective at controlling winter annual grass weeds as well as broadleaf weeds normally associated with WWF.
Keywords: Seed banks; Weed shifts; No-till cropping; Winter wheat; Dust-mulch fallow; Chemical fallow; Pacific Northwest

Dereje Hailu, Chemeda Fininsa, Epidemics of stripe rust (Puccinia striiformis) on common wheat (Triticum aestivum) in the highlands of Bale, southeastern Ethiopia, Crop Protection, Volume 26, Issue 8, August 2007, Pages 1209-1218, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.10.018.
(http://www.sciencedirect.com/science/article/B6T5T-4MM25NY-2/2/463e7ef9a26472d7720c4bbbd748d9a7)
Abstract:
The effects of common wheat cultivars and fungicide (triadimefon) spray intervals (at 7-, 14-, 21-, 28-d, and no spray) on the temporal epidemics of stripe or yellow rust caused by Puccinia striiformis f.sp. tritici were studied. The experiments were conducted in the main cropping seasons (August-December) in 2002 and 2003 at Agarfa and Sinana in Bale highlands, Ethiopia. Severity, disease progress rate (r), and area under disease progress curve (AUDPC) were used to evaluate the effects of the treatments. The spray intervals significantly affected disease severity and varied the rate of epidemic development. Stripe rust epidemics varied significantly between locations, seasons, and among cultivars. The disease developed at a rate of 0.173-0.244 units per day on the susceptible cv. Wabe, 0.155-0.231 on the moderately resistant cv. Mitike, and 0.06-0.143 on the resistant cv. Madda-Walabu under natural disease epidemics. The severity and rate of stripe rust progression were significantly influenced by resistance of the cultivars. Fungicide application significantly reduced stripe rust severity and AUDPC by reducing its progress rate on the susceptible cultivar. Grain yield harvested from sprayed plots was consistently greater than the yield harvested from unsprayed plots.
Keywords: Area under disease progress curve; Bale highlands; Disease progress rate; Puccinia striformis f.sp. tritici; Triticum aestivum

J.R. Qasem, Chemical control of wild-oat (Avena sterilis L.) and other weeds in wheat (Triticum durum Desf.) in Jordan, Crop Protection, Volume 26, Issue 8, August 2007, Pages 1315-1324, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.11.006.
(http://www.sciencedirect.com/science/article/B6T5T-4MMP24Y-1/2/90d797a02f4e94c98629424297ab525d)
Abstract:

Field experiments were conducted for 2 years to evaluate the effectiveness of certain herbicides on wild-oat (Avena sterilis L.) in wheat (Triticum durum L.). Results showed that tralkoxydim (0.3 l a.i. ha-1), imazamethabenz-methyl (0.5 and 0.63 l a.i. ha-1) and the mixture of imazmethabenz-methyl (0.38 l a.i. ha-1) and isoproturon (0.5 l a.i. ha-1) increased wheat grain yield up to the level of the weed-free control. In contrast, when used alone both isoproturon (1 and 1.5 l a.i. ha-1) and dimethenamid (1.8 l a.i. ha-1) reduced grain yield below that of the weed-infested control. The highest average straw yield was with imazamethabenz-methyl (0.38 l a.i. ha-1). Considering total wheat yield (grain and straw), imazamethabenz-methyl (0.38 l a.i. ha-1), imazamethabenz-methyl/isoproturon mixture, fenoxaprop-ethyl (0.09 l a.i. ha-1) and tralkoxydim (0.3 l a.i. ha-1) gave similar yield to that of the weed-free control. Imazamethabenz-methyl (0.5 and 0.63 l a.i. ha-1), imazamethabenz-methyl/isoproturon mixtures (0.38+0.5 or 0.38+0.75 l a.i. ha-1), diclofop-methyl (0.9 l a.i. ha-1) and fenoxaprop-ethyl (0.09 l a.i. ha-1) were most effective against A. sterilis. Imazamethabenz-methyl (0.5 and 0.63 l a.i. ha-1) severely reduced A. sterilis population, tiller number and dry weight compared with the weed-infested control. Poor A. sterilis control was obtained using dimethenamid, difenzoquat and isoproturon. However, while most herbicides increased growth of broadleaved weeds, isoproturon alone and its mixtures with imazamethabenz-methyl were most effective against these weeds. Based on grain and straw yields obtained, dimethanamid, isoproturon, diclofo-methyl, and difenzoquat appeared somehow phytotoxic to crop plants and lowered wheat yield beyond the weed-infested control.
Keywords: Diclofop-methyl; Tralkoxydim; Imazamethabenz; Imazamethabenz/isoproturon mixture; Isoproturon; Dimethenamid; fenoxaprop-ethyl; Difenzoquat; Wild-oat; Avena sterilis; Wheat; Control; Weeds

Javad Amid, The dilemma of cheap food and self-sufficiency: The case of wheat in Iran, Food Policy, Volume 32, Issue 4, August 2007, Pages 537-552, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.11.001.
(http://www.sciencedirect.com/science/article/B6VCB-4MSR8XD-1/2/329db24a872f7185ca57b9a819e15ad8)
Abstract:
Self-sufficiency in wheat has been one of the major goals of Iranian agricultural policies since the Revolution of 1979. Even so, the country failed to achieve this goal by the early 2000s, despite a satisfactory growth in wheat production. This paper addresses this failure and the political difficulties in introducing reforms that would reduce the need for import. First, the production and consumption of wheat are examined. The conclusion is that the cheap-bread policy has mainly been responsible for the imbalances between domestic supply and demand, and the continued reliance on wheat imports. Moreover, the paper argues that the subsidy program is an expensive safety net for the needy and shows that the Iranian government has intended to reform the program since the early 1990s. However, subsidy reforms are politically sensitive, especially in developing countries where subsidies are considered very important, both for supporting the poor and for political stability. An analysis of the Iranian attempts at subsidy reform suggests that they have not yet succeeded, mainly due to such political considerations.
Keywords: Food self-sufficiency; Wheat and flour price; Wheat consumption; Leakage; Food subsidy; Subsidy reform

S. Neethirajan, D.S. Jayas, N.D.G. White, Detection of sprouted wheat kernels using soft X-ray image analysis, Journal of Food Engineering, Volume 81, Issue 3, August 2007, Pages 509-513, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.11.020.
(http://www.sciencedirect.com/science/article/B6T8J-4MS9JJM-4/2/3f6487227338503692154bf480cb12e0)
Abstract:

Sprouted wheat kernels adversely affect bread and pasta making quality, thus lowering the grade and value to millers, bakers and grain dealers. In this study, the potential of using soft X-ray system in detecting the sprouted wheat kernels was evaluated. Sprouted kernels were produced by germinating seeds. Both the sprouted and healthy samples were X-rayed using a soft X-ray system. White specks were observed in all the sprouted kernel X-ray images. Algorithms were written to extract 55 image features including gray level modeling and histogram from the scanned images. Identification of sprouted and healthy kernels was determined using statistical and neural network classifiers. A four-layer back propagation neural network model correctly classified 90% and 95% of the sprouted and healthy kernels, respectively. Statistical classifier correctly identified 87% and 92% of the sprouted and healthy kernels, respectively.
Keywords: Sprouted kernels; Soft X-ray images; Statistical classifiers; Neural network classifiers

E. Razmi-Rad, B. Ghanbarzadeh, S.M. Mousavi, Z. Emam-Djomeh, J. Khazaei, Prediction of rheological properties of Iranian bread dough from chemical composition of wheat flour by using artificial neural networks, Journal of Food Engineering, Volume 81, Issue 4, August 2007, Pages 728-734, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.01.009.
(http://www.sciencedirect.com/science/article/B6T8J-4MXBF7B-1/2/2951eccf4cfab3ec88493f1a3d6e2631)
Abstract:
This paper shows the ability of artificial neural network (ANN) technology for predicting the correlation between farinographic properties of wheat flour dough and its chemical composition. The input parameters of the neural networks (NN) were the four most important chemical parameters influencing farinographic properties, namely protein content, wet gluten, sedimentation value and falling number. The output parameters of the NN models were six farinographic properties including water absorption, dough development time, dough stability time, degree of dough softening after 10 and 20 min and valorimeteric value. Results showed that, the Multi Layer ANN with training algorithm of back propagation (BP) was the best one for creation of non-linear mapping between input and output parameters. The ANN model predicted the farinographic properties of wheat flour dough with average RMS 10.794. These results show that the ANN can potentially be used to estimate farinographic parameters of dough from chemical composition. This development may have significant potential to improve product quality and reduce time and costs by minimizing farinographical experiments.
Keywords: Artificial neural network; Dough; Prediction; Rheological (Farinographic) properties

Nermin Bilgicli, Adem Elgun, Emine Nur Herken, Selman Turker, Nilgun Ertas, Senol Ibanoglu, Corrigendum to 'Effect of wheat germ/bran addition on the chemical, nutritional and sensory quality of tarhana, a fermented wheat flour-yoghurt product' [Journal of Food Engineering, 77 (2006) 680-686], Journal of Food Engineering, Volume 81, Issue 3, August 2007, Page 642, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.12.004.
(http://www.sciencedirect.com/science/article/B6T8J-4MMFJ0B-1/2/c8cdeae5dda8b6e4121ceee5f972ed46)

K. Knoblaugh, L. McProud, A. Wagle, A. Finkelstein, The Prevalence of Exposure to Hidden/Undeclared Wheat When Dining in a Restaurant or Other Foodservice Establishment, Journal of the American Dietetic Association, Volume 107, Issue 8, Supplement 1, ADA FNCE 2007 Food & Nutrition Conference & Expo, ADA FNCE 2007 Food & Nutrition Conference & Expo, August 2007, Page A73, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.05.180.
(http://www.sciencedirect.com/science/article/B758G-4P8G9Y7-8G/2/580a3024768b29f39f7b93ca2d8d6a99)

M. Erickson, E. Kelley, T. Halverson, White Whole Wheat Flour is an Acceptable Substitute for All-Purpose Flour in Shortbread Cookies, Journal of the American Dietetic Association, Volume 107, Issue 8, Supplement 1, ADA FNCE 2007 Food & Nutrition Conference & Expo, ADA FNCE 2007 Food & Nutrition Conference & Expo, August 2007, Page A77, ISSN 0002-8223, DOI: 10.1016/j.jada.2007.05.196.
(http://www.sciencedirect.com/science/article/B758G-4P8G9Y7-92/2/d0cecb5d6caa0d82c50e6ef986d0a5d4)

M. Virginia Sanchez-Puerta, Tsvetan R. Bachvaroff, Charles F. Delwiche, Sorting wheat from chaff in multi-gene analyses of chlorophyll c-containing plastids, Molecular Phylogenetics and Evolution, Volume 44, Issue 2, August 2007, Pages 885-897, ISSN 1055-7903, DOI: 10.1016/j.ympev.2007.03.003.
(http://www.sciencedirect.com/science/article/B6WNH-4N85B5C-1/2/99a87b64397c7d4fad8200f2c30c7ded)
Abstract:
Photosynthetic eukaryotes contain primary, secondary or tertiary plastids, depending on the source of the organelle (a cyanobacterium or a photosynthetic eukaryote). Plastid phylogeny is relatively well investigated, but molecular phylogenies have conflicted as a function of gene choice, taxon-representations, and analytical method. To better understand the influences of these variables, we performed analyses of a multi-gene data set based on 62 plastid-associated genes of 15 taxa representing the major plastid lineages. In an attempt to distinguish phylogenetic signal from non-phylogenetic patterns, we analyzed the data using a wide range of phylogenetic methods and examined the effect of covarion evolution and compositional bias. The data suggest that the chlorophyll c-containing plastids are monophyletic and acquired their plastids from the red algae after the emergence of the Cyanidiales. The relationships among chl c-containing plastids are particularly hard to resolve. This is the largest data set used for this purpose; the analyses show that cryptophyte plastids are sister to other chl c-containing plastids, and haptophyte and peridinin-containing dinoflagellate plastids are closely related.
Keywords: Plastid evolution; Chromalveolates; Phylogenetics; Haptophytes; Dinoflagellates

Yu-Hua TIAN, Bin YIN, Lin-Zhang YANG, Shi-Xue YIN, Zhao-Liang ZHU, Nitrogen Runoff and Leaching Losses During Rice-Wheat Rotations in Taihu Lake Region, China, Pedosphere, Volume 17, Issue 4, August 2007, Pages 445-456, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60054-X.
(http://www.sciencedirect.com/science/article/B82XV-4P5CHX6-5/2/f63a21f91d6e365aa39108ccfe2e2733)
Abstract:
Although nitrogen (N) loss through runoff and leaching from croplands is suspected to contribute to the deterioration of surrounding water systems, there is no conclusive evidence for paddy soils to prove this hypothesis. In this study, field plot experiments were conducted to investigate N losses through runoff and leaching for two consecutive years with 3 N fertilization rates in rice (Oryza sativa L.)-wheat (Triticum aestivum L.) rotations in the Taihu Lake region, China. A water collection system was designed to collect runoff and leachates for both the rice and wheat seasons. Results showed that dissolved N (DN), rather than particulate N (PN), was the main form of N loss by runoff. The NO3--N concentration in runoff was between 0.1 and 43.7 mg L-, whereas the NH4+-N concentration ranged from below detection limit to 8.5 mg L-. Total N (TN) loads by runoff were 1.0-17.9 and 5.2-38.6 kg ha- during rice and wheat seasons, respectively, and the main loss occurred at the early growing stage of the crops. Nitrogen concentrations in leachates during the rice seasons were below 1.0 mg L- and independent of the N application rate, whereas those during the wheat season increased to 8.2 mg L- and were affected by the fertilizer rate. Annual losses of TN through runoff and leaching were 13.7-48.1 kg ha-1 from the rice-wheat cropping

system, accounting for 5.6%-8.3% of the total applied N. It was concluded that reduction in the N fertilization rate, especially when the crop was small in biomass, could lower the N pollution potential for water systems.
Keywords: leaching; N fertilization rate; N loss; paddy soil; runoff

Bu-Chong ZHANG, Gao-Bao HUANG, Feng-Min LI, Effect of Limited Single Irrigation on Yield of Winter Wheat and Spring Maize Relay Intercropping, Pedosphere, Volume 17, Issue 4, August 2007, Pages 529-537, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60063-0.
(http://www.sciencedirect.com/science/article/B82XV-4P5CHX6-G/2/c4f6cea7cc1f97efce94a3b9e9ed2374)
Abstract:
A field experiment was conducted during the 2002/2003 cropping season of winter wheat (Triticum aestivum) and spring maize (Zea mays) to evaluate the effect of limited single drip irrigation on the yield and water use of both crops under relay intercropping in a semi-arid area of northwestern China. A controlled 35 mm single irrigation, either early or late, was applied to each crop at a certain growth stage. Soil water, leaf area, final grain yield and yield components such as the thousand-grain weight, length of spike, fertile spikelet number, number of grains per spike, and grain weight per spike were measured, and water use efficiency and leaf area index were calculated for the irrigated and non-irrigated relay intercropping treatments and sole cropping controls. The results showed that yield, yield components, water use efficiency, and leaf area index in the relay intercropping treatments were affected by limited single drip irrigation during various growth stages of wheat and maize. The total yields in the relay intercropping treatment irrigated during the heading stage of wheat and the heading and anthesis stage of maize were the highest among all the treatments, followed by that irrigated during the anthesis stage of wheat and silking stage of maize; so was the water use efficiency. Significant differences occurred in most yield components between the irrigated and non-irrigated relay-intercropping treatments. The dynamics of the leaf area index in the relay-intercropped or solely cropped wheat and maize showed a type of single-peak pattern, whereas that of the relay intercropping treatments showed a type of double-peak pattern. Appropriately, limited single irrigation and controlled soil water content level could result in higher total yield, water use efficiency, and leaf area index, and improved yield components in relay intercropping. This practice saved the amount of water used for irrigation and also increased the yield. Therefore, heading stage of wheat and heading and anthesis stage of maize were suggested to be the optimum limited single irrigation time for relay-intercropped wheat and maize in the semi-arid area.
Keywords: leaf area index; limited single irrigation; water use efficiency; winter wheat and spring maize relay intercropping; yield and yield components

Susan B. Altenbach, Kerry M. Kothari, Charlene K. Tanaka, William J. Hurkman, Genes encoding the PR-4 protein wheatwin are developmentally regulated in wheat grains and respond to high temperatures during grainfill, Plant Science, Volume 173, Issue 2, August 2007, Pages 135-143, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.04.007.
(http://www.sciencedirect.com/science/article/B6TBH-4NJG3WP-1/2/c9082cfa214566fcd1da6cd60ae36ec2)
Abstract:
Sequences encoding three wheatwins, including a novel protein not identified previously, were found among expressed sequence tags (ESTs) from grain from the US bread wheat Butte 86 and quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) was used to detect transcripts specific for two of the wheatwins in a variety of tissues. In the absence of pathogen challenge, wheatwin transcripts were detected in embryo, endosperm, whole grain, awns and glumes as well as in leaves, stems and roots. In both whole grain and endosperm, transcripts accumulated late in development and achieved the highest levels as grain reached maximum dry

weight. When high temperature regimens (37/28 [degree sign]C day/night) were imposed during grain development, the timing of transcript accumulation was compressed and maximum transcript levels were significantly higher than under a moderate 24/17 [degree sign]C day/night regimen. Accumulation profiles for two wheatwin proteins identified in endosperm by 2-DE/MS were consistent with transcript profiles and flour from grain produced under high temperatures had greater amounts of the two proteins than flour from grain produced under moderate temperatures. The data confirm that wheatwin genes are developmentally regulated in the grain and suggest that wheatwin plays a role in the response of the developing grain to high temperatures in addition to its protective role against fungal pathogens. Enhanced expression of wheatwin genes in grain produced under high temperature conditions may have important implications for wheat flour quality and allergenic potential.
Keywords: Abiotic stress; Allergens; Defense proteins; Heat stress; Flour quality; Quantitative RT-PCR

E. Nalini, S.G. Bhagwat, N. Jawali, Identification and characterization of some ITS variants from hexaploid wheat (Triticum aestivum L.), Plant Science, Volume 173, Issue 2, August 2007, Pages 262-268, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.05.011.
(http://www.sciencedirect.com/science/article/B6TBH-4NWCGR7-1/2/021f126fe1a215de9c52e8089e7c99fe)
Abstract:
We report the presence of intra-individual ITS variants among Indian bread wheat varieties by PCR-RFLP analysis. The analysis using HaeIII enzyme detected four polymorphic fragments among genotypes. A detailed analysis showed that the 300 bp HaeIII polymorphic fragment has arisen due to a point mutation in the ITS region leading to the loss of a HaeIII site. Genetic analysis showed that 300 bp HaeIII ITS variant in var. Kalyansona was located on the chromosome 1B. Of the remaining three polymorphic fragments, two were found to have originated from a NOR locus on the 1R chromosome of rye. Based on the combinations of the ITS variants present among the wheat varieties analyzed, the ITS variant that gave rise to the fourth polymorphic fragment (250 bp) was predicted to be located on a chromosome other than 1B.
Keywords: Internal transcribed spacer variants; Intra-individual variants; Mapping; Triticum aestivum

Christian Zinser, Harald K. Seidlitz, Gerhard Welzl, Heinrich Sandermann, Werner Heller, Dieter Ernst, Werner Rau, Transcriptional profiling of summer wheat, grown under different realistic UV-B irradiation regimes, Journal of Plant Physiology, Volume 164, Issue 7, 26 July 2007, Pages 913-922, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.06.006.
(http://www.sciencedirect.com/science/article/B7GJ7-4KKFP1J-1/2/fee2b2dbde691d9e764f5dfbf885d276)
Abstract: Summary
There is limited information on the impact of present-day ultraviolet-B (UV-B) radiation on a reprogramming of gene expression in crops. Summer wheat was cultivated in controlled environmental facilities under simulated realistic climatic conditions. We investigated the effect of different regimes of UV-B radiation on summer wheat (Triticum aestivum L.) cultivars Nandu, Star and Turbo. Until recently, these were most important in Bavaria. Different cultivars of crops often show great differences in their sensitivity towards UV-B radiation. To identify genes that might be involved in UV-B defence mechanisms, we first analyzed selected genes known to be involved in plant defence mechanisms. RNA gel blot analysis of RNA isolated from the flag leaf of 84-day-old plants showed differences in transcript levels among the cultivars. Flag leaves are known to be important for grain development, which was completed at 84 days post-anthesis. Catalase 2 (Cat2) transcripts were elevated by increased UV irradiation in all cultivars with highest levels in cv. Nandu. Pathogenesis-related protein 1 (PR1) transcripts were elevated only in cv. Star. A

minor influence on transcripts for phenylalanine ammonia-lyase (PAL) was observed in all three cultivars. This indicates different levels of acclimation to UV-B radiation in the wheat cultivars studied. To analyze these responses in more detail, UV-B-exposed flag leaves of 84-day-old wheat (cv. Nandu) were pooled to isolate cDNAs of induced genes by suppression-subtractive hybridization (SSH). Among the initially isolated cDNA clones, 13 were verified by RNA gel blot analysis showing an up-regulation at elevated levels of UV-B radiation. Functional classification revealed genes encoding proteins associated with protein assembly, chaperonins, programmed cell death and signal transduction.
We also studied growth, flowering time, ear development and yield as more typical agricultural parameters. Plant growth of young plants was reduced at increased UV-B radiation. Flowering and ear development were delayed concomitantly, whereas total grain weight was not influenced at any of the UV-B irradiation regimes.
Keywords: Gene expression; Suppression-subtractive hybridization; Transcript; UV-B; Wheat

M.J. Foulkes, R. Sylvester-Bradley, R. Weightman, J.W. Snape, Identifying physiological traits associated with improved drought resistance in winter wheat, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 11-24, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.007.
(http://www.sciencedirect.com/science/article/B6T6M-4NYBMDG-1/2/c563f10dde77d159be697b3d05b6b06e)
Abstract:
The association of specific target traits for drought resistance (early flowering, high accumulation of stem water soluble carbohydrate (WSC) reserves, presence of awns and high green flag-leaf area persistence) with yield performance under late-season drought was analyzed utilizing two doubled-haploid (DH) populations derived from crosses between Beaver x Soissons and Rialto x Spark in two seasons 2000/2001 and 2001/2002. The aim was to quantify associations between target traits and yield responses to drought, and to prioritize traits for drought resistance. Flowering time variation had a neutral effect on the absolute yield loss under drought, suggesting there may be a trade-off between water-saving behaviour in the shorter pre-flowering period with early flowering and a reduced capacity to access water associated with a smaller rooting system. The presence of awns also had a neutral effect on yield loss under drought amongst lines of the Beaver x Soissons population. The potential advantages of awns for increasing water-use efficiency and sensible heat transfer responsible for a cooler canopy appeared to be of less significance under moderate droughts in the UK than under severe droughts in other regions worldwide. The value of large stem soluble carbohydrate reserves for drought environments alone could not be confirmed in the UK environment. Stem WSC was positively associated with grain yield under both irrigation and drought. The genetic trait which showed the clearest correlation with the ability to maintain yield under drought was green flag-leaf area persistence. Averaged across years, the positive phenotypic correlation of this trait with yield under drought amongst DH lines of the Beaver x Soissons population ($r = 0.49$; $p <= 0.001$) indicated the potential use of this trait as a selection criterion for yield under drought. It is suggested that screens for this trait including marker-assisted selection would have value in future breeding programmes aimed at improving yields in high yielding, rainfed environments, but where drought can also be a problem, such as the UK.
Keywords: Drought resistance; Wheat; Traits; Breeding

S. Elhani, V. Martos, Y. Rharrabti, C. Royo, L.F. Garcia del Moral, Contribution of main stem and tillers to durum wheat (Triticum turgidum L. var. durum) grain yield and its components grown in Mediterranean environments, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 25-35, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.05.008.
(http://www.sciencedirect.com/science/article/B6T6M-4P2J354-1/2/9a4794d5fc9747882441d9f222064a6e)

Abstract:
Under terminal drought conditions, cereal varieties with limited tillering have been suggested to be advantageous, because they have fewer nonproductive tillers, thereby limiting water consumption prior to anthesis. In this study, four field trials were conducted over two growing seasons in southern Spain, under rainfed and irrigated conditions. Twenty-five genotypes were studied to evaluate the contribution of the main stem (MS) and tillers to grain yield and its components. Significant differences were found among genotypes for these contributions under non-stressed environments, but these differences were not significant under water-stress conditions. The contribution of the MS to plant grain yield was higher than that of tillers (68% vs. 32%) and was stable between years in irrigated trials. However, in the rainfed trials, MS contributed differently depending on year-to-year climate variations. Thus, under favorable weather conditions the contribution of MS to grain yield was higher than in the unfavorable year (85% vs. 59%). In irrigated environments, MS and tiller grain yield depended on the number of grains per spike, spikelets per spike, and thousand kernel weight (TKW). Under water-limited conditions, MS yield depended on the number of grains per spike and grains per spikelet, whereas the number of spikelets and TKW had less influence on MS grain yield. Furthermore, under water-stress conditions, high tillering genotypes showed yield levels similar to the genotypes with restricted tillering. Additionally, there was no significant evidence of a positive or negative effect of maximum tiller number on grain yield under rainfed conditions.
Keywords: Uniculm ideotype; Breeding; Crop yield; Durum wheat; Mediterranean environment

P.D. Jamieson, I.R. Brooking, M.A. Semenov, G.S. McMaster, J.W. White, J.R. Porter, Reconciling alternative models of phenological development in winter wheat, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 36-41, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.009.
(http://www.sciencedirect.com/science/article/B6T6M-4NX2VNS-1/2/0c720dbf4b3ccf0c0370bac248e75fd6)
Abstract:
Simulation of the timing of anthesis in wheat crops is achieved using two very different approaches. The older of these simulates progress to flowering by calculating the duration of phases between significant events on the shoot apex. The alternative method tracks development through leaf appearance, using the prediction of final mainstem leaf number to control the duration of the phase from emergence to flowering. Although these methods appear to differ substantially, we show in this paper that the number of leaves on the mainstem when the stage of terminal spikelet occurs is extremely tightly coupled to final mainstem leaf number. We conclude that accurate prediction of the terminal spikelet stage or similar prediction of mainstem leaf number amount to the same thing, so reconciling the methods.
Keywords: Phasic development; Leaf production; Final leaf number; Thermal time

A.K. Joshi, G. Ortiz-Ferrara, J. Crossa, G. Singh, R.C. Sharma, R. Chand, Rajender Parsad, Combining superior agronomic performance and terminal heat tolerance with resistance to spot blotch (Bipolaris sorokiniana) of wheat in the warm humid Gangetic Plains of South Asia, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 53-61, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.010.
(http://www.sciencedirect.com/science/article/B6T6M-4P0N23H-1/2/5d2e4980a7585069f5a8d6c7a8599718)
Abstract:
Seven hundred twenty-nine lines of diverse wheat germplasm lines were evaluated in eight locations of three countries (India, Nepal and Bangladesh) of South Asia for 5 years (1999-2000 to 2003-2004) through Eastern Gangetic Plains Screening Nursery (EGPSN) organized by CIMMYT South Asia, Nepal, for agronomic performance and tolerance to spot blotch of wheat. Each year, the number of lines represented a new set of 150 lines that included six common checks and a

different local check at each of the eight locations. One hundred and five lines, 21 in each year, advanced from EGPSN were also tested for 5 years (2000-2001 to 2004-2005) in five locations of South Asia through Eastern Gangetic Plains Yield Trials (EGPYT) to verify spot blotch tolerance and superior yield performance of the selected germplasm. Many lines yielded significantly more than the best check and possessed high levels of spot blotch resistance under warm humid environments of South Asia. The most promising 25 lines have been listed as sources of strong resistance, with 9 lines better yielding than the best resistant check PBW 343 in fewer days to maturity. Most of these superior lines represented elite CIMMYT germplasm and around half were derived from Kauz and Veery. The line EGPYT 67, Kauz//Kauz/Star/3/Prinia/4/Milan/Kauz, was the best for spot blotch resistance, yield, days to maturity, and 1000 grain weight (TKW). The next two lines in the order of merit were EGPYT 84 (Mrng/Buc//Blo/Pvn/3/Pjb 81) and EGPYT 69 (Chirya3/Pastor). The results demonstrate that additional spot blotch resistant wheat genotypes with high grain yield and TKW, and early maturity, have become available as a result of the regional and international collaboration in South Asia.
Keywords: Spot blotch; Bipolaris sorokiniana; Cochliobolus sativus; wheat; Triticum aestivum; Germplasm; Yield; Resistance; Heat tolerance

B. Arun, B.D. Singh, S. Sharma, R. Paliwal, A.K. Joshi, Development of somaclonal variants of wheat (Triticum aestivum L.) for yield traits and disease resistance suitable for heat stressed and zero-till conditions, Field Crops Research, Volume 103, Issue 1, 25 July 2007, Pages 62-69, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.04.011.
(http://www.sciencedirect.com/science/article/B6T6M-4NX8RDD-1/2/41cd7dd4bb1770bf41cf30e52757557a)
Abstract:
In a substantial rice-wheat cropping system area of South Asia, wheat sowing often gets too delayed and exposed to terminal heat stress. Therefore, farmers prefer varieties that are able to perform well under a short growing period. Tissue culturally regenerated plants of wheat variety cv. HUW 234, the most widely cultivated variety of North Eastern Plain Zone (NEPZ) of India were screened using immature embryo as explant. Days to heading and maturity, yield and other yield components and resistance to leaf rust and spot blotch were evaluated. A few somaclones in R3 and R4 generations displayed significant earliness for days to heading and maturity, improved yield traits and resistance to leaf rust and spot blotch diseases. The superior performance of two of the variants was confirmed in the R5 generation in 3 years of testing under two dates of conventional and zero-till sowing. Stability analysis also suggested superiority of the two somaclones across 12 environments. This appeared to confirm the possibility of obtaining useful somaclonal variants of wheat for very late sown as well as zero-till managed agriculture. The superior performing somaclones can be used as parents in the ongoing breeding programmes targeting late sown wheat in South Asia exposed to terminal heat stress.
Keywords: Tissue culture; Somaclonal variation; Triticum aestivum; Somatic embryogenesis; Zero till; Late sowing; Terminal heat stress

Bettina Bluemling, Hong Yang, Claudia Pahl-Wostl, Making water productivity operational--A concept of agricultural water productivity exemplified at a wheat-maize cropping pattern in the North China plain, Agricultural Water Management, Volume 91, Issues 1-3, 16 July 2007, Pages 11-23, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.03.001.
(http://www.sciencedirect.com/science/article/B6T3X-4NRCRTV-1/2/5330d801b0291705375abe89ad03e1e5)
Abstract:
This article presents a concept of 'agricultural water productivity' to make 'water productivity', as defined by [Molden, D., 1997. Accounting for water use and productivity. SWIM Paper 1. Colombo, Sri Lanka: International Irrigation Management Institute.], operational at the level of the agricultural

water user. After water productivity has entered the water policy and research arenas, efficiency concepts were often disregarded since they would be grounded in a 'conceptual blindness'. In the presented concept, water productivity is not used competitively to efficiency, but integrates it. Its system perspective allows going beyond 'yield' as the only output from agricultural water use, and considering different water fractions, their respective outputs and values. Values denote where the processing of water fractions has to be efficient in order to achieve optimal agricultural water productivity, i.e. a high agricultural water use product. Through efficiency indicators, we know about the margin for improving water processing, as well as which measures may facilitate a better allocation towards the highest valued fractions. The concept is applied to a groundwater irrigating wheat-maize farming system in the North China Plain. Results show that even if farmers improved agricultural water productivity for the output yield and achieved optimal precipitation allocation efficiency, production would always be negative, i.e. at the expense of other users in the watershed. Through the harmonized application of efficiency indicators and productivity, effective measures and their potential impact on productivity at the farm scale can be assessed. Further, the concept links farm level productivity to the regional scale in order to develop integrated solutions for sustainability and water productivity in the watershed.
Keywords: Water productivity; Agricultural water productivity; Classical efficiency; Water policy; North China plain

Guoju Xiao, Qiang Zhang, Yubi Yao, Shengmao Yang, Runyuan Wang, Youcai Xiong, Zhaojun Sun, Effects of temperature increase on water use and crop yields in a pea-spring wheat-potato rotation, Agricultural Water Management, Volume 91, Issues 1-3, 16 July 2007, Pages 86-91, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.05.002.
(http://www.sciencedirect.com/science/article/B6T3X-4P00S35-1/2/fdb9289468d827942b975b1f2944e662)
Abstract:
A greenhouse experiment on a pea-spring wheat-potato (Pe-Sw-Po) rotation system was conducted at the Guyuan Experimental Station (lat. 36[degree sign]02'N, long. 106[degree sign]28'E), in a semiarid region of China, during 2000-2005. The mean daily temperature was designed to increase 0.5-2.0 [degree sign]C, in the Pe-Sw-Po rotation system. When mean daily temperature increased by 1.2 [degree sign]C, water use efficiency (WUE) decreased by 7.3%, the summed length of the growing period of the rotation was shortened by 23 days, and the total yield of the rotation decreased by 7.8%. With a 2.0 [degree sign]C increase, WUE decreased by 12.5%, the growing period was shortened by 42 days, and the total yield decreased by 9.4%. Supplemental irrigation was beneficial to crop yields in the rotation with temperature increase. With 130 mm of supplemental irrigation spread over all growth stages and a 0.5-2.0 [degree sign]C in mean daily temperature, the total yields of all crops improved by 8.3-12.7%. Consequently, in this region, supplemental irrigation may play an important role in maintaining yields of crops in a Pe-Sw-Po rotation system affected by climate warming.
Keywords: Rotation system; Supplemental irrigation; Temperature increase; Water use efficiency; Yields

I.S.M. Zaidul, N.A. Nik Norulaini, A.K. Mohd. Omar, H. Yamauchi, T. Noda, RVA analysis of mixtures of wheat flour and potato, sweet potato, yam, and cassava starches, Carbohydrate Polymers, Volume 69, Issue 4, 2 July 2007, Pages 784-791, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.02.021.
(http://www.sciencedirect.com/science/article/B6TFD-4N49VMS-2/2/9f760caf75a3b17f37019618158a9d35)
Abstract:
Rapid visco analysis (RVA) was performed to study the pasting properties of mixtures of wheat flour and tuber starches, i.e., potato starch (PS), sweet potato starch (SPS), yam starch (YS), and

cassava starch (CS), at 10-50% starch in the mixtures. Lower phosphorus and higher amylose contents were observed in CS, followed by YS, SPS, and PS. The peak, breakdown, final, and setback viscosities of the control wheat flour were lower than those of the control PS, SPS, YS, and CS. The peak viscosity of wheat-PS mixtures was higher than those of the wheat-SPS, wheat-YS, and wheat-CS because of the higher phosphorus and lower amylose content of PS, which resulted in higher swelling of PS than that of SPS, YS, and CS. The breakdown viscosities increased as the starch content of the PS, SPS, and CS in the mixtures increased to up to the 50%, and the values tended to decrease in the wheat-YS mixture. The setback viscosities of wheat-SPS, wheat-YS, and wheat-CS increased significantly as the starch content increased from 10% to 50%, and that of wheat-PS dropped dramatically at 50%. The findings in this work provide evidence that tuber starches could be used as a partial substitute for wheat flour in some wheat-based products.
Keywords: Wheat flour; Potato starch; Sweet potato starch; Yam starch; Cassava starch; Mixture; Pasting properties

Mirjam A. Kabel, Gijs Bos, Jan Zeevalking, Alphons G.J. Voragen, Henk A. Schols, Effect of pretreatment severity on xylan solubility and enzymatic breakdown of the remaining cellulose from wheat straw, Bioresource Technology, Volume 98, Issue 10, July 2007, Pages 2034-2042, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.08.006.
(http://www.sciencedirect.com/science/article/B6V24-4M2WP0B-2/2/70ed2f63af79e32c0924db734bcb2ecc)
Abstract:
The effect of process conditions used for wheat straw pretreatments on the liquor- and residue-composition was studied. Hereto, the pretreatment conditions were expressed in a `combined severity -factor'. The higher the combined severity factor () the more xylan was released from the wheat straw, but the more xylan decomposed and furfural formation occurred. The percentage of residual xylan present after pretreatment appeared to be a good indicator concerning cellulose degradability or bio-ethanol production. Namely, cellulose degradation by using commercial enzymes was higher at higher severities corresponding to a lower amount of residual xylan. The xylan release and degradation was studied in more detail by using HPSEC and MALDI-TOF mass spectrometry. The more severe the treatment the more (acetylated) xylose oligomers with a DP lower than nine were analysed. The presence of (acetylated) xylans with a DP of 9-25 increased slightly from low to medium severity. The quantification of the DP-distribution of the (acetylated) xylans released proved to be a good tool to predict cellulose degradability.
Keywords: Wheat straw; Bioethanol; Severity; Heat treatment; Cellulases

