Kentang Benih
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Yield and canopy development of field grown potato plants derived from synthetic seeds/Aggrey Bernard Nyende, Siegfried Schittenhelm, Gunda Mix-Wagner, Jorg Michael Greef

European Journal of Agronomy, Volume 22, Issue 2, February 2005, Pages 175-184, ISSN 1161-0301, DOI: 10.1016/j.eja.2004.02.003. (http://www.sciencedirect.com/science/article/pii/S1161030104000206)

Abstract:
Although detailed growth studies and yield analysis are common for the conventional seed tuber plants in potato, their application to synthetic seeds does not exist. Growth measurements of potato plants from two field grown cultivars of synthetic seeds in comparison to their respective seed tubers were conducted during two seasons in the town of Braunschweig, Germany. In the 2001 season, using pre-germinated synthetic seeds, maximum plant height was recorded at 98 days after planting (DAP), 21 days later than for seed tuber plants. Maximum intercepted photosynthetic active radiation (IPAR) for plants derived from synthetic seeds was 96.4% for the cv. Desiree and 93.2% for the cv. Tomensa, while for plants derived from the seed tubers was 98.4% for the cv. Desiree and 96.6% for the cv. Tomensa. On average, plants from the synthetic seeds matured 40 days later than plants from the seed tubers. The plants derived from the synthetic seeds had lower tubers yields of 103 and 105 dt ha-1, while the plants derived from seed tubers yielded 152 and 147 dt ha-1 for the cvs. Desiree and Tomensa, respectively. In the 2002 season, using transplanted synthetic seed seedlings, maximum plant height was recorded at 84 DAP for both seed types. Maximum IPAR for plants derived from synthetic seeds was 92.5% for the cv. Desiree and 95.8% for the cv. Tomensa, while for plants derived from the seed tubers was 92.4% for the cv. Desiree and 96.5% for the cv. Tomensa. On average, the synthetic seed seedling plants matured approximately 12 days later than plants from the seed tubers. Tuber yields of 104 and 127 dt ha-1 were recorded for the plants derived from synthetic seeds, while 101 and 126 dt ha-1 for the plants from seed tubers of the cvs. Desiree and Tomensa, respectively. The results demonstrated that synthetic seeds can be an alternative propagating method. Their yield potential, similar to that of seed tuber plants is also dependent on fast canopy growth, early attainment of maximum leaf area for maximum light interception, and completing growth within the available growing season.

Keywords: Synthetic seeds; Yield; Canopy growth; Light interception (IPAR); Potato

Effects of straw mulch on soil nitrate dynamics, weeds, yield and soil erosion in organically grown potatoes/Thomas F. Doring, Michael Brandt, Jurgen He[ss], Maria R. Finckh, Helmut Saucke

Field Crops Research, Volume 94, Issues 2-3, 15 November 2005, Pages 238-249, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.01.006. (http://www.sciencedirect.com/science/article/pii/S0378429005000092)

Abstract:
The application of straw mulch to organic seed potatoes (Solanum tuberosum L.) has been shown to reduce virus incidence. In order to determine the associated agronomic effects of straw mulch, applied at 2.5-5 t ha-1, on soil nitrate dynamics, weed development, tuber yield and soil erosion, 12 field experiments were evaluated. Experiments were

conducted on organic farms over 3 years at two locations in a temperate climate (635-709 mm precipitation/year; 8.1 [degree sign]C mean air temperature) on loamy silt soils. Tuber yield and tuber size distribution were not influenced significantly by mulching. However, the risk of undesirable post harvest N-leaching was significantly reduced due to the immobilization of nitrate-N after harvest at 6.8-7.0 kg N t-1 straw in two experiments (18-34 kg NO3-N ha-1). There was no consistent effect of straw mulch on number of weeds, weed cover and above ground biomass of weeds. The fact that yield and weed development were not significantly affected by straw mulch is mainly attributed to the relatively low amounts of straw applied. Soil erosion was reduced by >97% in a rain simulation experiment on a potato field of 8% slope with 20% crop cover. Soil loss was greatest (1606 g m-2) in the unmulched treatment, and 31, 42 and 26 g m-2 in treatments with chopped straw at 1.25, 2.5 and 5 t ha-1, respectively.

Keywords: Straw mulch; Nitrogen; Organic farming; Potato; Soil erosion; Weeds

Pest damage in sweet potato, groundnut and maize in north-eastern Uganda with special reference to damage by millipedes (Diplopoda)/E. Ebregt, P.C. Struik, B. Odongo, P.E. Abidin

NJAS - Wageningen Journal of Life Sciences, Volume 53, Issue 1, 2005, Pages 49-69, ISSN 1573-5214, DOI: 10.1016/S1573-5214(05)80010-7. (http://www.sciencedirect.com/science/article/pii/S1573521405800107)

Abstract:
Field experiments were conducted in Soroti District, north-eastern Uganda, an area with two rainy seasons per calendar year, the first one with long, reliable rains and a second one with short, less reliable rain. The trials were with sweet potato (Ipomoea batatas (L.) Lamk), groundnut (Arachis hypogaea L.) and maize (Zea mays L.) and aimed at collecting information on the incidence of millipede damage. Failure of sweet potato cuttings to establish caused by biotic stress varied from 4 to 33%. A significant but variable proportion of that biotic stress was caused by millipedes. Millipedes of the species Omopyge sudanica were responsible for the loss of up to 84% of the sweet potato cuttings if the crop was planted early in the first rainy season. During bulking hardly any damage was inflicted on the storage roots. When the tubers were stored `in-ground on plants' during the dry season, millipedes in combination with other insect pests affected up to 86% of the tubers at the onset of the rains of the following growing season. Data on groundnut and maize were taken on plots where in the previous season sweet potato had been grown. Early in the first rainy season, O. sudanica also caused damage in germinating groundnut, causing plant losses of 12-29%. Maturing groundnut seeds were affected for 39%. Millipede damage in germinating maize seeds in the first and second rainy seasons amounted to 34% and 29%, respectively. The species O. sudanica, Spirostreptus ibanda and Tibiomus spp. cfr. ambitus were found in the vicinity of the maize seeds but were only found feeding on them during the second rainy season. More research is needed to quantitatively assess economic damage to crop production caused by millipedes.

Keywords: Arachis hypogaea; crop establishment; cropping system; Ipomoea batatas; Omopyge sudanica; Spirostreptus ibanda; Tibiomus spp. cfr. ambitus; Zea mays

Characterization of two midgut proteinases of Helicoverpa armigera and their interaction with proteinase inhibitors/Manasi A. Telang, Ashok P. Giri, Mohini N. Sainani, Vidya S. Gupta

Journal of Insect Physiology, Volume 51, Issue 5, May 2005, Pages 513-522, ISSN 0022-1910, DOI: 10.1016/j.jinsphys.2004.12.004.
(http://www.sciencedirect.com/science/article/pii/S0022191005000090)

Abstract:
Two serine proteinases from the midgut of Helicoverpa armigera have been partially purified and characterized. One proteinase, HGP-1, was capable of hydrolyzing a synthetic substrate of elastase and was inhibited by elastatinal. The second proteinase, HGP-2, was inhibited by a trypsin inhibitor. Molecular weights of HGP-1 and HGP-2 were approximately 26.0 and 29.0 kDa, respectively. Both the proteinases exhibited alkaline pH optima in the range of 10-11. Furthermore, interaction of HGP-1 and HGP-2 with proteinase inhibitors (PIs) from host and non-host plants was studied. HGP-1 was not only insensitive to a PI from chickpea (host) but was also able to degrade it. The same PI from chickpea was able to inhibit over 50% activity of HGP-2. On the contrary, PIs from potato (non-host) showed strong inhibition of both, HGP-1 and HGP-2 and also demonstrated protection of chickpea seed proteins from digestion by both the HGPs. These results could provide important clues in designing strategies for sustainable use of plant PIs in developing insect-tolerant transgenic plants.