M. Mirik, G.J. Michels Jr., S. Kassymzhanova-Mirik, N.C. Elliott, Reflectance characteristics of Russian wheat aphid (Hemiptera: Aphididae) stress and abundance in winter wheat, Computers and Electronics in Agriculture, Volume 57, Issue 2, July 2007, Pages 123-134, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.03.002.
(http://www.sciencedirect.com/science/article/B6T5M-4NDDSTV-2/2/9a8c0ae2fc9111c004e712c59de326ef)
Abstract:
The Russian wheat aphid (Diuraphis noxia (Mordvilko)) infests wheat (Triticum aestivum L.), barley (Hordeum vulgare L.), and other small grains and grasses. Russian wheat aphid infestations are unpredictable in time and space. In favorable conditions, Russian wheat aphid feeding can result in heavy damage to wheat and barley in a short period of time. A repetitive monitoring strategy that allows for rapid assessment of aphid infestation and damage over the growing season is critically needed. Tracking the irregular infestation patterns of Russian wheat aphid in order to optimize control efforts is central to the successful management of this aphid. One method that has been shown over a number of years to be useful for monitoring some insect outbreaks is to measure the

light reflected by the infested canopy, plant, or leaf. Hence, this research was designed to investigate: (1) the potential use of remotely sensed data to discern and identify differences in spectral reflection patterns (spectral signatures) of winter wheat canopies with and without Russian wheat aphid infestation, and (2) the relationship between spectral indices and Russian wheat aphid abundance in wheat canopies growing in field conditions. Russian wheat aphid-infested wheat canopies had significantly lower reflectance in the near infrared region and higher in the visible range of the spectrum when compared with noninfested canopies. Linear regression analyses showed that there were varying relationships between Russian wheat aphid density and spectral vegetation indices, with coefficients of determination (r2) ranging from 0.91 to 0.01. These results indicate that remote sensing data have the potential to distinguish damage by Russian wheat aphid and quantify its abundance in wheat. However, success for Russian wheat aphid density estimation depends on the selection of spectral vegetation indices.
Keywords: Aphid infestations; Remote sensing; Russian wheat aphid; Spectral signatures; Spectral indices; Wheat

J.M. Wagacha, J.W. Muthomi, Fusarium culmorum: Infection process, mechanisms of mycotoxin production and their role in pathogenesis in wheat, Crop Protection, Volume 26, Issue 7, July 2007, Pages 877-885, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.09.003.
(http://www.sciencedirect.com/science/article/B6T5T-4M7CM8X-4/2/f148913ddf70e996b4d0ab8a4a2c3179)
Abstract:
Fusarium culmorum is an important pathogen of wheat causing seedling blight, foot rot, and head blight (Fusarium head blight (FHB)) or scab. The pathogen is dominant in cooler areas like north, central and western Europe. The fungus reproduces asexually by means of conidia, which form the main mode of dispersal. Head blight is by far the most serious concern of Fusarium infection on pre-harvest wheat and other small grain cereals. The significance of F. culmorum in wheat production is attributed to both head blight and mycotoxin contamination of the grain harvested from infected ears. Ear infection mainly occurs during anthesis and is favoured by wet weather or high humidity and warm temperatures. The major mycotoxins produced by F. culmorum are deoxynivalenol, nivalenol and zearalenone, which are a potential health hazard for both humans and animals. The mycotoxins, especially deoxynivalenol, are believed to play a role in disease development. Available options of managing FHB include use of fungicides, cultural practices, resistant cultivars and biological agents. However, no wheat cultivar is completely resistant to FHB while fungicides are at most 70% effective against natural infection. This review seeks to document and infer information on F. culmorum, with special emphasis on wheat head blight infection process, mechanisms of mycotoxin production, the role the mycotoxins play in pathogenesis, and the possible management options.
Keywords: Fusarium culmorum; Mycotoxins; Wheat; Head blight; Pathogenesis

Ahmet Uludag, Yildiz Nemli, Avi Tal, Baruch Rubin, Fenoxaprop resistance in sterile wild oat (Avena sterilis) in wheat fields in Turkey, Crop Protection, Volume 26, Issue 7, July 2007, Pages 930-935, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.08.012.
(http://www.sciencedirect.com/science/article/B6T5T-4M3J0H1-3/2/45313b87b3709f996e5b2643e9d360fc)
Abstract:
Wheat has been traditionally an important crop in Turkey. Wild oat species (Avena spp.) have high occurrence and intensity in most regions of Turkey. Chemical control of wild oat has been used since the 1970s. Surviving sterile wild oat (Avena sterilis) plants after an ACCase herbicide application were first detected in the late 1990s. Seven (AKR1; AKR2; DZC; GKY1; GKY3; KMP; KMT) of 20 populations examined, were regarded as resistant to fenoxaprop with a range of R/S ratios of 2.41 and >8.0. All these populations were also cross resistant to clodinafop. AKR2

population showed cross-resistance to all ACCase herbicides examined. KMT population was resistant to all APPs but not CHDs, excluding partial resistance to tralkoxydim. GKY1 population exhibited resistant only to fenoxaprop but not resistant to other APP or CHD herbicides. No multiple resistance was detected to imazamethabenz, iodosulfuron+mesosulfuron or trifluralin except GKY1, which had multiple resistance to flamprop.
Keywords: Clethodim; Clodinafop; Diclofop; Flamprop; Fluazifop; Imazamethabenz; Iodosulfuron; Mesosulfuron; Tepraloxydim; Tralkoxydim; Trifluralin; ACCase; Herbicide resistance

Daizy R. Batish, Manpreet Kaur, Harminder P. Singh, Ravinder K. Kohli, Phytotoxicity of a medicinal plant, Anisomeles indica, against Phalaris minor and its potential use as natural herbicide in wheat fields, Crop Protection, Volume 26, Issue 7, July 2007, Pages 948-952, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.08.015.
(http://www.sciencedirect.com/science/article/B6T5T-4M33VPN-8/2/e6b066cf33a748415b13569aede58c99)
Abstract:
Anisomeles indica (Catmint; Lamiaceae) is an aromatic plant with a wide range of medicinal properties. In the search of new methods of weed management, we assessed A. indica for potential inhibitory activity against P. minor and other weeds of the wheat crop. A. indica leaf and root powder applied as mulch at 1 and 2 t ha-1 significantly reduced the emergence and growth of P. minor and other weeds of wheat crop similar to herbicide, without any negative effect on the wheat growth and yield. At 2 t ha-1 dose of root powder mulch of A. indica, there was an enhancement in the grain yield of wheat and suppression of weeds under natural field conditions. The study concludes that mulch of A. indica, a medicinal plant, holds good promise for use as a natural herbicide for managing weeds in wheat fields.
Keywords: Anisomeles indica; Catmint; Phalaris minor; Littleseed canarygrass; Mulching; Weed management; Natural herbicide

Shu-Hua Yang, Li-Jun Wang, Shao-Hua Li, Ultraviolet-B irradiation-induced freezing tolerance in relation to antioxidant system in winter wheat (Triticum aestivum L.) leaves, Environmental and Experimental Botany, Volume 60, Issue 3, July 2007, Pages 300-307, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.12.003.
(http://www.sciencedirect.com/science/article/B6T66-4MNYYY0-1/2/ad5d7ea480cf1f14f903afa2f005c940)
Abstract:
Seven-day-old seedlings of winter wheat (Triticum aestivum L.) in a growth chamber were exposed to ultraviolet-B (UV-B) irradiation for 20 days with daily biologically effective (BE) UV-B irradiation (UV-BBE) at low (4.2 kJ m-2 day-1, LUVB) and high (7.0 kJ m-2 day-1, HUVB) levels. The UV-B irradiated seedlings and the control without UV-B irradiation were then subjected to freezing stress at -6 [degree sign]C for 6 h and recovered to 20 [degree sign]C with gradually increased temperature, to investigate the effects of UV-B irradiation on freezing tolerance. During the UV-B exposure, both LUVB and HUVB irradiated seedlings had lower half lethal temperature (LT50) values in comparison with the control, and LUVB more effectively decreased the LT50 values than HUVB. Moreover, foliar concentrations of thiobarbituric acid reactive substances (TBARS) in the UV-B irradiated seedlings were lower than that of control after recovery from freezing stress. Hydrogen peroxide (H2O2) rapidly increased after UV-B exposure, as did activity of superoxide dismutase (SOD). After recovery from freezing stress, activities of catalase (CAT), guaiacol peroxidase (GPX) and glutathione reductase (GR) increased in both LUVB and HUVB leaves, whereas activities of ascorbate peroxidase (APX) and monodehydroascorbate reductase (MDHAR) significantly increased only in the LUVB leaves. Furthermore, the ascorbic acid (AsA) concentration and reduced-to-oxidized ascorbate ratio (AsA/DHA) increased in the LUVB leaves both at the end of UV-B exposure and after recovery from freezing stress. However, the reduced

glutathione (GSH) concentration, together with reduced-to-oxidized glutathione ratio (GSH/GSSG) increased in both LUVB and HUVB leaves after recovery from freezing stress. UV-B irradiation increased freezing tolerance in winter wheat seedlings, and this response appears to involve the scavenging enzymes and compounds in the antioxidant defense systems, particularly the ascorbate-glutathione cycle.
Keywords: UV-B irradiation; Freezing tolerance; Lipid peroxidation; Hydrogen peroxide; Antioxidant system; Cross-acclimation; Triticum aestivum

Sayed H. Raza, Habib R. Athar, Muhammad Ashraf, Amjad Hameed, Glycinebetaine-induced modulation of antioxidant enzymes activities and ion accumulation in two wheat cultivars differing in salt tolerance, Environmental and Experimental Botany, Volume 60, Issue 3, July 2007, Pages 368-376, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.12.009.
(http://www.sciencedirect.com/science/article/B6T66-4MS3J9B-8/2/1b6907341ac92d1195d1054580a56dd5)
Abstract:
Modulation of water relations, activities of antioxidant enzymes and ion accumulation was assessed in the plants of two wheat cultivars S-24 (salt tolerant) and MH-97 (moderately salt sensitive) subjected to saline conditions and glycinebetaine (GB) applied foliarly. Different levels of GB, i.e., 0 (unsprayed), 50 and 100 mM (in 0.10% Tween-20 solution) were applied to the wheat plants at the vegetative growth stage. Leaf water potential, leaf osmotic potential and turgor potential were decreased due to salt stress. Salt stress increased the Na+ and Cl- accumulation coupled with a decrease in K+ and Ca2+ in the leaves and roots of both cultivars thereby decreasing tissue K+/Na+ and Ca2+/Na+ ratios. Furthermore, salt stress decreased the activities of superoxide dismutase (SOD), whereas it increased the activities of catalase (CAT) and peroxidase (POD) in both wheat cultivars. However, accumulation of GB in the leaves of both wheat cultivars was consistently increased with an increase in concentration of exogenous GB application under both non-saline and saline conditions. Accumulation of Na+ was decreased with an increase in K+ accumulation upon a consistent increase in GB accumulation under salt stress conditions thereby resulting in better K+/Na+ and Ca2+/Na+ ratios in the leaves and roots. High accumulation of GB and K+ mainly contributed to osmotic adjustment, which is one of the factors known to be responsible for improving growth and yield under salt stress. The activities of all antioxidant enzymes, SOD, CAT and POD were enhanced by GB application in cv. MH-97 under saline conditions, whereas all these except SOD were reduced in cv. S-24. It is likely that both applied GB and intrinsic SOD scavenged ROS in the tolerant cultivar thereby resulting into low activities of CAT and POD enzymes under salt stress. In conclusion, the adverse effects of salt stress on wheat can be alleviated by the exogenous application of 100 mM GB by modulating activities of antioxidant enzymes and changes in water relations and ion homeostasis. Furthermore, effectiveness of GB application on regulation of activities of antioxidant enzymes was found to be cultivar-specific.
Keywords: Glycinebetaine; Oxidative stress; Osmotic adjustment; Salt tolerance; SOD; POD; CAT; K+/Na+ ratio; Ca2+/Na+ ratio

Vianney Houles, Martine Guerif, Bruno Mary, Elaboration of a nitrogen nutrition indicator for winter wheat based on leaf area index and chlorophyll content for making nitrogen recommendations, European Journal of Agronomy, Volume 27, Issue 1, July 2007, Pages 1-11, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.001.
(http://www.sciencedirect.com/science/article/B6T67-4N977NF-1/2/9faee8bd5f660f88134952d12ccfd4a9)
Abstract:
Remote sensing in the solar domain provides indirect measurements of green leaf area index and chlorophyll content on a within-field scale. This information can be used to build an indicator

related to the nitrogen status of the crop itself used to make nitrogen recommendations, varying on the within-field scale. We propose as an indicator for winter wheat crops the nitrogen absorption deficit determined by reference to optimal nitrogen status. Three methods for calculating the nitrogen absorption deficit of the crop from the green leaf area index (GLAI) and the chlorophyll content (Cab) are proposed and compared. The first method consists in evaluating the nitrogen nutrition index from the chlorophyll content. The second evaluates the nitrogen content of the canopy and the third directly estimates the quantity of nitrogen absorbed by the canopy from the quantity of chlorophyll that the canopy contains. The methods were calibrated and validated on three datasets obtained on 2 years and two sites, on experiments were nitrogen dressing varied from 0 to 300 kg ha-1. Measurements consisted in time evolution from end of winter to earing stage of dry matter (range 5.9-17.5 t ha-1), GLAI (range 0.1-6), chlorophyll content (range 0.3-0.9 g m-2 leaf or 0.1-4.5 g m-2 soil) and nitrogen absorption (range 38-234 kg ha-1). We found that the relationship between absorbed nitrogen and chlorophyll was more stable when considering integrated quantities of chlorophyll in the canopy (g m-2 soil) than when considering chlorophyll content (g cm-2 leaf). As a consequence, the third method gave the best results, both for description and prediction, with an error of about 20 kg N ha-1.
Keywords: Winter wheat; Chlorophyll; Green leaf area index; Nitrogen nutrition indicator; Nitrogen recommendation

Francesco Giunta, Rosella Motzo, Giovanni Pruneddu, Trends since 1900 in the yield potential of Italian-bred durum wheat cultivars, European Journal of Agronomy, Volume 27, Issue 1, July 2007, Pages 12-24, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.01.009.
(http://www.sciencedirect.com/science/article/B6T67-4NB38N3-1/2/e778025c1470d2ef70771a51e003a61e)
Abstract:
Changes in yield potential brought about by durum wheat breeding in Italy can be used to define future breeding objectives for durum improvement in Mediterranean environments. The grain yield of 20 durum wheat cultivars, grouped according to their period of release, into `old' (up to 1950), `intermediate' (1950-1973) and `modern' (1974-2000), was compared in an irrigated 2-year field trial, in which two sowing dates and two nitrogen fertilisation rates were imposed. The grain yield of the intermediate cultivars was 39% higher than that of those in the old group, but 18% less than that of the modern material. This increase was associated with earliness, kernel number, harvest index and total nitrogen uptake. Total above-ground biomass and individual kernel weight, on the other hand, were largely unaffected by breeding. Sowing date did not affect the ranking of cultivars, although the more modern cultivars benefited most from the availability of more soil nitrogen. By accessing syriacum germplasm, Italian breeders achieved a substantial improvement in the earliness and productivity of durum wheat well before the introduction of Rht genes. The introduction of dwarfing genes reduced lodging susceptibility, increased harvest index, and marginally delayed flowering time. Modern cultivars also out-performed their predecessors both when sown later and when provided with suboptimal levels of N fertiliser.
Keywords: Breeding; Durum wheat; Yield potential

Lambros Farmakis, John Kapolos, Athanasia Koliadima, George Karaiskakis, Study of the growth rate of Saccharomyces cerevisiae strains using wheat starch granules as support for yeast immobilization monitoring by sedimentation/steric field-flow fractionation, Food Research International, Volume 40, Issue 6, July 2007, Pages 717-724, ISSN 0963-9969, DOI: 10.1016/j.foodres.2007.01.009.
(http://www.sciencedirect.com/science/article/B6T6V-4MXJ3SC-1/2/64d6892e6fd9761bf036ccf4fb8b7284)
Abstract:

The efficiency and the effectiveness of wheat starch granules as a support for the immobilization of the alcohol resistant psychrophilic yeast Saccharomyces cerevisiae strain AXAZ-1 was studied. The growth rate of these cells in the presence or the absence of the support in the culture medium was investigated by the technique of sedimentation/steric field-flow fractionation (Sd/StFFF). An abrupt increase of biomass productivity in less required time was observed in the case of the presence of wheat starch granules in the culture medium. The results indicate that wheat starch granules might be a good medium for yeast cell culture and bioreactor formation.
Keywords: Yeast immobilization; Yeast cells proliferation; Biocatalysts; Wheat starch; Field flow fractionation

Pingping Zhang, Zhonghu He, Dongsheng Chen, Yong Zhang, Oscar R. Larroque, Xianchun Xia, Contribution of common wheat protein fractions to dough properties and quality of northern-style Chinese steamed bread, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 1-10, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.007.
(http://www.sciencedirect.com/science/article/B6WHK-4MSHT97-1/2/a639bdc084c67b9e056088e26e8e4003)
Abstract:
Thirty-three cultivars and advanced lines originated from China, Mexico, and Australia were sown in four environments in Chinese spring wheat regions to investigate the association between gluten protein fractions determined by reversed-phase high-performance liquid chromatography (RP-HPLC), and dough properties and northern-style Chinese steamed bread (CSB) quality. The genotypes were divided into two groups of 10 and 23 entries with and without the 1B/1R translocation, respectively. 1B/1R translocation lines had significantly high amounts of [omega]-gliadins, and low levels of glutenin and low molecular weight glutenin subunits (LMW-GS), but no significant difference in dough properties and CSB quality from non-translocation lines. The association between protein fractions and dough properties, and CSB quality largely depended upon the presence of 1B/1R translocation. Gliadin contributed more in quantity to flour protein content (FPC) than glutenin, while glutenin and its fractions contributed more to dough strength and CSB quality. Among non-translocation lines, moderate to high correlation coefficients between quantified glutenin and its fractions, and farinograph development time (DT, r=0.85-0.92) and stability (ST, r=0.81-0.93), extensograph maximum resistance (Rmax, r=0.90-0.93), CSB stress relaxation (SR, r=0.55-0.61) and CSB score (r=0.56-0.62), were observed. Gliadin:glutenin ratios showed significant and negative associations with dough properties and CSB quality. Correlation coefficients between gliadin:glutenin, gliadin:HMW-GS, gliadin:LMW-GS ratios, and CSB score were -0.79, -0.73, and -0.79 among non-translocation lines, respectively. HMW-GS and LMW-GS, x-type HMW-GS and y-type HMW-GS contributed similarly to dough properties and CSB quality for non-translocation lines. Weak correlations between protein fractions and dough properties, and CSB quality were observed among translocation lines. This information should be useful for improvement of dough properties and CSB quality.
Keywords: Triticum aestivum; 1B/1R translocation; Gluten protein; Quantification; Northern-style Chinese steamed bread

F. Schurer, R. Kieffer, H. Wieser, P. Koehler, Effect of hydrostatic pressure and temperature on the chemical and functional properties of wheat gluten II. Studies on the influence of additives, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 39-48, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.11.004.
(http://www.sciencedirect.com/science/article/B6WHK-4N5KXWX-1/2/586492df10858ccdb556651d5291a13b)
Abstract:
Cysteine, N-ethylmaleinimide, radical scavengers, various salts or urea were added to wheat gluten. After treatment at increasing pressure (0.1-800 MPa) and temperature (30-80 [degree

sign]C) the resulting material was analysed by micro-extension tests and an extraction/HPLC method to measure protein solubility. Furthermore, cysteine was added to isolated gliadin and glutenin prior to high-pressure treatment and protein solubility was determined. The resistance to extension of gluten strongly increased and the solubility of gliadin in aqueous ethanol decreased with increasing pressure and temperature. As compared to experiments without additive the observed effects were much stronger. Isolated gliadin turned largely insoluble in aqueous ethanol when cysteine was added prior to high-pressure treatment. The S-rich [alpha]- and [gamma]-gliadins were much more strongly affected than the S-poor [omega]-gliadins pointing to a disulphide related mechanism. Monomeric gliadin components were completely recovered after reduction of the aggregates with dithioerythritol. In contrast, samples without free thiol groups such as isolated gliadins or with SH groups, which had been blocked by N-ethylmaleinimide, were hardly affected by high-pressure treatment. The addition of radical scavengers to gluten showed no effect in comparison to the control experiment, indicating that a radical mechanism of the high-pressure effect can be excluded. The observed effects can be explained by thiol-/disulphide interchange reactions, which require the presence of free thiol groups in the sample. The addition of salts and urea showed that unfolding of the protein due to weakening of interprotein hydrogen bonds is strongest for ions with a high radius (e.g. thiocyanate). This leads to weakening of gluten at ambient pressure but it facilitates high pressure induced reactions, e.g. of disulphide bonds.
Keywords: Wheat gluten; High hydrostatic pressure; Cysteine; N-etylmaleinimide; Protein solubility; Rheological properties

M.A. Edwards, B.G. Osborne, R.J. Henry, Investigation of the effect of conditioning on the fracture of hard and soft wheat grain by the single-kernel characterization system: A comparison with roller milling, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 64-74, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.12.001.
(http://www.sciencedirect.com/science/article/B6WHK-4MV7527-1/2/351234f5f088c95c48c2721a789ace74)
Abstract:
A study has been carried out on selected hard and soft Australian wheats to determine the effect of conditioning on the crush-response profiles (CRPs) measured using the single-kernel characterization system (SKCS 4100). In addition, the fragmentation patterns that resulted from crushing in the SKCS have been compared with those that resulted from the first break stage of roller milling. It was found that the CRPs were changed significantly ($P<0.05$) as a result of conditioning. In particular, the rheological parameters shell stiffness and strength and endosperm strength all decreased following conditioning. The fragmentation patterns, assessed using low-resolution microscopy and particle size analysis, that resulted from the crushing of unconditioned wheat in the SKCS were the closest match with those that resulted from first break milling of conditioned wheat. These results show how the SKCS may be used to monitor the progress of wheat conditioning prior to milling. They also provide support for the use of SKCS measurements on unconditioned wheat for the prediction of milling performance.
Keywords: Fracture properties; Milling: SKCS; Conditioning; Wheat

Ryan Likes, Ronald L. Madl, Steven H. Zeisel, Stuart A.S. Craig, The betaine and choline content of a whole wheat flour compared to other mill streams, Journal of Cereal Science, Volume 46, Issue 1, July 2007, Pages 93-95, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.11.002.
(http://www.sciencedirect.com/science/article/B6WHK-4MSHT97-2/2/ee4e1a62150a02d9fd219ca90c4cac3d)
Keywords: Betaine; Choline; Whole Wheat; Milling

Isabel Sanchez-Alonso, Maria T. Solas, A. Javier Borderias, Technological implications of addition of wheat dietary fibre to giant squid (Dosidicus gigas) surimi gels, Journal of Food Engineering,

Volume 81, Issue 2, July 2007, Pages 404-411, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.11.015.
(http://www.sciencedirect.com/science/article/B6T8J-4MP5KGR-3/2/105801c3f4bdbe88022266e7e4647458)
Abstract:
The technological effect of wheat dietary fibre was studied in surimi gel products obtained from giant squid (Dosidicus gigas). Three and six percent wheat dietary fibre with different particle sizes was added at the same time as water to maintain similar moisture levels in all samples. Under scanning electronic microscopy (SEM), gel samples with added dietary fibre presented a regular distribution of dietary fibre: however, the dietary fibres were larger than the cells of the gel matrix, making the protein network less homogeneous. This, combined with a smaller proportion of protein, reduced the gel strength, hardness, cohesiveness and water binding capacity (WBC) of gels. Addition of wheat dietary fibre to giant squid surimi also made gels yellower and reduced their lightness. The sensory panel detected no differences in the appearance of samples, but they did detect differences in textural properties.
Keywords: Dietary fibre; Wheat dietary fibre; Surimi muscle gels; Giant squid; Dosidicus gigas; Textural properties

Tika B. Adhikari, Boovaraghan Balaji, Jill Breeden, Stephen B. Goodwin, Resistance of wheat to Mycosphaerella graminicola involves early and late peaks of gene expression, Physiological and Molecular Plant Pathology, Volume 71, Issues 1-3, July-September 2007, Pages 55-68, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2007.10.004.
(http://www.sciencedirect.com/science/article/B6WPC-4PYYTRT-3/2/811765e13b8e3f5afaf1d9a27fd3cc5d)
Abstract:
Large-scale cDNA-AFLP profiling identified numerous genes with increased expression during the resistance response of wheat to the Septoria tritici blotch fungus, Mycosphaerella graminicola. To test whether these genes were associated with resistance responses, primers were designed for the 14 that were most strongly up-regulated, and their levels of expression were measured at 12 time points from 0 to 27 days after inoculation (DAI) in two resistant and two susceptible cultivars of wheat by real-time quantitative polymerase chain reaction. None of these genes was expressed constitutively in the resistant wheat cultivars. Instead, infection of wheat by M. graminicola induced changes in expression of each gene in both resistant and susceptible cultivars over time. The four genes chitinase, phenylalanine ammonia lyase, pathogenesis-related protein PR-1, and peroxidase were induced from about 10- to 60-fold at early stages (3 h-1 DAI) during the incompatible interactions but were not expressed at later time points. Nine other genes (ATPase, brassinosteroid-6-oxidase, peptidylprolyl isomerase, peroxidase 2, 40S ribosomal protein, ADP-glucose pyrophosphorylase, putative protease inhibitor, methionine sulfoxide reductase, and an RNase S-like protein precursor) had bimodal patterns with both early (1-3 DAI) and late (12-24 DAI) peaks of expression in at least one of the resistant cultivars, but low if any induction in the two susceptible cultivars. The remaining gene (a serine carboxypeptidase) had a trimodal pattern of expression in the resistant cultivar Tadinia. These results indicate that the resistance response of wheat to M. graminicola is not completed during the first 24 h after contact with the pathogen, as thought previously, but instead can extend into the period from 18 to 24 DAI when fungal growth increases dramatically in compatible interactions. Many of these genes have a possible function in signal transduction or possibly as regulatory elements. Expression of the PR-1 gene at 12 h after inoculation was much higher in resistant compared to susceptible recombinant-inbred lines (RILs) segregating for the Stb4 and Stb8 genes for resistance. Therefore, analysis of gene expression could provide a faster method for separating resistant from susceptible lines in research programs. Significant differential expression patterns of the defense-related genes between the resistant and

susceptible wheat cultivars and RILs after inoculation with M. graminicola suggest that these genes may play a major role in the resistance mechanisms of wheat.
Keywords: Defense-related genes; Cereal; Monocot; Mycosphaerella graminicola; Pathogenesis-related genes; Real-time PCR analysis; Septoria tritici; Triticum aestivum; Wheat

Rong-Chao Ge, Gui-Ping Chen, Bao-Cun Zhao, Yin-Zhu Shen, Zhan-Jing Huang, Cloning and functional characterization of a wheat serine/threonine kinase gene (TaSTK) related to salt-resistance, Plant Science, Volume 173, Issue 1, July 2007, Pages 55-60, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.04.005.
(http://www.sciencedirect.com/science/article/B6TBH-4NHV4C2-1/2/d39e54d2a3f7a7162a4ef331b39a60cb)
Abstract:
The full-length sequence of a putative Triticum aestivum serine/threonine protein kinase gene, named TaSTK, was cloned from a salt-resistant wheat line RH8706-49 based on differential expression studies of this salt-resistant line versus a salt-sensitive line H8706-34 under salt-stress conditions using cDNA-AFLP, RACE and gene amplification methods. The cDNA length is 1958 bp, of which 1431 bp form the open reading frame encoding 476 amino acids. The genomic sequence for the coding region is 4095 bp and includes 5 exons. Bioinformatic analysis suggests that the gene locates in the 2BL and 2DL chromosome and has two copies. The cDNA and genomic sequences have been submitted to GenBank database (Accession No.: AY956328, DQ341377). Expression of the TaSTK mRNA was demonstrated with Northern hybridization to be enhanced under salt conditions, and the degree of salt related enhancement was greater in salt-resistant material RH8706-49 than that in the salt-sensitive material H8706-34. Excess expression of the TaSTK gene, in the form of a TaSTK gene-modified Arabidopsis thaliana material, was demonstrated to increase the growth of the roots in salt containing medium and improve the tolerance of the plant against salt stress.
Keywords: Salt-resistant; Wheat (Triticum aestivum L); Serine/threonine protein kinase; Rapid amplification of cDNA ends; Gene cloning

N.Z. Lupwayi, K.G. Hanson, K.N. Harker, G.W. Clayton, R.E. Blackshaw, J.T. O'Donovan, E.N. Johnson, Y. Gan, R.B. Irvine, M.A. Monreal, Soil microbial biomass, functional diversity and enzyme activity in glyphosate-resistant wheat-canola rotations under low-disturbance direct seeding and conventional tillage, Soil Biology and Biochemistry, Volume 39, Issue 7, July 2007, Pages 1418-1427, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2006.12.038.
(http://www.sciencedirect.com/science/article/B6TC7-4N3GJB5-1/2/460e169460d1a17aaab872c222978a32)
Abstract:
As glyphosate-resistant (GR) crops are becoming common in agro-ecosystems, their effects on non-target soil organisms need to be monitored. We evaluated soil microbial biomass C (MBC), bacterial functional diversity and community structure, and dehydrogenase enzyme activity in a field experiment conducted at six sites on the Canadian prairies. Treatments consisted of a factorial arrangement of three GR wheat and GR canola crop frequencies and two tillage systems. GR crop frequencies were arranged in 4-yr wheat-canola-wheat-pea rotations, with GR wheat and GR canola in zero of four, two of four, or three of four possible GR crop frequencies. The two tillage systems were either low soil-disturbance direct-seeding (LDS) or conventional tillage (CT). MBC increased with increasing frequency of GR crops in two of 20 site-years in the rhizosphere, and had no effects in bulk soil. Depending on tillage, GR crop frequency also affected the functional diversity of rhizosphere soil bacteria in only two of 20 site-years, and had no effects in bulk soil. Shifts in the structures of bacterial communities related to GR crop frequency were detected, but they were few and inconsistent. In three of 22 cases (10 in rhizosphere+12 in bulk soil), the activity of dehydrogenase enzyme decreased with increasing frequency GR crops in both

the rhizosphere and bulk soil. In five of 20 site-years, soil MBC in the rhizosphere was greater under CT than under LDS, regardless of GR crop frequency. In bulk soil, tillage affected soil MBC in five site-years, three of which had greater MBC under CT than LDS, and vice versa in the other two. Tillage affected the functional diversity of soil bacteria in the rhizosphere in three site-years, but the effects were not consistent. Similar inconsistent tillage-related patterns were observed in the community structures of bacteria. There were no tillage effects on bacterial diversity in bulk soil. Dehydrogenase enzyme activity was greater under LDS than under CT in three of four cases in which tillage had significant effects. Overall, GR crop frequency effects on soil microorganisms were minor and inconsistent over a wide range of growing conditions and crop management.
Keywords: GMO; Roundup-ready; Herbicide-resistant; Tillage; Transgenic

Huyuan Feng, Shiwen Li, Lingui Xue, Lizhe An, Xunling Wang, The interactive effects of enhanced UV-B radiation and soil drought on spring wheat, South African Journal of Botany, Volume 73, Issue 3, July 2007, Pages 429-434, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.03.008.
(http://www.sciencedirect.com/science/article/B7XN9-4NNPCT9-1/2/9905fbc8a03f7a7dbb16062309010102)
Abstract:
The combined effects of enhanced UV-B radiation and soil drought on the phenological development, photosynthetic pigments, ultraviolet absorbing compounds (e.g. flavonoids), physiological characteristics, biomass and yields of spring wheat (Triticum aestivum L.) under arid and semiarid field conditions were investigated in this study. The enhanced UV-BBE radiation was 4.25 kJ m2 day- 1, which simulated 20% stratospheric ozone depletion on clear summer solstice (Lanzhou, 1550 m above sea level, China). Soil moisture was maintained at 20% (control groups) and 15% (drought stress groups) by water-irrigation periodically. Phenology was delayed by increased UV-B radiation and the combination of UV-B and drought. In contrast, it was prompted by drought as compared with control in all cultivars. In UV-B- or drought-treated plants, pigments contents (chlorophyll a and b), leaf relative water content and water potential were reduced, However, lipid peroxidation products (MDA) and membrane permeability (relative electronic conductance) increased, and UV-B absorbing compounds (e.g. flavonoids) were induced by UV-B or water stress. Enhanced UV-B radiation or drought could decrease the net photosynthetic capacity through different paths, and led to the reduction of root, stem and leaves biomass and yield, as well as changed biomass and the harvest index. The plant growth, photosynthetic capacities, pigment contents, biomass and yield were reduced by the combination of two stresses in comparison with single stresses. The results suggested that co-stresses of supplementary UV-B radiation and drought Synergistically functioned and one of them could alleviate the inhibitory effects of another under the condition of arid and semiarid loessial soils. In addition, the earlier-ripped cultivar was better than middle or later-matured cultivars in response to the stress.
Keywords: Drought; Growth; Physiological properties; Triticum aestivum; Ultraviolet-B radiation

S. Dmitrieva, F. Minibayeva, A. Ponomareva, L. Gordon, Cell proliferation and ultrastructure in the roots of young wheat seedlings induced by oxidative stress, South African Journal of Botany, Volume 73, Issue 3, July 2007, Page 499, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.04.043.
(http://www.sciencedirect.com/science/article/B7XN9-4NY4S0K-1F/2/2f7e48b353f8d69d76c70ad4e4182f31)

Jiang Zhou, Jim Song, Roger Parker, Microwave-assisted moulding using expandable extruded pellets from wheat flours and starch, Carbohydrate Polymers, Volume 69, Issue 3, 25 June 2007, Pages 445-454, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.01.001.
(http://www.sciencedirect.com/science/article/B6TFD-4MV753F-1/2/68d17bc98892bc7bbf8b873a7939b82c)
Abstract:

Extruded pellets made from wheat flour and purified wheat starch were expanded by applying microwave heating within moulds, a method known as microwave-assisted moulding (MAM). Selection of adequate mould material, pre-treatment of pellets and control of the initial loading of pellets in the mould cavity were found to be the key issues to achieve a uniformly foamed block with good integrity. Polytetrafluoroethylene (PTFE) was found to be an appropriate mould material for the MAM process. The bonding between foamed pellets in a block can be significantly enhanced by soaking the pellets in a NaCl solution before microwave foaming. There exists an optimum initial loading of pellets in the mould for a given pellet formulation, which allows sufficient expansion to achieve an acceptable extent of interfacial bonding and mould filling. The work demonstrated the feasibility of moulding starch block foams and potential applications of the foams in packaging and lightweight composites.
Keywords: Microwave heating; Moulding; Wheat; Starch; Foams; Blocks; Expandable; Extruded pellets; Fusion and bonding

J. Hiltbrunner, B. Streit, M. Liedgens, Are seeding densities an opportunity to increase grain yield of winter wheat in a living mulch of white clover?, Field Crops Research, Volume 102, Issue 3, 20 June 2007, Pages 163-171, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.03.009.
(http://www.sciencedirect.com/science/article/B6T6M-4NJX46G-1/2/f6cab8a4ef9394a50b9db52ff0c2a677)
Abstract:
Optimum plant densities are a key to maximise yields in most crops. However, such information is often lacking for more environmentally sound cropping systems, such as living mulches (LM) for small grains. In 2004 and 2005, three trials were conducted in the Swiss Midlands on fields managed in accordance with the Swiss organic farming guidelines. The objective of the study was to determine whether seeding density of winter wheat (Triticum aestivum L.) is a relevant factor for determining grain yield in a white clover (Trifolium repens L.) living mulch. The winter wheat cv. Titlis was directly sown in wide spaced rows (0.375 m) at densities of 300 (LM300), 450 (LM450) or 600 (LM600) viable grains m-2 in a white clover living mulch established at a seeding rate of 15 kg ha-1. A bare soil control treatment with a wheat density of 450 viable grains m-2 (BS450) was also included in the trials. Mean grain yields of LM300, LM450, and LM600 never reached the values observed in BS450. This was mainly due to a lower ear density, which, nevertheless, increased linearly with the seeding density within the living mulch in all trials, but the rate of increase depended on the environment. The decrease of the grain weight brought about by the increasing seeding density had only a marginal impact on the grain yield, which was increased from 1.31, 1.98, and 4.09 Mg ha-1 (LM300) to 1.97, 2.64, and 4.75 Mg ha-1 (LM600) for each of the three trials in the study. Significantly higher protein contents were observed for LM300 compared to the higher densities in the living mulch and to BS450. Our research showed that an increase of the seeding density is an effective mean to increase the grain yield in living mulch systems with white clover. However, it is likely that the control of the living mulch to reduce competition with the main crop is a more relevant factor.
Keywords: Winter wheat; Triticum aestivum L.; White clover; Trifolium repens L.; Living mulch; Yield components; Organic farming

B. Rinkevich, Separating the wheat from the chaff: The interplay of science and environmental management decision through a critical examination of the literature, Journal of Experimental Marine Biology and Ecology, Volume 344, Issue 2, 15 June 2007, Pages 229-237, ISSN 0022-0981, DOI: 10.1016/j.jembe.2006.12.006.
(http://www.sciencedirect.com/science/article/B6T8F-4N74JDC-1/2/96c3fc098aefab94032bb84e4330aa62)

Muhammad Arfan, Habib R. Athar, Muhammad Ashraf, Does exogenous application of salicylic acid through the rooting medium modulate growth and photosynthetic capacity in two differently adapted spring wheat cultivars under salt stress?, Journal of Plant Physiology, Volume 164, Issue 6, 4 June 2007, Pages 685-694, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.05.010.
(http://www.sciencedirect.com/science/article/B7GJ7-4KJ74NK-3/2/a9275d02b5bd157a452e22311cf2407e)
Abstract: Summary
In order to assess whether exogenous application of salicylic acid (SA) through the rooting medium could modulate the photosynthetic capacity of two wheat cultivars differing in salinity tolerance, a hydroponic experiment was conducted under greenhouse conditions. Seeds of a salt tolerant (S-24) and a moderately salt sensitive (MH-97) cultivar were germinated at 0 or 150 mM NaCl in Hoagland's nutrient solution containing different levels of salicylic acid (SA) (0, 0.25, 0.50, 0.75 and 1.00 mM) for 7 d. Seven-day old wheat seedlings were transferred to hydroponics and grown at 0, or 150 mM NaCl for for further 30 d. Different levels of salicylic acid (SA) were also maintained in the solution culture. After 30 d, four plants out of six were harvested and the remaining plants were left for the estimation of yield attributes Salt stress reduced the growth and grain yield of both cultivars. However, cv. S-24 performed better than MH-97 under salt stress with respect to leaf area, and grain yield. Exogenous application of SA promoted growth and yield, and counteracted the salt stress-induced growth inhibition of salt tolerant S-24, whereas for MH-97 there was no improvement in growth or grain yield with SA application. Of the varying SA levels used, the most effective levels for promoting growth and grain yield were 0.75 and 0.25 mM under normal and saline conditions, respectively. The improvement in growth and grain yield of S-24 due to SA application was associated with improved photosynthetic capacity. Changes in photosynthetic rate due to SA application were not due to stomatal limitations, but were associated with metabolic factors, other than photosynthetic pigments and leaf carotenoids.
Keywords: Carotenoids; Hydroponics; Photosynthesis; Photosynthetic pigments; Salinity stress; Yield

Zhi-Qiang Wang, Yong-Ze Yuan, Ji-Quan Ou, Qing-Hua Lin, Chu-Fu Zhang, Glutamine synthetase and glutamate dehydrogenase contribute differentially to proline accumulation in leaves of wheat (Triticum aestivum) seedlings exposed to different salinity, Journal of Plant Physiology, Volume 164, Issue 6, 4 June 2007, Pages 695-701, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.05.001.
(http://www.sciencedirect.com/science/article/B7GJ7-4K606BN-2/2/57b2a6c7b37d358d54408b3f349c7ad4)
Abstract: Summary
To investigate the roles of ammonium-assimilating enzymes in proline synthesis under salinity stress, the activities of glutamine synthetase (GS; EC 6.3.1.2) and NADH-dependent glutamate dehydrogenase (NADH-GDH; EC 1.4.1.2) were determined in leaves of wheat (Triticum aestivum) seedlings exposed to salt stress at 150 and 300 mM NaCl for 5 d. At the lower salinity, only GS activity increased markedly. At 300 mM NaCl, however, NADH-GDH activity increased while GS activity decreased. A significant accumulation of proline was found only at high-salinity exposure while glutamate, a proline precursor, increased dramatically under both low and high salinity. These data suggests that GS-catalysis might be the main glutamate synthesis pathway under low salinity. At 300 mM NaCl, glutamate seems to be preferentially produced through the process catalyzed by NADH-GDH. The increase of ammonium in salinity-stressed wheat seedlings might have resulted from increased photorespiration, which is responsible for the higher NADH-GDH activity. The activity of [Delta]1-pyrroline-5-carboxylate reductase (P5CR; EC 1.5.1.2) was significantly enhanced at 300 mM NaCl but remained unchanged at 150 mM. [Delta]1-Pyrroline-5-carboxylate synthetase (P5CS) activity did not show a specific response, indicating that P5CR might be the limiting step in proline synthesis from glutamate at high salinity.
Keywords: Glutamate dehydrogenase; Glutamine synthetase; Proline; Salinity; Wheat

Can-xing DUAN, Xiao-ming WANG, Zhen-dong ZHU, Xiao-fei WU, Testing of Seedborne Fungi in Wheat Germplasm Conserved in the National Crop Genebank of China, Agricultural Sciences in China, Volume 6, Issue 6, June 2007, Pages 682-687, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60100-X.
(http://www.sciencedirect.com/science/article/B82XG-4P48RF7-7/2/e48013df15fd5054e3ca38904bbb0e10)
Abstract: Abstract
There is a primary understanding of the dominant fungi in wheat seeds conserved in the National Crop Genebank of China (NCGB) and an evaluation of the healthy status of wheat germplasm propagated in different regions. A total of 1465 wheat accessions were detected for seedbone fungi by blotter, agar plate, and wash tests. By blotter test, 17 genera of fungi, including more than 30 species, were detected in 712 wheat accessions from Shaanxi, Hebei, and Qinghai provinces, China. Alternaria was the most frequently detected in wheat seeds from Shaanxi Province, followed by Rhizopus, Penicillium, Aspergillus, Bipolaris, Cladosporium, Gonatobotrys, Chaetomium, and others. Seedborne fungi in wheat seeds from Hebei Province, with relatively high incidence were Alternaria, Rhizopus, Penicillium, Aspergillus, Bipolaris, Cladosporium, and Fusarium. In the seeds from Qinghai Province, Alternaria, Rhizopus, Bipolaris, Cladosporium, and Trichothecium are important seed-borne fungi. The seed germination was reduced substantially when seeds were infected by Fusarium verticillioides (syn. F. moniliforme), Bipolaris nodulosa, and Cladosporium herbarum. Eighteen genera and 25 species of fungi were identified in 353 accessions from Shaanxi Province using the agar plate test. The dominant fungi were Alternaria, Aspergillus, Bipolaris, Gonatobotrys, Penicillium, and Fusarium. The smut fungi, Ustilago tritici, was detected by the wash test in 400 accessions, but it was low in incidence in 300 seed samples from Shaanxi Province (1.3%), and in 100 samples from Hebei Province (2.0%). Totally 19 genera of fungi were detected in wheat seed samples, and some seedborne fungi were saprophytic and others were biotrophic which could cause seedborne diseases in the field.
Keywords: wheat germplasm; seedborne fungi; seed health; detection

Monireh Cheniany, Hassan Ebrahimzadeh, Azam Salimi, Vahid Niknam, Isozyme variation in some populations of wild diploid wheats in Iran, Biochemical Systematics and Ecology, Volume 35, Issue 6, June 2007, Pages 363-371, ISSN 0305-1978, DOI: 10.1016/j.bse.2006.12.006.
(http://www.sciencedirect.com/science/article/B6T4R-4MV1H79-2/2/0138ba4c12d953e1e408be8f204dadfb)
Abstract:
Isozyme electrophoresis data of seed extracts from 11 populations of diploid wheat species (Triticum boeoticum Bioss. and Triticum urartu Thumanian ex Gandilyan), distributed mainly in the western and west-northern Iran, were investigated. The five enzyme systems used were peroxidase, polyphenol oxidase, superoxide dismutase, malate dehydrogenase and catalase. The first three were found to be useful as molecular marker for characterization of diploid wheat populations. A total of 13 bands from three enzyme systems were recorded. The value of a `Jaccard's' similarity coefficient ranges from 0.333 to 1.000. Data analysis was done using clustering method UPGMA. On the basis of Jaccard's coefficient, the obtained dendrogram supports previous relationship between T. boeoticum and T. urartu as separate species as well as reflecting their distinct gene pools and substantiating their specific recognition despite the overall morphological similarity.
Keywords: Diploid wheat; Isozyme variation; Genetic relationships; Triticum

Prabal K. Ghosh, Digvir S. Jayas, Marco L.H. Gruwel, Noel D.G. White, A magnetic resonance imaging study of wheat drying kinetics, Biosystems Engineering, Volume 97, Issue 2, June 2007, Pages 189-199, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.03.002.

(http://www.sciencedirect.com/science/article/B6WXV-4NM5XTW-2/2/2a94aef64845c21f997026b08ab4d82e)
Abstract:
A spin-echo (SE) magnetic resonance imaging (MRI) technique was used to study non-invasively moisture levels as a function of time in single wheat kernels. Internal moisture distribution during drying of wheat at temperatures of 30, 40, and 50 [degree sign]C for 4 h was analysed from the MR images. The influence of the individual wheat components on the drying process was observed using physically different wheat kernels: intact kernels, mechanically scarified kernels with incisions in the pericarp, and kernels with the embryo removed. Drying rate curves for these different kernels were obtained at three different temperatures and the effects of temperature on the drying curves were discussed. A calibration curve of MR image intensity versus the moisture content of the grain was obtained using nuclear magnetic resonance (NMR) spectra of wheat at different, known, moisture contents. Results obtained from this study provided details of the drying kinetics in wheat kernels.

Cristina Bilbao-Sainz, Michael Butler, Tony Weaver, Julian Bent, Wheat starch gelatinization under microwave irradiation and conduction heating, Carbohydrate Polymers, Volume 69, Issue 2, 1 June 2007, Pages 224-232, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.09.026.
(http://www.sciencedirect.com/science/article/B6TFD-4MG6P93-1/2/0988e7888930fec95f12e0a551f59953)
Abstract:
Wheat starch-water dispersions at excess water conditions were heated under mixing to different temperatures by either microwave energy at 2000 W or by conduction heating in order to compare both heating methods.
The effects of microwaves and conduction heating on starch gelatinization were evaluated using different techniques; It was possible to obtain the same viscosity for both heating methods but the required time was much shorter for microwaves heated starch dispersions. No unique structures due to the heating method were observed under the microscope. At the beginning of the heating process an increase in the mobility of the starch protons occurred, slightly higher for microwaves heated samples. Likewise, DSC experiments revealed an increase in the enthalpy for short times microwave heated samples. The heating method caused no differences in the mechanism of gelatinization; nevertheless the crystallinity disappeared at a higher rate when heated with microwaves.
Keywords: Starch; Microwave heating; Conduction heating; Gelatinization; Dielectric properties; Differential scanning calorimetry; X-ray; Nuclear magnetic resonance; Transmission electron microscopy

A.K. Sharma, K.S. Babu, R.K. Sharma, Kamlesh Kumar, Effect of tillage practices on Tilletia indica Mitra (Karnal bunt disease of wheat) in a rice-wheat rotation of the Indo-Gangetic Plains, Crop Protection, Volume 26, Issue 6, June 2007, Pages 818-821, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.07.007.
(http://www.sciencedirect.com/science/article/B6T5T-4M3BC00-1/2/18d9dcb375df1c91402c928411a179d4)
Abstract:
A study was conducted to evaluate the influence of tillage systems on the incidence of Tilletia indica (Karnal bunt) in a rice-wheat system that is the most popular and prevalent crop rotation in the Indo-Gangetic Plains of India. A total of 906 samples, were drawn from the farmers' fields during the month of April during the 3 years study period. The samples collected were 365, 171, and 370 from the zero tillage (ZT), furrow irrigated raise bed system (FIRBS), and conventional till (CT) sown fields, respectively. The disease incidence, incidence index and percent-infected samples were calculated and statistically analyzed. Results showed that ZT fields had the lowest

mean incidence of Karnal bunt, i.e. 9.00% infected samples in comparison to 18.10% and 16.20% under FIRBS and CT, respectively. Similarly, the average infection in infected samples was equal in FIRBS and CT, but the samples from ZT were statistically lower. KB incidence index showed a similar trend. ZT has shown a reduced incidence of KB in comparison to the raised bed (FIRBS) and CT systems. If ZT is followed for a period of a few years, it may help in reducing the effective soil inoculum and reducing the disease incidence over time.

Livia Simon-Sarkadi, Gabor Kocsy, Zoltan Sebestyen, Gabor Galiba, Deletions of chromosome 5A affect free amino acid and polyamine levels in wheat subjected to salt stress, Environmental and Experimental Botany, Volume 60, Issue 2, June 2007, Pages 193-201, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.10.002.
(http://www.sciencedirect.com/science/article/B6T66-4MBBYWH-1/2/dc158d40fd3bf73dae032827141335ad)
Abstract:
Several genes affecting abiotic stress tolerance are located on chromosome 5A of wheat. The objective of this study was to determine the regions of the 5A chromosome, which control the salt tolerance and accumulation of free amino acids and polyamines. For this purpose, three deletion lines, 5AL-20, 5AL-8, 5AL-10, lacking increasingly large sections of chromosome 5A from the moderately salt-tolerant Triticum aestivum cv. Chinese Spring (CS) were compared. Treatment with NaCl resulted in a significantly greater decrease in fresh weight in the deletion lines than in CS. The amino acid composition was affected by both salt treatment and chromosome deletions. Among the most abundant amino acids, the relative amount of Gaba was greater in CS, while that of glutamate was greater in the deletion lines under control conditions. This difference was also observed after salt stress in the case of glutamate. Consequently, the absolute amount of glutamate was also higher in the deletion lines than in CS under both control and stress conditions. Chromosome deletions also affected the arginine, proline, valine and lysine levels. Following 100 mM NaCl treatment the putrescine and spermidine contents were lower in the deletion lines compared to the CS, while 200 mM NaCl resulted in higher putrescine content. Chromosome regions affecting amino acid and polyamine levels could be determined in the present genetic system. The distal part of the chromosome 5A may be involved in the control of salt tolerance through the regulation of Glu levels.
Keywords: Arginine; Genetic analysis; Glutamate; Putrescine; Salt stress tolerance; Spermidine; Triticum aestivum

Renu Khanna-Chopra, Devarshi S. Selote, Acclimation to drought stress generates oxidative stress tolerance in drought-resistant than -susceptible wheat cultivar under field conditions, Environmental and Experimental Botany, Volume 60, Issue 2, June 2007, Pages 276-283, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.11.004.
(http://www.sciencedirect.com/science/article/B6T66-4MNHY3H-1/2/a6da63236558282cfb38c85f173b1b58)
Abstract:
Wheat crop may experience water deficit cycles during their life cycle, which induces oxidative stress. Present study was conducted to evaluate the role of oxidative stress management in the leaves of two wheat (Triticum aestivum L.) cultivars, C306 (drought-resistant) and Moti (drought-susceptible), when subjected directly to severe water stress (non-acclimated) or to water stress cycles of increasing intensity with an intermittent rewatering (drought-acclimation). Mild water stress during vegetative growth enabled C306 to acclimatize better than Moti during subsequent water stress of severe nature during post-anthesis period. The drought-acclimated C306 leaves maintained favourable water relations and lower membrane injury due to low H_2O_2 accumulation than non-acclimated C306 plants during severe water stress. This is due to systematic increase in the activity of H_2O_2 scavenging enzymes particularly APX and POX and maintenance of

ascorbate and glutathione redox pool by efficient functioning of GR enzyme in the drought-acclimated C306 plants. In contrast, both acclimated as well as non-acclimated Moti plants exhibited loss in turgor potential, high H2O2 levels and poor antioxidant enzyme response leading to enhanced membrane damage during severe water stress conditions. Hence, present study shows that genotypic differences in drought tolerance could be, at least in part, attributed to the ability of wheat plants to acclimate and induce antioxidant defense under water deficit conditions.
Keywords: Antioxidant defense; Water stress; Oxidative stress; Triticum aestivum

Philippe Chabot, Paul A. Dorosh, Wheat markets, food aid and food security in Afghanistan, Food Policy, Volume 32, Issue 3, June 2007, Pages 334-353, ISSN 0306-9192, DOI: 10.1016/j.foodpol.2006.07.002.
(http://www.sciencedirect.com/science/article/B6VCB-4M04JDY-1/2/ee0af21204ebd225b152d62211dedd2c)
Abstract:
In Afghanistan, after two decades of civil strife and successive droughts from 1998 to 2002, large inflows of food aid, distributed mainly to returning refugees and through food for work programs, have helped offset production shortfalls of wheat, the country's major staple. At the same time, private international trade from neighboring countries, especially Pakistan, has also played a major role in augmenting wheat supply and stabilizing prices.
This paper presents an analysis of wheat prices and market flows in Afghanistan based on results of surveys of wheat traders and millers, and econometric analysis of price movements in major markets in Afghanistan and Pakistan. In spite of food aid imports, domestic prices were not lowered below import parity levels in most major Afghan markets. Thus, the price evidence suggests that large-scale inflows of food aid, which benefited the country by providing resources for targeted food for work and other programs, did not have major price disincentive effects on domestic production, at least through mid-2003. However, following the 2003 bumper harvest, the analysis suggests that continued food aid inflows may have depressed producer prices by as much as about 15%. Moreover, given substantial prospects for rehabilitation of irrigation infrastructure, there is ample scope for increasing domestic production of wheat and decreasing import demand, so price disincentive effects of food aid remain a possibility in the future, as well.
Keywords: Food security; Food aid; Afghanistan; Agricultural markets

P. Prabhasankar, Jyotsna Rajiv, D. Indrani, G. Venkateswara Rao, Influence of whey protein concentrate, additives, their combinations on the quality and microstructure of vermicelli made from Indian T. Durum wheat variety, Journal of Food Engineering, Volume 80, Issue 4, June 2007, Pages 1239-1245, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.09.013.
(http://www.sciencedirect.com/science/article/B6T8J-4M7K9H8-7/2/97648b588f3fb4e10a3ee811feef68eb)
Abstract:
Effect of whey protein concentrate (5%, 7.5%, 10%) and additives on the quality of vermicelli made from Indian durum wheat was studied. The results revealed that with increase in whey protein concentrate (WPC) from 0% to 10%, cooked vermicelli weight increased from 82.5 to 88 g/25 g, cooking loss increased from 6.0 to 8.4%, L values indicating lightness increased (47.42-52.9); b values indicating yellowness decreased (7.0-3.80) and shear force decreased (66-45 g). Sensory evaluation of vermicelli with 5%, 7.5%, 10% WPC showed that addition of above 5% WPC resulted in whitish colour vermicelli with mashy strand quality and sticky mouthfeel. Studies on the effect of additives namely ascorbic acid (0.01% and 0.015%), gluten (1.5% and 3.0%) and glycerol monostearate (GMS) (0.25% and 0.5%) individually as well as in combination on the quality of vermicelli with 5% WPC indicated that combination of 0.01% ascorbic acid, 3% gluten and 0.5% GMS resulted in vermicelli having lower cooking loss, creamy yellow colour, firm, discrete strands and non-sticky mouthfeel. The protein content of vermicelli with 5% WPC and combination of

additives was 16% as against 11.5% of control vermicelli. Scanning electron microscopy study of control vermicelli, vermicelli with 5% WPC and vermicelli with 5% WPC and combination of additives revealed that vermicelli with 5% WPC showed a rough surface with a prominent rupture while vermicelli with 5% WPC and combination of additives showed a continuous, rupture free structure.
Keywords: Durum wheat; Whey protein concentrate; Vermicelli; SEM; Texture

Salim-ur Rehman, Alistair Paterson, John R. Piggott, Chapatti quality from British wheat cultivar flours, LWT - Food Science and Technology, Volume 40, Issue 5, June 2007, Pages 775-784, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.04.009.
(http://www.sciencedirect.com/science/article/B6WMV-4K7WV04-1/2/4314dcfea95f768f255022e03a8a6cc2)
Abstract:
The aim was to study wheat flour parameters relevant to suitability for production of chapattis, made from British wheat cultivars. Wholemeal flours from eight British cultivars grown in UK differed in physicochemical and rheological properties, and were less suited to chapatti production than Mehrani, commercial wholemeal chapatti flour. Chapatti quality of Mehrani wholemeal flour was rated as excellent, hence this was used as a benchmark. Flours from cultivars Riband and Galahad gave weak dough whereas those from Fresco and Mercia yielded dough high in resistance to sheeting that contracted after rolling. Dough from Avalon, Hereward and Pastiche had moderate resistance to sheeting properties. Changes in softness of chapatti during storage were evaluated using an Instron testing machine. Evaluation by sensory panel indicated that all cultivars produced chapattis that were fair to good in sensory characteristics. Some correlations were found between sensory and instrumental attributes of chapatti.
Keywords: Rheological; Physico-chemical; Sensory; Softness; Chapatti; Storage

Tibor Janda, Gabriella Szalai, Kornelia Lesko, Rusina Yordanova, Simona Apostol, Losanka Petrova Popova, Factors contributing to enhanced freezing tolerance in wheat during frost hardening in the light, Phytochemistry, Volume 68, Issue 12, June 2007, Pages 1674-1682, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.04.012.
(http://www.sciencedirect.com/science/article/B6TH7-4NVCG0G-1/2/adf38bd11493d73589a1de25af0de8d3)
Abstract:
The interaction between light and temperature during the development of freezing tolerance was studied in winter wheat (Triticum aestivum L. var. Mv Emese). Ten-day-old plants were cold hardened at 5 [degree sign]C for 12 days under normal (250 [mu]mol m-2 s-1) or low light (20 [mu]mol m-2 s-1) conditions. Some of the plants were kept at 20/18 [degree sign]C for 12 days at high light intensity (500 [mu]mol m-2 s-1), which also increased the freezing tolerance of winter wheat. The freezing survival rate, the lipid composition, the antioxidant activity, and the salicylic acid content were investigated during frost hardening. The saturation level of hexadecanoic acid decreased not only in plants hardened at low temperature, but also, to a lesser extent, in plants kept under high light irradiation at normal growth temperature. The greatest induction of the enzymes glutathione reductase (EC 1.6.4.2.) and ascorbate peroxidase (EC 1.11.1.11.) occurred when the cold treatment was carried out in normal light, but high light intensity at normal, non-hardening temperature also increased the activity of these enzymes. The catalase (EC 1.11.1.6.) activity was also higher in plants grown at high light intensity than in the controls. The greatest level of induction in the activity of the guaiacol peroxidase (EC 1.11.1.7.) enzyme occurred under cold conditions with low light. The bound ortho-hydroxy-cinnamic acid increased by up to two orders of magnitude in plants that were cold hardened in normal light. Both high light intensity and low temperature hardening caused an increase in the free and bound salicylic acid content of the leaves. This increase was most pronounced in plants that were cold treated in normal light.

Keywords: Triticum aestivum L.; Antioxidant enzymes; Fatty acid composition; Frost tolerance; Salicylic acid

Giselle Martinez-Noel, Vinay J. Nagaraj, Gonzalo Calo, Andres Wiemken, Horacio G. Pontis, Sucrose regulated expression of a Ca2+-dependent protein kinase (TaCDPK1) gene in excised leaves of wheat, Plant Physiology and Biochemistry, Volume 45, Issues 6-7, June-July 2007, Pages 410-419, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2007.03.004.
(http://www.sciencedirect.com/science/article/B6VRD-4N7RXYT-1/2/47025e8730b3013338c1a77a00673042)
Abstract:
Sucrose (Suc) can influence the expression of a large number of genes and thereby regulates many metabolic and developmental processes. However, the Suc sensing and the components of the ensuing signaling transduction pathway leading to the regulation of gene expression are not fully understood. We have shown that protein kinases and phosphatases are involved in the Suc induced expression of fructosyltransferase (FT) genes and fructan accumulation by an hexokinase independent pathway in wheat (Triticum aestivum). In the present study, using an RT-PCR based strategy, we have cloned a calcium-dependent protein kinase (TaCDPK1) cDNA that is upregulated during Suc treatment of excised wheat leaves. The deduced amino-acid sequence of CDPK1 has high sequence similarity (>70%) to known CDPKs from both monocots and dicots. Based on sequence homology, TaCDPK1 sequence shows a variable domain preceding a catalytic domain, an autoinhibitory function domain, and a C-terminal calmodulin-domain containing 4 EF-hand calcium-binding motifs, along with a N-myristoylation motif in the N-terminal variable domain. The recombinant Escherichia coli expressed TaCDPK1 was able to phosphorylate histone III-S in a calcium dependent manner in in vitro assays. The TaCDPK1 gene expression, as determined by quantitative RT-PCR, is induced by Suc and this effect is repressed by the inhibitors of the putative components of the Suc signal transduction pathway (calcium, Ser/Thr protein kinases and protein phosphatases). We propose that TaCDPK1 is involved in the Suc induced signaling pathway in wheat leaves.
Keywords: Calcium-dependent protein kinase; Fructan; Sugar signaling; Triticum aestivum

Shaoming Tong, Zhongfu Ni, Huiru Peng, Guoqing Dong, Qixin Sun, Ectopic overexpression of wheat TaSrg6 gene confers water stress tolerance in Arabidopsis, Plant Science, Volume 172, Issue 6, June 2007, Pages 1079-1086, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.03.011.
(http://www.sciencedirect.com/science/article/B6TBH-4NCSGH4-1/2/1eca0a115ecb639f080ab89c1b5d4c56)
Abstract:
Transcriptional regulation plays a key role in plant response to abiotic stresses. Study in barley indicated that a stress-responsive gene (Srg6), as potential transcriptional regulator, was induced by various abiotic stresses. However, functional roles of Srg proteins in stress tolerance are unknown. In this study, we isolated a wheat homolog of barley Srg6 gene, and designated TaSrg6. Expression analysis indicated that expression of TaSrg6 gene is induced by various stress treatments, including PEG, salt, low temperature and ABA. The fusion protein GFP-TaSrg6 was concentrated in the nucleus when transiently expressed in onion epidermal cells. Overexpression of TaSrg6 gene in Arabidopsis conferred water stress tolerance in terms of survival rate, CMS value and relative water loss. We concluded that TaSrg6 protein played an important role in the enhancement of water stress tolerance in plants.
Keywords: Arabidopsis; Water stress; Overexpression; Stress-responsive gene; TaSrg6; Wheat

Dirk B. Hays, Jung Hwa Do, Richard E. Mason, Gaylon Morgan, Scott A. Finlayson, Heat stress induced ethylene production in developing wheat grains induces kernel abortion and increased

maturation in a susceptible cultivar, Plant Science, Volume 172, Issue 6, June 2007, Pages 1113-1123, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.03.004.
(http://www.sciencedirect.com/science/article/B6TBH-4N8BMT2-2/2/70d116cb730e32ec6f365590aaad5447)
Abstract:
In this work we present evidence that the heat stress induced kernel abortion and suppression of grain maturation in a representative heat susceptible hard red winter wheat (Triticum aestivum L.) cultivar is regulated by heat stress induced ethylene production. Exposure to heat stress (38 [degree sign]C) during early kernel development (10 DAP) resulted in a 6-fold increase in ethylene production in developing kernels of the heat susceptible hard red winter wheat cultivar `Karl 92'. A similar 7-fold increase in ethylene production in embryos and 12-fold increase in ethylene production in the flag leaf of heat stressed plants of `Karl 92' was also found. In contrast, no change in ethylene production was observed in the heat tolerant hard white spring wheat cultivar `Halberd'. In an effort to link the heat stress induced ethylene production to the observed increase in kernel abortion and reduced kernel weight in the heat susceptible `Karl 92', plants were treated with the ethylene receptor inhibitor 1-methylcyclopropane (1-MCP) prior to exposure to heat stress. Inhibiting ethylene perception in the heat susceptible `Karl 92' in this manner blocked heat stress induced kernel abortion and reduction in kernel weight and demonstrated a clear link between ethylene in regulating susceptibility to heat stress or perception of high temperatures as a timing signal for transitioning to developmental arrest and senescence in certain wheat genotype classes.
Keywords: Wheat; Triticum aestivum; Heat stress; Seed; Ethylene

Carmine Crecchio, Maddalena Curci, Antonella Pellegrino, Patrizia Ricciuti, Nunzia Tursi, Pacifico Ruggiero, Soil microbial dynamics and genetic diversity in soil under monoculture wheat grown in different long-term management systems, Soil Biology and Biochemistry, Volume 39, Issue 6, Organic Wastes in Soils: Biochemical and Environmental Aspects - Biochemical and Environmental Aspects, Second General Annual Conference of European Geosciences Union, Soil System Sciences Division, Session SSS12, Recycling of Organic Wastes in Soils: Biochemical and Environmental Issues, June 2007, Pages 1391-1400, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2006.12.016.
(http://www.sciencedirect.com/science/article/B6TC7-4MNHVDH-H/2/ddb4e03fddd06a4d248dcedfe0aac58b)
Abstract:
Organic matter incorporation into soil can increase nutrient availability to plants but it can affect soil microbial communities. These in turn influence soil fertility and plant growth. Soil biochemical and microbiological properties are indicators of soil quality, but there is still no consensus as to how these should be used. Recent developments in molecular biology have provided new tools to obtain a view of the whole microbial community. The long-term impact of crop residue management on the microbial biomass, and on the activity and community structure of soil bacteria was evaluated in a clay soil of Southern Italy, where a monoculture of durum wheat (Triticum durum Desf.) was grown in semiarid conditions, and burning or incorporation of post harvest plant residues were typical practices. The role of N-mineral fertilization, simultaneously with the ploughing in of crop residues and during the plant growth cycle was also investigated. Total bacterial counts of viable cells, biomass C, ATP content of soil microorganisms, genetic fingerprinting of the total eubacterial community and of ammonia oxidizers were evaluated. Burning and incorporation did not affect microbial biomass C, ATP content, and total bacterial counts of viable cells although statistically relevant changes were detected among rhizosphere and bulk soil samples regardless of the crop residue management used. Molecular fingerprinting confirmed that: no significant change in the composition and diversity of total bacteria, as well as of ammonia oxidizers was induced by the crop residue managements; that soil bacteria were more

sensitive to N fertilizer application during the plant growth cycle; and that rhizosphere soil samples were significantly different from those of the bulk soil. As microbiological and genetic factors related to soil fertility were not affected significantly, the long-term incorporation of crop residues, under the field conditions investigated, is a sustainable practice to manage post-harvest residues.
Keywords: Crop residue management; Microbial community; ATP; Biomass; Genetic fingerprinting

M.J. Bahrani, M.H. Raufat, H. Ghadiri, Influence of wheat residue management on irrigated corn grain production in a reduced tillage system, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 305-309, ISSN 0167-1987, DOI: 10.1016/j.still.2006.08.004.
(http://www.sciencedirect.com/science/article/B6TC6-4KXWJKX-1/2/a35a23ab31d7c24d6d3d1793781d75d7)
Abstract:
Management of wheat (Triticum aestivum L.) residues for corn (Zea mays L.) planting is an important issue in southern parts of Iran where these two irrigated crops are consecutively grown. Concerns have been raised in recent years over the burning of the crop residues by farmers in these areas. A 2-year (2001-2002) field experiment was conducted as a randomized complete block design with three replications. The treatments consisted of irrigated corn planted, after burning wheat residues followed by conventional tillage (CT), after residue removal followed by CT, after soil incorporation of 0, 25, 50, 75, and 100% of residue followed by chisel plow, disk harrow, and row crop planter equipped with row cleaner. The CT operations consisted of mollboard plowing followed by two times disk harrowing. Treatments had significant effects on corn grain yield, biological yield, and leaf area index. The highest grain yield (15.73 t ha-1) and grains per ear (709.3) were obtained when 25-50% of wheat residues were soil incorporated and the seeds were sown with planter equipped with row cleaner in both years as compared with conventional tillage practices. It is recommended that complete residue removal or burning should be avoided; hence for successful corn production after wheat, residue management techniques that reduce residue level in the row area should be implemented.
Keywords: Residue management; Soil conservation; Corn planting; Row cleaner

Yu-Chun Qi, Yun-She Dong, Ji-Yuan Liu, Manfred Domroes, Yuan-Bo Geng, Li-Xin Liu, Xing-Ren Liu, Xiao-hong Yang, Effect of the conversion of grassland to spring wheat field on the CO2 emission characteristics in Inner Mongolia, China, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 310-320, ISSN 0167-1987, DOI: 10.1016/j.still.2006.08.008.
(http://www.sciencedirect.com/science/article/B6TC6-4M0BH8B-2/2/840e2cb20cd9ad925c38738cf822bde5)
Abstract:
Chinese grasslands have undergone great changes in land use in recent decades. Approximately 18.2% of the present arable land in China originated from the cultivation of grassland, but its impact on the carbon cycle has not been fully understood. This study was conducted in situ for 3 years to assess the comprehensive effects of cultivation of temperate steppe on soil organic carbon (SOC) and soil respiration rates as well as ecosystem respiration. As compared with those in the Stipa baicalensis steppe, the SOC concentrations at depths of 0-10 and 10-20 cm in the spring wheat field were found to have decreased by 38.3 and 17.4% respectively from 29.5 and 21.9 g kg-1 to 18.2 and 18.1 g kg-1 after a cultivation period of 30 years. Accordingly, the total amounts of soil respiration through the growing season (from April to September) in 2002, 2003 and 2004 were 265.2, 282.2 and 237.4 g C m-2 respectively in the spring wheat field, which were slightly lower than the values of 342.2, 412.0 and 312.1 g C m-2 in the S. baicalensis steppe, while ecosystem respiration of 690.9, 991.2 and 569.6 g C m-2 respectively in the spring wheat field were markedly higher than those of 447.0, 470.9 and 429.7 g C m-2 in the steppe plot. Similar seasonal variations of ecosystem respiration and soil respiration existed in both sample sites. Respiration rates were higher and greater differences existed in both ecosystem respiration and

soil respiration during the exuberant growth stage of plants (from mid-June to mid-August). However, in the slower-growth period of the growing season (before late May and after late August), the CO2 effluxes of the two sample sites were similar and remained at a relatively low level. The results also showed that ecosystem respiration and soil respiration were under similar environmental controls in both sample sites. Soil water content at a depth of 0-10 cm and soil temperatures at 5 and 10 cm were the main factors affecting the variations in ecosystem respiration and soil respiration rates in droughty years of 2002 and 2004 and in the rainy 2003, respectively. This study suggests that the conversion of the grassland to the spring wheat field has increased the carbon loss of the whole ecosystem due to the change of vegetation cover type and significantly reduced the carbon storage of surface soil. In addition, the tillage of grassland had different effects on ecosystem respiration and soil respiration. The effects were also dissimilar in different growth stages, which should be fully considered when assessing and predicting the effects of cultivation on the net CO2 balance of grassland ecosystems.
Keywords: Inner Mongolia; Stipa baicalensis steppe; Cultivation; Soil organic carbon (SOC); CO2 emission