Keywords: Helicoverpa armigera gut proteinases; Elastase; Plant proteinase inhibitors; Insect-resistant plants

Expression of a fungal cyanamide hydratase in transgenic soybean detoxifies cyanamide in tissue culture and in planta to provide cyanamide resistance/Xing-Hai Zhang, Wei Qun Zhong, Jack M. Widholm

Journal of Plant Physiology, Volume 162, Issue 9, 14 September 2005, Pages 1064-1073, ISSN 0176-1617, DOI: 10.1016/j.jplph.2004.11.013.
(http://www.sciencedirect.com/science/article/pii/S0176161705000465)

Abstract:
Embryogenic tissue cultures of soybean were transformed by particle bombardment with a vector pCHZ-II that carries the coding sequence for cyanamide hydratase (Cah), an enzyme that converts toxic cyanamide to urea, from the soil fungus Myrothecium verrucaria. The Cah gene was driven by the constitutive Arabidopsis thaliana actin-2 promoter and terminated with its cognate terminator. This vector also carries the hygromycin phosphotransferase gene (hpt) driven by the potato (Solanum tuberosum) ubiquitin-3 promoter. Twelve individual lines of transgenic plants that were obtained under hygromycin selection expressed Cah mRNA and exhibited resistance to hygromycin in leaf tissue culture, while the untransformed tissues were sensitive. Cah enzyme activity was present in extracts of transformed leaves and embryogenic tissue cultures when measured by a colorimetric assay and the presence of the Cah protein was confirmed by enzyme-linked immunosorbent assay (ELISA). Cah expression detoxified cyanamide in leaf callus and embryogenic cultures as well as in whole plants as shown by cyanamide resistance. The Cah-expressing plants grew and set seeds normally indicating that the Cah enzyme activity did not affect soybean plant metabolism. We also describe a test whereby callus was formed on cultured leaf tissue in the presence of hygromycin or cyanamide only if the hpt or Cah gene was expressed, respectively. This test is a convenient and cost-effective way to follow the marker gene in the primary regenerated plants and subsequent generations, which is particularly reliable for the hpt gene expression using hygromycin.

Keywords: Cyanamide; Cyanamide hydratase; Glycine max; Selectable marker gene

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Early management of late blight (Phytophthora infestans) by using systemic fungicides applied to seed-potato tubers/A.B. Andreu, D.O. Caldiz

Crop Protection, Volume 25, Issue 3, March 2006, Pages 281-286, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.05.002.
(http://www.sciencedirect.com/science/article/pii/S0261219405001493)

Abstract:
Planting of seed tubers infected with late blight has been reported as a major cause in initiating the disease at field level. Seed treatments with contact fungicides can protect healthy tubers from infection during handling, grading and cutting before planting, but are not effective in protecting the young plant after emergence, when is more susceptible to the disease. Foliar fungicide applications are still required so crop protection early in the season, as a consequence of seed treatments could be an advantage especially in environments conducive to late blight epidemics. The systemic fungicides iprovalicarb+propineb (Melody Duo) and propyl carbamate (Previcur N), from Bayer CropScience, were applied to seed potato tubers (40-50 g) immediately after cutting or at planting to the bottom of the furrow and seed piece in cultivars Kennebec, Shepody, Ranger Russet, Russet Burbank and Spunta, at doses of 0.8 and 1.6 kg ton-1 and 0.4 and 0.8 l ton-1 of seed, respectively. Treated and control seed tubers were planted in pots in a greenhouse. From the time plants had one fully expanded leaf up to 40 days after emergence each treatment was evaluated by the detached-leaf method to assess foliage protection by means of artificial late blight inoculation. For all cultivars a higher level of foliage protection was found in those plants from seed tubers treated with iprovalicarb+propineb, while no effects were observed when the chemical was applied at planting to the bottom of the furrow. Used as described, this fungicide provided a higher protection against late blight than propyl carbamate. Further pre-commercial field trials, carried out during two growing seasons, with iprovalicarb+propineb was effective in protecting the foliage of cultivars Spunta, Kennebec and Shepody up to 4-6 weeks after crop emergence. For the first 4 weeks protection was high and the following two weeks it was satisfactory. This innovative application of iprovalicarb+propineb was only effective when the chemical was applied to cut seed tubers immediately after cutting and before suberization. Due to its effectiveness in controlling late blight this type of treatment should be part of a strategy for integrated late blight management, particularly where late blight epidemics occur early in the season.

Keywords: Solanum tuberosum; Late blight; Systemic fungicides; Seed-tubers; Foliage protection

Effect of a combination of chlorine dioxide and thiophanate-methyl pre-planting seed tuber treatment on the control of black scurf of potatoes/Deena Errampalli, Rick D. Peters, Kathy MacIsaac, Danny Darrach, Peter Boswall

Crop Protection, Volume 25, Issue 12, December 2006, Pages 1231-1237, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.03.002.

(http://www.sciencedirect.com/science/article/pii/S0261219406000597)

Abstract:
The pre-planting seed tuber treatments of chlorine dioxide (ClO2), thiophanate-methyl (TPM), and a combination treatment of ClO2, followed by TPM, were evaluated for control of stem canker and black scurf (Rhizoctonia solani), and storage rots; black scurf, common scab (Streptomyces scabies), dry rot (Fusarium spp.) and silver scurf (Helminthosporium solani) on potato (Solanum tuberosum L.) cv. Kennebec. Field experiments were conducted in two consecutive years, 1999 and 2000, at the Agriculture and Agri-Food Canada Research Farm in Harrington, Prince Edward Island (PEI), Canada. The combination treatment of ClO2 (200 [mu]g g-1) and TPM (50 g active ingredient100 kg-1 of tubers) significantly (P=0.05) reduced stem canker and black scurf on progeny tubers at harvest and after storage. The low incidence of scab and dry rot in untreated controls hindered the evaluation of the efficacy of the combination treatment and also showed that conditions were not favourable for disease development during this period at Harrington. The combination treatment was not effective on silver scurf in storage. A comparison among control, ClO2, TPM, and the combination treatment indicates that pre-planting ClO2 treatment may have killed the majority of the black scurf sclerotia on the tuber surface and that the combination of TPM fungicide treatment following ClO2 treatment gave protection to progeny tuber by suppressing the growth of the R. solani. A higher marketable yield was observed in the combination treatment as compared with the untreated control. Phytotoxicity was not observed in tubers treated with the combination treatment.

Keywords: Black scurf; Common scab; Rhizoctonia solani; Storage diseases; Streptomyces scabies; Thiophanate-methyl

Soil water stress and the growth and yield of potato plants grown from microtubers and conventional seed tubers/Jackson Kawakami, Kazuto Iwama, Yutaka Jitsuyama

Field Crops Research, Volume 95, Issue 1, 8 January 2006, Pages 89-96, ISSN 0378-4290, DOI: 10.1016/j.fcr.2005.02.004.
(http://www.sciencedirect.com/science/article/pii/S037842900500050X)

Abstract:
Tuber yields of potato plants grown from microtubers in fields are more variable than yields from conventional seed tubers (CT). One reason could be their higher susceptibility to water stress. This study clarified the effect of soil water stress from 1 month after emergence on the growth and yield of plants grown from conventional seed tubers and microtubers in fields. Microtubers (0.5-3 g) and conventional seed tubers (50 g) were grown in Hokkaido, Japan, over three field seasons. One month after emergence, poly-shelters were placed over the plots to prevent rainfall, and either irrigated (wet plot) or non-irrigated (dry plot) treatments were formed. At mid-flowering (about 50 days after emergence) leaf area index (LAI) in microtuber plants was decreased relatively more due to soil water stress than LAI in conventional seed tuber plants. However, at maximum shoot growth (about 80 days after emergence) both microtuber and conventional seed tuber plants had a similar relative decrease in LAI due to soil water stress. At mid-flowering and maximum shoot growth microtuber and conventional seed tuber plants had reduced stomatal conductance due to soil water stress, but the reduction in stomatal conductance was greater in conventional seed tuber plants than in microtuber plants. Microtuber and conventional seed tuber plants had similar root development at maximum

shoot growth. Tuber production from mid-flowering until plant maturity was similarly affected by soil water stress in microtuber and conventional seed tuber plants. At harvest, plants affected by soil water stress had about 87% of the tuber dry weight of irrigated plants. We conclude, that the greater variation on tuber yield of microtuber plants cannot be attributed to soil water stress from 1 month after emergence.

Keywords: Drought tolerance; Field cultivation; Leaf area index; Root growth; Solanum tuberosum L.; Stomatal conductance

Low-level jet streams associated with spring aphid migration and current season spread of potato viruses in the U.S. northern Great Plains/Min Zhu, Edward B. Radcliffe, David W. Ragsdale, Ian V. MacRae, Mark W. Seeley

Agricultural and Forest Meteorology, Volume 138, Issues 1-4, 29 August 2006, Pages 192-202, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2006.05.001. (http://www.sciencedirect.com/science/article/pii/S0168192306001407)

Abstract:
Green peach aphid, Myzus persicae (Sulzer), is the principal and possibly sole vector of Potato leafroll virus (PLRV) and a key vector of Potato virus Y (PVY) in the U.S. northern Great Plains. Current season spread of PLRV and PVY in seed potato depends primarily on flight activity of winged aphids and the availability of virus inoculum. M. persicae does not overwinter outdoors in the northern Great Plains, populations are reestablished each year by spring immigrants from the south. The objective of this research was to relate spring low-level jet (LLJ) streams to intensity of M. persicae flight activity and current season spread of PLRV and PVY. Synoptic weather maps were used to identify LLJ events that could have brought aphids into the northern Great Plains and to record the timing and duration of each event from 1 May to 30 June. HYSPLIT (Hybrid Single-particle Lagrangian Integrated Trajectory), a trajectory analysis model developed by the National Oceanic and Atmospheric Administration and Australian Bureau of Meteorology, was used to track pathways of air particles to their source. Captures of M. persicae and other potential vector species by a regional aphid trapping network (Aphid Alert) from 1992 to 1994 and 1998 to 2003 were used as measures of aphid flight activity. Results from winter grow-outs of the Minnesota Seed Potato Certification Program were used as measures of available PLRV and PVY inoculum. As a possible surrogate for aphid flight activity we used data on spring wind events to predict current season seed lot rejections due to PLRV and PVY. Statistical models were developed relating frequency and duration of spring wind events to subsequent M. persicae abundance and severity of PLRV and PVY spread in the northern Great Plains. Results showed that the cumulative LLJ duration fit best with cumulative M. persicae capture through the first week of August (R2 ranging from 0.597 to 0.883), and the current season spread of PLRV fit best with inoculum and cumulative M. persicae capture through the first week of August (R2 = 0.75, P = 0.015). LLJ duration did not reliably predict seasonal abundance of PVY vectors other than M. persicae. The model for prediction of PVY using LLJ duration and PVY inoculum was considerably less reliable (R2 = 0.30, P = 0.34) although using both M. persicae capture through the first week of August and PVY inoculum fit better (R2 = 0.39, P = 0.231).

Keywords: Myzus persicae; Potato leafroll virus; Potato virus Y; Low-level jet stream

Assessment of the Behaviour of Potatoes in a Cup-belt Planter/H. Buitenwerf, W.B. Hoogmoed, P. Lerink, J. Muller
Biosystems Engineering, Volume 95, Issue 1, September 2006, Pages 35-41, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.06.007.
(http://www.sciencedirect.com/science/article/pii/S1537511006002078)
Abstract:
The functioning of most potato planters is based on transport and placement of the seed potatoes by a cup-belt. The capacity of this process is rather low when planting accuracy has to stay at acceptable levels. The main limitations are set by the speed of the cup-belt and the number and positioning of the cups. It was hypothesised that the inaccuracy in planting distance, that is the deviation from uniform planting distances, mainly is created by the construction of the cup-belt planter.
To determine the origin of the deviations in uniformity of placement of the potatoes a theoretical model was built. The model calculates the time interval between each successive potato touching the ground. Referring to the results of the model, two hypotheses were posed, one with respect to the effect of belt speed, and one with respect to the influence of potato shape. A planter unit was installed in a laboratory to test these two hypotheses. A high-speed camera was used to measure the time interval between each successive potato just before they reach the soil surface and to visualise the behaviour of the potato.
The results showed that: (a) the higher the speed of the cup-belt, the more uniform is the deposition of the potatoes; and (b) a more regular potato shape did not result in a higher planting accuracy.
Major improvements can be achieved by reducing the opening time at the bottom of the duct and by improving the design of the cups and its position relative to the duct. This will allow more room for changes in the cup-belt speeds while keeping a high planting accuracy.

Transmission of seed-borne infection of muskmelon by Didymella bryoniae and effect of seed treatments on disease incidence and fruit yield/J. Sudisha, S.R. Niranjana, S. Umesha, H.S. Prakash, H. Shekar Shetty,
Biological Control, Volume 37, Issue 2, May 2006, Pages 196-205, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.11.018.
(http://www.sciencedirect.com/science/article/pii/S1049964405003282)
Abstract:
Infected muskmelon plants were collected and a fungus was isolated during field survey of muskmelon conducted in 4th, 5th, and 6th agroclimatic zones of Karnataka state. The pathogen was identified as Didymella bryoniae upon incubation on potato dextrose agar plates. The pathogen causes gummy stem blight disease in muskmelon. Spore concentration of 12 x 105 ml-1 was found to be very effective in reestablishment of the pathogen upon artificial inoculation. The pathogen was located both externally and internally on the seed. Naturally infected seeds were subjected to transmission studies in vitro and in vivo. Four fungicides and two biological agents were evaluated for their efficacy against gummy stem blight disease incidence and fruit yield in field conditions. In water agar, primary seedling infection occurred on hypocotyls and cotyledons while pycnidia on ungerminated seeds and stunted seedling were also noticed due to severity of the infection. Typical symptoms expressed from 35 to 67 days after sowing until harvest experimentally, the fungus was more prevalent at the collar region of the plant. Mean disease incidence from all the cultivars significantly reduced except Bavistin