Ranjan Bhattacharyya, S. Chandra, R.D. Singh, S. Kundu, A.K. Srivastva, H.S. Gupta, Long-term farmyard manure application effects on properties of a silty clay loam soil under irrigated wheat-soybean rotation, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 386-396, ISSN 0167-1987, DOI: 10.1016/j.still.2006.08.014.
(http://www.sciencedirect.com/science/article/B6TC6-4M0S2YC-1/2/8d54e8ee58e4117403a16e70119c37b3)
Abstract:
Increasing importance has been placed on the use of agricultural soils for the mitigation of atmospheric CO2 through sequestration of soil C. Although crop productivity is sustained mainly through the application of organic manure in the Indian Himalayas, little information is available on C sequestration, C content in different aggregate size fractions and soil water transmission properties (infiltration and saturated hydraulic conductivity) as affected by long-term manure addition. We analyzed results of an 8-year experiment, initiated in 1995-1996 on a silty clay loam soil, to determine the influence of fertilizer and fertilizer + farmyard manure (FYM) application on those important soil properties. The overall increase in soil organic C (SOC) content in the 0-45 cm soil depth in NPK + FYM treatment as compared to NPK and control treatments was 11.0 and 13.9 Mg C ha-1 at the end of 8 years, respectively. Application of FYM significantly reduced soil bulk density and increased mean weight diameter (MWD) and SOC contents in different aggregate size fractions. Soil organic C content in macroaggregates was greater than in microaggregates. The response of SOC content to FYM application was dependent upon inorganic fertilization and more upon balanced application of NPK than N only. Steady state infiltration rate under NPK + FYM (1.98 cm h-1) was higher than under unfertilized (0.72 cm h-1) and NPK (1.2 cm h-1). Soil water sorptivity (calculated from Philip's equation) under NPK + FYM (1.06 cm min-0.5) was higher than under NPK (0.61 cm min-0.5). We conclude that hill farmers in northern India should be encouraged to use FYM along with chemical fertilizers to increase SOC content and improve soil physical properties.
Keywords: Soil organic C; Aggregate stability; C contents in aggregates; Farmyard manure; Bulk density; Infiltration rate; Wheat-soybean cropping

Stephen Machado, Steve Petrie, Karl Rhinhart, Annie Qu, Long-term continuous cropping in the Pacific Northwest: Tillage and fertilizer effects on winter wheat, spring wheat, and spring barley production, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 473-481, ISSN 0167-1987, DOI: 10.1016/j.still.2006.09.007.
(http://www.sciencedirect.com/science/article/B6TC6-4M93BHR-1/2/7345464f08fc0aaf105c60bf34ec4c89)

Abstract:
Conventional tillage winter wheat (Triticum aestivum) (WW)-summer fallow reduces soil productivity and increases soil erosion. Conservation tillage management, together with intensive cropping may have the potential to reverse these sustainability concerns. The objective of this study was to determine the effects of conventional tillage (CT) and no-tillage (NT) systems on grain yield of long-term annual cropping of monoculture WW, spring wheat (SW), and spring barley (Hordeum vulgare) (SB) grown with or without fertilizer, in the Pacific Northwest region of the USA. In unfertilized crops, grain yield of WW, SW, and SB was 15%, 25%, and 50% higher, respectively, in CT than in NT plots, an indication of the involvement of yield limiting factors under the NT cropping system. When fertilized, there were no significant differences in grain yield of WW. Yields of SW and SB, however, remained 21% and 15% higher, respectively, in CT than in NT, an indication that factors other than fertility were involved. These results suggest that in order for NT management to be widely adopted by area growers, the yield-limiting factors need to be addressed.
Keywords: Barley; Continuous cropping; Conventional tillage; Monoculture; No-tillage; Pacific Northwest; Wheat

He Jin, Li Hongwen, Wang Xiaoyan, A.D. McHugh, Li Wenying, Gao Huanwen, N.J. Kuhn, The adoption of annual subsoiling as conservation tillage in dryland maize and wheat cultivation in northern China, Soil and Tillage Research, Volume 94, Issue 2, June 2007, Pages 493-502, ISSN 0167-1987, DOI: 10.1016/j.still.2006.10.005.
(http://www.sciencedirect.com/science/article/B6TC6-4MG1NR9-1/2/cfd24367e887fe267dab2609c85454cc)
Abstract:
Soil compaction caused by random traffic or repetitive tillage has been shown to reduce water use efficiency, and thus crop yield due to reduced porosity, decreased water infiltration and availability of nutrients. Conservation tillage coupled with subsoiling in northern China is widely believed to reduce soil compaction, which was created after many years of no-till. However, limited research has been conducted on the most effective time interval for subsoiling, under conservation tillage. Data from conservation tillage demonstration sites operating for 10 years in northern China were used to conduct a comparative study of subsoiling interval under conservation tillage. Three modes of traditional tillage, subsoiling with soil cover and no-till with soil cover were compared using 10 years of soil bulk density, water content, yield and water use efficiency data. Cost benefit analysis was conducted on subsoiling time interval under conservation tillage. Yield and power consumption were assessed by based on the use of a single pass combine subsoiler and planter. Annual subsoiling was effective in reducing bulk density by only 4.9% compared with no-till treatments on the silty loam soils of the Loess plateau, but provided no extra benefit in terms of soil water loss, yield increase or water utilization. With the exception of bulk density, no-till and subsoiling with cover were vastly superior in increasing water use (+10.5%) efficiency and yield (+12.9%) compared to traditional tillage methods. Four years of no-till followed by one subsoiling reduced mechanical inputs by 62%, providing an economic benefit of 49% for maize and 209% for wheat production compared to traditional tillage. Annual subsoiling reduced inputs by 25% with an increased economic benefit of 23% for maize and 135% for wheat production. Yield and power consumption was improved by 5% and 20%, respectively, by combining subsoiling with the planting operation in one pass compared with multipass operations of subsoiling and planting. A key conclusion from this is that annual subsoiling in dryland areas of northern China is uneconomical and unwarranted. Four years of no-till operations followed by 1 year subsoiling provided some relief from accumulated soil compaction. However, minimum soil disturbance and maximum soil cover are key elements of no-till for saving water and improving yields. Improved yields and reduced farm power consumption could provide a significant base on which to promote combined planter and subsoiling operations throughout northern China. Further research is

required to develop a better understanding of the linkages between conservation tillage, soil quality and yield, aimed at designing most appropriate conservation tillage schemes.
Keywords: Conservation tillage; Subsoiling; No-till; Maize; Wheat; Loess; Economics

A.B.G. Leek, J.J. Callan, P. Reilly, V.E. Beattie, J.V. O'Doherty, Apparent component digestibility and manure ammonia emission in finishing pigs fed diets based on barley, maize or wheat prepared without or with exogenous non-starch polysaccharide enzymes, Animal Feed Science and Technology, Volume 135, Issues 1-2, 15 May 2007, Pages 86-99, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.03.024.
(http://www.sciencedirect.com/science/article/B6T42-4KGPPDB-1/2/b208cd235b1a0eddd5a0cf725ed1b946)
Abstract:
A 3x2 factorial-design experiment was conducted with finishing pigs to examine the effect of cereal type (barley, maize or wheat) and a non-starch polysaccharide enzyme supplement (endo-1,3(4)-[beta]-glucanase and endo-1,4-[beta]-xylanase) on apparent nutrient digestibility, nitrogen (N) balance and manure ammonia (NH3-N) emission. Diets were formulated to contain similar concentrations of digestible energy and lysine, sulphur amino acids, threonine and tryptophan. After a 14-day dietary adaptation period, urine and faeces were collected from 24 boars (four boars per treatment, 61 kg initial live weight), housed in metabolism crates. NH3-N emission was measured over 10 days using a laboratory scale procedure. The procedure consisted of a sealed vessel containing 2 kg slurry, vacuum pump and three impingers in series per sample. The coefficient of total tract apparent digestibility (CTTAD) of dry matter (DM), gross energy (GE) and N digestibilities were higher in wheat-based diets than maize- or barley-based diets ($P<0.01$) while the CTTAD of NDF was lower in barley-based diets than maize and wheat-based diets ($P<0.001$). Enzyme inclusion had no effect on the CTTAD's of DM, GE, NDF or N. A lower proportion of N intake was excreted as faecal N in the wheat-based diets than the barley- or maize-based diets ($P<0.001$) and as ammoniacal N in barley-based diets than in maize- or wheat-based diets ($P<0.01$). There was a significant cerealxenzyme interaction ($P<0.01$) in the urine:faeces N excretion ratio. Enzyme supplementation increased the urine:faeces N excretion ratio in barley-based diets ($P<0.05$), but decreased the ratio in wheat-based diets ($P<0.01$) whilst the maize-based diet was unaffected. During manure storage (0-240 h), NH3-N emission was affected by a cerealxenzyme interaction ($P<0.01$). Enzyme supplementation increased NH3-N emission in the barley-based diet and decreased NH3-N emission in the wheat-based diet. In conclusion, ammonia emission from the manure of finishing pigs is affected by the use of cereal types differing in the concentration of [beta]-glucan and arabinoxylans and exogenous non-starch polysaccharide enzyme supplementation.
Keywords: Enzymes inclusion; Nutrient digestibilities; Ammonia; Cereal grains; Pig manure

T.N. Nortey, J.F. Patience, J.S. Sands, R.T. Zijlstra, Xylanase supplementation improves energy digestibility of wheat by-products in grower pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 96-99, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.092.
(http://www.sciencedirect.com/science/article/B7XNX-4MY11CS-J/2/f9699affdc35914b697f23033054d9e9)
Abstract:
Value-added processing of cereals produces high-value fractions for food and bio-processing application and by-products that are used in animal nutrition to reduce feed costs. Wheat by-products contain arabinoxylans that might limit nutrient digestibility. Effects of xylanase supplementation (0 or 4375 U/kg feed) on energy digestibility were studied in a wheat control and by-product diets (30% millrun, middlings, shorts, screenings, and bran) in a 2 x 6 factorial arrangement. The wheat control diet was formulated to contain 3.34 Mcal digestible energy

(DE)/kg and 2.8 g apparent digestible lysine/Mcal DE, and included 0.4% chromic oxide as a marker for digestibility. Twelve ileal-cannulated pigs (32.5 +/- 2.5 kg) were each fed seven of 12 diets. Faeces and then digesta were each collected for 2 d, and diet digestibility values are reported. Wheat had higher ileal and total-tract energy digestibility than by-products ($P < 0.01$). Xylanase improved energy digestibilities for by-products ($P < 0.001$) but not for wheat. Among by-products, ileal energy digestibility was lowest for middlings (62%), then bran < screenings < millrun, and highest for shorts (66%). Xylanase improved ($P < 0.05$) ileal energy digestibility of millrun by 19% to 76%. Total-tract energy digestibility of millrun improved from 72 to 79% (similar to wheat) with xylanase ($P < 0.05$). In summary, xylanase improved energy digestibility in the selected wheat by-product diets, indicating that arabinoxylans in wheat by-products limit nutrient digestibility.
Keywords: Energy digestibility; Pig; Wheat by-product; Xylanase

L. Lahaye, Y. Riou, B. Seve, The effect of grinding and pelleting of wheat and maize on amino acids true ileal digestibility and endogenous losses in growing pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 138-140, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.123.
(http://www.sciencedirect.com/science/article/B7XNX-4N0XTFR-F/2/061d2b41ef6f5cf987e2cbc119c85e46)
Abstract:
Two experiments were performed in order to test the effects of grinding and pelleting wheat (experiment 1) or maize (experiment 2) on amino acids (AA) standardized (SID) and true (TID) ileal digestibility. Basal ileal endogenous losses (IEL), used to calculate SID from apparent digestibility, were determined by feeding a protein-free diet. Total IEL required to calculate TID were estimated as the difference between total and dietary losses determined according to the isotope dilution technique using 15N-labeled crops. Wheat and maize were ground to compare two different mean particle sizes (d50 500 [mu]m and 1000 [mu]m). Then, a fraction of the 500-[mu]m mash was further pelleted through two dies of different thicknesses (16 vs. 20 mm for wheat and 16 vs. 24 mm for maize), holes diameter 4 mm in both cases. Cereals were incorporated in 4 isoproteic diets either in mash form (fine vs. coarse mash) or in pelleted form (thin vs. thick die). In experiment 1, wheat was associated with rapeseed meal diets, while in experiment 2, maize was associated with soybean meal. The reduction of wheat particle size affected neither AA SID nor TID. In contrast, the pelleting treatment significantly improved protein and most AA SID and TID. In addition, total IEL of protein and several AA were significantly reduced when the thicker die was used. Numeric improvements of protein and AA SID were observed with reduction of maize particle size and this was associated with a significant decrease in total IEL so that TID was not modified. Further improvements of AA SID and TID occurred with pelleting of maize, without significant effect on IEL regardless of die thickness.
Keywords: Amino acids; Ileal digestibility; Endogenous losses; Wheat; Maize; Pig

J.S. Sands, R.M. Kay, Phyzyme XP phytase improves growth performance and nutrient utilization in wheat-based diets fed to weaned pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 264-267, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.111.
(http://www.sciencedirect.com/science/article/B7XNX-4MYMT9M-2/2/1f2a5b30c65d2204049271b8985ded37)
Abstract:
The effect of phytase (Phyzyme XP) on performance and nutrient utilization in piglets fed wheat-based diets was evaluated using 24 male pigs averaging 7 kg. Four experimental diets containing either 0 (positive control, adequate nutrients), 0 (negative control (NC), reduced nutrients), 500 or 1000 U/kg of phytase were used for each of two dietary phases (day 0 to 14 and day 14 to 33).

Feed and water were provided ad libitum. Animals were weighed at weekly intervals until day 28 and feed intake (DFI) recorded daily. From day 28 to 33 pigs were fed at 3 times maintenance energy intake and DFI recorded. Total amounts of faeces and urine were recorded for each individually housed pig. Digestibilities and balance of dry matter (DM), phosphorus (P), calcium (Ca), nitrogen (N) and gross energy (GE) were calculated for feed, faeces and urine. Compared to the NC, daily live weight gain was improved ($P < 0.05$) for pigs receiving the highest level of supplemental phytase in phase 2. Phytase addition at 1000 FTU/kg also increased faecal digestibilities of P and Ca ($P < 0.05$). Contrasts comparing NC and Phytase diets showed that Ca ($P < 0.02$) and P ($P < 0.05$) balance were improved.
Keywords: Pigs; Phytase; Performance; Digestibility; Balance

J.E. Lindberg, K. Lyberg, J. Sands, Influence of phytase and xylanase supplementation of a wheat-based diet on ileal and total tract digestibility in growing pigs, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 268-270, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.114.
(http://www.sciencedirect.com/science/article/B7XNX-4MYFG5R-P/2/452278690dac12848c95d595441a389e)
Abstract:
The effect of phytase and xylanase supplementation of a wheat-based pig diet on the ileal and total tract apparent digestibility of dietary components and minerals were studied in eight growing pigs fitted with a PVTC cannula in a randomized block design experiment. The diets (A and B) were similar in major ingredient composition and in nutrient content. In diet A, part of the limestone was replaced with di-calcium phosphate to increase the content of available phosphorus (P). Diet B was fed without or with supplementation with phytase (500 FTU/kg; diet BP), xylanase (4000 XU/kg; diet BX) and phytase + xylanase (500 FTU and 4000 XU/kg; diet BPX). There were no differences ($P > 0.05$) between diets in the ileal or total tract digestibility of organic matter (OM), NDF and crude protein (CP). The ileal and total tract digestibility for P and Ca differed ($P < 0.05$) between diets, while there were no treatment effects for Zn. The ileal and total tract digestibility for P and Ca was higher ($P < 0.05$) on diets BP and BPX than on the other diets. In conclusion, phytase improved the utilization of dietary P and Ca in a wheat-based diet, while xylanase had no additional benefits in terms of OM and CP digestibility or mineral utilization. Phytase had no effect on the digestibility of OM, CP or NDF.
Keywords: Phytase; Xylanase; Pigs; Digestibility

S. Moehn, J.K.A. Atakora, J. Sands, R.O. Ball, Effect of phytase-xylanase supplementation to wheat-based diets on energy metabolism in growing-finishing pigs fed ad libitum, Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 271-274, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.118.
(http://www.sciencedirect.com/science/article/B7XNX-4N6Y5V3-1/2/21eb007570da50a242c7f8b11169d09a)
Abstract:
The effects of dietary protein and phosphorus level, and phytase and/or xylanase addition on performance, nutrient digestibility and energy metabolism in finisher pigs were determined. Protein reduction increased nutrient digestibility, pig performance and dietary net energy. Phosphorus reduction increased heat production, and tended to negatively affect all parameters. Phytase increased daily gain and dietary metabolizable energy. Xylanase improved digestibility of nutrients and energy, but had no effect on dietary net energy. Phytase and xylanase addition were not additive.
Keywords: Pig; Protein; Phosphorus; Phytase; Xylanase; Net energy

Sander J. Zwart, Wim G.M. Bastiaanssen, SEBAL for detecting spatial variation of water productivity and scope for improvement in eight irrigated wheat systems, Agricultural Water Management, Volume 89, Issue 3, 10 May 2007, Pages 287-296, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.02.002.
(http://www.sciencedirect.com/science/article/B6T3X-4NB2SJ2-1/2/8e083d78daf3c3e4c5e7b0294a2a2c73)
Abstract:
A methodology has been developed to quantify spatial variation of crop yield, evapotranspiration (ET) and water productivity (WPET) using the SEBAL algorithm and high and low resolution satellite images. SEBAL-based ET estimates were validated over an irrigated, wheat dominated area in the Yaqui Valley, Mexico and proved to be accurate (8.8% difference for 110 days). Estimated average wheat yields in Yaqui Valley of 5.5 t ha-1 were well within the range of measured yields reported in the literature. Measured wheat yields in 24 farmers' fields in Sirsa district, India, were 0.4 t ha-1 higher than SEBAL estimated wheat yields. Area average WPET in the Yaqui Valley was 1.37 kg m-3 and could be considered to be high as compared to other irrigated systems around the world where the same methodology was applied. A higher average WPET was found in Egypt's Nile Delta (1.52 kg m-3), Kings County (CA), USA (1.44 kg m-3) and in Oldambt, The Netherlands (1.39 kg m-3). The spatial variability of WPET within low productivity systems (CV = 0.33) is higher than in high productivity systems (CV = 0.05) because water supply in the former case is uncertain and farming conditions are sub-optimal. The high CV found in areas with low WPET indicates that there is considerable scope for improvement. The average scope for improvement in eight systems was 14%, indicating that 14% ET reduction can be achieved while maintaining the same yield. It is concluded that the proposed methodology is accurate and that better knowledge of the spatial variation of WPET provides valuable information for achieving local water conservation practices in irrigated wheat.
Keywords: SEBAL; Water productivity; Wheat; Evapotranspiration; Crop production; Water saving

Atilio J. Barneix, Physiology and biochemistry of source-regulated protein accumulation in the wheat grain, Journal of Plant Physiology, Volume 164, Issue 5, 3 May 2007, Pages 581-590, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.03.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4JXPS07-8/2/6b29188868982f9dead14ec46ab2e358)
Abstract: Summary
Wheat is unique among cereals for the baking qualities of its flour, which are dependent upon the type and concentration of its proteins. As a consequence, the grain protein concentration (GPC) is one of the main determinants of wheat international market price.
More than 50-70% of the final grain N is accumulated before flowering and later remobilized to the grain, N fertilization being the common practice used to produce high GPC. However, after incremental additions of N fertilizer, GPC reaches a maximum and then remains constant, without any increase in N uptake or remobilization by the crop, thus decreasing the efficiency of N fertilizer.
Although, the genetic and molecular mechanisms that regulate N uptake by the roots are being clarified quickly, the regulation and physiology of N transport from the leaves to the grain remains less clear. In this review, the possible regulatory points involved in N transport to the grain and the difficulties for increasing GPC are discussed.
It has been demonstrated that protein synthesis in the grain is source-limited, and that the grain can accumulate protein limited only by the amino acids provided by the phloem. It has also been shown that there is no limitation in the amino acid/sugar ratios that can be exported to the phloem. On the other hand, uptake transporters are depressed when the plant concentration of some amino acids, such as glutamine, is high. It has also been shown that a high N supply increases cytokinins concentration, preventing leaf senescence and proteolysis.

Based on this information, it is postulated that there are two main regulatory points during grain filling when plant N status is ample. On the one hand, the N uptake transporters in the roots are depressed due to the high amino acids concentration in the tissues, and N uptake is low. On the other, a high amino acids concentration keeps the cytokinins level high, repressing leaf protein degradation and decreasing amino acid export to the phloem. As a consequence, GPC cannot be increased despite the ample N supply.
Keywords: Amino acids export; Grain protein concentration; N remobilization; Triticum aestivum L.; Wheat

Pei-guo GUO, Gui-hua BAI, Rong-hua LI, Carver Brett, Baum Michael, Molecular Characterization of Atlas 66-Derived Wheat Near-Isogenic Lines Contrasting in Aluminum (Al) Tolerance, Agricultural Sciences in China, Volume 6, Issue 5, May 2007, Pages 522-528, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60078-9.
(http://www.sciencedirect.com/science/article/B82XG-4NX345H-2/2/8c45299de2e4af351eb492ce2683e5ee)
Abstract:
Aluminum (Al) toxicity is the major limiting factor for wheat growth in acidic soils. Genetic improvement of A1 tolerance is one of the most cost-effective solutions to improve wheat productivity. The objective of this study was to characterize near isogenic lines (NILs) contrasting in A1 tolerance derived from Atlas 66 in the backgrounds of Al-sensitive cultivars Chisholm and Century using amplified fragment length polymorphism (AFLP) and simple sequence repeat (SSR). A total of 200 AFLP and 88 SSR primer pairs were screened and 12 markers (11 AFLPs and one SSR) were associated with Al-tolerance in NILs of at least one recurrent parental background. Among them, nine were linked to A1 tolerance in the Chisholm-derived NILs, seven were associated with Al-tolerance in the Century-derived NILs, and three AFLPs derived from the primer combinations of pAG/mGCAG, pCAG/mAGC and pGTG/mGCG, and one SSR, Xwmc331 on chromosome 4D, associated with A1 tolerance in NILs of both recurrent parental backgrounds. Those common markers across two backgrounds may be the major marker loci associated with Al-tolerance in Atlas 66 and could be useful for marker-assisted breeding to improve A1 tolerance in wheat. In addition, evaluation of A1 tolerance among different genotypes using hematoxylin stain and relative root growth revealed that Atlas 66 was more tolerant to A1 stress than the NILs, therefore suggested that the Al-tolerant NILs might not carry all Al-tolerance loci from Atlas 66 and inheritance of A1 tolerance in Atlas 66 is more likely multigenic.
Keywords: aluminum (Al) tolerance; Triticum aestivum L.; molecular marker

Zhi-hong GAO, Xiao-yuan CHEN, Yuan-pei LUO, The Equilibrium and Growth Stability of Winter Wheat Root and Shoot Under Different Soil Water Conditions, Agricultural Sciences in China, Volume 6, Issue 5, May 2007, Pages 597-606, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60088-1.
(http://www.sciencedirect.com/science/article/B82XG-4NX345H-D/2/528618f0a75e1a4e7c642838cbb2a116)
Abstract:
The equilibrium between root, shoot and growth stability under different soil water conditions were investigated in a tube experiment of winter wheat. The water supplying treatments included: sufficient irrigation at whole growth phase, moderate deficiency irrigation at whole growth phase, serious deficiency irrigation at whole growth phase, sufficient irrigation at jointing stage, tillering stage, flowering stage, and fillering respectively, after moderate and serious water deficit during their previous growth stage. Root and shoot biomass were measured. On the basis of the cooperative root-shoot interactions model, the equilibrium and growth stability were studied on the strength of the kinetics system theory. There was only one varying equilibrium point between the root and shoot over the life time of the winter wheat plant. Water stress prolonged the duration of

stable growth, the more serious the water deficit, the longer the period of stable growth. The duration of stable growth was shortened and that of unstable growth was prolonged after water recovery. The growth behavior of the plants exposed to moderate water deficit shiifted from stable to unstable until the end of the growth, after rewatering at flowering. In the life-time of the crop and shoot had been adjusting themselves in structure and function so as to maintain an equilibrium, but could nor acnieve the equilibrium state for long. They were always in an unbalanced state from the beginning to the end of growth. This was the essence of root-shoot equilibrium. Water stress inhibited the function of root and shoot, reduced root shoot interactions, and as a result, the plant growth gradually tended to stabilize. Rewatering enhanced root shoot interactions, prolonged duration of instable growth. Rewatering at flowering could upset the inherent relativity during the long time of stable growth from flowering to filling stage, thus leading to unstable growth and enhanced dry matter accumulating rate in the whole plant.
Keywords: winter wheat; root and shoot equilibrium; growth stability; soil moisture

Junguo Liu, Jimmy R. Williams, Alexander J.B. Zehnder, Hong Yang, GEPIC - modelling wheat yield and crop water productivity with high resolution on a global scale, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 478-493, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.11.019.
(http://www.sciencedirect.com/science/article/B6T3W-4MW90GB-3/2/f3ea27f75db1660dda9cbe674ff14919)
Abstract:
With population growth and economic development, the agricultural sector is facing the challenge to produce more food with less water. Crop water productivity (CWP) is important for understanding water-food relationships. It also provides a basis for the assessment of water use efficiency embodied in global food trade. However, traditional methods are not sufficient for estimating CWP on a global scale considering large spatial and temporal variations across different geographical locations. In this paper, a GIS-based EPIC model (GEPIC) is developed and tested to estimate wheat (Triticum aestivum L.) yield and CWP at a grid resolution of 30' on the land surface. A comparison between simulated yields and FAO statistical yields in 102 countries over 10 years shows a good agreement. The simulated CWP is also mostly in line with the CWP reported in the literature.
The simulation results show that compared with rainfed wheat, irrigated wheat has higher frequencies for high CWP (>0.8 kg m-3) and lower frequencies for low CWP (<0.8 kg m-3). This is likely because irrigation can provide timely water supply to crop development and the management of irrigated crops is usually more intensive than in rainfed production. A strong linear relation is found between CWP and yield. High wheat yield and CWP appear in the European countries, especially those in western and northern Europe. Low wheat yield and CWP are seen in most African countries. The simulation using GEPIC, however, shows that wheat yield and CWP in many African countries could increase substantially with sufficient water supply and fertilizer application. Variations in CWP across countries suggest that global water use could be reduced through food trade. Calculations indicate a saving of 77 x 109 m3 of water in 2000 through international wheat trade as a result of relatively high CWP in major exporting countries. However, the simulation results also suggest that an overall improvement in CWP through better crop management practices in local areas could make a greater contribution to the reduction in global water use.
Keywords: EPIC; GIS; Irrigated and rainfed production; Virtual water trade

Syed Sajidin Hussain, Muhammad Mudasser, Prospects for wheat production under changing climate in mountain areas of Pakistan - An econometric analysis, Agricultural Systems, Volume 94, Issue 2, May 2007, Pages 494-501, ISSN 0308-521X, DOI: 10.1016/j.agsy.2006.12.001.

(http://www.sciencedirect.com/science/article/B6T3W-4N08V44-1/2/2a831ae98cbfc1a9711aace2157cb6d9)

Abstract:
We assess potential future impacts of climate change on wheat yields in Swat and Chitral districts of Pakistan, mountainous areas with average altitudes of 960 and 1500 m above sea level, respectively. Using past climate data (1976-2000) to track temperature trends in both study districts, we find that increased temperatures correspond to an increase in Growing Degree Days (GDDs) and a decrease in Growing Season Length (GSL). Chitral district shows a stronger decline in season length than Swat district. Compared with the estimated optimum level of 157 days, the 25 year average GSL for the dominant varieties is estimated to be 156 days in Swat district and 195 days in Chitral district. Future increases in temperature of 1.5 and 3 [degree sign]C are likely to cause wheat yields to decline (by 7% and 24% respectively) in Swat district and increase (by 14% and 23% respectively) in Chitral district. Future increases in precipitation of 5-15% during the growing season show a negligible impact on wheat yield.
Development and dissemination of short duration varieties, which can withstand the climatic anomalies expected in the future, should be given priority in the mountain region. More recent High Yielding Varieties (HYV) of the warmer plain areas should also be tested and introduced in the mountain areas because the expected future increases in temperatures caused by global warming would render these varieties suitable for the mountain areas.
Keywords: Climate change impact; Wheat yield; Mountain areas; Growing season length; Transcendental model; Chitral; Swat; Pakistan

William F. Schillinger, Ann C. Kennedy, Douglas L. Young, Eight years of annual no-till cropping in Washington's winter wheat-summer fallow region, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 345-358, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.10.017.
(http://www.sciencedirect.com/science/article/B6T3Y-4MG6NXV-2/2/3bdb5b6978b4a2cef52c6c1bade1295f)

Abstract:
The tillage-based winter wheat (Triticum aestivum L.)-summer fallow (WW-SF) cropping system has dominated dryland farming in the Pacific Northwest USA for 125 years. We conducted a large-scale multidisciplinary 8-year study of annual (i.e., no summer fallow) no-till cropping systems as an alternative to WW-SF. Soft white and hard white classes of winter and spring wheat, spring barley (Hordeum vulgare L.), yellow mustard (Brassica hirta Moench), and safflower (Carthamus tinctorius L.) were grown in various rotation combinations. Annual precipitation was less than the long-term average of 301 mm in 7 out of 8 years. Rhizoctonia bare patch disease caused by the fungus Rhizoctonia solani AG-8 appeared in year 3 and continued through year 8 in all no-till plots. All crops were susceptible to rhizoctonia, but bare patch area in wheat was reduced, and grain yield increased, when wheat was grown in rotation with barley every other year. Remnant downy brome (Bromus tectorum L.) weed seeds remained dormant for 6 years and longer to heavily infest recrop winter wheat. There were few quantifiable changes in soil quality due to crop rotation, but soil organic carbon (SOC) increased in the surface 0-5 cm depth with no-till during the 8 years to approach that found in undisturbed native soil. Annual no-till crop rotations experienced lower average profitability and greater income variability compared to WW-SF. Yellow mustard and safflower were not economically viable. Continuous annual cropping using no-till provides excellent protection against wind erosion and shows potential to increase soil quality, but the practice involves high economic risk compared to WW-SF. This paper provides the first comprehensive multidisciplinary report of long-term alternative annual no-till cropping systems research in the low-precipitation region of the Pacific Northwest.

Keywords: Annual cropping; Bromus tectorum L.; Drought; Dryland cropping systems; Farm economics; Increased cropping intensity; No-till; Salsola iberica; Soil quality; Wind erosion; Winter wheat-summer fallow

Inigo Loureiro, M. Concepcion Escorial, Jose Maria Garcia-Baudin, M. Cristina Chueca, Hybridization between wheat (Triticum aestivum) and the wild species Aegilops geniculata and A. biuncialis under experimental field conditions, Agriculture, Ecosystems & Environment, Volume 120, Issues 2-4, May 2007, Pages 384-390, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.10.015.
(http://www.sciencedirect.com/science/article/B6T3Y-4MFKCXK-2/2/8fd5245694d7d4f23ef8a8b44603305e)
Abstract:
Hybridization between Aegilops geniculata, A. biuncialis and bread wheat Triticum aestivum has been evaluated during two seasons under simulated field conditions to estimate the field hybridization rate under Central Spain conditions. The mean frequencies of hybridization between A. biuncialis and A. geniculata with wheat were 0.34% and 0.31%, respectively. Data from 10 hybrid plants for each combination showed that hybrids can be partially fertile by backcrossing with wheat parent, with percent averages of 3.17 grains/spikelets for A. biuncialis x wheat hybrids and 2.87 grains/spikelets for A. geniculata x wheat hybrids. Self-pollination, although at very low rates, was also possible in hybrids. The potential risks associated with natural hybridization in the context of transgenic wheat cultivation are discussed.
Keywords: Aegilops spp.-wheat hybrids; Natural hybridization; Hybrid fertility; Gene transfer; Risk assessment

R. Rodriguez-De Lara, C.A. Herrera-Corredor, M. Fallas-Lopez, R. Rangel-Santos, V. Mariscal-Aguayo, P.A. Martinez-Hernandez, J.G. Garcia-Muniz, Influence of supplemental dietary sprouted wheat on reproduction in artificially inseminated doe rabbits, Animal Reproduction Science, Volume 99, Issues 1-2, May 2007, Pages 145-155, ISSN 0378-4320, DOI: 10.1016/j.anireprosci.2006.04.055.
(http://www.sciencedirect.com/science/article/B6T43-4K18Y02-1/2/e4a3d181d3af05690099190542fd63d0)
Abstract:
The sprouted wheat contains great amounts of 6-methoxybenzoxazolinone (6-MBOA) a phenol compound that stimulates reproduction in certain small wild herbivorous mammals. The objective of the present study was to evaluate the effect of dietary sprouted wheat as supplement on reproduction in artificially inseminated doe rabbits. Two-month-old New Zealand White doe rabbits (n = 48) were randomly allocated to one of two treatments: (1) pelleted diet plus sprouted wheat for 6 consecutive days prior to service, (2) pelleted diet only (control). First insemination occurred when does reach 3200 g body weight and bred 6 days after parturition across 6 months period during summer and autumn. Records from 41 does completing the experiment accounted for 192 inseminations and 142 kindlings equivalent to 4.6 +/- 0.15 and 3.5 +/- 0.15 litters per doe, respectively. Mean daily intake of sprouted wheat on wet and dry matter bases were 196.1 +/- 7.5 and 75.4 +/- 2.9 g, respectively. The number of young born produced per doe during the trail was significantly (P = 0.02) greater in does fed sprouted wheat (28.1 +/- 1.2 versus 23.6 +/- 1.3 control). Does fed sprouted wheat had 0.65 +/- 0.06 receptivity rate at AI over 28% greater (P = 0.001) than does in the control treatment. Sexual receptivity was not influenced by physiological status of does and season (P > 0.05). Diet and season had no effect (P > 0.05) on kindling rate. However, physiological status had an effect (P = 0.002) on this variable. Kindling rates for nulliparous, lactating and non-lactating does were 0.95 +/- 0.08, 0.63 +/- 0.04 and 0.78 +/- 0.11, respectively. Sexually receptive does had a greater (P = 0.0001) kindling rate (0.95 +/- 0.05) than non-receptive females (0.63 +/- 0.05). Does fed sprouted wheat produced larger (P = 0.02) litters than those in the control group: 7.7 +/- 0.30 and 6.8 +/- 0.32, respectively. There was an effect of

season (P = 0.04) on the size of the litter at birth. Largest litters were born during autumn (7.9 +/- 0.37) than during summer (6.6 +/- 0.41). Receptive does had more (P = 0.002) young in the litter (7.9 +/- 0.28) than non-receptive (6.6 +/- 0.35). Feeding sprouted wheat as a source of biological 6-MBOA enhanced sexual receptivity and prolificacy in artificially inseminated doe rabbits bred in summer and autumn.
Keywords: Rabbits--dietary 6-methoxybenzoxazolinone; Season; Oestrus synchronization; AI

Qi Li, Wenju Liang, Yong Jiang, Yi Shi, Jianguo Zhu, Deborah A. Neher, Effect of elevated CO2 and N fertilisation on soil nematode abundance and diversity in a wheat field, Applied Soil Ecology, Volume 36, Issue 1, May 2007, Pages 63-69, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2006.11.003.
(http://www.sciencedirect.com/science/article/B6T4B-4MJBTJC-2/2/2ab5888bb874f14eb0a2d113dff79379)
Abstract:
An experimental platform of free-air CO2 enrichment (FACE) was established in mid June of 2004 over a rice-wheat rotation ecosystem located at a suburb of Jiangdu, China. We compared the abundance and diversity of soil nematodes from a wheat field with high (225.0 kg N ha-1) and low (112.5 kg N ha-1) levels of N fertilisation exposed to the elevated and ambient CO2 during the wheat growing season in 2005. The results showed that elevated CO2 and N fertilisation had significant effects on the abundance and diversity of soil nematodes. Elevated CO2 increased the abundance of omnivores-predators, the values of maturity index (MI) and structural index (SI) of nematode assemblage at the jointing stage of wheat. Two levels of N fertilisation had significant effects on the abundance of fungivores at the wheat jointing stage, while nematode channel ratio (NCR) showed responses to different N fertilisation and the interaction effects of elevated CO2 and N fertilisation at the wheat ripening stage.
Keywords: Soil nematodes; Abundance; Diversity; N fertilisation; FACE; Wheat field

Johannes Ravn Jorgensen, Lise C. Deleuran, Bernd Wollenweber, Prospects of whole grain crops of wheat, rye and triticale under different fertilizer regimes for energy production, Biomass and Bioenergy, Volume 31, Issue 5, May 2007, Pages 308-317, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2007.01.001.
(http://www.sciencedirect.com/science/article/B6V22-4NC5SXG-1/2/558b62a7c809e750fc7276dc3756e2d0)
Abstract:
Cereal grain yield and biomass production are affected by fertilizer application strategies. In order to quantify the performance of wheat, rye and triticale cultivars for use as energy crops, field experiments with either modified phosphorus-potassium or potassium applications were designed at two locations in Denmark over a 3-year period. Five wheat cultivars (`Astron', `Herzog', `Kosack', `Kraka' and `Ure'), two winter rye cultivars (the population cultivar `Motto' and the hybrid cultivar `Marder') and the triticale cultivar `Alamo' were selected. The grain and straw fractions were analysed for biomass, ash and contents of nitrogen (N), K, Cl, sulphur (S) and Na.
Dry matter yields varied between 11.5 and 15.9 t ha-1 at the two locations. Triticale and rye had a higher total dry matter yield than wheat, even at lower inputs of N fertilizer. Thus, the constant high yield of rye and triticale is an advantage for biomass for energy purposes. The mineral content of the grain fraction changed only little between years and locations. By contrast, large variations in the analysed ions in the straw fraction between years and locations were observed. The use of K fertilizers resulted in a significantly increased concentration of K in the straw. However, this increased concentration was eliminated in years with high precipitation in the final 3 weeks before harvest, where substantial amounts of K, Cl and S were removed. The results are discussed in relation to the possible use of grain crops for energy production.
Keywords: Bioenergy; Biofuels; Mineral composition; Cereals; Cultivars

Chun Chang, Peilin Cen, Xiaojian Ma, Levulinic acid production from wheat straw, Bioresource Technology, Volume 98, Issue 7, May 2007, Pages 1448-1453, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.03.031.
(http://www.sciencedirect.com/science/article/B6V24-4MH8B9D-6/2/6a66f29278d8e5b947f3d68ac585b6f7)
Abstract:
Studies were carried out on the effects of temperature, acid concentration, liquid:solid ratio and reaction time on levulinic acid production from wheat straw using response surface methodology. The P-value of the coefficient for acid concentration was 0.0002, suggesting that this was highly significant. The quadratic effects of temperature and liquid:solid ratio were also significant and their P-values were <0.0001 and 0.0027, respectively. The coefficient determination (R2) was good for the second-order model. The optimal conditions for levulinic acid production from wheat straw were 209.3 [degree sign]C, 3.5% acid concentration, 15.6 liquid:solid ratio and 37.6 min of reaction time resulted 19.86% yield.
Keywords: Levulinic acid; Wheat straw; Response surface methodology; Yield

Muneshwar Singh, K. Sammi Reddy, V.P. Singh, T.R. Rupa, Phosphorus availability to rice (Oriza sativa L.)-wheat (Triticum estivum L.) in a Vertisol after eight years of inorganic and organic fertilizer additions, Bioresource Technology, Volume 98, Issue 7, May 2007, Pages 1474-1481, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.02.045.
(http://www.sciencedirect.com/science/article/B6V24-4M64541-1/2/b75766eedc553e485274b6389957bc2e)
Abstract:
Integrated use of inorganic fertilizer N and well decomposed cattle manure (CM) or 30-35 days old Parthenium (Parthenium hysterophorus L.), a weed grown off site as green manure (GM) under repeated applications of fertilizer P and urea N for eight years in a rice (Oriza sativa L.)-wheat (Triticum estivum L.) sequence was studied on transformation of fertilizer P applied to soil at the National Research Center for Weed Science, Jabalpur, India. Based on the results, it appeared that, repeated applications of 52 kg super-phosphate P resulted in a marked increase in Olsen P linearly with time. Conjunctive use of urea fertilizer N with organic manure resulted in a larger increase in Olsen P in the Vertisol. Studies further revealed that the greater accumulation of fertilizer P applied in excess to crop removal occurred in inorganic P in the plots receiving only fertilizer N. However, plots receiving fertilizer N along with organic manures led to P accumulation predominantly in organic forms. The study suggests that these two pools of P acted as a sink when fertilizer P was applied in excess to crop removal and are bio-chemically active. The Olsen P status after 8 cycles of rice-wheat crops revealed that the average amount of fertilizer P required after adjusting for crop uptake to increase Olsen P by 1 mg kg-1 soil was 7.2 kg P ha-1 in the plots receiving only fertilizer N. Whereas, application of 5 t FYM or 6 t GM reduced it to 4.6 kg P ha-1. The plots receiving manure always maintained a greater concentration of Olsen P. The application of CM or GM with fertilizer N enriched short-term inorganic P as well as long-term organic P fertility. After eight years, larger concentrations of organic P in the subsurface layer (16-30 cm), compared to initial values, indicates downward movement of P in organic forms.
Keywords: Cattle manure; Green manure; Fertilizer N; Organic and inorganic P pools; Apparent P recovery; Vertisol

Peter H. Sikkema, Lynette Brown, Christy Shropshire, Nader Soltani, Responses of three types of winter wheat (Triticum aestivum L.) to spring-applied post-emergence herbicides, Crop Protection, Volume 26, Issue 5, May 2007, Pages 715-720, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.06.010.