(Carbendazim 50% WP), among which fungicides Dithane M-45 0.2% (Mancozeb 75% WP) and Wanis 0.3% significantly (P = 0.001) reduced the disease incidence where only 10.2 and 13.0%, disease was recorded, respectively and severity of gummy stem blight compared with Captaf 0.3% (Captan 50% WP) with 24.2% disease, whereas Bavistin (Carbendazim 50% WP) seed treatment was par with the control. Among antagonists, Pseudomonas fluorescens applied as pure culture (1 x 108 cfu ml-1) and formulation of (26 x 107 cfu g-1) at the rate of 8 and 10 g kg-1 significantly (P = 0.001) reduced the disease incidence, which showed 17.7, 21.5, and 20.5%, disease respectively. On the contrary pure culture of Trichoderma harzianum (1 x 108 cfu ml-1) recorded 18.2% D. bryoniae incidence followed by its formulation (21 x 107 cfu g-1), which recorded 24.0 and 21.2% disease in 8 and 10 g kg-1, respectively. Mean fruit weight from all the tested cultivars were increased at higher concentration (0.3%) by as much as 265 g in Dithane M-45, 154 g in Captaf and only 55 g in Bavistin treated seeds, while Wanis treatment resulted in decreased fruit weight when compared to untreated control. Seeds treated with P. fluorescens both as pure culture and formulation significantly (P = 0.001) effective in increasing the fruit yield by 370, 350, and 363 g, respectively. Though slight decrease in the yield was noticed in T. harzianum both as pure culture and formulation were significantly (P = 0.001) effective in increasing the fruit yield. However, both P. fluorescens and T. harzianum treatments showed significant increase in fruit weight over fungicides and untreated seeds.

Keywords: Muskmelon (Cucumis melo L.); Gummy stem blight; Didymella bryoniae; Seed transmission; Seed treatment

Outcrossing and coexistence of genetically modified with (genetically) unmodified crops: a case study of the situation in the Netherlands/ C.C.M. Van De Wiel, L.A.P. Lotz

NJAS - Wageningen Journal of Life Sciences, Volume 54, Issue 1, 2006, Pages 17-35, ISSN 1573-5214, DOI: 10.1016/S1573-5214(06)80002-3. (http://www.sciencedirect.com/science/article/pii/S1573521406800023)

Abstract:
With the introduction of genetically modified (GM) crops the EU has demanded that individual member states enact measures to prevent inadvertent admixture -- through outcrossing -- of genetically modified organisms (GMOs) with products from conventional and organic farming. A literature review on out-crossing was prepared for the Coexistence Committee installed in the Netherlands in 2004. For sugar beet and potato, isolation distances do not appear to be of overriding importance, as true seeds are not part of the harvested product. The only route for admixture is through persistence of GM hybrid volunteers, and these should already be subject to strict control in good agricultural practice. Data on maize indicate that a distance larger than 25 m is needed to keep admixture below the EU labelling threshold of 0.9%, and larger than 250 m to remain below the 0.1% threshold as favoured by organic farming organizations. Oilseed rape is more complex because apart from pollen flow also persistence of volunteers in and outside arable fields, and hybridization with wild relatives play a role. At the present state of knowledge, isolation distances of 100-200 m and rotation intervals of 6-8 years might be warranted for the 0.9% threshold. It is as yet not clear whether a threshold of 0.1% is achievable in practice. The conclusions are compared with the measures recommended by the Dutch Coexistence Committee.

Keywords: gene flow; isolation measures; maize; oilseed rape; sugar beet; potato; Zea mays; Brassica napus; Beta vulgaris; Solanum tuberosum

Carvone: Why and how should one bother to produce this terpene/Carla C.C.R. de Carvalho, M. Manuela R. da Fonseca

Food Chemistry, Volume 95, Issue 3, April 2006, Pages 413-422, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.01.003.
(http://www.sciencedirect.com/science/article/pii/S0308814605000907)

Abstract:
d-Carvone or (4S)-(+)-carvone has a caraway/dill odour and is the main constituent of caraway (Carum carvi) and dill (Anethum graveolens) seed oils whilst l-Carvone or (4R)-(-)-carvone has a sweet spearmint odour and is the main constituent of spearmint (Mentha spicata). Carvone is produced by both extraction and purification of essential oils from caraway, dill and spearmint seeds and by chemical and biotechnological synthesis.
The several applications of carvone as fragrance and flavour, potato sprouting inhibitor, antimicrobial agent, building block and biochemical environmental indicator, along with its relevancy in the medical field, justify the interest in this monoterpene.

Keywords: Carvone; Caraway; Dill; Spearmint; Chemical synthesis; Biotechnologycal synthesis

Cryobank of plant genetic resources in Russian Academy of Sciences/A.S. Popov, E.V. Popova, T.V. Nikishina, O.N. Vysotskaya

International Journal of Refrigeration, Volume 29, Issue 3, Issue with Special Emphasis on Cryobiology, May 2006, Pages 403-410, ISSN 0140-7007, DOI: 10.1016/j.ijrefrig.2005.07.011.
(http://www.sciencedirect.com/science/article/pii/S014070070500246X)

Abstract:
Cryopreservation is the most reliable method for long-term storage of plant genetic resources. A review of cell injury by ice crystals and dehydration during a freeze-thaw cycle is given. For successful regeneration of plants and cultures after cryopreservation of their cells, the development of reliable cryopreservation procedure is required including preliminary cultivation, treatment by cryoprotectors, freezing by different methods, thawing and recultivation. Up to now 27 cell lines successfully resumed their growth after storage in liquid nitrogen and preserved their specific features and biosynthetic potential. Besides, shoot tips of 40 cultivars of potato, rose, strawberry and raspberry regenerated plants both in vitro and in vivo after cryopreservation. The longest storage duration was 25 years. Now in liquid nitrogen we continuously store 24 cell strains of rare medicinal plants, shoot tips of seven cultivars of strawberry and raspberry and seeds of 250 endangered plant species collected over all Russian territory.

Keywords: Cryogenics; Cryopreservation; Data bank; Liquid nitrogen; Chilling injury; Cell; Dehydration; Storage life; Cryogenie; Cryoconservation; Banque de donnees; Azote liquide; Maladie due au froid; Cellule; Deshydratation; Duree de conservation

Availability of essential trace elements in Indian cereals, vegetables and spices using INAA and the contribution of spices to daily dietary intake/Vivek Singh, A.N. Garg

Food Chemistry, Volume 94, Issue 1, January 2006, Pages 81-89, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.10.053.

(http://www.sciencedirect.com/science/article/pii/S0308814604008131)
Abstract:
Indian diet is primarily vegetarian and consists of various cereals and vegetables along with spices, often used in the preparation of curries. The nutritive potential of each ingredient, in terms of trace element contents, has been evaluated using instrumental neutron activation analysis (INAA). Four minor (Na, K, P and Cl) and 16 trace elements (Br, Co, Cr, Cs, Cu, Fe, Hg, Mn, Mo, Rb, Sb, Sc, Se, Sr, Th and Zn) have been determined in six cereals, nine vegetables and 20 spices and condiments, including two betel leaves. None of the carbohydrate-rich cereals or potato was rich in any of the essential elements but leafy vegetables showed higher contents of Fe and other nutrients. Fe/Zn is well correlated with Fe contents in cereals and spices. Out of various spices, cinnamon was most enriched in Fe, Co, Cr, Na, K, P and Zn, whereas turmeric and curry leaves were found to be particularly rich in Se. Cumin and mustard seeds were rich in Cu. Some environmental contaminants, such as Hg, Cr, Br and Th, were also present in significant amounts. An attempt has been made to evaluate the contribution of essential elements (Cr, Cu, Fe, Mn, P, Se and Zn) in spices to the daily dietary intake (DDI) through an Indian vegetarian diet. For a typical mixture of six commonly used spices, contributions of Cr, Fe, Mn and Zn, were found to be 7.5% of DDI in each case.
Keywords: Cereals; Vegetables; Spices; Essential nutrients; Instrumental neutron activation analysis; Daily dietary intake; Toxic contaminants