(http://www.sciencedirect.com/science/article/B6T5T-4KNM9T6-3/2/fe3fde9ea1e18d8f37e988c5c6bf6b31)
Abstract:
Field studies were conducted over a three-year period (2002-2004) to evaluate the tolerance of recently developed varieties of winter wheat representing soft white winter wheat (SWWW), soft red winter wheat (SRWW), and hard red winter wheat (HRWW) to four spring-applied post-emergence (POST) herbicides. Bromoxynil plus MCPA, 2,4-D amine, dichlorprop plus 2,4-D, and dicamba plus MCPA plus mecoprop were applied at one and two times the manufacturers' recommended dose. Bromoxynil plus MCPA and 2,4-D amine did not cause any visual injury. Dichlorprop plus 2,4-D did not cause injury in 2002 or 2003, but did injure all the three types of winter wheat 7 days after treatment (DAT) in 2004, but no injury was seen at 14, 28, and 42 DAT. Dicamba plus MCPA plus mecoprop caused injury in all the three types of winter wheat each year. Dicamba plus MCPA plus mecoprop at 600 g ai/ha reduced height 7% in SWWW and SRWW, while at 1200 g/ha reduced height 10% and 11% in SWWW and SRWW, respectively. Generally, winter wheat yield was not affected by 2,4-D amine, bromoxynil plus MCPA, or dichlorprop plus 2,4-D. In 2003, dicamba plus MCPA plus mecoprop at 600 g/ha decreased SWWW yield, however, when applied at 1200 g/ha, yield was decreased in all three years for both the SWWW and SRWW. The yield of HRWW was not affected by any of the herbicides evaluated. Overall, of the four herbicides evaluated, only the dicamba plus MCPA plus mecoprop POST caused unacceptable crop injury and yield loss in SWWW and SRWW.
Keywords: Hard red winter wheat; Height; Herbicide sensitivity; Soft red winter wheat; Soft white winter wheat; Tolerance; Yield

Eskandar Zand, Mohammad Ali Baghestani, Saeid Soufizadeh, Reza PourAzar, Mozhgan Veysi, Naser Bagherani, Alireza Barjasteh, Mohammad Mehdi Khayami, Nooshin Nezamabadi, Broadleaved weed control in winter wheat (Triticum aestivum L.) with post-emergence herbicides in Iran, Crop Protection, Volume 26, Issue 5, May 2007, Pages 746-752, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.06.014.
(http://www.sciencedirect.com/science/article/B6T5T-4KTMTN5-2/2/61b4ef17cf3f97aefbc943424d8d7f9f)
Abstract:
Field experiments were conducted in 2004-2005 at five locations in wheat growing areas in Iran, to study weed control and winter wheat response to post-emergence applications of diflufenican plus MCPA at 0.5, 1, and 1.5 L/ha, clopyralid plus 2,4-D, and fluroxypyr both at 1.5, 2, and 2.5 L/ha, tribenuron methyl, 2,4-D plus MCPA, bromoxynil plus MCPA, and dichloprop-p plus mecoprop-p plus MCPA. The post-emergence application of diflufenican plus MCPA, clopyralid plus 2,4-D, and fluroxypyr provided better control of broadleaved weeds compared with other herbicides. The data show that in most cases fluroxypyr at 2.5 L/ha caused the most reduction in weed populations and biomass. The efficacy of bromoxynil plus MCPA was generally better than tribenuron methyl, 2,4-D plus MCPA, and dichloprop-p plus mecoprop-p plus MCPA, although it varied among the locations and weed species. The application of diflufenican plus MCPA, clopyralid plus 2,4-D, and fluroxypyr resulted in highest wheat yield among all treatments.
Keywords: Post emergence herbicides; Weed injury; Weed population; Weed biomass; Wheat yield

X.Y. Zhang, C. Loyce, J.M. Meynard, H. Monod, Modeling the effect of cultivar resistance on yield losses of winter wheat in natural multiple disease conditions, European Journal of Agronomy, Volume 26, Issue 4, May 2007, Pages 384-393, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.12.004.
(http://www.sciencedirect.com/science/article/B6T67-4MY118S-1/2/79181d3c6b83711163b21ef69a440acd)
Abstract:

The use of winter wheat (Triticum aestivum L.) cultivars resistant to diseases may make it possible to reduce yield losses without the need to use fungicides, which are expensive and may damage the environment. The cultivar resistances favored depend on the region considered and the nature of the most widespread diseases in that region. We have constructed a statistical linear model for the estimation of relative yield loss due to diseases, making it possible to assess the effects of winter wheat cultivars in various disease conditions. We considered the interactions 'potential disease intensity x winter wheat cultivar' for four main fungal diseases: septoria tritici blotch (Mycosphaerella graminicola), brown rust (Puccinia triticina), yellow rust (Puccinia striiformis) and powdery mildew (Erysiphe graminis). This model can therefore be readily adapted to different regions with diverse combinations of these diseases. The potential intensity of each disease in each trial was calculated based on the symptoms observed on susceptible cultivars not treated with fungicide. The cultivar effect was characterized by the ratings of cultivar susceptibility to each disease and by cultivar earliness. The parameters of the model were estimated from 276 wheat cultivar trials carried out over 12 years (1991-2002) in the major wheat-growing areas of France. This model can help to choose from the cultivars resistant to several diseases (but very rarely resistant to all the diseases), those cultivars best adapted to a given environment, according to the hierarchy of potential disease intensities encountered.
Keywords: Winter wheat; Crop loss; Cultivar resistance to diseases; Septoria tritici blotch; Brown rust; Yellow rust; Powdery mildew; Genotype x environment interaction; Factorial regression

Adriana E. Lenardis, Catalina van Baren, Paola Di Leo Lira, Claudio M. Ghersa, Plant-soil interactions in wheat and coriander crops driving arthropod assemblies through volatile compounds, European Journal of Agronomy, Volume 26, Issue 4, May 2007, Pages 410-417, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.12.007.
(http://www.sciencedirect.com/science/article/B6T67-4N7Y8F1-1/2/412b9f01a9c23d5d0f6815b646adb5ab)
Abstract:
Arthropod assemblies are frequently determined by bottom-up interactions that include emission of organic volatile compounds. Therefore, changes in soil characteristics associated with land use history can influence the volatile emissions of plants affecting the structure of arthropod assemblies in croplands. This study aims (1) to study the relationships between soil degradation levels due to land-use history, and the change in particular soil chemical characteristics; (2) to analyze plant-soil interactions quantifying the effect of soil degradation on the production of biomass and grain yield of coriander and wheat crops, and on the production and chemical composition of volatile secondary metabolites in coriander grain; (3) to find the relationship between the analyzed plant-soil interactions and the emission of volatile signals affecting arthropod assemblies; and (4) to determine the relationship between particular chemical soil characteristics and the structure of arthropod assemblies. For these purpose, two experiments were carried out in which volatile compounds were conducted from source plots with soils with different levels of degradation, sown with wheat or coriander, to sink plots with similar soil, sown with wheat. Crops were evaluated on source plots, and the arthropods communities were assessed on sink-plots. Coriander produced high biomass, grain yield and essential oil in the favorable environments and wheat produced higher biomass and grain yield in soil with low degradation than with high degradation. Particular chemical soil elements, for example, Na, Fe, Mn, N and CEC and essential oil components, for example, [gamma]-trepanned, p-cymene, asinine and [beta]-pinene could be involved in the arthropods assemblies. Based on these results, arthropods communities in agricultural systems are, at least, partially controlled by chemical signals, which depend on plant-soil interactions.
Keywords: Coriander; Wheat; Arthropods; Volatile compounds; Soil degradation

Michael P. Fuller, Andrew M. Fuller, Spyridon Kaniouras, Jack Christophers, Troy Fredericks, The freezing characteristics of wheat at ear emergence, European Journal of Agronomy, Volume 26, Issue 4, May 2007, Pages 435-441, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.01.001.
(http://www.sciencedirect.com/science/article/B6T67-4N6FVHV-1/2/38c9542a8f70278de40447b6adde8e5e)
Abstract:
Wheat is occasionally exposed to freezing temperatures during ear emergence and can suffer severe frost damage. Few studies have attempted to understand the characteristics of freezing and frost damage to wheat during late development stages.
It was clearly shown that wheat appears to have an inherent frost resistance to temperatures down to -5 [degree sign]C but is extensively damaged below this temperature. Acclimation, whilst increasing the frost resistance of winter wheat in a vegetative state was incapable of increasing frost resistance of plants at ear emergence. It is proposed that the ability to upregulate frost resistance is lost once vernalisation requirement is fulfilled.
Culms and ears of wheat were able to escape frost damage at temperatures below -5 [degree sign]C by supercooling even to as low as -15 [degree sign]C and evidence collected by infrared thermography suggested that individual culms on a plant froze as independent units during freezing with little or no cross ice-nucleation strategies to protect wheat from frost damage in the field appear to revolve around avoiding ice nucleation.
Keywords: Wheat; Frost resistance; Electrical conductivity; Infrared thermography; Ice nucleation; Supercoooling

Rosella Motzo, Francesco Giunta, The effect of breeding on the phenology of Italian durum wheats: From landraces to modern cultivars, European Journal of Agronomy, Volume 26, Issue 4, May 2007, Pages 462-470, ISSN 1161-0301, DOI: 10.1016/j.eja.2007.01.007.
(http://www.sciencedirect.com/science/article/B6T67-4N5CST7-1/2/f55abb8507e002efcf3524c5bb8511e6)
Abstract:
An understanding of the changes in phenology resulting from durum wheat breeding in Italy can inform breeding objectives for durum wheat improvement in Mediterranean environments. The phenology of a set of 20 durum wheat cultivars, grouped according to their period of release into `old', `intermediate' and `modern', was compared in two sowings (September and May) with or without artificial vernalization. The vernalization treatment and the 6 h range in daylength and wide variation in temperature were responsible for the variation in anthesis date from 817 to 2105 [degree sign]Cd (base 0 [degree sign]C) from sowing. Old cultivars had the greatest photoperiod sensitivity and cold requirement, intermediate ones the greatest earliness per se and modern ones the least photoperiod sensitivity and greatest earliness per se. The first substantive effect of breeding in Italy on phenology was achieved with introgression from syriacum germplasm, which increased earliness both by an increase in earliness per se and a reduction in photoperiod sensitivity. The next step, characterized by the introduction of the semi-dwarfing gene Rht1, had a specific effect of reducing photoperiod sensitivity, although the modern group of varieties has a relatively low level of earliness per se, which is fundamental for preserving and increasing the length of the TS-anthesis period. Some quantitative cold requirement still persists in Italian germplasm, although all the cultivars tested are classified as spring types. The main phenological events affected by the changes in anthesis date resulting from breeding depend on the mechanism involved. Variability among cultivars within each group is also described.
Keywords: Durum wheat; Phenology; Breeding; Vernalization; Sowing date

Biljana Skrbic, Antonije Onjia, Multivariate analyses of microelement contents in wheat cultivated in Serbia (2002), Food Control, Volume 18, Issue 4, May 2007, Pages 338-345, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.10.017.

(http://www.sciencedirect.com/science/article/B6T6S-4HVDYMY-2/2/e9a3f286b38b763d35ad01ee71acc631)
Abstract:
Microelements in soft winter wheat grain samples collected from all over Serbian wheat growing regions were analyzed quantitatively by atomic absorption spectrophotometry. Microelement contents differed markedly among wheat samples harvested from various regions. The most frequently occurring pattern is Fe > Mn > Zn > Cu > Pb > As > Cd > Hg. Principal component analysis (PCA) and cluster analysis (CA) were applied to classify the samples according to their microelement contents. Four PCs, explaining 84% of total variance, correlate well with the following elements: PC1 with Cu, Mn, and Zn content; PC2 with Pb and As; PC3 with Cd; and PC4 with Hg. Iron fails to load significantly on any PCs. Physical meaning of PCs could be attributed to metabolic processes in wheat, soil type, vicinity of industrial centers and busy motorways, and application of agrochemicals.
Keywords: Microelements; Wheat; AAS; Principal component analysis; Cluster analysis; Pearson correlation

A.L. Charles, T.C. Huang, P.Y. Lai, C.C. Chen, P.P. Lee, Y.H. Chang, Study of wheat flour-cassava starch composite mix and the function of cassava mucilage in Chinese noodles, Food Hydrocolloids, Volume 21, Issue 3, May 2007, Pages 368-378, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.04.008.
(http://www.sciencedirect.com/science/article/B6VP9-4JWDY4F-4/2/ba27ff73133599d2fd5de11e07231215)
Abstract:
Starch and mucilage extracts of sweet cassava tubers were incorporated into wheat flour-cassava starch (WF-CS) composite mix to make Chinese noodle. CS was extracted from fresh 1- and 2-yr-old sweet cassava tubers and was mixed at an optimized ratio of 70:30 into patent hard red Spring wheat (HRSW) flour. Noodles of proportional substitution of cassava mucilage in WF-CS blends were also manufactured to investigate the hydrocolloidal properties of both extracts. Wheat noodles containing CS (WF-CS) showed improved textural attributes, cutting and biting forces especially tensile strengths than the control noodles. Cooking tests indicated improved cooking, texture properties with addition of 30% CS. The incremental addition of cassava mucilage demonstrated improved desirable color development in the WF-CS composite noodles and was proposed to inhibit or reduce intramolecular interaction among the amylopectin and amylose molecules, creating softer gel structures in the noodle food system. The diverse noodle textural developments were attributed to both molecular and hydrocolloidal properties of the extracts studied.
Keywords: Wheat flour; Cassava starch; Cassava mucilage; Chinese noodle

Cristina M. Rosell, Concepcion Collar, Monica Haros, Assessment of hydrocolloid effects on the thermo-mechanical properties of wheat using the Mixolab, Food Hydrocolloids, Volume 21, Issue 3, May 2007, Pages 452-462, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.05.004.
(http://www.sciencedirect.com/science/article/B6VP9-4KD5C24-1/2/245c52b54b17614661fab2cb3087806b)
Abstract:
Hydrocolloids have been revealed as very useful additives in breadmaking. However, interactions between them have been scarcely investigated. The effects of different molecular structure hydrocolloids (hydroxypropylmethylcellulose (HPMC), pectin (PC), guar gum (GG) and xanthan gum (XG)) on the wheat dough behaviour subjected to a dual mechanical shear stress and temperature constraint using the Mixolab device have been studied. HPMC incorporation induced the greatest benefits on wheat dough behaviour during mechanical shearing and thermal treatment resulting in a significantly increased water absorption, dough development time and

stability during mixing and decreased dough weakening with heating. Different synergistic (HPMC/XG on water absorption enhancement, HPMC/GG on dough stability increase) and antagonistic effects (HPMC/PC on dough development time, HPMC/GG on dough weakening) between hydrocolloids were observed. Special care should be taken when HPMC/XG are combined due to the deleterious effects of the pair on dough rheology during heating.
Keywords: Hydrocolloids; Wheat flour dough; Mixing and pasting properties; Mixolab

Zivile Luksiene, Honorata Danilcenko, Zivile Taraseviciene, Zilvinas Anusevicius, Audrone Maroziene, Henrikas Nivinskas, New approach to the fungal decontamination of wheat used for wheat sprouts: Effects of aminolevulinic acid, International Journal of Food Microbiology, Volume 116, Issue 1, 1 May 2007, Pages 153-158, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2006.12.040.
(http://www.sciencedirect.com/science/article/B6T7K-4MY0MC0-1/2/221cad6e4dee316c5264a3145e72cfda)
Abstract:
Nowadays, there is a growing interest in natural, minimally processed, nutritional and healthy foods. Sprouted seeds can be offered as natural nutritive products. Regrettably, existing seed decontamination technologies are limited and have specific disadvantages. 5-aminolevulinic acid (5-ALA) as a novel and effective tool for wheat decontamination from microfungi is proposed in this work. Inhibition of wheat with 5-ALA revealed a drastically suppressed development of microfungi. Studies of wheat germination characteristics showed that 5-ALA stimulates the growth of wheat seedlings and roots without impairing the vigor of germination and the viability of seeds. 5-ALA also induces either marginal or significant activities of antioxidant enzymes which can be associated with enhanced cellular capacity to detoxify reactive oxygen species. The results indicate that 5-ALA application may be an effective, environmentally friendly and inexpensive technology to be used in producing sprouts for human consumption.
Keywords: 5-Aminolevulinic acid; Wheat seeds; Germination; Microfungi; Antioxidant enzymes

Hongwei Yue, Dong Jiang, Tingbo Dai, Xiaodong Qin, Qi Jing, Weixing Cao, Effect of nitrogen application rate on content of glutenin macropolymer and high molecular weight glutenin subunits in grains of two winter wheat cultivars, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 248-256, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.003.
(http://www.sciencedirect.com/science/article/B6WHK-4MFJJ75-1/2/d9fb4454171716e70068c7eda208dda8)
Abstract:
Two winter wheat (Triticum aestivum L.) cultivars differing in grain protein content were selected to study the effect of N application rate on changes in contents of glutenin macropolymer (GMP) and high molecular weight glutenin subunits (HMW-GS) during grain filling. Contents of GMP and HMW-GS were much higher in the high GPC cultivar, Xuzhou 26, than those in low GPC cultivar, Ningmai 9. N increased contents of GMP and HMW-GS in Xuzhou 26 with N rate between 0 and 300 kg ha-1, while at the very high N rate of 300 kg ha-1 the contents of GMP and HMW-GS in Ningmai 9 decreased. The high contents of GMP and HMW-GS at maturity were closely related to the rapid increase in contents of GMP and HMW-GS during the initial period of their synthesis. HMW-GS and GMP content were closely correlated. The total HMW-GS content was important in determining GMP content than the content of any HMW-GS pair or any individual HMW-GS present in the selected cultivars. The pattern of response of GMP content to N application rate was closely related to the regulatory effect of N on HMW-GS synthesis.
Keywords: Winter wheat (Triticum aestivum L.); Glutenin macropolymer; High molecular weight glutenin subunits; Nitrogen rate

H. Chanvrier, S. Uthayakumaran, P. Lillford, Rheological properties of wheat flour processed at low levels of hydration: Influence of starch and gluten, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 263-274, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.006.
(http://www.sciencedirect.com/science/article/B6WHK-4MJC1YG-2/2/53470d34083beb27ae00f66f2c8ccf03)
Abstract:
The rheological properties of wheat flour under processing such as extrusion (with 28% moisture content, wet basis) are influenced by the molecular changes its components undergo during processing. But, there was no simple relationship between the wheat-flour characteristics and their rheological properties. In order to investigate the quantitative and qualitative effects of the individual flour components on rheological properties, model blends of wheat starch and wheat gluten with different starch/gluten ratios were studied. The effects of gluten and starch quality were also investigated by using different gluten types and by modifying the amylose content of starch, respectively. The shear viscosity of the blends, determined by capillary rheometry under controlled conditions (35% moisture content, 140 [degree sign]C), was observed to be modified by both gluten and amylose content. The changes undergone by wheat gluten under these conditions were analysed by HPLC, to determine the levels of unextractable polymeric proteins, and by Lab-on-a-Chip analysis of protein composition, to follow the polymerisation of protein under processing. This study indicated that in low hydrated products in the molten state, shear viscosity is affected by the structure of the blends as determined by fluorescence microscopy and by the molecular changes occurring during processing.
Keywords: Wheat flour; Starch-gluten blends; Capillary rheometry; Protein molecular size; Product structure

R. Kieffer, F. Schurer, P. Kohler, H. Wieser, Effect of hydrostatic pressure and temperature on the chemical and functional properties of wheat gluten: Studies on gluten, gliadin and glutenin, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 285-292, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.008.
(http://www.sciencedirect.com/science/article/B6WHK-4MHPHM4-1/2/b3732d3b02c2d1ec008e1ea6a31dbf18)
Abstract:
The effect of hydrostatic pressure (0.1-800 MPa) in combination with various temperatures (30-80 [degree sign]C) on the chemical and physical properties of wheat gluten, gliadin and glutenin was studied. Chemical changes of proteins were determined by extraction, reversed-phase high-performance liquid chromatography (HPLC), sodium dodecylsulphate (SDS) polyacrylamide gel electrophoresis (PAGE), circular dichroism (CD) spectroscopy, thiol measurement and studies on disulphide bonds. Rheological changes were measured by extension tests and dynamic stress rheometry. Treatment of gluten with low pressure (200 MPa) and temperature (30 [degree sign]C) increased the proportion of the ethanol-soluble fraction (ESF) and decreased gluten strength. The enhancement of both pressure and temperature provoked a strong reduction of the ESF and the thiol content of gluten. Within gliadin types, cysteine containing [alpha]- and [gamma]-gliadins, but not cysteine-free [omega]-gliadins were sensitive to pressure and were transferred to the ethanol-insoluble fraction. Disulphide peptides isolated from treated gluten confirmed that cleavage and rearrangement of disulphide bonds were involved in pressure-induced reactions. Increased pressure and temperature induced a significant strengthening of gluten, and under extreme conditions (e.g. 800 MPa, 60 [degree sign]C), gluten cohesivity was lost. Isolated gliadin and glutenin reacted differently: solubility, HPLC and SDS-PAGE patterns of gliadin having a very low thiol content were not influenced by pressure and heat treatment; only conformational changes were detected by CD spectroscopy. In contrast, the properties of isolated glutenin having a relatively high thiol content were strongly affected by high pressure and temperature, similar to the effects on total gluten.

Keywords: Wheat gluten; Hydrostatic pressure; Protein solubility; Rheological properties

Wujun Ma, Mark W. Sutherland, Stephen Kammholz, Phillip Banks, Paul Brennan, William Bovill, Grant Daggard, Wheat flour protein content and water absorption analysis in a doubled haploid population, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 302-308, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.005.
(http://www.sciencedirect.com/science/article/B6WHK-4MM8BDK-1/2/ff1b3de2f52e9bbbd9947d2e5f88ff4b)
Abstract:
A wheatxmaize induced doubled haploid population that segregates at the Awned locus for awned and awnless phenotypes were studied at two field sites using a genetic linkage map. Interval QTL analysis indicated that significant QTLs for wheat flour water absorption and protein content were located on a linkage group associated with the morphological marker, awns. The QTL peak for flour water absorption was located at the Awned locus (B1, 5AL), whilst the QTL peak for protein content was located nearby, 10.1 cm away from the Awned locus. The locations of those QTL were confirmed by analysing data from two independent field trials conducted under different environment conditions. The QTL identified for water absorption controlled 12% and 11% of the observed variance at the two field trials, whilst for flour protein content the QTL explained 7% and 19% of the variance respectively. Variance component analysis indicated that the QTL for water absorption controlled approximately 14.8-25.0% and 13.6-23% of the genetic variance at the two sites studied (Roma and Jimbour) whilst the QTL for protein content explained between 12.8% and 30.4% of the genetic variance at Roma and 34.7-82.6% at Jimbour. Cross-site analysis with composite interval mapping approach resulted in significant LOD values of 6.12 and 9.94 for water absorption and protein content, respectively. The QTL for water absorption was independent from the hardness locus.
Keywords: Wheat flour; Protein content; Water absorption; Awn; QTL

F. Dal Bello, C.I. Clarke, L.A.M. Ryan, H. Ulmer, T.J. Schober, K. Strom, J. Sjogren, D. van Sinderen, J. Schnurer, E.K. Arendt, Improvement of the quality and shelf life of wheat bread by fermentation with the antifungal strain Lactobacillus plantarum FST 1.7, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 309-318, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.004.
(http://www.sciencedirect.com/science/article/B6WHK-4MJBTKX-1/2/57cb68f40cf62198d4e59f09f1bdef13)
Abstract:
Lactobacillus plantarum FST 1.7 was screened for in vitro antimicrobial activity and was shown to be active against spoilage moulds and bacteria. Isolation of antimicrobial compounds from cell-free supernatant identified lactic acid, phenyllactic acid and the two cyclic dipeptides cyclo (l-Leu-l-Pro) and cyclo (l-Phe-l-Pro) as the major components responsible for this activity. L. plantarum FST 1.7 was tested for the ability to produce the antifungal compounds during sourdough fermentation and to produce bread of good quality and increased shelf-life. A rheofermentometer was used to examine the gaseous release and development characteristics of the dough. A range of parameters was determined including pH, TTA and specific loaf volume. The results were compared with those obtained using Lactobacillus sanfranciscensis, a chemically acidified and a non-acidified dough. The quality of sourdough and bread produced using L. plantarum FST 1.7 was comparable to that obtained using common sourdough starters, e.g. L. sanfranciscensis. Sourdoughs and breads were evaluated for the ability to retard growth of Fusarium culmorum and Fusarium graminearum two fungi found on breads. Sourdough and bread produced with strain FST 1.7 showed consistent ability to retard the growth of both Fusarium species, thus indicating that L. plantarum FST 1.7 has also the potential to improve the shelf-life of wheat bread.
Keywords: Wheat bread; Lactobacillus; Antifungal; Cyclic dipeptides

Z.H. Liu, H.Y. Wang, X.E. Wang, G.P. Zhang, P.D. Chen, D.J. Liu, Phytase activity, phytate, iron, and zinc contents in wheat pearling fractions and their variation across production locations, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 319-326, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.10.004.
(http://www.sciencedirect.com/science/article/B6WHK-4MJBTKX-3/2/c2cc33fb7233e538f6ef4dcf39da5e4d)
Abstract:
Pearling is an effective method for evaluating the distribution of chemical components in wheat grain. Twelve pearling fractions (P1-P12) of wheat grain were obtained using two rice polishers for 10 cultivars (six soft red wheats and four hard white wheats) grown at two locations with different environmental conditions in Jiangsu Province, China. The results show that the effects of cultivar, location, and pearling on wheat flour phytase activity, phytate, iron, and zinc contents were all significant, with pearling having the greatest effect. All the four components showed a diminishing trend as pearling progressed from the outer layers to the inner part of wheat grain. Generally, the P2 fraction (the outer 4-8% layer of wheat grain) had the highest phytase activity and phytate and iron contents, whereas the P1 fraction (the outer 0-4% layer) ranked the highest for zinc content. Growing location had a large influence on grain phytase, phytate, and iron, but the differences between locations decreased as pearling level increased.
Keywords: Phytase; Phytate; Iron; Zinc; Pearling; Production locations; Wheat

Carla D. Mejia, Lisa J. Mauer, Bruce R. Hamaker, Similarities and differences in secondary structure of viscoelastic polymers of maize [alpha]-zein and wheat gluten proteins, Journal of Cereal Science, Volume 45, Issue 3, May 2007, Pages 353-359, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.009.
(http://www.sciencedirect.com/science/article/B6WHK-4MJC1YG-3/2/45624f65b39da9c1cc29eb0c01e833df)
Abstract:
The secondary structure of a dough-like zein polymer was compared to the structure present in a wheat viscoelastic system using FT-IR spectroscopy. When zein was mixed at 35 [degree sign]C, which is above its glass transition temperature (Tg), changes in its secondary structure suggested that the protein loses its native structure, mainly composed of [alpha]-helices (~68%), and a viscoelastic system is formed by a structural rearrangement that favors [beta]-sheet structures. This rearrangement is very similar to the structural changes observed in gluten viscoelastic polymers. Upon removal of shear stress, the zein polymer showed a rapid decrease in the proportion of [beta]-sheet structures (from ~48% to ~28% after the first 3 min) in favor of unordered structures. At the same time, the viscoelasticity of the polymer decreased rapidly. In contrast, gluten, in a similar viscoelastic system and held at the same temperature, showed a fairly constant high content of [beta]-sheet structures (~49%) coinciding with the slow relaxation time typical of gluten networks after the removal of shear. We speculate that the addition of a protein capable of causing extensive and stable [beta]-sheet formation in the zein-starch viscoelastic polymer could increase the stability and relaxation time of the zein system and, thereby, create the possibility of a zein dough with similar functionality to a wheat viscoelastic system.
Keywords: Zein; Gluten; Secondary structure; Glass transition

S. Yanniotis, A. Petraki, E. Soumpasi, Effect of pectin and wheat fibers on quality attributes of extruded cornstarch, Journal of Food Engineering, Volume 80, Issue 2, May 2007, Pages 594-599, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.06.018.
(http://www.sciencedirect.com/science/article/B6T8J-4KSSW3B-2/2/df18d5bed6d8766ce9013779c516f235)
Abstract:

The effect of pectin alone or in combination with wheat fiber on the physical and structural properties of extruded cornstarch, under specific moisture content, barrel temperature and screw speed conditions were studied using a Laboratory single screw extruder. The expansion ratio, the moisture content and the porosity decreased as the concentration of the fibers increased, while hardness increased. Fibers also reduced the size of the cells and increased their number. Pectin increased porosity and reduced expansion ratio and hardness but there was not any apparent effect of pectin on the size and the number of the cells. Interaction between fibers and pectin does not give a statistically significant effect on any of the attributes studied.
Keywords: Extrusion; Snacks; Fiber; Pectin; Functional foods

Anna Maria De Leonardis, Daniela Marone, Elisabetta Mazzucotelli, Fahima Neffar, Fulvia Rizza, Natale Di Fonzo, Luigi Cattivelli, Anna Maria Mastrangelo, Durum wheat genes up-regulated in the early phases of cold stress are modulated by drought in a developmental and genotype dependent manner, Plant Science, Volume 172, Issue 5, May 2007, Pages 1005-1016, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.02.002.
(http://www.sciencedirect.com/science/article/B6TBH-4N1464G-3/2/492e9ae5f7e807906dd5cd52153dd54f)
Abstract:
A set of 10 durum wheat genes isolated as early induced in response to cold and light and 10 Cbf genes were tested for their expression in a range of durum wheat samples obtained from plants at different stages of development and exposed to different dehydration conditions. All tested genes showed some transcript accumulation also in response to water stress, indicating that each of them represents a target of the cold and dehydration signalling pathways. Gene expression profiles changed in response to water stress treatment in a way strictly dependent on developmental phase, tissue analysed and stress protocol applied. Significant differences were observed in dehydration-dependent transcript accumulation when durum wheat varieties, chosen on the basis of their tolerance to water stress, were analysed. Genes clearly up-regulated by water stress in some genotypes, but down-regulated in others were also found. Among the cultivars tested the most tolerant variety, Ofanto, showed the highest number of up-regulated genes. These findings also point out that a general frame of the molecular response to water stress cannot be drown from the analysis of few experiments, rather the plant molecular response to dehydration changes continuously resulting from an integration of a series of internal and external stimuli.
Keywords: Durum wheat; e-cor Genes; Cbf genes; Water stress

Gurpreet Singh, S.K. Jalota, Yadvinder Singh, Manuring and residue management effects on physical properties of a soil under the rice-wheat system in Punjab, India, Soil and Tillage Research, Volume 94, Issue 1, May 2007, Pages 229-238, ISSN 0167-1987, DOI: 10.1016/j.still.2006.07.020.
(http://www.sciencedirect.com/science/article/B6TC6-4KYY3JD-1/2/ad97dd4b452e818a5d74ec984a8c2a58)
Abstract:
Sustainability of the rice-wheat rotation is important to Asia's food security. Intensive cropping with no return of crop residues and other organic materials results in loss of soil organic matter and is not sustainable. We evaluated effect of eight treatments comprised of various combinations of green manure (GM), wheat straw (WS), rice straw (RS), farmyard manure (FYM) and urea alone (control) on physical and hydraulic properties of soil in a rice-wheat experiment (1988-2001) on a loamy sand in Punjab, India. After rice harvest, organic carbon (OC) content in the FYM (0.51%), WS (0.56%) and WS + RS (0.59%) treatments were significantly greater as compared to control (0.42%). With addition of GM to all these treatments; FYM + GM (0.59%), WS + GM (0.60%), WS + RS + GM (0.64%) and GM (0.47%), organic carbon content further increased significantly. Increased OC content of the soil in turn improved its aggregation status, infiltration rate and

decreased the bulk density, dispersion ratio and soil strength correspondingly. After wheat harvest mean effects of these organic treatments continued, but their magnitude decreased. The differences in rice yield were not significant among urea, GM and WS applied alone or in combination. However, FYM + GM + urea produced highest yield. There was no residual effect of the long-term application of GM, WS and RS incorporation in wheat yields, but FYM application to rice showed significant residual effects on wheat.
Keywords: Organic manures; Soil organic carbon; Soil physical properties; Rice; Wheat

Xiaolei Zhou, Hui Wang, Quangong Chen, Jizhou Ren, Coupling effects of depth of film-bottomed tillage and amount of irrigation and nitrogen fertilizer on spring wheat yield, Soil and Tillage Research, Volume 94, Issue 1, May 2007, Pages 251-261, ISSN 0167-1987, DOI: 10.1016/j.still.2006.07.015.
(http://www.sciencedirect.com/science/article/B6TC6-4KV2R9B-3/2/cc819cdd5ff61d28ca314a5fdbb558b8)
Abstract:
The crop cultivation with film-bottomed tillage may benefit more, but little is known about the coupling effects of depth of film-bottomed tillage (DFBT) and amount of irrigation and nitrogen (N) fertilizer on spring wheat yield. A field quadratic regression orthogonal design experiment was conducted to determine the effects of DFBT, irrigation and N fertilization on seed yield of spring wheat (Triticum aestivum L.) in the Hexi Corridor, China from 2002 to 2005. Five levels of irrigation (143, 165, 225, 285, and 306 mm), five levels of N (45, 70, 140, 210, and 235 kg N ha-1) and five DFBT (46, 60, 70, 80, and 94 cm) were investigated. Irrigation (44 mm <= irrigation <= 300 mm), DFBT (46 cm <= DFBT <= 80 cm), and N (<=160 kg N ha-1) significantly increased wheat yield. DFBT, N and irrigation had a positive effect on wheat yield, in the order: irrigation > N > DFBT. The coupling between DFBT x N and, between N x irrigation had a synergistic effect on spring wheat yield. The coefficient of DFBT x irrigation was negative showing the coupling of DFBT x irrigation had a reciprocal inhibition or substitution effect. The findings suggest that spring wheat should be irrigated with 300 mm of water, with an application of 160 kg N ha-1 and a 70 cm DFBT in the arid climate and sandy soil areas of China, to obtain the highest wheat yield with maximum economic benefit. The assessment with respect to N fertilizer use efficiency, environmental pollution need further research.
Keywords: Spring wheat (Triticum aestivum L.) yield; Coupling effect; Nitrogen; Depth of film-bottomed tillage; Irrigation; Sandy soil

Thomas Kichey, Bertrand Hirel, Emmanuel Heumez, Frederic Dubois, Jacques Le Gouis, In winter wheat (Triticum aestivum L.), post-anthesis nitrogen uptake and remobilisation to the grain correlates with agronomic traits and nitrogen physiological markers, Field Crops Research, Volume 102, Issue 1, 30 April 2007, Pages 22-32, ISSN 0378-4290, DOI: 10.1016/j.fcr.2007.01.002.
(http://www.sciencedirect.com/science/article/B6T6M-4N3GNW4-1/2/57d4520107a1d7bc413e88f60a06f909)
Abstract:
In wheat, nitrogen (N) uptake and remobilisation after flowering contributes largely, in Northern countries, to grain yield and grain protein content. The aim of our study was first to estimate the proportion of N taken up and remobilised to the grain as well as their relative efficiency using 15NO3--labelling at flowering. The validity of the technique was assessed in comparison to the N budget calculation method on five winter wheat cultivars grown for 2 years at low and high fertilization input. We estimated that on average 71.2% of grain N originates from remobilisation with significant genotypic differences. Among the five genotypes, significant differences were also found for both N remobilisation efficiency (from 69.8 to 88.8%) and N translocation efficiency (from 89.7 to 93.4%). In parallel, during 1 year, we monitored physiological markers representative of N

assimilation and recycling at two sampling dates during the grain filling period. We then examined if there was any relationship between these physiological markers, N absorption and remobilisation estimates and agronomic traits related to yield and grain N content. Nitrate reductase (NR) activity was highly correlated to N absorbed post-flowering and to grain protein content. Glutamine synthetase (GS) activity was even more highly correlated than NR activity to the amount of N remobilised and grain yield. The use of physiological traits such as NR and GS activities as markers of the wheat N status is discussed.
Keywords: Glutamate dehydrogenase; Glutamine synthetase; Nitrate reductase; N use efficiency; Triticum aestivum

Isabel Mira, V. Kurtis Villwock, Karin Persson, On the effect of surface active agents and their structure on the temperature-induced changes of normal and waxy wheat starch in aqueous suspension. Part II: A confocal laser scanning microscopy study, Carbohydrate Polymers, Volume 68, Issue 4, 23 April 2007, Pages 637-646, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.07.036.
(http://www.sciencedirect.com/science/article/B6TFD-4KYY3V6-3/2/5eeaa1c8db695424fa88ca0a1f5ba846)
Abstract:
The location and penetration patterns of two fluorescently labelled, surface active molecules into normal and waxy wheat starch granules prior, during and after the temperature-induced gelatinization were studied by means of confocal laser scanning microscopy (CLSM). Amphiphilic dyes were found to have a tendency to penetrate wheat starch granules in aqueous suspension. The penetration patterns were however found to be dependent on the contact time, type of starch and the chain length (C12 vs. C16) of the amphiphilic dye. The penetration of amphiphilic dyes through the starch granule matrix proved to be less restricted in waxy than in normal wheat starch. For a given type of starch, the penetration of the longer chain dye was more constrained than that of the shorter chain one. The extent to which the dye diffuses into the granule matrix as it gelatinizes is also affected by the chain length of the dye, diffusion of the shorter chain dye occurring more profusely and at lower temperatures than for the longer chain one. These differences are suggested to be related to the dissociation temperature of the AM-amphiphilic dye complexes.
Keywords: Starch gelatinization; Amphiphilic dyes; CLSM; Wheat starch; Waxy wheat starch

Isabel Mira, Karin Persson, V. Kurtis Villwock, On the effect of surface active agents and their structure on the temperature-induced changes of normal and waxy wheat starch in aqueous suspension. Part I. Pasting and calorimetric studies, Carbohydrate Polymers, Volume 68, Issue 4, 23 April 2007, Pages 665-678, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.07.032.
(http://www.sciencedirect.com/science/article/B6TFD-4KXDR6X-2/2/8c0d57595686f0fee23b594fd62dbd06)
Abstract:
Pasting and calorimetric studies of normal and waxy wheat starch were performed in the presence of a series of ionic (sulphates, trimethyl ammonium bromides) and non-ionic (monoglycerides, maltosides) short (12 carbon atoms) and long (16 carbon atoms) n-alkyl chain surfactants. With the exception of the alkyl ammonium bromides, all of the short chain surfactants lower the pasting temperature (PT) in normal wheat starch, while the long chain surfactants have the opposite effect. Contrary, regardless of their chain length, all ionic surfactants lower the PT in waxy wheat starch while the non-ionic surfactants induce small, sometimes almost negligible changes in the PT. Calorimetric studies revealed the absence of a direct connection between the effect of surfactants on the onset of the starch gelatinization transition and the PT. However, in the presence of all surfactants, except the alkyl ammonium bromides, the PT of normal wheat starch was found to lie within or very close the temperature range within which the dissociation of the amylose-surfactant complexes takes place. Waxy wheat starch, in contrast, pasted at temperatures that fell within the

temperature range of the starch gelatinization transition. This is taken as evidence of the existence of a correlation between the PT and the dissociation of the amylose-surfactant complexes.
Keywords: Surfactants; Starch gelatinization; Starch pasting; Wheat starch; Waxy wheat starch

Longhui Li, Qiang Yu, Quantifying the effects of advection on canopy energy budgets and water use efficiency in an irrigated wheat field in the North China Plain, Agricultural Water Management, Volume 89, Issues 1-2, 16 April 2007, Pages 116-122, ISSN 0378-3774, DOI: 10.1016/j.agwat.2006.12.003.
(http://www.sciencedirect.com/science/article/B6T3X-4MWGYKJ-1/2/ea0facafbac7597bff2a927e4e786b67)
Abstract:
Competing demands for water with increasing population calls for developing strategies for increasing the crop water use efficiency (WUE) of irrigated crops, especially in the semiarid regions of the world. In this context, it is important to quantify the various factors that control the WUE of irrigated crops in these regions. Advection is an important factor that can have significant effects on the energy exchange in irrigated fields of arid regions, and hence control the crop canopy WUE (CWUE). An eddy covariance system was applied to measure water and heat fluxes and then to quantify advection in an irrigated winter wheat filed at the Yucheng Integrated Experiment Station, Chinese Academy of Sciences in the North China Plain (NCP) (36[degree sign]57'N, 116[degree sign]36'E, 28 m a.s.l.) in 2004. Priestley-Taylor parameter and canopy-air temperature differences were employed to identify the occurrence of advection. Effects of advection on canopy energy budgets and CWUE were examined by computing the equilibrium and advective evapotranspiration. It was found that enhanced advection occurs when the crop canopy-air temperature differences are negative or when the Priestley-Taylor parameter takes on values >1.5. Due to enhanced advection, the percentage of latent and sensible heat flux exchange contribution to the total water loss from the fields through evapotranspiration can exceed 50%, and CWUE decreased remarkably. Advection in the experiments probably resulted from drier soil regimes in the upwind areas.
Keywords: Energy balance; Advection; Priestley-Taylor parameter; Canopy-air temperature difference; Canopy water use efficiency

Stephen Hobbs, Cedric Seynat, Panos Matakidis, Videogrammetry: A practical method for measuring vegetation motion in wind demonstrated on wheat, Agricultural and Forest Meteorology, Volume 143, Issues 3-4, 10 April 2007, Pages 242-251, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2006.12.008.
(http://www.sciencedirect.com/science/article/B6V8W-4MW9018-1/2/5514029f7036ed0506fd20c384616f14)
Abstract:
Plant motion in wind is a common phenomenon but has rarely been quantified. Among other effects, plant motion is known to affect the quality (or 'coherence') of interferometric radar images although the loss of quality is so far only understood qualitatively. The videogrammetry technique reported here was developed to obtain measurements of wheat plant motion in wind through a growing season to enable quantitative modelling of radar interferometric coherence for wheat fields, and so to improve our understanding of the radar imaging process for real vegetation.
Videogrammetry using standard consumer camcorders was used to measure plant motion since it is a practical field technique which does not disturb the plants significantly. Small targets placed on the plants are tracked in 3D using stereo pairs of video images and allow the motion of individual plant elements to be measured. Local wind measurements were recorded in parallel with the video data. Examples of the data obtained and their analysis are presented. Specific results are shown for the amplitude of wheat plant motion versus windspeed, the variation of the plants' oscillation

frequency through the growing season, and the spatial coherence of the motion of neighbouring plants.
The results demonstrate that videogrammetry using 'high-street' consumer equipment is a practical technique for the measurement of plant motion in wind.
Keywords: Wheat; Vegetation motion; Wind; Radar; Videogrammetry

Angelika Mustroph, Gerd Albrecht, Fermentation metabolism in roots of wheat seedlings after hypoxic pre-treatment in different anoxic incubation systems, Journal of Plant Physiology, Volume 164, Issue 4, 5 April 2007, Pages 394-407, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.02.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4JRM019-3/2/30d7e0cdbb6752d7a3df470ac351c29f)
Abstract: Summary
A hypoxic pre-treatment (HPT) can improve the anoxic survival of flooding sensitive plants. Here, we tested whether a 4-d HPT of wheat plants (Triticum aestivum L.) would improve their anoxic resistance, and if so, why. We found that the metabolic adjustment during prolonged HPT involved an increased lactate excretion rate, the up-regulation of glycolytic and fermentative enzymes as well as the accumulation of various sugars. Therefore, HPT wheat roots could sustain a 3 times higher ethanolic fermentation rate during an anoxic period compared to non-pre-treated (NHPT) roots. Nevertheless, the enhanced fermentation rate provided temporary relief to the energy crisis only, and both NHPT and HPT plants died after 5 d of anoxia in illumination. Comparison of different low oxygen incubation systems using excised roots or roots of intact plants revealed striking differences. The benefits of intact shoots, oxygen transport as well as additional sugar supply enabled a more stable energy supply of anoxia-treated NHPT and HPT roots. However, the height of the fermentation rate was correlated with a high ATP content during dark anoxic incubation, but not in illumination.
Keywords: Anoxia; Ethanol; Fermentation; Hypoxic pre-treatment; Triticum aestivum (wheat)

Tomoko Tamura, Kaede Terauchi, Toshihiro Kiyosaki, Tomiko Asakura, Junko Funaki, Ichiro Matsumoto, Takumi Misaka, Keiko Abe, Differential expression of wheat aspartic proteinases, WAP1 and WAP2, in germinating and maturing seeds, Journal of Plant Physiology, Volume 164, Issue 4, 5 April 2007, Pages 470-477, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.02.009.
(http://www.sciencedirect.com/science/article/B7GJ7-4JXPS07-2/2/f79172c9a9df3da9cd9bd76dd66d0855)
Abstract: Summary
Two aspartic proteinase (AP) cDNA clones, WAP1 and WAP2, were obtained from wheat seeds. Proteins encoded by these clones shared 61% amino acid sequence identity. RNA blotting analysis showed that WAP1 and WAP2 were expressed in both germinating and maturing seeds. The level of WAP2 mRNA expression was clearly weaker than that of WAP1 in all tissues of seeds during germination and maturation. APs purified from germinating seeds were enzymatically active and digested the wheat storage protein, gluten. To elucidate the physiological functions of WAP1 and WAP2 in seeds, we investigated the localisation of WAP1 and WAP2 by in situ hybridisation. In germinating seeds investigated 24 h after imbibition, both WAP1 and WAP2 were expressed in embryos, especially in radicles and shoots, scutellum, and the aleurone layer. In maturing seeds, WAP1 was expressed in the whole embryo, with slightly stronger expression in radicles and shoots. WAP1 was also expressed in the aleurone layer 3 weeks after flowering. Strong signals of WAP1 mRNA were detected in the whole embryo and aleurone layer 6 weeks after flowering. On the other hand, WAP2 was scarcely detected in seeds 3 weeks after flowering, and thereafter weak signals began to appear in the whole embryo. WAP1 and WAP2 were expressed widely in germinating and maturing seeds. Such diversity in site- and stage-specific expression of the two enzymes suggests their differential functions in wheat seeds.
Keywords: Aspartic proteinase; Germination; Seed maturation; Wheat; Wheat storage protein

Carmelina Spano, Riccardo Buselli, Monica Ruffini Castiglione, Stefania Bottega, Isa Grilli, RNases and nucleases in embryos and endosperms from naturally aged wheat seeds stored in different conditions, Journal of Plant Physiology, Volume 164, Issue 4, 5 April 2007, Pages 487-495, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.03.015.
(http://www.sciencedirect.com/science/article/B7GJ7-4KHC2WS-1/2/d7c17bddf7072470db94e0ee0da86aea)
Abstract: Summary
Temperature and moisture content are particularly important factors influencing the longevity of seeds, and therefore the ageing of seeds is closely tied to storage conditions. The ageing process is characterised by many physiological and biochemical changes: membranes tend to leak, enzymes lose catalytic activity, and chromosomes accumulate mutations. Since viability loss is also associated with the breakdown of nucleic acids, the aim of the study was to determine whether the damage induced by ageing could be associated with changes in the activity of RNases and nucleases in embryos and endosperms of differently stored wheat seeds. In order to better characterise seed conditions, the damage to membranes during seed ageing was evaluated by measuring the conductivity of the soaking solution during imbibition, and by using the Evans Blue colorant; lipid peroxidation was also recorded. RNases and nucleases were studied by SDS-PAGE and activity staining. Ageing of seeds stored in a dry state involved a progressive loss of membrane integrity, which increased with the degree of ageing, while lipid peroxidation remained unchanged. Changes in nucleolytic enzyme activity were recorded in embryos: a decrease in RNases and an increase in nucleases. In the endosperm compartment there were no significant differences in ribonuclease and nuclease patterns during seed ageing. Moreover, neutral RNases were absent in endosperms of dry seeds and were activated following imbibition. Present studies reveal that embryos and endosperms have different enzymatic patterns, thus highlighting that the two seed compartments age independently. A different nucleolytic pattern was present in seeds of comparable viability and membrane damage, which were stored differently, and nuclease metabolism was subject to regulation according to both ageing and the length of the storage period.
Keywords: Embryo; Endosperm; Nucleases and RNases; Seed ageing; Triticum durum Desf.

Nong-nong SHI, Guang-yuan HE, Ke-xiu LI, Hui-zhong WANG, Guan-ping CHEN, Ying XU, Transferring a Gene Expression Cassette Lacking the Vector Backbone Sequences of the 1Ax1 High Molecular Weight Glutenin Subunit into Two Chinese Hexaploid Wheat Genotypes, Agricultural Sciences in China, Volume 6, Issue 4, April 2007, Pages 381-390, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60060-1.
(http://www.sciencedirect.com/science/article/B82XG-4NKBGKG-1/2/a7f8a9bf30b875f180459ebf5278f7b7)
Abstract:
lAxl high molecular weight glutenin subunit (HMW-GS) gene expression cassette (GEC) lacking vector backbone sequences together with selectable marker Bar GEC were co-transformed into Chinese hexaploid cultivars Een 1 and Emai 12 to test the feasibility and the efficiency of explant regeneration, transformation frequency and transgene expression comparing with whole vector transformation by the approaches of plasmid extraction and excision, immature embryo isolation, particle co-bombardment, tissue culture, DNA extraction, PCR amplification, southern hybridization, leaf-painting test and SDS-PAGE etc. No significant difference was shown in tissue culture response of the proportion of embryogenic calli, somatic embryogenesis and regeneration frequency between GEC and whole plasmid bombarded embryos, but both regenerated less well than non-bombarded control. Total 56 plantlets that survived PPT selection had insertion of at least the Bar gene, 18 were from the GEC treatment and 38 from the whole plasmid treatment, the escape ratio averaged 0.23. Six independent transplants f230 - f235 with GEC transformation from

genotype Emai 12 presented clear PCR amplification bands of Bar and lAxl gene. The transformation and co-transformation frequency were 3.51 and 100% respectively. PCR amplification using a primer-pair specific for ampicillin resistant gene indicated the existence of AmpR gene in whole vectors but the removal in GECs and transplants. Southern blot of total DNA and PCR products from transgenic plants of lAxl GEC confirmed the integration of the transgene lAxl and the absence of the EcoR I recognition site at both ends of the lAxl GEC when integrated. SDS-PAGE showed the expression of lAxl GEC and un-expression of whole plasmid. The length of integrated fragment, the proportion of the gene of interest (GOI) and the selectable marker (MG), bombardment pressure and genotypes are vital for the expression of a transformed GEC.
Keywords: Triticum aestivum L.; HMW-GS; 1Ax1; gene expression cassette; transformation frequency; expression

Rui-yue ZHANG, Zhao-shi XU, Lian-cheng LI, Ming CHEN, You-zhi MA, Isolation and Expression Analysis of a Novel Abiotic Stress-Induced Gene W89 from Wheat, Agricultural Sciences in China, Volume 6, Issue 4, April 2007, Pages 391-398, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60061-3.
(http://www.sciencedirect.com/science/article/B82XG-4NKBGKG-2/2/0f2dd519d07feaa400116b3f1d10e451)
Abstract:
Water stress and cold stress are important factors restricting plant growth. However, there is little knowledge on the function of stress-responsive genes in plants. Therefore, it is necessary to clone some important genes to study the mechanism of plant adaptation to abiotic stress for improvement of plant resistance. A putative water stress-induced gene, W89, was cloned from the cDNA library of drought-treated wheat seedlings by phage hybridization in situ, and its entire length was obtained using 5'-rapid amplification of cDNA ends (RACE) and reverse transcription-polymerase chain reaction (RT-PCR). The full-length cDNA of W89 consists of 2392 bp and contains a 1896 bp open reading frame (ORF) encoding a 631 amino acid protein. Southern blot analysis indicated that W89 was a single-copy gene. RT-PCR analysis revealed that the expression of W89 was upregulated by drought, cold, and abscisic acid (ABA). Amino acid sequence analysis discovered that W89 had a conserved region of DUF248 (pfam03141), which contained a methyltransferase domain with a sterile alpha motif (SAM)-binding motif. Phylogenetic analysis showed that W89 was 66% identical to Oryza sativa dehydration-responsive protein (BAD67956). It was supposed that W89 was a novel dehydration-responsive protein encoding gene. On the basis of the functions of methyltransferase and the SAM-binding motif, the SAM-binding motif of W89 was supposed to be connected with other proteins or transcription factors to transduce stress signals and finally regulate the expression of stress-responsive genes on the early stage of drought stress.
Keywords: wheat; water stress; cold; gene cloning

Merethe Bagge, Xianchun Xia, Thomas Lubberstedt, Functional markers in wheat, Current Opinion in Plant Biology, Volume 10, Issue 2, Genome Studies and Molecular Genetics / Edited by Stefan Jansson and Edward S Buckler, April 2007, Pages 211-216, ISSN 1369-5266, DOI: 10.1016/j.pbi.2007.01.009.
(http://www.sciencedirect.com/science/article/B6VS4-4N14DD3-2/2/80be6365d4e1300013698d806ccd6f5c)
Abstract:
Wheat (Triticum aestivum L.) is one of the most important staple crops world-wide. Gene-derived `functional' markers (FMs, also called perfect or diagnostic markers elsewhere) would be the ideal tools for marker-assisted breeding of wheat but, at present, their utility is restricted by the limited availability of genes that control agronomic characters. This bottleneck will be overcome in the next decade by ongoing genomics projects. Another obstacle for assigning sequence to trait

variation is the high level of linkage disequilibrium (LD) found in elite materials. Thus, although laborious, TILLING seems to be the most promising approach for targeting sites in genes of interest for FM development. Once larger numbers of FMs become available for wheat breeding, they might be useful in exploiting the fixed genetic variation that is present in regions of high LD.

Alejandro Del Pozo, Pilar Perez, Diego Gutierrez, Aitor Alonso, Rosa Morcuende, Rafael Martinez-Carrasco, Gas exchange acclimation to elevated CO2 in upper-sunlit and lower-shaded canopy leaves in relation to nitrogen acquisition and partitioning in wheat grown in field chambers, Environmental and Experimental Botany, Volume 59, Issue 3, April 2007, Pages 371-380, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2006.04.009.
(http://www.sciencedirect.com/science/article/B6T66-4K4WH42-1/2/a252696cd3a350cefed54d650af85683)
Abstract:
Growth at elevated CO2 often decreases photosynthetic capacity (acclimation) and leaf N concentrations. Lower-shaded canopy leaves may undergo both CO2 and shade acclimation. The relationship of acclimatory responses of flag and lower-shaded canopy leaves of wheat (Triticum aestivum L.) to the N content, and possible factors affecting N gain and distribution within the plant were investigated in a wheat crop growing in field chambers set at ambient (360 [mu]mol mol-1) and elevated (700 [mu]mol mol-1) CO2, and with two amounts of N fertilizer (none and 70 kg ha-1 applied on 30 April). Photosynthesis, stomatal conductance and transpiration at a common measurement CO2, chlorophyll and Rubisco levels of upper-sunlit (flag) and lower-shaded canopy leaves were significantly lower in elevated relative to ambient CO2-grown plants. Both whole shoot N and leaf N per unit area decreased at elevated CO2, and leaf N declined with canopy position. Acclimatory responses to elevated CO2 were enhanced in N-deficient plants. With N supply, the acclimatory responses were less pronounced in lower canopy leaves relative to the flag leaf. Additional N did not increase the fraction of shoot N allocated to the flag and penultimate leaves. The decrease in photosynthetic capacity in both upper-sunlit and lower-shaded leaves in elevated CO2 was associated with a decrease in N contents in above-ground organs and with lower N partitioning to leaves. A single relationship of N per unit leaf area to the transpiration rate accounted for a significant fraction of the variation among sun-lit and shaded leaves, growth CO2 level and N supply. We conclude that reduced stomatal conductance and transpiration can decrease plant N, leading to acclimation to CO2 enrichment.
Keywords: Triticum aestivum L.; Acclimation; Chlorophyll; Elevated CO2; Nitrogen; Photosynthesis; Rubisco activity; Stomatal conductance; Transpiration

Alessandro Masoni, Laura Ercoli, Marco Mariotti, Iduna Arduini, Post-anthesis accumulation and remobilization of dry matter, nitrogen and phosphorus in durum wheat as affected by soil type, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 179-186, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.09.006.
(http://www.sciencedirect.com/science/article/B6T67-4M57HFS-1/2/d236e6af618d9eea829c153015d1ca4f)
Abstract:
The objective of the research was to quantify the changes in the accumulation of dry matter and N and P content of four durum wheat (Triticum durum Desf.) varieties grown on two soil types (sandy-loam and clay-loam), differing for texture, nitrogen content and water holding capacity. Plants were grown in containers and were rainfed until anthesis; irrigation was performed during grain filling to avoid water stress. The difference in total vegetative weight and nitrogen and phosphorus content of plants between anthesis and maturity was used to indirectly estimate the relative contribution of pre-anthesis assimilation and remobilization to grain yield. The behaviour of the four varieties was similar as they ranked in the same order for pre-anthesis and post-anthesis dry matter accumulation and grain yield and differences in soil characteristics induced similar

changes in dry matter, N and P accumulation and remobilization. Soil type greatly affected the patterns of dry matter, N and P accumulation and remobilization. Plants grown on clay-loam soil had higher dry weight and N and P content both at anthesis and at maturity and higher grain yield at maturity, compared to plants grown on sandy-loam soil and the remobilization of dry matter, N and P were 75, 140 and 55% higher. Most of the grain carbohydrates originated from photosynthates produced during grain fill, as the contribution of remobilization of dry matter to grain yield did not reach 30%, while most of the grain N and P originated from the remobilization of N and P accumulated prior to anthesis as remobilization of N accounted for 73-82% of grain N content and remobilization of P accounted for 56-63% of grain P content.
Keywords: Accumulation; Dry matter; Durum wheat; Grain filling; Nitrogen; Phosphorus; Remobilization

P. Martiniello, Biochemical parameters in a Mediterranean soil as effected by wheat-forage rotation and irrigation, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 198-208, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.09.009.
(http://www.sciencedirect.com/science/article/B6T67-4M936WF-1/2/cf339280c751ad1c4a0d333f51584e34)
Abstract:
Crop rotations induce changes in yield production and in properties of topsoil. In a typical Mediterranean topsoil in southern Italy, 6-year durum wheat-forage rotation experiments were conducted from 1991 to 1996 under different water regimes to ascertain the effect of rotations on crop yield and soil properties. The following rotations were investigated under irrigated and rainfed treatments: 6-year continuous wheat (Triticum durum Desf.) (cW), wheat after 3 year of meadow (AW), meadow after 3 year continuous wheat (WA), wheat after 3 year of continuous annual binary mixture (BW) and annual binary mixture after 3 year continuous wheat (WB). After 6 years of cropping, was investigated the effect of rotations and irrigation on biochemical soil parameters (organic carbon (Corg), total nitrogen (Ntot), microbial biomass (Bc), soil respiration (SR), metabolic quotient (qCO2), fluorescein diacetate hydrolysis (FDAH), acid and alkaline phosphomonoesterase (respectively, acP and alP) and arylsulfatase (aryS)). Irrigation increased the dry biomass yield of all crops by 31.6%. Dry biomass of rotation AW and BW was, respectively, 18.8% and 8.8% higher than cW under irrigation and 17.1% and 12.9% higher under rainfed condition. Cereal grain yield under irrigation was 30.4%, 25.8% and 25.6% higher than rotations cW, AW and BW, respectively, for the rainfed condition. The results indicated that cW in comparison to AW and BW, under both irrigated conditions, stressed all biochemical compounds. In other crop rotations, irrigation over rainfed reduced the content of Corg, Ntot and Bc in the soil. The relationships between biochemical and enzyme compounds under irrigated condition presented higher number of statistical significant r-values than rainfed. Significant correlations of alP and FDAH parameters with wheat dry matter under both condition of irrigation. The WA and WB rotations increased biochemical parameters under both irrigated conditions. The large amount of biochemical compounds of the WA and WB rotation left in the soil enhance aerial crop yields and not reduced the content of Corg parameter, in the durum wheat cultivation in Mediterranean environment.
Keywords: Crop rotation; Durum wheat; Forage crop; Irrigation; Soil biochemical property

H. Wangstrand, J. Eriksson, I. Oborn, Cadmium concentration in winter wheat as affected by nitrogen fertilization, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 209-214, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.09.010.
(http://www.sciencedirect.com/science/article/B6T67-4M9414T-2/2/9999cf1eabf19351686f2149f8af127f)
Abstract:

Cadmium (Cd) is a toxic heavy metal which to a relatively large extent is ingested via wheat-based products. Conflicting results have been reported on how the application of nitrogen (N) fertilizers to winter wheat (Triticum aestivum L.) affects the Cd concentration in grain. The objectives of this study were to investigate how and to what degree application of N fertilizer affected the Cd concentration in winter wheat grain under field conditions and how consistent such effects were between sites and cultivars. Two wheat cultivars fertilized with four rates of nitrate of lime (100, 145, 190 and 235 kg N ha-1) were investigated in field trials, where the fertilizer was applied on two occasions as is common for bread wheat. In addition, data on Cd and N concentrations in grain of wheat, oats and barley from a Swedish soil monitoring programme were evaluated. In the field trials the grain Cd concentration increased with increasing N rate, irrespective of the Cd concentration in soil and grain. Each 10 kg increase in N application gave an increased Cd concentration in grain of approximately 0.001-0.003 mg kg-1. The relative increase in Cd concentration as a function of N rate varied between 6 and 14% across sites and cultivars when the N rate was increased from 145 to 175 kg N. The grain Cd concentration was also positively correlated to the grain N concentration. The data from the Swedish soil monitoring programme showed a significant positive correlation between the N and Cd concentrations in grain of winter wheat, oats and barley. A possible explanation for the increase in grain Cd concentration could be ion exchange reactions in the soil solution, where an increased concentration of the fertilizer cation Ca2+ may have caused an increased concentration of Cd2+ in soil solution and eventually in wheat grain.
Keywords: Cadmium; Grain; Nitrogen; Nitrate of lime; Winter wheat; Uptake

M. Moriondo, F. Maselli, M. Bindi, A simple model of regional wheat yield based on NDVI data, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 266-274, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.007.
(http://www.sciencedirect.com/science/article/B6T67-4MD9KHN-1/2/17c549102729cca80c57faf586b424f0)
Abstract:
The application of crop simulation models to yield estimation on a regional scale is generally constrained by the lack of spatially distributed information on major environmental and agronomic factors affecting crop conditions. The use of remote sensing data can circumvent this problem by providing actual estimates of these conditions with various spatial and temporal resolutions. The current paper presents the development and testing of a methodological framework which utilizes NDVI data taken from satellite platforms and a simulation model (CROPSYST) to estimate wheat yield. This operation relies on two main steps, the first being the computation of wheat above-ground biomass obtained through the use of NDVI-derived FAPAR estimates. The second step consists of the final repartition of the estimated biomass into crop yield, which is obtained through the use of an harvest index computed by integrating the CROPSYST development sub-model and NDVI data.
The proposed methodology was applied in two Italian provinces where wheat is widely grown (Grosseto and Foggia). In both cases, attention was first devoted to the production of multi-year NDVI data sets descriptive of wheat conditions. Next, the current methodology was applied to estimate wheat yield. The results obtained showed the high accuracy of the method in estimating wheat yield at the provincial level. Correlation coefficients equal to 0.77-0.73 were obtained between measured and simulated crop yield, with corresponding root mean square errors (RSME) of 0.47 and 0.44 Mg/ha for Grosseto and Foggia, respectively.
Keywords: Intercepted radiation; Phenology; Harvest index; Remote sensing data

M.R. Jahansooz, I. A.M. Yunusa, D.R. Coventry, A.R. Palmer, D. Eamus, Radiation- and water-use associated with growth and yields of wheat and chickpea in sole and mixed crops, European

Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 275-282, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.008.
(http://www.sciencedirect.com/science/article/B6T67-4MFK46W-1/2/f95da7ae9b73232499161f7e1c8c1411)
Abstract:
A renewed interest in mixed cropping for its potential to boost yields through increased capture and use of solar radiation and soil-water by the component species. This led to the present study, in which we assessed the performance of wheat and chickpea, grown as sole crops or mixed at half their sole crop populations for their capacity to capture and use solar radiation and soil-water. Trials were conducted in the drought season of 1994 and with or without supplementary irrigation in an average rainfall season of 1995. For the rainfed crops in both years, there was no advantage of mixed crops over wheat grown as a sole crop (wheat-s) either in terms of green area index (GAI), fraction of photosynthetically active radiation intercepted by the canopy (iPAR), dry matter (DM) or grain yield produced. The lack of a yield advantage of mixed cropping was associated with poor canopy development and low yielding capacity of chickpea; it was unable to compensate for its reduced population density in the mixture. Grain yield for chickpea in the mixed crop (chickpea-m) averaged just 29% that of its sole crop (chickpea-s), whereas wheat grown in mixture (wheat-m) produced 72% the yield for wheat-s. Supplementary irrigation from early spring onwards in 1995 increased yield for chickpea-m by 44% over that of chickpea-s, while yield for wheat-m fell to 65% that for wheat-s. Every millimetre of irrigation water increased yield by 10.0, 3.8 and 12.5 kg ha-1 for wheat-s, mixed crop and chickpea-s, respectively. Mixed cropping did not affect the time taken by either wheat or chickpea to attain maximum growth rate, flowering or maturity. The land equivalent ratio (LER) based on grain yields for wheat-chickpea intercropping were 1.01 in 1994, 1.02 without irrigation in 1995, and 1.10 with irrigation in 1995. Neither radiation-use-efficiency nor water-use-efficiency was improved by mixed cropping compared with wheat-s. The poor performance of the mixed crop was ascribed to its poor canopy development early in the season, especially by the chickpea that resulted in low iPAR and transpiration. It is concluded that there was no advantage of growing wheat and chickpea in mixed crops in southern cereal belts of Australia if total biomass or grain yield is the primary purpose.
Keywords: Evapotranspiration; Transpiration; Soil evaporation; Dry matter production; Grain yield; Land equivalent ratio (LER); Radiation-use-efficiency; Water-use-efficiency; Irrigation

Mikhail A. Semenov, Peter D. Jamieson, Pierre Martre, Deconvoluting nitrogen use efficiency in wheat: A simulation study, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 283-294, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.10.009.
(http://www.sciencedirect.com/science/article/B6T67-4MD9KHN-2/2/4468067e135275e740a4dd43d3693543)
Abstract:
Cereal producers are under pressure to increase yields and maintain profitability against a background of environmental constraints and high fertiliser costs. The production of high yields requires high inputs of N, and excessive N can lead to pollution of watercourses. This provides an incentive for the maximisation of nitrogen use efficiency (NUE), defined as grain yield per unit available soil N from all sources. Routes to the improvement of NUE may be through selection of an appropriate environment for the crop, better management or crop genetic improvement. However, the relative importance of these choices is poorly understood. Here we have used a modelling approach to quantify the effects of these factors on NUE. We performed an analysis using the Sirius wheat simulation model for a range of N treatments at two contrasting European sites: Rothamsted, UK and Seville, Spain. Several simple crop traits were selected for sensitivity analysis of NUE. These included traits controlling wheat development, determining sizes of N storage pools in the plant and traits responsible for uptake-efficiency of roots for water and N. We used Sirius because it is based on simple, mechanistic descriptions of wheat phenology and

nitrogen uptake and redistribution, which makes it possible to link model cultivar parameters with simple physiological traits. Our analysis showed that weather and N management are the source of large variations in NUE. At Rothamsted, where water was not a limiting factor, N treatments produce more variation in NUE (~51%) than weather (~32%). At Seville, where water is limited, weather was responsible for larger variation in NUE (for a shallow soil and low N treatment up to ~100%) compared with ~40% for N treatments. Two traits (leaf [N] and phyllochron) out of six showed potential for improvement of NUE. A decrease in leaf [N] increased NUE by 10-15%, when N was limiting, but for high N supply the effect on NUE was negligible. Increasing phyllochron to delay flowering produced up to 15% increase in NUE at Rothamsted, but no increase at Seville. Our analysis demonstrated that a crop simulation model is a powerful tool for deconvoluting complex traits in wheat. This may facilitate genetic and subsequent genomics research by focusing experiments only on those wheat traits that are identified by the modelling study as the most promising.
Keywords: Crop modelling; Sirius; Complex trait; Sensitivity analysis

Juan M. Herrera, Peter Stamp, Markus Liedgens, Interannual variability in root growth of spring wheat (Triticum aestivum L.) at low and high nitrogen supply, European Journal of Agronomy, Volume 26, Issue 3, April 2007, Pages 317-326, ISSN 1161-0301, DOI: 10.1016/j.eja.2006.11.003. (http://www.sciencedirect.com/science/article/B6T67-4MS9R99-1/2/c518b3ff76375ab4613e5cd2b529771e)
Abstract:
Little is known about the spatial and temporal characteristics of the root growth of spring wheat and its modification by nitrogen (N) supply. For 4 years the cultivar Toronit was fertilized with 20 (LN) or 270 kg N ha-1 (HN) in lysimeters. The shoot traits were measured at harvest, while root growth was screened regularly at 10 soil depths in minirhizotrons between 0.05 and 1.00 m. The cumulative number of roots cm-2 (CNR) was fitted to a logistic equation to study the course of root growth at each soil depth. Furthermore, the vertical patterns of CNR were examined at the beginning of tillering, stem elongation, anthesis and physiological maturity by a non-parametric regression (splines).
The parameters of the logistic and non-parametric models were influenced by all the factors; thus the root system was highly plastic. Whereas the N off take was similar at LN in 1999, 2001 and 2002, the period of linear increase in CNR in the subsoil was 7 d longer in 2001 than in 2002. At HN, the N off take was higher in 1999 than in 2001 but the reverse was true for root growth. There was also variation among years in the total duration of root growth, with differences up to 20 d. The percentage of roots grown after anthesis ranged from 1 to 22% of the total roots grown by physiological maturity, demonstrating that the root growth of spring wheat can be high and variable after anthesis. This percentage differed among years more in the subsoil and supported the evidence provided by the time parameters of the logistic equation that the impact of climatic and soil conditions on root growth seems to become stronger with time. At all levels of N supply, the vertical pattern of CNR was characterized by an exponential decrease at the beginning of tillering in all the years. Such a clear pattern was not found at later developmental stages. Though the basic knowledge of the variability of root growth of spring wheat increased, the interannual variability in root dynamics was not explained fully by climatic differences among the growing seasons.
Keywords: Wheat; Nitrogen; Root; Development; Growth; Soil

Hongyong Sun, Xiying Zhang, Suying Chen, Dong Pei, Changming Liu, Effects of harvest and sowing time on the performance of the rotation of winter wheat-summer maize in the North China Plain, Industrial Crops and Products, Volume 25, Issue 3, April 2007, Pages 239-247, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2006.12.003.