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G1-1 and LeG1-1/LeG1-2 genes are involved in meristem activation during breakage of dormancy and early germination in potato tubers and tomato seeds/Caterina Agrimonti, Giovanna Visioli, Roberto Bianchi, Anna Torelli, Nelson Marmiroli
Plant Science, Volume 173, Issue 5, November 2007, Pages 533-541, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2007.08.004.
(http://www.sciencedirect.com/science/article/pii/S016894520700221X)
Abstract:
To determine the role of genes in plant development, we have analysed the expression of G1-1, a gene isolated in potato tuber and of its tomato homologues LeG1-1 and LeG1-2. Expression of G1-1 in tuber increased in buds during the first stages of sprouting, whereas almost no transcript was found in the parenchyma. The highest levels of expression were detectable in sprouts and in developing sink leaves. In situ hybridization on potato tissues showed that the G1-1 transcript was mainly localized in shoot apical meristems, suggesting that the expression of this gene was correlated to meristem activity. LeG1-1 and LeG1-2 expression, measured at different stages of tomato seed germination showed its maximum after the primordial roots emerged from the teguments. High levels of transcript were found both in roots and hypocotyls of the seedlings. Indeed LeG1-1 and LeG1-2 transcript levels were low in meristematic structures formed in the in vitro cultured tomato hypocotyls and in explants of cotyledons. All these results suggest that G1-1 and its homologues, LeG1-1 and LeG1-2, may be involved in the maintenance of the sink function of potato tuber and tomato seed. In these organs, they are also responsible for activation

and growth of pre-existing meristems, but not in their de novo formation.
Keywords: Dormancy; Sink-source Transition; Solanum tuberosum; Solanum lycopersicum; Meristem activation

Egyptian mango by-product 2: Antioxidant and antimicrobial activities of extract and oil from mango seed kernel/Ahmed E.M. Abdalla, Saeid M. Darwish, Eman H.E. Ayad, Reham M. El-Hamahmy
Food Chemistry, Volume 103, Issue 4, 2007, Pages 1141-1152, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.10.026.
(http://www.sciencedirect.com/science/article/pii/S0308814606008028)
Abstract:
Egyptian mango seeds were collected as wastes from local fruit processing units, the kernels were separated and dried. The antioxidant and antimicrobial activities of mango seed kernel extract and oil were investigated. The results indicated that combination of both mango seed kernel extract and oil had optimum antioxidant potency higher than each one alone. Addition of 400 ppm methanol extract and 5% mango seed kernel oil increased the oxidative stability of sunflower oil incubated at ambient temperature as well as sunflower oil during frying. Moreover, both extract and oil improved the stability and quality characteristics of fresh and stored potato chips. On the other hand, mango seed kernel extract reduced total bacterial count, inhibited coliforms growth, showed remarkable antimicrobial activity against Escherichia coli strain and extended the shelf-life of pasteurized cow milk. These results provide useful information on the utilization of mango seed kernel as natural antioxidant and antimicrobial in foods.
Keywords: Mango seed kernel extract and oil; Sunflower oil; Potato chips; Cow milk; Antioxidant activity; Antimicrobial effect

Effect of postharvest application of gibberellic acid and benzyl adenine on the duration of dormancy of potatoes produced by plants grown from TPS/Alexios A. Alexopoulos, Konstantinos A. Akoumianakis, Stavros N. Vemmos, Harold C. Passam
Postharvest Biology and Technology, Volume 46, Issue 1, October 2007, Pages 54-62, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.03.016.
(http://www.sciencedirect.com/science/article/pii/S0925521407001123)
Abstract:
Potato tubers from plants grown from true seed (TPS) were treated with gibberellic acid (GA) and benzyl adenine (BA) individually or in combination and stored at 5, 10 and 20 [degree sign]C. The application of GA or GA + BA caused faster breakage of dormancy at 10 and 20 [degree sign]C, increased weight loss and respiratory activity, mainly following the appearance of sprouts, as well as reducing the specific weight of tubers. Prior to visible sprouting, dry matter and fructose contents of the parenchyma and tissues near the buds did not significantly change, but there was a slight increase in the concentration of sucrose following GA + BA treatment. By contrast, an increase in the glucose content, initially in the tissues near the buds and subsequently in the parenchyma was observed prior to visible sprouting in tubers that had been treated with GA or GA + BA. Moreover, GA and GA + BA caused an increase in the length, fresh weight and dry matter content of sprouts. It is concluded that GA alone or in combination with BA (but not BA alone) promotes dormancy breakage and sprouting, although not necessarily via the same mechanism that occurs in the absence of growth regulator application. Tubers grown from TPS

appear to respond to growth regulators in a similar way to those derived from seed tubers.
Keywords: Sprouting; Respiration; Sugars; Starch

Frying quality and stability of high-oleic Moringa oleifera seed oil in comparison with other vegetable oils/S.M. Abdulkarim, K. Long, O.M. Lai, S.K.S. Muhammad, H.M. Ghazali
Food Chemistry, Volume 105, Issue 4, 2007, Pages 1382-1389, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.05.013.
(http://www.sciencedirect.com/science/article/pii/S0308814607004542)
Abstract:
The performance of the high-oleic Moringa oleifera seed oil (MoO) in deep-frying was evaluated by comparing its frying stability with other conventional frying oils [canola (CLO), soybean (SBO), and palm olein (PO)]. The oils were used as a frying media to fry potato chips for 6 h a day up to a maximum of 5 days. Standard methods for the determination of used frying oil deterioration such as changes in color, viscosity, free fatty acids (FFA), peroxide value (PV), p-anisidine value (p-AV), iodine value (IV), specific extinction 233 and 269 nm) and total polar compounds (TPC) were used to evaluate the oils. At the end of the frying period, the change in percent FFA from the initial to final day of frying were as follows SBO (60.0%), PSO (65.0%), MoO (66.6%) and CLO (71.4%) and the change in p-AV and TOTOX value of MoO were found to be significantly lower ($P < 0.05$) than the rest of the oils tested, followed by PO, with the highest values obtained in CLO and SBO. The levels of conjugated dienes and trienes at 233 and 269 nm) throughout the frying period were lowest in MoO and PO followed CLO, with highest levels found in SBO. The rate of darkening and increase in viscosity were proportional to the frying time for all the oils. PO darkened earlier followed by CLO. At the end of frying period, TPC was significantly ($P < 0.05$) lower in MoO (20.78%) and PSO (21.23%), as compared to CLO (28.73%) and SBO (31.82%).
Keywords: High-oleic Moringa oleifera seed oil; Oxidative stability and frying quality

Polyphenolic content and in vitro antioxidant characteristics of wine industry and other agri-food solid waste extracts/Dimitris P. Makris, George Boskou, Nikolaos K. Andrikopoulos
Journal of Food Composition and Analysis, Volume 20, Issue 2, March 2007, Pages 125-132, ISSN 0889-1575, DOI: 10.1016/j.jfca.2006.04.010.
(http://www.sciencedirect.com/science/article/pii/S0889157506001001)
Abstract:
Solid by-products from white and red wine industry were subjected to evaluation as potential sources of antioxidant phytochemicals on the basis of their content in phenolics and in vitro antioxidant activity. Furthermore, several other common plant solid wastes, including apple, potato and onion peels, as well as carob pods and olive tree leaves were also considered, in order to carry out a comparative assessment. The results showed that extracts from grape seeds (either white or red) contain exceptionally high amounts of total polyphenols (10.3-11.1% on a dry weight basis), a great part of which is composed of flavanols. Red grape pomace and stems contained appreciable amounts of polyphenols, whereas potato and white grape peels were the tissues with the lowest polyphenol content. The in vitro antiradical activity and reducing power were shown to be highly dependent on the total flavonoid and total flavanol content ($P<0.001$), but the hydroxyl free radical scavenging activity did not exhibit the same trend, suggesting

dependence on particular structural features. The results indicate that wine industry by-products, including grape seeds but also red grape pomace and stems, are very rich sources of antioxidant polyphenols compared with other agri-food solid wastes, and therefore their exploitation as a source of added-value products may be more cost-effective and merits a profounder investigation.