(http://www.sciencedirect.com/science/article/B6T77-4MSY8DP-2/2/c3c192f47fbf8c8be9bb7e8a5ed9ef65)
Abstract:
Rotation of winter wheat (Triticum aestivum L.) and summer maize (Zea mays L.) is the prevailing double-cropping system in the North China Plain. Typically, winter wheat is planted at the beginning of October and harvested during early June. Maize is planted immediately after wheat and harvested around 25th of September. The growing season of maize is limited to about 100-110 days. How to rectify the sowing date of winter wheat and the harvest time of summer maize are two factors to achieve higher grain yield of the two crops. Three-year field experiments were carried out to compare the grain yield, evapotranspiration (ET), water use efficiency (WUE) and economic return under six combinations of the harvest time of summer maize and sowing date of winter wheat from 2002 to 2005. Yield of winter wheat was similar for treatments of sowing before 10th of October. Afterwards, yield of winter wheat was significantly reduced ($P < 0.05$) by 0.5% each day delayed in sowing. The kernel weight of maize was significantly increased ($P < 0.05$) by about 0.6% each day delayed from harvest before 5th of October. After 10th of October, kernel weight of maize was not significantly increased with the delay in harvest because of the lower temperature. The kernel weight of maize with thermal time was in a quadratic relationship. Total seasonal ET of winter wheat was reduced by 2.5 mm/day delayed in sowing and ET of maize was averagely increased by 2.0 mm/day delayed in harvest. The net income, benefit-cost and net profit per millimetre of water used of harvest maize at the beginning of October and sowing winter wheat around 10th of October were greater compared with other treatments. Then the common practice of harvest maize and sowing winter wheat in the region could be delayed by 5 days correspondingly.
Keywords: Harvest time; Sowing date; Summer maize; Winter wheat; Grain yield; Water use

Majdi A. Al-Mahasneh, Taha M. Rababah, Effect of moisture content on some physical properties of green wheat, Journal of Food Engineering, Volume 79, Issue 4, April 2007, Pages 1467-1473, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.04.045.
(http://www.sciencedirect.com/science/article/B6T8J-4JXXR4R-3/2/0344af94981bfcab5f084ce6ecfad880)
Abstract:
Determination of physical characteristics of grain and agricultural commodities is important in the design of harvesting, handling, and processing equipment. Physical properties of green wheat (frikeh) kernels were established over moisture content range from 9.3 to 41.5% (w.b.) which covers the moisture range from harvesting to storage. Increasing of moisture content was found to increase axial dimensions, mass of 1000 seeds kernel surface area, kernel volume, and static friction coefficient, while decreasing bulk density, true density, and porosity. Kernel length, width, thickness, and effective mean diameter increased from 6.24 to 6.66 mm, 3.65 to 4.22 mm, 3.43 to 3.85 mm, and 4.19 to 4.75 mm, respectively. Mass of 1000 seeds was found to increase from 32.57 to 51.95 g. Kernel surface area, volume, and sphericity were found to increase from 47.07 to 61.02 mm2, 28.84 to 41.95 mm3, and 0.685 to 0.721, respectively. Bulk density, true density, and porosity were found to decrease with moisture content increase from 711.3 to 675.4 kg/m3, 1333.2 to 1241 kg/m3, and 46.65 to 45.59, respectively. Static friction coefficients were found to increase as moisture content increases. Static friction coefficient was largest between green wheat kernels and plywood surface ranging from 0.41 to 0.62, while the largest increase in static friction coefficient with moisture content was observed for stainless steel and ranged from 0.22 to 0.64.
Keywords: Physical properties; Frikeh; Green wheat; Moisture content

S. Villeneuve, P. Gelinas, Drying kinetics of whole durum wheat pasta according to temperature and relative humidity, LWT - Food Science and Technology, Volume 40, Issue 3, April 2007, Pages 465-471, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.01.004.

(http://www.sciencedirect.com/science/article/B6WMV-4JG48WX-1/2/a67dcef7e84eb62f610915da7a4970da)
Abstract:
Drying kinetics of bran-free and bran-rich pasta (whole durum) was determined according to temperature (40, 60 or 80 [degree sign]C) and relative humidity (65%, 75% or 85%). Compared to temperature, relative humidity in drying chamber had a greater effect on pasta effective moisture diffusivity ([alpha]<0.01), and both parameters responded to a modified Arrhenius-type equation. Activation energy of pasta (11.4 kJ mol-1) was lower than reported in the literature. Bran changed the course of pasta drying, depending on temperature and relative humidity. When relative humidity was higher than 75%, effective moisture diffusivity of bran-rich pasta decreased but the reverse was observed below 75%. Above 76 [degree sign]C, equilibrium moisture content of bran-rich pasta was higher than bran-free pasta. In conclusion, optimal drying conditions for bran-rich pasta were different than standard (bran-free) pasta. Close control of relative humidity in pasta drying unit would be critical, especially under high relative humidity and high temperature conditions.
Keywords: Pasta drying; Effective moisture diffusivity; Equilibrium moisture content; Whole-wheat pasta

M. Anguita, J. Gasa, M. Nofrarias, S.M. Martin-Orue, J.F. Perez, Effect of coarse ground corn, sugar beet pulp and wheat bran on the voluntary intake and physicochemical characteristics of digesta of growing pigs, Livestock Science, Volume 107, Issues 2-3, April 2007, Pages 182-191, ISSN 1871-1413, DOI: 10.1016/j.livsci.2006.09.016.
(http://www.sciencedirect.com/science/article/B7XNX-4M94177-1/2/47cea06376a68ebd6955969ea8bfe596)
Abstract:
The aim of this work was to evaluate the influence of a coarse ground cereal and two fibrous ingredients incorporated in the diet on the physicochemical properties of digesta and productive parameters of pigs during the first stage of the growing period. A total of 96 pigs (initial body weight, BW, 15 kg) were distributed into four experimental treatments: the control diet (CT) consisted of corn, barley and soybean meal milled to pass through a 2.5 mm screen; the coarse corn diet (CC) was prepared by milling the corn to a coarser particle size (4.0 mm screen); the sugar beet pulp diet (SBP) and the wheat bran diet (WB) were prepared by replacing some of the corn for sugar beet pulp (80 g/kg) or wheat bran (100 g/kg) respectively, in order to contain a higher amount of non-starch polysaccharides (NSP). Three experimental periods were considered (7, 21 and 42 days) during which body weight (BW) and voluntary feed intake were assessed. At the end of each period eight animals per diet were slaughtered. Weight of the gastrointestinal tract and its compartments (full and empty) was recorded and the contents were sampled. Digesta samples were analysed for water concentration, water retention capacity (WRC), ammonia and short-chain fatty acids concentration (SCFA). Histological study of the proximal colon tissues was also performed. In general, the different parameters evaluated showed differences between the experimental periods, but few interactions were recorded. Animals fed CC, SBP and WB diets presented a lower feed intake ($P <= 0.009$) compared to CT fed animals. Compared to the control diet, coarse grinding of corn provoked an increase in the colonic digesta content ($P = 0.032$). Similarly, animals fed the SBP diet compared to CT animals, showed an increase in the contents ($P = 0.009$) of hindgut, and in the concentration of water in the digesta ($P <= 0.011$). Compared to CT diet the SBP diet lowered the ammonia concentration in the hindgut contents ($P <= 0.045$) and increased the concentration of SCFA in the distal colon ($P <= 0.025$). Animals fed the SBP diet also showed a lower number of lymphoid nodes in the colonic mucosa compared to the other diets ($P <= 0.043$). Minor modifications were observed associated with the incorporation of wheat bran in the diet, but colonic water from WB fed animals showed a tendency to increase cytolytic capacity. The results confirm major changes in the voluntary intake and physicochemical

properties of digesta as affected by the incorporation in the diet of a fibrous ingredient or coarse grinding of cereals.
Keywords: Growing pigs; Dietary fibre; Physicochemical properties; Cytolysis

Yan ZHU, Wei-Xing CAO, Ting-Bo DAI, Yong-Chao TIAN, Xia YAO, A Knowledge Model System for Wheat Production Management, Pedosphere, Volume 17, Issue 2, April 2007, Pages 172-181, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60023-X.
(http://www.sciencedirect.com/science/article/B82XV-4NCMMBG-5/2/45ea4d556343bb0a869d7d4be136bc70)
Abstract:
A knowledge model with temporal and spatial characteristics for the quantitative design of a cultural pattern in wheat production, using systems analysis and dynamic modeling techniques, was developed for wheat management, as a decision-making tool in digital farming. The fundamental relationships and algorithms of wheat growth indices and management criteria to cultivars, ecological environments, and production levels were derived from the existing literature and research data to establish a knowledge model system for quantitative wheat management using Visual C++. The system designed a cultural management plan for general management guidelines and crop regulation indices for time-course control criteria during the wheat-growing period. The cultural management plan module included submodels to determine target grain yield and quality, cultivar choice, sowing date, population density, sowing rate, fertilization strategy, and water management, whereas the crop regulation indices module included submodels for suitable development stages, dynamic growth indices, source-sink indices, and nutrient indices. Evaluation of the knowledge model by design studies on the basis of data sets of different eco-sites, cultivars, and soil types indicated a favorable performance of the model system in recommending growth indices and management criteria under diverse conditions. Practical application of the knowledge model system in comparative field experiments produced yield gains of 2.4% to 16.5%. Thus, the presented knowledge model system overcame some of the difficulties of the traditional wheat management patterns and expert systems, and laid a foundation for facilitating the digitization of wheat management.
Keywords: expert system; knowledge model; quantitative decision-making; regulation index; wheat

Ming-De HAO, Jun FAN, Quan-Jiu WANG, Ting-Hui DANG, Sheng-Li GUO, Ji-Jun WANG, Wheat Grain Yield and Yield Stability in a Long-Term Fertilization Experiment on the Loess Plateau, Pedosphere, Volume 17, Issue 2, April 2007, Pages 257-264, ISSN 1002-0160, DOI: 10.1016/S1002-0160(07)60032-0.
(http://www.sciencedirect.com/science/article/B82XV-4NCMMBG-G/2/bdf678b3570205df4dc6fbd75340b4f3)
Abstract:
To provide a scientific basis for sustainable land management, a 20-year fertility experiment was conducted in Changwu County, Shaanxi Province, China to investigate the effects of long-term application of chemical fertilizers on wheat grain yield and yield stability on the Loess Plateau using regression and stability analysis. The experiment consisted of 17 fertilizer treatments, containing the combinations of different N and P levels, with three replications arranged in a randomized complete block design. Nitrogen fertilizer was applied as urea, and P was applied as calcium superphosphate. Fertilizer rates had a large effect on the response of wheat yield to fertilization. Phosphorus, combined with N, increased yield significantly ($P <= 0.01$). In the unfertilized control and the N or P sole application treatments, wheat yield had a declining trend although it was not statistically significant. Stability analysis combined with the trend analysis indicated that integrated use of fertilizer N and P was better than their sole application in increasing and sustaining the productivity of rainfed winter wheat.
Keywords: dryland wheat yield; long-term fertilization; nitrogen; phosphorus; yield stability

Taiji Nomura, Atsushi Ishihara, Hajime Iwamura, Takashi R. Endo, Molecular characterization of benzoxazinone-deficient mutation in diploid wheat, Phytochemistry, Volume 68, Issue 7, April 2007, Pages 1008-1016, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.01.007.
(http://www.sciencedirect.com/science/article/B6TH7-4N5175F-1/2/ee60510550d01aa846e8b54c10be3eea)
Abstract:
Benzoxazinones (Bxs) are representative defensive compounds in gramineous plants, including wheat (genus Triticum) and its wild relative species (genus Aegilops). Bx production was found to be variable among three diploid wheat species with the same A genome as hexaploid wheat (2n = 6x = 42, genomes AABBDD). All accessions of Triticum monococcum (2n = 2x = 14, AA) and Triticum urartu (2n = 2x = 14, AA) accumulated Bxs, but 18 out of 28 accessions of Triticum boeoticum (2n = 2x = 14, AA) were Bx-deficient. Bx-deficient accessions were grouped into two types by genomic PCR analysis of the five Bx biosynthetic loci (TbBx1-TbBx5): those retaining all five loci (type I) and those lacking TbBx3 and TbBx4 loci (type II). Despite the Bx-deficient phenotype, all five TbBx genes were transcribed in the type-I accessions. The Bx deficiency in one accession of type I was due to the disintegration of the TbBx1, TbBx4 and TbBx5 genes due to insertions or deletions in their coding sequences. The TbBx2 and TbBx3 genes of those accessions had the complete sequences of the functional enzymes. In the type-II accessions, the remaining three genes, TbBx1, TbBx2 and TbBx5, were all transcribed, with the exception of two accessions in which either TbBx1 or TbBx5 was not transcribed. The TbBx1 coding sequence of the type-II accessions was also disintegrated, like that of the type-I accessions. These findings suggest that the Bx deficiency in T. boeoticum first resulted from disintegration of the TbBx1 coding sequence, followed by transcription failure, disintegration of the coding sequences and elimination of the TbBx1-TbBx5 genes.
Keywords: Triticum boeoticum; Gramineae; Wheat; Secondary metabolism; Biosynthesis; Benzoxazinone; DIBOA; DIMBOA; Mutant

Delphine Renard-Merlier, Beatrice Randoux, Emmanuel Nowak, Flora Farcy, Roger Durand, Philippe Reignault, Iodus 40, salicylic acid, heptanoyl salicylic acid and trehalose exhibit different efficacies and defence targets during a wheat/powdery mildew interaction, Phytochemistry, Volume 68, Issue 8, April 2007, Pages 1156-1164, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.02.011.
(http://www.sciencedirect.com/science/article/B6TH7-4NCK2C7-2/2/bf959abe57558094b02ca6891bb173b4)
Abstract:
Prophylactic efficacies of Iodus 40 and salicylic acid (SA) against wheat powdery mildew caused by Blumeria graminis f. sp. tritici have been shown and compared with those of heptanoyl salicylic acid (HSA) and trehalose. Plantlets treated once exhibited 55%, 50%, 95%, and 38% protection levels, respectively. Two sprayings increased these levels up to 60%, 65%, 100%, and 60%, respectively. Biological effects of these resistance inducers on reactive oxygen species (ROS) metabolism and lipid peroxidation were also investigated. We found clear differences in the extent and the type of induced responses, with HSA exhibiting both the most numerous and the highest effects. HSA and SA induced a 5.5-fold increase of whole cell DAB staining due to hydrogen peroxide accumulation, whereas Iodus 40 and trehalose increased staining intensity at the penetration sites only. However, these effects were not correlated with any modification of catalase (CAT), oxalate oxidase (OXO) or lipoxygenase (LOX) activities, except for HSA which decreased CAT in non-inoculated conditions and increased LOX in infectious conditions. HSA also induced an increase in the rate of lipid peroxidation, whereas Iodus 40 induced a decrease. The effects of the inducers on germinating conidia and wheat epidermal cells responding to fungal penetration were also investigated. Papilla-linked autofluorescence was affected by SA and Iodus

40 whereas germination was slightly altered by Iodus 40. The newly described protective efficacies and the partial, distinct and non-overlapping activities of these inducers on the wheat/powdery mildew interaction are discussed.
Keywords: Blumeria graminis; Resistance inducer; Triticum aestivum

Dongmei Wang, Petra Marschner, Zakaria Solaiman, Zed Rengel, Belowground interactions between intercropped wheat and Brassicas in acidic and alkaline soils, Soil Biology and Biochemistry, Volume 39, Issue 4, April 2007, Pages 961-971, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2006.11.008.
(http://www.sciencedirect.com/science/article/B6TC7-4MJBNSD-4/2/4fcae2ddec008afb43c277189b034a36)
Abstract:
Our previous studies showed that, under P-limiting conditions, growth and P uptake were lower in the wheat genotype Janz than in three Brassica genotypes when grown in monoculture. The present study was conducted to answer the question if P mobilised by the Brassicas is available to wheat; leading to improved growth of wheat when intercropped with Brassicas compared to monocropped wheat. To assess if the interactions between the crops depend on soil type, the wheat genotype Janz and three Brassica genotypes (two canolas and one mustard) were grown for 6 weeks in monoculture or wheat intercropped with each Brassica genotype in an acidic and an alkaline soil with low P availability (with two plants per pot). Wheat grew equally well in the two soils, but the Brassicas grew better in the acidic than in the alkaline soil. In the acidic soil, monocropped Brassicas had a 3 to 4 fold greater plant dry weight (dw) and P uptake than wheat; plant dw and P uptake in wheat were decreased or not affected by intercropping and increased in the Brassicas. In the alkaline soil, dw and P uptake of the Brassicas was twice as high as in wheat, with intercropping having no effect on these parameters. The contribution of wheat to the total shoot dw and P uptake per pot was 4-21% and 32-40% in acidic and alkaline soil, respectively. Mycorrhizal colonisation was low in all genotypes in the acidic soil (1-6%). In the alkaline soil, mycorrhizal colonisation of monocropped wheat was 62%, but only 43-47% in intercropped wheat. Intercropping decreased P availability in the rhizosphere of wheat in the acidic soil but had no effect on rhizosphere P availability in the alkaline soil. Intercropping had a variable effect on rhizosphere microbial community composition (assessed by fatty acid methylester analysis (FAME) and ribosomal intergenic spacer amplification (RISA)), ranging from intercropping having no effect on the rhizosphere communities to intercropping resulting in a new and similar rhizosphere community composition in both genotypes. The results of this study show that intercropping with Brassicas does not improve growth and P uptake of wheat; thus there is no indication that P mobilised by the Brassicas is available to wheat.
Keywords: Brassicas; Intercropping; Microbial community composition; Monocropping; Mycorrhiza; P uptake; Rhizosphere; Wheat

Guoju Xiao, Qiang Zhang, Youcai Xiong, Miaozi Lin, Jing Wang, Integrating rainwater harvesting with supplemental irrigation into rain-fed spring wheat farming, Soil and Tillage Research, Volume 93, Issue 2, April 2007, Pages 429-437, ISSN 0167-1987, DOI: 10.1016/j.still.2006.06.001.
(http://www.sciencedirect.com/science/article/B6TC6-4KKFP33-1/2/68b8f07c06b730adc7767989f2da1ce6)
Abstract:
A field experiment was conducted at the Haiyuan Experimental Station (36[degree sign]34'N, 105[degree sign]39'E), in a semiarid region of China, from 2000 to 2003 for rain-fed spring wheat (Triticum aestivum) production to maximize the utilization of low rainfall. This paper reports the two field cultivations of rainwater harvesting with a sowing in the furrow between film-covered ridges (SFFCR), and with a sowing in the holes on film-covered ridges (SHFCR). At the same time, the periods and indices of supplemental irrigation during the whole growth stage of rain-fed spring

wheat were also studied. The periods of supplemental irrigation included the three-leaf stage (irrigated once), the elongation stage to flowering stage (irrigated twice), and the flowering stage to filling stage (irrigated once). The indices of supplemental irrigation during the whole growth stage of rain-fed spring wheat must reach over 59 and 40 mm in order to realize the 2250 and 2000 kg ha-1 yield, respectively. This research also presented such a concept of efficient water saving supplemental irrigation, which was considered as a new index of water saving irrigation. The experimental result showed that the efficiency of water saving supplemental irrigation of field cultivation with SFFCR was 5.5-5.8%, and with SHFCR was 9.4-9.6%. The efficiency of water saving supplemental irrigation of field cultivation with SHFCR was improved by 40.4% in comparison with SFFCR. Consequently, in this region, the integration of rainwater harvesting and supplemental irrigation can play a crucial role in the improvement of rain-fed spring wheat yields and water use.
Keywords: Efficiency of water saving supplemental irrigation; Rain-fed spring wheat; Rainwater harvesting; Supplemental irrigation; Semiarid region of China

J. Moldenhauer, A.J. Van der Westhuizen, Z.A. Pretorius, B.M. Moerschbacher, Microscopic studies on stripe rust-infected doubled haploid wheat lines derived from a cross Kariega x Avocet S, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 304, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.092.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-34/2/4c922fdb8b0353b68c17051251866740)

M.J. Moloi, A.J. Van der Westhuizen, Involvement of nitric oxide during the Russian wheat aphid resistance, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 304, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.093.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-35/2/6f28714bbc193a7895feba3955b65dff)

S.A. Saheed, K.A.E. Larsson, G. Delp, C.E.J. Botha, L.M.V. Jonsson, G. Bradley, Wound callose synthesis in response to Russian wheat aphid and Bird cherry-oat aphid feeding on barley cv Clipper, South African Journal of Botany, Volume 73, Issue 2, April 2007, Page 310, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.02.110.
(http://www.sciencedirect.com/science/article/B7XN9-4NBRG1G-3S/2/72b0028f11c74a9b09c7f385e3b806b8)

Anil Gunaratne, Harold Corke, Effect of hydroxypropylation and alkaline treatment in hydroxypropylation on some structural and physicochemical properties of heat-moisture treated wheat, potato and waxy maize starches, Carbohydrate Polymers, Volume 68, Issue 2, 21 March 2007, Pages 305-313, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.12.004.
(http://www.sciencedirect.com/science/article/B6TFD-4MWPV6Y-2/2/12bda69c04b89b3ccc5d520af9c363ba)
Abstract:
Hydroxypropylation was carried out on heat-moisture treated (HMT) wheat, potato and waxy maize starches. Hydroxypropylation increased swelling factor and amylose leaching of both native and HMT starches. Hydroxypropylation of HMT starches reduced enthalpies of gelatinization and amylopectin retrogradation more than for the corresponding non-HMT hydroxypropylated starches. This indicates that heat-moisture treatment increases the derivatization of amylopectin. Disruption and reorientation of amylopectin double helices during heat-moisture treatment could facilitate the access of reaction reagent to the highly ordered crystalline regions resulting in greater derivatization. Cold paste viscosity was greatly increased with high pasting stability when hydroxypropyl groups were introduced to HMT wheat and potato starches. Alkaline treatment

increased gelatinization temperature of all the starches but enthalpy was unaffected. Amylose leaching and swelling factor greatly increased in wheat but decreased in potato and waxy maize starches with alkaline treatment. This increased amylose leaching and swelling factor along with greater reduction of amylose-lipid complex endotherm of wheat starch by alkaline treatment is consistent with the disruption of amylose-lipid complex. The amylose-lipid complex is susceptible to hydrolysis in alkaline conditions. Heat-moisture treatment had no influence on transition parameters of amylose-lipid complex.
Keywords: Heat-moisture treatment; Hydroxypropylation; Physicochemical properties

G.B.S. Chahal, Anil Sood, S.K. Jalota, B.U. Choudhury, P.K. Sharma, Yield, evapotranspiration and water productivity of rice (Oryza sativa L.)-wheat (Triticum aestivum L.) system in Punjab (India) as influenced by transplanting date of rice and weather parameters, Agricultural Water Management, Volume 88, Issues 1-3, 16 March 2007, Pages 14-22, ISSN 0378-3774, DOI: 10.1016/j.agwat.2006.08.007.
(http://www.sciencedirect.com/science/article/B6T3X-4M1D02R-2/2/645e0025b5f2f28b39bb45b06ef8fd66)
Abstract:
Rice-wheat cropping system being highly productive and profitable, dominates the irrigated alluvial tract of Indo-Gangetic Plain of South Asia. In this region, the transplanting is staggered over a longer period (starting from early May to end of June) due to scarcity of migratory labour and power supply. Yield response of rice to different transplanting dates gets varied with weather conditions at different growth stages of the crop as well as with the occurrence of insect-pests infestation. The present investigation, therefore, concerns the effects of different dates of transplanting and weather parameters on yield, evapotranspiration and water productivity of rice and subsequent wheat in rice-wheat cropping system in Indian Punjab involving field experimentation for 2 years and simulation for 23 years. For the simulation study, crop production and management (CROPMAN) model which is a multi-year, multi-crop and daily time step cropping system was used. The simulated rice yields with varying dates of transplanting of rice complimented the field results and showed an increasing trend when transplanting was shifted from high to low evaporative demand owing to favourable weather conditions for plant growth. Duration of temperature greater than 37 [degree sign]C during post-transplanted seedling period (DsT), temperature greater than 33 [degree sign]C (TF) and number of rain showers (NSF) from flowering to pollen stage (75-90 days after transplanting) affected rice yield (Yr) significantly. Sixty-seven percent variability in rice yield was explained by these weather parameters following the equation Yr = 0.656SR - 36.9DsT - 175.9TF - 102.5NSF + 11995. Shifting of transplanting dates also resulted into a saving of 192 mm as wet (evapotranspiration) and 590 mm as dry (irrigation) water. Real and apparent crop water productivities (grain yield per unit of water consumed by the crop as ET and irrigation water applied, respectively) were more (>70%) in rice transplanted under lower (end of June onwards) than higher evaporative demand (mid May).
Keywords: Rice-wheat system; Rice transplanting dates; Weather parameters; Yield; Evapotranspiration; Crop water productivity

Jie Pan, Yan Zhu, Weixing Cao, Modeling plant carbon flow and grain starch accumulation in wheat, Field Crops Research, Volume 101, Issue 3, 15 March 2007, Pages 276-284, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.12.005.
(http://www.sciencedirect.com/science/article/B6T6M-4MS9R5R-1/2/f7930e3265ba1fe8a5e1bc4823521129)
Abstract:
The process of starch accumulation in grain directly influences the yield and quality formation in wheat. Since few studies have been aimed at modeling the grain starch accumulation, this study was undertaken to develop a simplified process model for predicting the rate of starch

accumulation in wheat grain by focusing on the variation of plant carbon dynamics post-anthesis. Five different experiments involving genotypes, nitrogen rates and water regimes were conducted to support model development and model evaluation. The model proposed that the starch accumulation rate (STR) in individual grain was determined by the availability of carbon source in plant (GCAi) and the ability of starch synthesis in grain (f(Ai)), as influenced by the factors of temperature, water and nitrogen conditions within plants. The f(Ai) could be described in a two-section curve with post-anthesis growing degree days (GDD), first exponential increase and then linear decrease. The GCAi was determined by post-anthesis carbon assimilation and carbon remobilization from vegetative organs to grains. A genotypic parameter was incorporated into the model algorithm, i.e. the maximum rate of individual grain starch accumulation, to differentiate the ability of starch accumulation among cultivars. The overall performance of the model was validated with different data sets from three field experiments spanning 3 years and comprising various genotypes, nitrogen and water levels. The RMSE values for all treatments were averaged as 12.51%, indicating a good fit between the simulated and observed data. It appears that the model can give a reliable prediction for grain starch accumulation of different wheat cultivars under various growing conditions.
Keywords: Simulation model; Carbon flow; Starch accumulation; Grain yield; Winter wheat

Abdul Wahid, Mubaraka Perveen, Sadia Gelani, Shahzad M.A. Basra, Pretreatment of seed with H2O2 improves salt tolerance of wheat seedlings by alleviation of oxidative damage and expression of stress proteins, Journal of Plant Physiology, Volume 164, Issue 3, 7 March 2007, Pages 283-294, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.01.005.
(http://www.sciencedirect.com/science/article/B7GJ7-4JHMRMC-6/2/e660375e628a709a21c79bd289b57789)
Abstract: Summary
Increased salinity is a stringent problem to crop production while seed pretreatment can effectively induce salt tolerance in plants. Hydrogen peroxide (H2O2), a stress signal molecule, was evaluated as seed treatment to produce the metabolic changes, which could lead to improved salt tolerance in wheat. Soaking in 1, 40, 80 and 120 [mu]M H2O2 revealed a low penetration, reaching maximum at 5 h (2.58+/-0.23 [mu]mol g-1 fresh seeds at 120 [mu]M) and declining thereafter to the level of water control by 8 h. This revealed the activation of antioxidants and H2O2 scavenging in seed after 5 h. Seeds treated with 1-120 [mu]M H2O2 for 8 h and germinated in saline (150 mM NaCl) medium curtailed the mean germination time (MGT) being even less than water controls. Level of H2O2 in seedlings arising from H2O2-treated seeds grown under salinity was markedly lower than salinized controls, suggesting the operation of antioxidant system in them. These seedlings exhibited better photosynthetic capacity, particularly the stomatal conductance (gs), thus improving the leaf gas exchange due to stomatal component of photosynthesis. Moreover, H2O2 treatment improved leaf water relations and maintained turgor. Although Na+ and Cl- content increased due to salinity, H2O2-treated seedlings displayed greater tissue K+, Ca2+, NO3- PO43- levels and improved K+:Na+ ratio. H2O2 treatment enhanced the membrane properties, as revealed from greatly reduced relative membrane permeability (RMP) and less altered ion leakage pattern (comparable to water controls). Seedlings exhibited the expression of two heat-stable (stress) proteins with apparent molecular masses of 32 and 52 kDa. Results suggest that H2O2 signals the activation of antioxidants in seed, which persists in the seedlings to offset the ion-induced oxidative damage. These changes led to the expression of stress proteins and improved physiological attributes, which supported the seedling growth under salinity.
Keywords: H2O2 absorption; Membrane permeability; ROS scavenging; Signaling; Stress proteins

Xinghong Yang, Xiaoying Chen, Qiaoying Ge, Bin Li, Yiping Tong, Zhensheng Li, Tingyun Kuang, Congming Lu, Characterization of photosynthesis of flag leaves in a wheat hybrid and its parents

grown under field conditions, Journal of Plant Physiology, Volume 164, Issue 3, 7 March 2007, Pages 318-326, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.01.007.
(http://www.sciencedirect.com/science/article/B7GJ7-4JGBF15-1/2/d7a24f773b424e0eba0733ed0ead6eae)
Abstract: Summary
Two wheat cultivars, one with high yield and the other with a high tolerance against oxidative stress, were compared with a hybrid of these two cultivars by investigating their photosynthetic characteristics of flag leaves. From the beginning of flowering to the 17th day, CO2 assimilation rate (Pmax) was maintained and there were no appreciable differences between the hybrid and its parents. Pmax showed no decrease at noon compared to that in the morning. From the 20th to the 30th day of flowering, Pmax decreased significantly, and this decrease was significantly less in the hybrid than in its parents. The actual photosystem II (PSII) efficiency ([Phi]PSII) and the maximal efficiency of PSII photochemistry (Fv/Fm) showed a significant decrease only on the 30th day after anthesis; this decline was much less marked in the hybrid relative to its parents, both in the morning and at noon. A decrease occurred in [Phi]PSII and Fv/Fm at noon when compared to that in the morning, but this decrease was less marked in the hybrid than in its parents. Rubisco activity decreased significantly from the 13th day of flowering and was higher in the morning than at noon both in the hybrid and its parents. However, the hybrid always showed a higher value of Rubisco activity. The activities of posphoenolpyruvate carboxylase and pyruvate phosphate dikinase showed similar changes to those in Rubisco activity, particularly from the 20th to 30th day. The results of this study suggest that the higher photosynthetic capacity of the flag leaf in the hybrid can help to accumulate more dry material, and may be the physiological basis for higher yield over its parents.
Keywords: Flag leaf; Hybrid; Photosynthesis; PSII efficiency; Wheat

Ewa Gajewska, Maria Sklodowska, Relations between tocopherol, chlorophyll and lipid peroxides contents in shoots of Ni-treated wheat, Journal of Plant Physiology, Volume 164, Issue 3, 7 March 2007, Pages 364-366, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.05.021.
(http://www.sciencedirect.com/science/article/B7GJ7-4KKNMYP-1/2/9aa3c7bad03be174b6016fe1365f096f)
Abstract: Summary
The influence of 50 and 100 [mu]M Ni on chlorophyll and tocopherol contents, as well as lipid peroxidation was studied in the shoots of wheat plants. Chlorophyll content in the shoots decreased in response to Ni application. Ni stress led to an enhancement of lipid peroxides content, accompanied by a substantial increase in tocopherol concentration in the wheat shoots.
Keywords: Chlorophyll; Lipid peroxidation; Nickel; Oxidative stress; Tocopherol; Triticum aestivum L.