Keywords: Added-value products; Antiradical activity; Apples; Carobs; Flavonoids; Grape pomace; Olive tree leaves; Onions; Polyphenols; Potatoes; Reducing power; Vinification by-products

General mechanism of water sorption on foodstuffs - Importance of the multitemperature fitting of data and the hierarchy of models/Sylwester Furmaniak, Artur P. Terzyk, Piotr A. Gauden

Journal of Food Engineering, Volume 82, Issue 4, October 2007, Pages 528-535, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.03.012. (http://www.sciencedirect.com/science/article/pii/S026087740700180X)

Abstract:
This paper points out the importance of the multitemperature fitting procedure in description of water sorption on foodstuffs. The data tabulated in literature (water sorption at different temperatures on: chickpea seeds, lentil seeds, potato and on green peppers) were described applying the BET, GAB and recently proposed GDW models. Our results explain total failure of the first model in description of multitemperature data and the similarities between the GAB and GDW are shown. Finally the general mechanism of water sorption on foodstuffs is proposed. This mechanism can be of the GAB or GDW type, depending on the arrangement and features of the primary water sorption sites. If the geometrical constraints for creation of the BET - like type clusters do not occur on surface, and if each from primarily sorbed water molecules convert only into one secondary surface site, one can say that the mechanism follows the GAB scenario (as for example in the case of lentil seeds). Contrary, in the case of rough or porous surfaces, where there are the geometric constraints for creation of secondary sites (for example sorption on chickpea seeds), and/or where one primary site produces more than one secondary site (potato and green peppers), the mechanism of water sorption is of the GDW type.

Keywords: Enthalpy of sorption; Equilibrium moisture content; Isotherm model; Water sorption mechanism; GAB; GDW

Chemical and physicochemical characterisation of co-products from the vegetable food and agro industries/A. Serena, K.E. Bach Knudsen

Animal Feed Science and Technology, Volume 139, Issues 1-2, 3 December 2007, Pages 109-124, ISSN 0377-8401, DOI: 10.1016/j.anifeedsci.2006.12.003. (http://www.sciencedirect.com/science/article/pii/S0377840106005608)

Abstract:
Six co-products from the vegetable food and agro industres in Denmark - brewer's spent grain, pea hull, seed residue (rye grass), potato pulp, sugar beet pulp and pectin residue - were collected eight times during two seasons (four samples from each season) (n = 8; N = 48). The samples were analysed for dry matter (DM), ash, sand, protein, amino acids, ether extract (EE), carbohydrate constituents, enzyme digestible organic matter (EDOM) and physicochemical properties--water binding capacity (WBC) and swelling. The co-products in general had a low DM (142-216 g/kg as is), EE (6-54 g/kg DM) and protein (61-116 g/kg DM) content and a high content of non-starch polysaccharide (430-743 g/kg

DM). Exceptions, however, were seed residue and pea hull which had a DM content of 896-923 g/kg as is, and brewer's spent grain which had a EE and protein content of 117 and 215 g/kg DM, respectively. The sugar beet pulp and potato pulp had a high content of soluble fibre, which resulted in high WBC and swelling. Even though pectin residue had a high content of insoluble fibre constituents, WBC and swelling were high. Seed residue, brewer's spent grain and pea hull had high content of insoluble fibre, which was responsible for the relatively low EDOM. There was a variation from year to year in the concentration of ash ($P<0.0001$) and sand ($P=0.003$) in seed residue and for protein ($P=0.04$) and EDOM ($P=0.003$) in pea hull. In conclusion, co-products from the vegetable food and agro industries are characterised by a high DF content resulting in high swelling and WBC and relatively low EDOM. The variability in chemical composition of most co-products was in the same relative range as found for barley and wheat in other national and Scandinavian studies.

Keywords: Carbohydrates; Co-products; Chemical composition; Physicochemical properties

Feeding activity of the East African millipede Omopyge sudanica Kraus on different crop products in laboratory experiments/E. Ebregt, P.C. Struik, P.E. Abidin, B. Odongo

NJAS - Wageningen Journal of Life Sciences, Volume 54, Issue 3, 2007, Pages 313-323, ISSN 1573-5214, DOI: 10.1016/S1573-5214(07)80022-4. (http://www.sciencedirect.com/science/article/pii/S1573521407800224)

Abstract:
Millipedes can cause considerable damage in the production of sweet potato and some other crops in East Africa. Quantitative information on intake of crop diets by and body weight gain of millipedes was collected in short-term no-choice feeding activity laboratory experiments conducted in north-eastern Uganda using female millipedes of the species Omopyge sudanica. Diets consisted of sweet potato and cassava storage root material, groundnut seeds, or maize grains. Differences in intake and body weight gain between diets were not statistically different. The consumption index, i.e., the ratio between intake and body weight gain, was significantly higher for sweet potato than for most other diets. The efficiency of conversion of ingested food, i.e., 100 x the ratio between body weight gain and intake, was significantly lower for the root crops -- especially sweet potato -- than for the grain crops. The research showed how difficult it is to obtain reliable, quantitative data on the feeding habits of millipedes, but also illustrated that O. sudanica can cause harm to crops in north-eastern Uganda and elsewhere in East Africa.

Keywords: no-choice feeding activity; food intake; body weight gain; consumption index; efficiency of conversion of ingested food

Feeding high fibre diets changes luminal environment and morphology in the intestine of sows/A. Serena, M.S. Hedemann, K.E. Bach Knudsen,

Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 115-117, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.105. (http://www.sciencedirect.com/science/article/pii/S1871141307001060)

Abstract:
Sows were fed three diets varying in type and level of dietary fibre (DF). The low fibre diet (LF; 17% DF) was based on wheat and barley. In the two high DF diets (HF1, high in soluble DF and HF2, high in insoluble DF; ~ 44% DF), the cereal part of the diet was substituted

with different co-products (sugar beet pulp, potato pulp, pectin residue, pea hull, brewer's spent grain, and seed residue). The diets were fed for a four-week period to 12 sows (4 for each diet). Sows were stunned 4 h post-feeding, and digesta and tissue samples were collected from various parts of the small and large intestines. The carbohydrate load to the large intestine was 538-539 g/d when feeding the high DF diets and 190 g/d when feeding diet LF. Feeding sows the high DF diet containing large proportion of soluble DF resulted in a lower dry matter content of digesta (23 contra 28%), a higher tissue weight (2.9 contra 2.0 kg), and a higher crypt depth (492 contra 330 [mu]m) and area (23,201 contra 15,751 [mu]m2) in the colon compared with the low DF diet. In conclusion, increasing the amount of DF in the diet for sows resulted in an increased amount of digesta entering the large intestine which influences the functional properties of digesta. Furthermore, a high DF diet with a high proportion of soluble DF increases tissue weight, crypt depth and crypt area in the midcolon compared to a low fibre diet.

Keywords: Co-products; Carbohydrates; Luminal environment; Morphology; Sows

Absorption of lactic acid is more synchronized with the absorption of glucose than with the absorption of short-chain fatty acids -- A study with sows fed diets varying in dietary fibre/A. Serena, H. Jorgensen, K.E. Bach Knudsen,

Livestock Science, Volume 109, Issues 1-3, 10th International Symposium on Digestive Physiology in Pigs, Denmark 2006, Part 2, 15 May 2007, Pages 118-121, ISSN 1871-1413, DOI: 10.1016/j.livsci.2007.01.107. (http://www.sciencedirect.com/science/article/pii/S1871141307001096)

Abstract:
Sows were fed one of three diets varying in level and type of dietary fibre (DF). A low DF diet (LF; 17% DF) based on wheat and barley and two generic high DF diets (HF1, high in soluble DF and HF2, high in insoluble DF; ~ 41% DF) where the cereals were substituted with co-products (sugar beet pulp, potato pulp, pectin residue, pea hull, brewer's spent grain and seed residue (ray grass)) from the vegetable food and agro industries. Six sows were fitted with a catheter in the portal vein and the mesenteric artery and a flow probe around the portal vein. The sows were fed 2 kg/d of the three experimental diets in a repeated 3 x 3 crossover design. Blood samples were collected the last day in each period at - 120, - 60, 0, 15, 30, 45, 60, 90, 120 and then at 60-min intervals up to 600 min after feeding. Although lactic acid (LA) is formed by microbial fermentation, the absorption profile of LA was more comparable with the absorption profile of glucose than with that of other SCFA.

Keywords: Absorption; Lactic acid; Glucose; Short-chain fatty acids

Xylogalacturonan exists in cell walls from various tissues of Arabidopsis thaliana/Joris Zandleven, Susanne OxenbollSorensen, Jesper Harholt, Gerrit Beldman, Henk A. Schols, Henrik V. Scheller, Alphons J. Voragen

Phytochemistry, Volume 68, Issue 8, April 2007, Pages 1219-1226, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.01.016. (http://www.sciencedirect.com/science/article/pii/S0031942207000556)

Abstract:
Evidence is presented for the presence of xylogalacturonan (XGA) in Arabidopsis thaliana. This evidence was obtained by extraction of pectin from the seeds, root, stem, young leaves and mature leaves of A.

thaliana, followed by treatment of these pectin extracts with xylogalacturonan hydrolase (XGH). Upon enzymatic treatment, XGA oligosaccharides were primarily produced from pectin extracts obtained from the young and mature leaves and to a lesser extent from those originating from the stem of A. thaliana. The oligosaccharide GalA3Xyl was predominantly formed from these pectin extracts. No XGA oligosaccharides were detected in digests of pectin extracts from the seeds and roots.
A low number of XGA oligosaccharides was obtained from pectins of A. thaliana. This indicates a uniform distribution of xylose in XGA from A. thaliana. The predominant production of GalA3Xyl, as well as the release of linear GalA oligosaccharides pointed to a lower degree of xylose substitution in XGA from A. thaliana than in XGA from apple and potato.
The estimated amount of XGA accounted for approximately 2.5%, 7% and 6% (w/w) of the total carbohydrate in the pectin fraction of the stem, young leaves and mature leaves, respectively.
Keywords: Arabidopsis thaliana; Pectin; Xylogalacturonan hydrolase; Xylogalacturonan

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A comparison of potato seed tuber yields in beds, pots and hydroponic systems/Ricardo Monteiro Correa, Jose Eduardo Brasil Pereira Pinto, Cesar Augusto Brasil Pereira Pinto, Valdemar Faquin, Erika Soares Reis, Aline BeraldoMonteiro, Willian E. Dyer
Scientia Horticulturae, Volume 116, Issue 1, 10 March 2008, Pages 17-20, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.10.031.
(http://www.sciencedirect.com/science/article/pii/S0304423807003846)
Abstract:
The objective of this study was to compare potato seed tuber production of cvs. Monalisa and Agata growing in beds, pots or hydroponics, with either single or staggered harvests. All culture systems were established in plastic sheeting-covered greenhouses protected with an anti-aphid network. The beds and 3 L pots were filled with Plantmax(R) substrate and placed in suspended beds. The hydroponic system utilized NFT (Nutrient film technique) and 4 m x 15 cm x 7 cm PVC tubes with a 4% slope and the fertilizers were a commercial formula. Each experiment was 4 treatments in factorial Scheme 2 x 2 with 2 cultivars (Monalisa and Agata) and 2 harvest methods (single and staggered). All three experiments were carried out in randomized design with 6 replicates and 7 plants per replicate.
The hydroponics system presents some advantages: as harvest easiness, mineral nutrition control of plants, efficient use of water besides reducing the costs with pesticide. This system allows many harvest during the cycles culture allowing to maximize potato seed tubers harvest.
The hydropony system was better statistically for tubers/plant number in single and staggered harvest. In all systems, the non-destructive harvest provided larger amount of tubers/plant, being the length and biomass these tubers smaller than in single harvest.
There were significant interaction between culture system and harvest methods for the number of tubers per plant, tuber length and tuber fresh weights. The number of tubers per plant in hydroponics was 147% higher than the bed and pot systems for a single harvest. Even, tuber

production from a staggered harvest in hydroponics was 286% greater than in the bed and pot systems for Monalisa and Agata cvs. Tuber lengths from potatoes growing in beds were 17% longer than those growing in pots or hydroponics from a single harvest. It was observed that tuber fresh weights in bed system, from a single harvest, were 51% larger than pot and hydroponic systems. Numbers of sprouts per tuber ranged from 2.55 to 3.04 for the 3 culture systems and 2 harvest methods. The sprouts length ranged 0.51-0.92 for Monalisa and Agata cultivar growing in bed, pots and hydropony system.
Keywords: Solanum tuberosum L.; Tissue culture; Seed tubers; Nutrient film technique

Effect of gibberellic acid on the duration of dormancy of potato tubers produced by plants derived from true potato seed/Alexios A. Alexopoulos, George Aivalakis, Konstantinos A. Akoumianakis, Harold C. Passam
Postharvest Biology and Technology, Volume 49, Issue 3, September 2008, Pages 424-430, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2008.02.009. (http://www.sciencedirect.com/science/article/pii/S0925521408000793)
Abstract:
Gibberellic acid (GA) was applied to potato tubers cultivated from true seed (TPS) either by immersion of intact tubers in aqueous solutions, or by the excision of a small area of the tuber close to the point of detachment from the stolon and immersion of this region only in GA. Corresponding treatments with deionised water were used as controls. Tubers that had been treated with GA broke dormancy earlier than the controls, especially when the tubers were cut prior to treatment. Dormancy breakage correlated with higher weight loss and an increase in the rate of respiration of tubers following sprout emergence. The optimum time of immersion in GA to achieve dormancy breakage was 2 h, irrespective of GA concentration over the range tested (1-50 mg L-1). The bisection of tubers at various times after GA application to the point of detachment from the stolon indicated that GA movement longitudinally within the tuber was necessary for it to have an effect on sprouting. GA did not affect the rate of ethylene production by the tubers, but increased starch breakdown and [alpha]-glucosidase activity in the bud, as well as the RNA content, especially at the sprout apex, prior to sprouting.
Keywords: [alpha]-Glucosidase; Ethylene; Respiration; RNA; Starch