Shigeru Takahashi, Muhuddin R. Anwar, Wheat grain yield, phosphorus uptake and soil phosphorus fraction after 23 years of annual fertilizer application to an Andosol, Field Crops Research, Volume 101, Issue 2, 5 March 2007, Pages 160-171, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.11.003.
(http://www.sciencedirect.com/science/article/B6T6M-4MHPBS9-1/2/6355c26880a4cf98cc00fc405b537ac0)
Abstract:
A field experiment was conducted on an Andosol to evaluate wheat (Triticum aestivum L.) yield, P and N uptake and soil P fraction after long-term fertilization (no fertilizer, NPK, NP, NK and PK treatments). Application rates of N, P and K fertilizers were 100, 65 and 83 kg ha-1 year-1 by ammonium sulfate, superphosphate, and potassium chloride, respectively. Phosphorus fertilization was critical for grain yield since the NK treatment did not increase yield compared with no fertilizer treatment. Agronomic efficiency of P was greater than agronomic efficiency of N, although

apparent recovery of P and N were 17 and 53%, respectively. Combination application of fertilizer P and N resulted in the greatest grain yield over 23-year cultivation. Interaction impact on grain yield between P and N ranged from 71 to 109%, and was greater than the values for cereals in the earlier works. The N/P ratios of wheat decreased by P application and increased by N application. The N/P ratios in NPK and NP treatments were higher than the values attaining maximum yield for cereal crops reported by other works.
Increase in soil available P in the treatments with P application was modest after 23-year fertilization. Total inorganic P (Pi), Ca-Pi + Al-Pi + Fe-Pi, increased in the treatments with P application at 0-15 cm. Total Pi was greater at 0-15 cm depth than at 30-50 cm depth. Although apparent recovery of fertilizer P (Ca-Pi as superphosphate) was less than 20%, soil Ca-Pi was very low even in the treatments with P application. This meant that unutilized fertilizer P did not remain in the form of Ca-Pi. In contrast to inorganic P, there was no significant difference in total organic P (Po), Ca-Po + Al-Po + Fe-Po, among the treatments and soil depths. Regardless of fertilizer treatments, Al-Pi was the predominant form at 0-15 cm depth and Al-Pi concentrations were similar to Fe-Pi concentrations at 30-50 cm depth. On the other hand, Fe-Po was greater than Al-Po at 0-15 cm depth. Difference in inorganic P at 0-15 cm depth demonstrated that unutilized fertilizer P was transformed mainly to Al-Pi followed by Fe-Pi. However, wheat seemed to absorb P from Al-Pi and Fe-Pi modestly.
Keywords: Fractionation; Long-term experiment; Phosphorus; Wheat

Flavio Breseghello, Mark E. Sorrells, QTL analysis of kernel size and shape in two hexaploid wheat mapping populations, Field Crops Research, Volume 101, Issue 2, 5 March 2007, Pages 172-179, ISSN 0378-4290, DOI: 10.1016/j.fcr.2006.11.008.
(http://www.sciencedirect.com/science/article/B6T6M-4MJC1YR-1/2/d7a9e70a1b52a3e1524a1ad4ae36a3fd)
Abstract:
Kernel size and shape in wheat are important because of their relationship with yield and milling quality. This paper reports QTL analyses of kernel morphology in two hexaploid wheat mapping populations, grown in NY and CA. Kernel morphology was evaluated through a new and improved method, combining measurements from two orthogonal pictures. Single marker regression showed that several genomic positions, scattered through the genome, were related to kernel size and shape, in both populations. The direction of allele effects was consistent between environments, although the LOD scores varied considerably. Composite interval mapping revealed QTLs on all seven homoeologous groups, considering both populations. For the QTLs detected through this method, the signal and magnitude of additive effects were similar between environments, indicating small QTL x environment interaction. In the population W7984 x Opata 85, the strongest signal was detected on the chromosome 5B, for kernel length. In the population AC Reed x Grandin, the most important QTLs were detected on chromosome 2D, affecting the lateral dimensions of the kernel. This study agreed with previous reports that the genetic control of kernel length and width are largely independent. Additionally, it was shown that QTLs detected on different mapping populations, with identical evaluation methods, can be very distinct.
Keywords: Grain size; Grain shape

Zhi-yu KANG, Jian-jun WANG, Xun-wu SHANG, Score System Study for Hand-Extended Noodle Quality Based on HMW-GS Index in Wheat Flour, Agricultural Sciences in China, Volume 6, Issue 3, March 2007, Pages 304-310, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60049-2.
(http://www.sciencedirect.com/science/article/B82XG-4NNP3JJ-7/2/7885043f8c8a90beea7869baf430007b)
Abstract:
Hand-extended noodle, a special kind of noodle, requires particular quality flour to make it. High molecular weight glutenin subunits (HMW-GS) in wheat are important protein subunits, which

affect flour quality. To improve breeding and selection efficiency of wheat varieties which are used in making hand-extended noodle, 100 spring wheat varieties were selected to study the importance of HMW-GS on noodle quality score indexes such as color, appearance, taste agreeability, toughness, stickiness, smoothness, taste, and total score, through methods of quantity theory and statistic evaluation. It was shown that the hand-extended noodle quality score of HMW-GS 1, 2*, N, 7, 7 + 8, 17 + 18, 22, 2 + 10, 2 + 11, 2 + 12, 5 + 10, and 10 was 5.40, 5.35, 0, 2.55, 2.56, 9.19, 0.05, 0.15, 1.49, 1.14, 10.00, and 5.14, respectively. The score system for hand-extended noodle quality based on HMW-GS index included eight multiple linear regression equations (R2 > 0.98). Hence, using the HMW-GS composition, the eight hand-extended noodle quality indexes would be forecasted exactly. Results indicated that ideal subunit compositions of HMW-GS for this special usage were composition 1, 17 + 18, 5 + 10, or composition 2*, 17 + 18, 5 + 10. This standard could be used on variety selection in the early generation of breeding crosses. HMW-GS 2 + 10, 2 + 11, and 2 + 12 were the least desirable subunits for hand-extended noodle, which should be avoided in wheat variety selection aimed for hand-extended noodle flour use.
Keywords: wheat; HMW-GS; hand-extended noodle; score index; score system

Xing LI, Wen-xiang YANG, Ya-ning LI, Da-qun LIU, Hong-fei YAN, Qing-fang MENG, Ting ZHANG, Identification of AFLP Markers Linked to Lr19 Resistance to Wheat Leaf Rust, Agricultural Sciences in China, Volume 6, Issue 3, March 2007, Pages 311-315, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60050-9.
(http://www.sciencedirect.com/science/article/B82XG-4NNP3JJ-8/2/3b751a7f7f06f9019b9f5433915cfe5e)
Abstract:
AFLP analyses were carried out on Thatcher, 23 near-isogenic lines and F2 generation of TcLr19 x Thatcher, to develop molecular markers for gene Lr19 resistance to wheat leaf rust. Seven markers linked to Lr19 resistance trait were obtained, which were P-AGT/M-GAG289bp (3.3 cM), P-ACA/M-GGT102bp (4.1 cM), P-ACA/M-GGT106bp (4.1 cM), P-AAC/M-CAG123bp (4.9 cM), P-AAC/M-GGT203bp (5.0 cM), P-ACA/M-GGT290bp (5.7 cM), and P-ATC/M-GAG293bp (9.6 cM). All of these specific fragments were isolated from the polyacrylamide gels, reamplified, cloned, and sequenced. The research may facilitate genetic mapping, physical mapping, and the eventual cloning of Lr19.
Keywords: wheat; Lr19; molecular marker; AFLP

Chui-Hua Kong, Peng Wang, Xiao-Hua Xu, Allelopathic interference of Ambrosia trifida with wheat (Triticum aestivum), Agriculture, Ecosystems & Environment, Volume 119, Issues 3-4, March 2007, Pages 416-420, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.07.014.
(http://www.sciencedirect.com/science/article/B6T3Y-4KSD56J-2/2/6d53016b3940c1a5b0365619bf42ae2b)
Abstract:
Ambrosia trifida is worldwide spreading in ecological terms as pioneer species and is one of the most economically destructive weeds occurring on arable lands in North China. It has long been suspected of using allelopathy to interfere with the growth and establishment of crop plants, but the mechanisms involved in allelopathy is largely unknown. In this study, a series of experiments were conducted to assess the phytotoxicity and to identify the allelochemicals of A. trifida against wheat (Triticum aestivum). The results showed that wheat growth could be significantly inhibited in A. trifida infested or residue amended soils in Northeast China. Two carotane-type sesquiterpenes, 1[alpha]-angeloyloxy-carotol and 1[alpha]-(2-methylbutyroyloxy)-carotol, were subsequently isolated and identified from the toxic soils. Both compounds had high inhibitory activity on wheat growth. Their inhibition thresholds were 11.5 [mu]g/g soil for 1[alpha]-angeloyloxycarotol) and 16.3 [mu]g/g soil for1[alpha]-(2-methylbutyroyloxy)-carotol. Furthermore, these two compounds were detected from A. trifida infested and residue amended soils. Their amounts ranged from 13.7 to

43.2 [mu]g/g soil. As a result, A. trifida could release sufficient quantities of 1[alpha]-angeloyloxycarotol and 1[alpha]-(2-methylbutyloyloxy)-carotol into the soil to act as allelochemicals inhibiting the growth of wheat. The study suggested that 1[alpha]-angeloyloxy-carotol and 1[alpha]-(2-methylbutyroyloxy)-carotol could be key allelochemicals in A. trifida infested wheat fields and that A. trifida interferes with wheat growth via allelopathy.
Keywords: Allelopathy; Ambrosia trifida; Triticum aestivum; Allelochemical; Amended soil; Northeast China

Raj Gupta, Ashok Seth, A review of resource conserving technologies for sustainable management of the rice-wheat cropping systems of the Indo-Gangetic plains (IGP), Crop Protection, Volume 26, Issue 3, Weed Science in Time of Transition, March 2007, Pages 436-447, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.04.030.
(http://www.sciencedirect.com/science/article/B6T5T-4M93692-1/2/d3c90aec5fe6f6acb92ee485b8cb42d9)
Abstract:
Rice and wheat are the staple food crops occupying nearly 13.5 million hectares of the Indo-Gangetic plains (IGP) of South Asia covering Pakistan, India, Bangladesh and Nepal. These crops contribute more than 80% of the total cereal production and are critically important to employment and food security for hundreds of millions of rural families. The demand for these two cereals is expected to grow between 2% and 2.5% per annum until 2020, requiring continued efforts to increase productivity while ensuring sustainability. Starting from the 1960s, expansion of area and intensification of rice-wheat productions system based on the adoption of Green Revolution (GR) technologies, incorporating the use of high-yielding varieties, fertilizers and irrigation, led to increased production and productivity of both these crops. However, continued intensive use of GR technologies in recent years has resulted in lower marginal returns and, in some locations to salinization, overexploitation of groundwater, physical and chemical deterioration of the soil, and pest problems. This paper presents findings from recent research on resource conservation technologies involving tillage and crop establishment options that are enabling farmers to sustain productivity of intensive rice-wheat systems. Field results show that the resource conserving technologies, an exponent of conservation agriculture, improve yields, reduce water consumption, and reduce negative impacts on the environmental quality. The paper considers contributions of innovative inter-institutional collaboration in international agricultural research and socio-economic changes in the IGP countries that led to rapid development and adoption of these technologies by farmers.
Keywords: Crop establishment; RCT; Rice; Tillage; Water; Wheat

You-Cai Xiong, Feng-Min Li, Ting Zhang, Chen Xia, Evolution mechanism of non-hydraulic root-to-shoot signal during the anti-drought genetic breeding of spring wheat, Environmental and Experimental Botany, Volume 59, Issue 2, March 2007, Pages 193-205, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2005.12.003.
(http://www.sciencedirect.com/science/article/B6T66-4JRKCYW-2/2/fa3782d3574e47f52cf03f1c4cb3c2a6)
Abstract:
The objectives of this study were to: (1) characterize the evolutional tendency of the non-hydraulic root-sourced signal (NRS) from wheat wild relatives to its modern hexaploid species, and (2) test whether species sensitivity to the NRS was allied with their drought tolerance profiles. The NRS was judged to begin when there was a significant lowering of stomatal conductance without change in leaf relative water content (RWC). The lethal soil water content (LSWC) was operationally characterized as the soil water content (SWC) at the drying lethal point of wheat plants. The threshold of soil water content (TSWC) at which the NRS was triggered, and the LSWC differed amongst six wheat species. For 'MO1' and 'MO4' representing `diploid' species, the

TSWC and the LSWC were initiated successively at about 51% FWC (field water capacity) and about 30% FWC, respectively. Conversely, 'Plateau 602' and 'Longchun 8139-2' (modern hexaploid species) exhibited the TSWC and the LSWC between about 68% FWC and less than 14% FWC, a much wider threshold range (TR). Increasing TSWC was significantly correlated with decreasing LSWC (r = 0.9464**). The widened TR from the TSWC to the LSWC was also significantly correlated with longer survival days (SD) and higher maintenance ratio of grain yield (MRGY), respectively (r = 0.9411** and 0.8068*, respectively). Meanwhile, those species having higher TSWC had the least reduction ratio of stomatal conductance under the decreasing soil moisture from -0.2 to -1 MPa. This suggests that advances in yield performance and drought tolerance would be made evolutionally by targeted selection for an earlier onset of NRS.
Keywords: Non-hydraulic root-sourced signal (NRS); Spring wheat; Lethal soil water content (LSWC); Drought tolerance; Evolutionary mechanism; Threshold range

Jin-Shui Wang, Mou-Ming Zhao, Xiao-Quan Yang, Yue-Ming Jiang, Cui Chun, Gelation behavior of wheat gluten by heat treatment followed by transglutaminase cross-linking reaction, Food Hydrocolloids, Volume 21, Issue 2, March 2007, Pages 174-179, ISSN 0268-005X, DOI: 10.1016/j.foodhyd.2006.03.006.
(http://www.sciencedirect.com/science/article/B6VP9-4JMB0MJ-4/2/f3b97c515c16de1192d2a1cbff2d7a85)
Abstract:
Improvement in the functional properties of food proteins using microbial transglutaminase (TGase) has been the subject of recent studies in food field. However, changes in functional properties of wheat gluten as affected by cross-linking with TGase have not been well studied. Gelation of wheat gluten treated by TGase was investigated in this present study. Obvious decrease in the minimum concentration for gelation of the heated gluten (16%) was found compared with 22% of the original gluten. The surface lysine and glutamine residues of the gluten increased with heating, the formation of [epsilon]- ([gamma]-glutamyl)lysyl cross-links increased markedly in the gelation of heated-gluten treated by TGase. Significant (P<0.05) improvements in rheological properties, water-holding capacity and texture properties of the TGase-induced gluten gels were observed, particularly, for gels of TGase-induced glutens treated by pre-heating. It indicated that TGase had significant (P<0.05) effect on gelation capacity and gel properties of wheat gluten proteins.
Keywords: Wheat gluten; Microbial transglutaminase; Protein cross-linking; Minimum concentration for gelation; Rheological properties; Water-holding capacity; Texture properties

Pham Van Hung, Tomoko Maeda, Naofumi Morita, Dough and bread qualities of flours with whole waxy wheat flour substitution, Food Research International, Volume 40, Issue 2, Starch Functionality III, March 2007, Pages 273-279, ISSN 0963-9969, DOI: 10.1016/j.foodres.2006.10.007.
(http://www.sciencedirect.com/science/article/B6T6V-4MD4646-4/2/d1cd97d9bc64d44fa30a6f78dd396e0f)
Abstract:
Whole wheat flour has been developed as fiber-rich food for healthy bowel function. In this study, whole waxy wheat flour (WWF) was characterized and applied for breadmaking with the hope that breads made from WWF would improve the quality based on the superior properties of the waxy flour in retardation of bread staling. WWF had significantly higher protein, ash and dietary fiber contents (13.5%, 1.6% and 15.3%, respectively), but lower lipid content (0.8%) than commercial white flour (CWF). Amounts of soluble and insoluble dietary fiber in WWF were 4.1% and 11.2% (% total weight), respectively. WWF had lower pasting temperature and viscosities than CWF. Dough made from WWF increased water absorption and showed lower stability during mixing than that from CWF. The high amount of dietary fiber diluted the gluten protein in dough during mixing

to form weak and inextensible dough. Bread made from whole waxy wheat flour had significantly low specific volume and big gal cell distribution as compared to that from CWF. Also, dark-brown color and bitter taste are weak points of whole waxy wheat bread. However, the WWF bread was significantly softer than CWF bread during storage. The qualities of breads were also improved using partial WWF substitution (10%, 30% or 50%) for CWF. As a result, whole waxy wheat flour can be used for breadmaking to improve nutritious quality of bread for health benefits.
Keywords: Waxy wheat; Breadmaking; Dough property; Whole grain

T.A. Shittu, A.O. Raji, L.O. Sanni, Bread from composite cassava-wheat flour: I. Effect of baking time and temperature on some physical properties of bread loaf, Food Research International, Volume 40, Issue 2, Starch Functionality III, March 2007, Pages 280-290, ISSN 0963-9969, DOI: 10.1016/j.foodres.2006.10.012.
(http://www.sciencedirect.com/science/article/B6T6V-4MK60XF-1/2/ab7d8e9fc5b92331f69b60ef75489ad7)
Abstract:
The use of composite cassava-wheat (CCW) flour for commercial breadmaking purposes and consumption of CCW bread are relatively new in Nigeria. This study investigated the effect of baking temperature and time on some physical properties of bread from composite flour made by mixing cassava and wheat flour at ratio of 10:90 (w/w). A central composite rotatable experimental design was used while the baking temperature and time investigated ranged from 190 to 240 [degree sign]C and 20 to 40 min, respectively. Loaf volume, weight and specific volume varied significantly ($p < 0.001$) from 440 to 920 cm3, 162 to 183 g and 3.31 to 5.32 cm3/g, respectively. The tristimulus color parameters such as L* (lightness) and brownness index (BI) of the crust varied significantly ($p < 0.01$) from 31 to 72 and 68 to 123, respectively. Moreover, Fresh crumb moisture, density, porosity and softness as well as the dried crumb hardness were also significantly ($p < 0.01$) affected by both the baking temperature and time with values ranging from 34% to 39%, 0.16 to 0.20 g/cm3, 0.69 to 0.80, 13.00 to 18.05 mm and 0.90 to 2.05 kgf, respectively. Due to the complex effect of temperature and time combination, most of the measured properties could not be reliably predicted from the second order response surface regression equations except the loaf weight and crumb moisture. Further studies are required to optimize the CCW bread baking process based on some storage and consumption qualities.
Keywords: Bread loaf properties; Composite flour; Cassava; Wheat; Response surface methodology

G.M. Campbell, C. Fang, I.I. Muhamad, On Predicting Roller Milling Performance VI: Effect of Kernel Hardness and Shape on the Particle Size Distribution from First Break Milling of Wheat, Food and Bioproducts Processing, Volume 85, Issue 1, March 2007, Pages 7-23, ISSN 0960-3085, DOI: 10.1205/fbp06005.
(http://www.sciencedirect.com/science/article/B8JGD-4S1T0R2-2/2/32a0c12a3440942c0908fab7f44003b0)
Abstract:
Models based on the breakage equation for roller milling have been developed to predict the output particle size distribution delivered by First Break roller milling of wheat from distributions of single kernel characteristics. These models allow prediction of the breakage of mixtures of kernels of unknown origin or varieties and varying in size and hardness, based solely on Perten Single Kernel Characterisation System (SKCS) characteristics. Predictions have been developed for both Sharp-to-Sharp and Dull-to-Dull roll dispositions, and show good agreement with independent data. Milling under a Dull-to-Dull disposition is more sensitive to kernel hardness and gives a more pronounced U-shaped distribution of output particle sizes (i.e., large proportions of both small and large particles, with few in the mid-size range) than Sharp-to-Sharp milling. Similarly, softer wheats break to give a more U-shaped distribution than harder wheats. These findings also demonstrate

that kernel hardness as reported by the SKCS is meaningful in relation to wheat breakage during roller milling. Previous work has shown that single kernel moisture measurements can be included in predictive equations; further work reported here demonstrates the potential to add the fourth SKCS parameter, kernel mass, to predictions in order to allow for the effect of kernel shape on breakage.
Keywords: wheat; flour; hardness; roller milling; breakage equation; single kernel characterization

P.S. Belton, C. Wrigley, F. Bekes and W. Bushuk, Editors, Gliadin and Glutenin: The Unique Balance of Wheat Quality, AACC International Press, St. Paul, MN, USA (2005) 480pp., $129, ISBN:0-891127-51-9., Journal of Cereal Science, Volume 45, Issue 2, March 2007, Page 121, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.11.003.
(http://www.sciencedirect.com/science/article/B6WHK-4MNYJVB-3/2/9e4f7c788c8509e89404448c45d11bfb)

B.G. Osborne, R.J. Henry, M.D. Southan, Assessment of commercial milling potential of hard wheat by measurement of the rheological properties of whole grain, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 122-127, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.005.
(http://www.sciencedirect.com/science/article/B6WHK-4M2WP2K-1/2/c42dd633941e7c187521eb065189d62a)
Abstract:
The single-kernel characterisation system (SKCS) 4100 instrument has previously been shown to provide in situ measurements of the rheological properties of the bran and endosperm layers of wheat, otherwise only possible following their isolation by dissection or machining. The current study has confirmed that endosperm maximum stress (endosperm strength (ES) as measured using the SKCS 4100 correlates highly (r=0.898) with compressive strength (maximum stress, [sigma]max) measurements performed on specimens of endosperm tissues of known dimensions, isolated from different subsamples of the same bulk wheat samples. This provides a means of scaling the stress axis of the crush-response profile plots to the Instron scale (MPa) so that the SKCS endosperm stress/strain curves for hard wheat, soft wheat and durum can be compared with Instron results presented in the literature. In addition, a simple method for the measurement of ES and stiffness, using the SKCS 4100, has been developed. The method has been shown to rank wheat samples according to their performance when processed on a 650 kg/h pilot mill. The criterion against which the SKCS-derived rankings were compared was the Milling Quality Index, which uses both the percentage flour extraction and Branscan speck count measurements.
Keywords: Genomics; Milling quality; Grain rheology; Wheat

F.M. DuPont, R. Chan, R. Lopez, Molar fractions of high-molecular-weight glutenin subunits are stable when wheat is grown under various mineral nutrition and temperature regimens, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 134-139, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.008.
(http://www.sciencedirect.com/science/article/B6WHK-4MP5KR4-1/2/340b575ca4904f9181c44c6ceb332809)
Abstract:
Molar fractions of the high-molecular-weight glutenin subunits (HMW-GS) were determined for flour from bread wheat (Triticum aestivum L. cv Butte86) produced under 13 different combinations of temperature, water and mineral nutrition. Albumins, globulins and gliadins were removed from the flour by extraction with 0.3 M NaI in 7.5% 1-propanol. Total HMW-GS were recovered by extracting the remaining protein with 2% SDS and 25 mM DTT. Individual HMW-GS were then separated and quantified by RP-HPLC. Constant molar fractions for the five HMW-GS were maintained under all environmental conditions, despite large differences in duration of grain fill,

total protein per grain, flour protein percentage, and total HMW-GS per grain. Similar molar fractions were found for five other US wheat varieties. The Bx7 subunit accumulated to the highest level at 30% of total HMW-GS. The Dx and Dy subunits were present in smaller but nearly equal proportions, 22% and 23%, respectively, and the Ax and By subunits were the least abundant, 14% and 12%, respectively. Although the amounts of HMW-GS per unit of flour are strongly affected by environment, the different subunits respond so similarly to external conditions that their final proportions appear to be determined mainly by genetic factors.
Keywords: Glutenin; Environment; HPLC; Bread wheat; High-molecular-weight glutenin subunits; Wheat; Wheat flour

N.M. Edwards, M.C. Gianibelli, T.N. McCaig, J.M. Clarke, N.P. Ames, O.R. Larroque, J.E. Dexter, Relationships between dough strength, polymeric protein quantity and composition for diverse durum wheat genotypes, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 140-149, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.012.
(http://www.sciencedirect.com/science/article/B6WHK-4M3J0SD-1/2/49ec2f42f26bb242eaeef9ecd5789f46)
Abstract:
Five different Glu-B1 HMW-GS patterns were identified among a collection of diverse durum wheat genotypes grown in 2001 in two locations in western Canada. The durum wheat lines exhibited a wide range of dough and gluten strength characteristics as measured by alveograph and 2 g mixograph parameters, gluten index (GI), and protein composition as measured by unextractable polymeric protein (UPP) content and the ratio of high-molecular weight (HMW) glutenin subunits (GS) to low-molecular weight (LMW) GS. HMW-GS subunits patterns represented within the genotypes were 6+8, 7+8, 7+16, 14+15 and 20. Two of the genotypes expressed Glu-A1 HMW-GS 2* in combination with other HMW-GS. Approximately 95% of the durum genotypes were [gamma]-gliadin 45 types. Analysis of variance indicated that genotype was a greater source of variation in all measurements than was growing location, with the exception of protein content which showed less variation contributed by genotype and more contributed by location than for other quality parameters. UPP was strongly associated with all strength measurements. All of the [gamma]-gliadin 42 types were low in UPP and weak. Among the [gamma]-gliadin 45 types, those possessing HMW-GS 20 were typically in the lower half of the UPP and strength range. There was no clear evidence of an association between any of the other HMW-GS patterns and gluten strength. The majority exhibited HMW to LMW-GS ratios that were within the relatively narrow range of 0.15-0.25, yet there were wide variations in dough strength among genotypes within that range. Increasing proportions of HMW-GS resulting in ratios of greater than 0.30 were generally associated with weak dough and gluten and low UPP content.
Keywords: Durum wheat; Gluten index; Alveograph; Polymeric protein; Mixograph; High molecular weight glutenin subunits; Gluten strength

H.D. Sapirstein, P. David, K.R. Preston, J.E. Dexter, Durum wheat breadmaking quality: Effects of gluten strength, protein composition, semolina particle size and fermentation time, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 150-161, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.08.006.
(http://www.sciencedirect.com/science/article/B6WHK-4M6SBG0-1/2/6b5b3cbc89ffa42d0a0f077e89483b9f)
Abstract:
The effects of particle size of granulars (semolina and flour combined), gluten strength, protein composition and fermentation time on the breadmaking performance were compared for eleven durum wheat genotypes of diverse strength from North America and Italy grown in the same environment. All genotypes were [gamma]-gliadin 45 types (low-molecular weight glutenin subunit 2 patterns) associated with superior pasta-making quality. Three cultivars with high-molecular

weight glutenin subunit 20 exhibited relatively weak gluten, confirming that this subunit is associated with weakness in durum wheat. Gluten strength as measured by a range of technological tests was directly and strongly related to the proportion of insoluble glutenin (IG) in granulars protein as determined by a spectrophotometric procedure. Reducing the particle size of granulars by gradual reduction shortened development time in both the farinograph and mixograph. Reducing granulars also increased starch damage and, accordingly, farinograph water absorption, but remix-to-peak baking absorption was unaffected due to increased fermentation loss for finer granulars. Neither loaf volume, nor remix-to-peak mixing time were affected by the particle size of the granulars indicating that regrinding is not an asset for baking provided there is adequate gassing power. Loaf volume was directly related to gluten strength and IG content, and inversely related to residue protein, a non-gluten containing fraction. When fermentation time was reduced from the standard 165 to 90 min and 15 min, all genotypes exhibited a progressive increase in loaf volume. Therefore, regardless of strength, short fermentation time is preferred when high volume durum wheat bread is desired. Some of the stronger durum genotypes exhibited remix-to-peak bread volume comparable to that expected of good quality bread wheat, indicating that there is potential to select for genotypes with improved baking quality in conventional breeding programs by screening for high content of insoluble glutenin.
Keywords: Durum wheat semolina; Particle size; Insoluble glutenin; Fermentation; Breadmaking

Thomas M. Giersch, Ming-Jie Wu, Louise Duncan, Xiaochun Zhao, James Chin, Detection of mutations in the 7A allele of wheat (Triticum aestivum) granule-bound starch synthase (Wx-7A) with a monoclonal antibody produced by targeted peptide immunisation, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 162-171, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.007.
(http://www.sciencedirect.com/science/article/B6WHK-4MK610W-1/2/8f8437af254fb25fa6408e5ab200ab06)
Abstract:
A peptide sequence unique for the granule-bound starch synthase (GBSS1) of hexaploid wheat (Triticum aestivum) was identified by sequence alignment of the three isoforms. Multiple antigenic peptides (MAP) of different length (16 and 20 AA) were synthesised against the selected sequence. The assessment of the immune response in mice against differently presented forms (resin-bound, free) and two types of adjuvants indicated that the free MAP with the longer peptide is more immunogenic. A 20AA MAP that elicited a strong immune response was used to produce a monoclonal antibody for the 7A isoform of GBSS 1. Epitope mapping of the selected Mab (F5-1F2) revealed that a 12mer partial sequence of the immunising peptide was specifically detected. Based on this Mab, a simple high throughput ELISA was developed that allows the quick identification of wheat lines carrying the 7A allele of GBSS 1 with minute amounts of sample.
Keywords: Wheat; Triticum aestivum; Starch; GBSS I; Waxy protein; Monoclonal antibodies

Ann Blechl, Jeanie Lin, Son Nguyen, Ronald Chan, Olin D. Anderson, Frances M. Dupont, Transgenic wheats with elevated levels of Dx5 and/or Dy10 high-molecular-weight glutenin subunits yield doughs with increased mixing strength and tolerance, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 172-183, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.009.
(http://www.sciencedirect.com/science/article/B6WHK-4M33W1C-1/2/5d57b60d9be091bc15946d503d7bc60b)
Abstract:
To test the effects of independently increasing the in vivo levels of high-molecular-weight glutenin subunits (HMW-GS) Dx5 and Dy10 on wheat flour properties, we increased the copy numbers of their corresponding genes by genetic transformation. Thirteen transformants with increases in one or both subunits were chosen for biochemical and functional characterization by solvent

fractionation, RP-HPLC, SDS-sedimentation, and micro-mixing. Increases in Dx5 and Dy10 contents ranged from 1.4- to 3.5-fold and 1.2- to 5.4-fold, respectively, and generally resulted in increased polymeric protein, increased mixing times and tolerances, and lower peak resistances. Increases in Dx5 content had larger effects on most parameters than comparable increases in Dy10. Flours with more than 2.6-times the native levels of Dx5 could not be mixed under standard 2-g mixograph conditions, while flours with 5.4 times the native levels of Dy10 could be mixed if sufficient time was allowed. Increases in Dx5 and Dy10 had additive effects on mixing behavior. These experiments demonstrate that dough mixing strength and tolerance can be increased by raising the levels of native HMW-GS Dx5 or Dy10, but that the effects of the two subunits are quantitatively and qualitatively different.
Keywords: Transgenic; Triticum aestivum; Gluten polymer

Peter Gollan, Kerrie Smith, Mrinal Bhave, Gsp-1 genes comprise a multigene family in wheat that exhibits a unique combination of sequence diversity yet conservation, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 184-198, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.07.011.
(http://www.sciencedirect.com/science/article/B6WHK-4MR1P4F-1/2/d1d3a3e2a53064edd749672aeaf2918e)
Abstract:
While the commercially important trait of grain hardness in wheat is largely determined by the puroindoline proteins, a number of studies suggest additional loci, and a role for the grain softness protein-1 (GSP-1), encoded by the gene Gsp-1 tightly linked to the puroindoline genes, remains ambiguous. To investigate their role individual Gsp-1 genes were cloned from several accessions of durum, diploid and hexaploid wheat, rather than sequencing of genomic DNA PCR products. Analysis of clones identified >1 restriction fragment length polymorphisms (RFLPs) in some 2n progenitors, >2 RFLP types in several durums and >3 in common wheat. DNA sequencing identified 30 different Gsp-1 haplotypes from various 2n, 4n and 6n wheats, exhibiting extensive single nucleotide polymorphisms (SNPs) and a 3-base deletion, all but three haplotypes being novel. Shared SNPs between various diploids, indicated an ancient origin of this gene family, but certain aspects were unique to durums, and existence of multigenes in at least some genomes was confirmed through single plant analysis of select accessions of Aegilops speltoides, durum and common wheat. Most interestingly, despite the great sequence diversity, the functionally important amino acids involved in lipid binding, i.e., the 10 cysteines and two tryptophans, were retained in all putative proteins. The results suggest that these genes may be functionally important, particularly in durums which lack puroindolines, and may have major roles in plant defence and only a minor influence on grain texture.
Keywords: Grain hardness; Grain softness proteins; Gsp-1; Evolution

Xueyan Shan, Sally R. Clayshulte, Scott D. Haley, Patrick F. Byrne, Variation for glutenin and waxy alleles in the US hard winter wheat germplasm, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 199-208, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.007.
(http://www.sciencedirect.com/science/article/B6WHK-4MFK42D-1/2/64195fa9dcf9fb7a70566904ca1775e0)
Abstract:
We conducted a survey of high- and low-molecular-weight glutenin subunits (HMW-GS and LMW-GS, respectively) and waxy (Wx) allele composition in 111 winter wheat cultivars and advanced lines developed in the US Hard Winter Wheat Region since 1991. At the HMW-GS Glu-A1 locus, 76.1% of entries had allele b (encoding subunit 2*), 21.2% carried allele a (subunit 1), and 2.7% had allele c (null). Glu-B1 alleles were c (subunits 7+9; 47.7% of entries), b (subunits 7+8; 33.3%), e (subunits 20x+20y; 7.7%), i (subunits 17+18; 6.3%), and w (subunits 6*+8*; 5%). At Glu-D1, 80.6% of the entries carried allele d (subunits 5+10), 11.3% had allele a (subunits 2+12), 7.2%

carried allele b (subunits 3+12), and 0.9% had allele e (subunits 2+10). Glu-B1 and Glu-D1 allele frequency differed significantly ($P<0.01$) from a previous study of the US Hard Winter Wheat germplasm developed from 1970 to 1990. At LMW-GS loci, five Glu-A3 alleles, nine Glu-B3 alleles, and five Glu-D3 alleles were identified. Ten entries with the null Wx-B1b allele and seven with the null Wx-A1b allele were detected. This survey allows comparisons of HMW-GS and waxy allele compositions with the US Hard Winter Wheat germplasm from previous eras and provides baseline data on LMW-GS composition.
Keywords: High-molecular-weight glutenin subunits; Low-molecular-weight glutenin subunits; End-use quality; Waxy; Wheat; Triticum aestivum

C. Primo-Martin, N.H. van Nieuwenhuijzen, R.J. Hamer, T. van Vliet, Crystallinity changes in wheat starch during the bread-making process: Starch crystallinity in the bread crust, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 219-226, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.08.009.
(http://www.sciencedirect.com/science/article/B6WHK-4M93P7B-1/2/4cd0c00837fb77c227f0d2ce80323e0e)
Abstract:
The crystallinity of starch in crispy bread crust was quantified using several different techniques. Confocal scanning laser microscopy (CSLM) demonstrated the presence of granular starch in the crust and remnants of granules when moving towards the crumb. Differential scanning calorimetry (DSC) showed an endothermic transition at 70 [degree sign]C associated with the melting of crystalline amylopectin. The relative starch crystallinity, as determined by X-ray and DSC, from different types of breads was found to lie between 36% and 41% (X-ray) and between 32% and 43% (DSC) for fresh bread crust. Storage of breads in a closed box (22 [degree sign]C) for up to 20 days showed an increase in crust crystallinity due to amylopectin retrogradation both by X-ray and DSC. However, DSC thermograms of 1-day old bread crust showed no amylopectin retrogradation and after 2 days storage, amylopectin retrogradation in the crust was hardly detectable. 13C CP MAS NMR was used to characterize the physical state of starch in flour and bread crumb and crust. The intensity of the peaks showed a dependence on the degree of starch gelatinization.
Comparison of the results for two different types of bread showed that the baking process influenced the extent of starch crystallinity in the bread crust. Amylopectin retrogradation, which is the main process responsible for the staling of bread crumb, cannot be responsible for crispness deterioration of the crust as amylopectin retrogradation upon storage of breads could only be measured in the crust after 2 days storage. Under the same conditions loss of bread crust crispness proceeds over shorter times.
Keywords: Crust; Bread; Crystallinity; Starch; X-ray; DSC; CSLM; NMR

V. Greffeuille, F. Mabille, M. Rousset, F.-X. Oury, J. Abecassis, V. Lullien-Pellerin, Mechanical properties of outer layers from near-isogenic lines of common wheat differing in hardness, Journal of Cereal Science, Volume 45, Issue 2, March 2007, Pages 227-235, ISSN 0733-5210, DOI: 10.1016/j.jcs.2006.09.002.
(http://www.sciencedirect.com/science/article/B6WHK-4MNYJVB-2/2/1976eac860e3a13566d2cba83ea7c534)
Abstract:
The mechanical properties of the combined outer layers from near-isogenic wheats differing by hardness were determined. Results from traction tests showed significant differences between the isogenic lines, outer layers from grains of the soft type showing higher extensibility. Determination of the mechanical properties of the corresponding component tissues revealed significant differences between the isolated tissues from soft or hard wheat grains. It also allowed analysis of their respective contribution to the properties of the combined peripheral tissues using a simulation

of their rupture as unseparated tissues. According to the results, if the component layers displayed similar maximum lineic force to rupture, the rupture of combined outer layers occurs when the least extensible individual tissue breaks. The major cell wall biochemical components of the combined outer layers and of their component tissues were analysed. The phenolic acid composition of soft wheat pericarp contained more ferulic acid in either monomeric or polymeric forms than the pericarp from hard wheat. Arabinoxylans in walls of the soft wheat pericarp appeared 1.6 times more cross-linked by ferulic acid dehydrodimers than walls of hard wheat. These differences in arabinoxylan cross-linking may explain the observed differences in pericarp mechanical properties.
Keywords: Common wheat; Outer layers; Hardness; Mechanical properties; Phenolic cross-link