Oxylipin profile and antioxidant status of potato tubers during extended storage at room temperature/Pierre Delaplace, Jorge Rojas-Beltran, Patrick Frettinger, Patrick du Jardin, Marie-Laure Fauconnier,
Plant Physiology and Biochemistry, Volume 46, Issue 12, December 2008, Pages 1077-1084, ISSN 0981-9428, DOI: 10.1016/j.plaphy.2008.09.001. (http://www.sciencedirect.com/science/article/pii/S0981942808001629)
Abstract:
Potato tubers (cv. Bintje) (Solanum tuberosum L.) were stored under extreme conditions at 20 [degree sign]C for 350 days without sprout inhibitors in order to assess whether aging- and/or senescence-related processes occurred. Under these extreme storage conditions, multiple sprouting followed by the formation of daughter tubers occurs. At the same time, an increase in respiration intensity, as evidenced by cytochrome c oxidase activity (E.C. 1.9.3.1), is observed, leading to a potential increase in reactive oxygen species (ROS) production. As polyunsaturated fatty acids are priority targets of oxidative attacks, the damage to lipids was assessed by oxylipin profiling in both free

and esterified forms. Oxylipin profiling showed a predominance of linoleic acid-derived oxylipins and of 9-hydroxy and 9-hydroperoxy fatty acids in both free and esterified forms. No significant accumulation of individual oxylipin was observed 350 days after harvest. To further understand the absence of lipid breakdown products accumulation, the main enzymatic and non-enzymatic antioxidants were assessed. Antioxidant enzyme activities [superoxide dismutase (E.C. 1.15.1.1), catalase (E.C. 1.11.1.6.), ascorbate peroxidase (E.C. 1.11.1.11)] were enhanced during the advanced phase of aging. The main non-enzymatic antioxidant compound, ascorbate, decreased markedly in the early stages of storage, followed by a slower decline. Total radical scavenging activity was also maintained at the end of the storage period. Our results indicate that the enhanced aging process occurring during storage at room temperature does not seem to be associated with the changes classically encountered during leaf senescence or seed aging and that the observed degenerative processes do not surpass the protective potential of the tubers.

Keywords: Potato; Solanum tuberosum L.; Oxylipin; Aging; Fatty acid hydroperoxide; Oxidative stress; Post-harvest storage

Influence of field margins and landscape context on ground beetle diversity in Wisconsin (USA) potato fields/Ben P. Werling, Claudio Gratton

Agriculture, Ecosystems & Environment, Volume 128, Issues 1-2, October 2008, Pages 104-108, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.05.007. (http://www.sciencedirect.com/science/article/pii/S0167880908001461)

Abstract:
The influence of natural areas on ground beetle (Coleoptera: Carabidae) diversity and community composition in Wisconsin potatoes was assessed at local and large spatial scales. To accomplish this, ground beetle communities were sampled in potatoes and grassy field-margin habitats set in landscapes composed of varying amounts of natural area. At a local scale, field-margin habitats supported more, and different, carabid species than potatoes. Large carabids, brachypterous species, species typical of dry habitats and species that feed on seeds were all underrepresented in potatoes compared to field margins. However, the amount of field-margin habitat surrounding potatoes did not affect carabid community structure in the crop. At a larger scale, beetle diversity in potatoes increased and community composition changed with increases in the amount of natural area within 1.5 km of the crop. However, this effect was not evident in adjacent field-margin habitats. These results suggest that the amount of natural area surrounding potatoes affects the composition of potential crop colonizers at a large spatial scale but that disturbances currently limit the types of species that colonize potatoes.

Keywords: Field margin; Landscape ecology; Biodiversity; Potatoes

Microsporogenesis and crossing behavior of a tetraploid, interspecific inter-EBN hybrid potato/J. Panahandeh, M. Valizadeh, M. Khosroshahly, A.P. Yermishin, F.R. Khoei, N. Mahna

Scientia Horticulturae, Volume 116, Issue 4, 20 May 2008, Pages 348-353, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.02.006. (http://www.sciencedirect.com/science/article/pii/S0304423808000502)

Abstract:
The commercial potato Solanum tuberosum L. autotetraploid, has many wild relatives with the ploidy range of 2-6x, which are suitable sources of traits interesting in potato breeding. However, not all of

these species can be readily crossed with cultivated potato due to pre- and post-zygotic barriers. Post-zygotic barrier on Solanum spp. is attributed to their difference in endosperm balance number (EBN). According to the EBN successful crosses need to have a 2:1 ratio of maternal to paternal EBN in hybrid endosperm. Thus, only parents with the same EBN can be crossed. The cultivated potato is 4EBN, while wild allotetraploid relatives such as S. stoloniferum are 2EBN. In this study, meiosis and crossability of an exceptional tetraploid 3EBN hybrid obtained from our previous research by crossing S. stoloniferum x S. tuberosum with 2 and 4EBN testers were studied. Although the exact chromosome pairing analysis was not possible, the formation of several polyvalents in each meiocyte suggests that recombination could occur between different genomes. Meiosis had many irregularities such as unequal segregation as well as having laggard chromosome and micronuclei. Crosses involving the interspecific hybrid, as the male parent with 2 and 4EBN testers were not successful, some of which were apparently due to the pollen-pistil incompatibility. Interestingly controlled self-pollination resulted in viable seeds. Crosses of the interspecific hybrid as pistillate parent in the absence of pre-zygotic barrier in most case were successful. Results of the study confirmed the segregation of EBN value in the gametes of hybrid. It was expected that backcross progeny of this hybrid would be a good source for selecting aneutetraploids.

Keywords: Potato; S. tuberosum; S. stoloniferum; Crossability and interspecific hybrid

Timing of injury and efficacy of soil-applied insecticides against wireworms on potato in Virginia/Thomas P. Kuhar, Juan M. Alvarez, ***Crop Protection***, Volume 27, Issues 3-5, March-May 2008, Pages 792-798, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.11.011. (http://www.sciencedirect.com/science/article/pii/S0261219407002852)

Abstract:
Wireworm control has become a major pest management concern for potato growers in the United States. Studies were conducted from 2002 to 2005 on the Eastern Shore of Virginia to identify the species complex of wireworms and timing of injury to potatoes, and to evaluate the efficacy of various soil-applied insecticides alone or in combination for wireworm control. The cornfield wireworm, Melanotus communis (Gyllenhal), was the dominant species found in potato fields accounting for roughly 80% of individuals collected. Conoderus lividus De Geer and Conoderus vespertinus (Fabricius) comprised the remaining 20% of wireworm specimens found. Wireworms were most apparent on or near potato seed pieces in late April, and were detected less frequently near potato plants over time as the season progressed into July. Most wireworm damage to potato tubers, however, occurred late in the potato crop season (after mid-June). There was a significant positive relationship between tuber size and percentage of wireworm damage. In general, the longer tubers remained in the ground, the higher the percentage of wireworm injury.
Results from several insecticide efficacy experiments in potatoes showed that fipronil, imidacloprid, thiamethoxam, and bifenthrin applied to the soil at planting provided similar wireworm control (50-80%) to that of the organophosphate standards, phorate, and ethoprop. Combinations of imidacloprid or thiamethoxam with fipronil or bifenthrin did not enhance the efficacy of any one of them used alone. The aforementioned products provide much needed alternative insecticide

modes of action for wireworm control in potatoes and perhaps other crops in the future.
Keywords: Conoderus spp.; Melanotus spp.; Chemical control; Pest management; Solanum tuberosum

Online measurement of water content in candidate reference materials by acousto-optical tuneable filter near-infrared spectrometry (AOTF-NIR) using pork meat calibrants controlled by Karl Fischer titration/Vikram Kestens, Jean Charoud-Got, Andrea Bau', Alexander Bernreuther, Hakan Emteborg,
Food Chemistry, Volume 106, Issue 4, 4th International Workshop on Water in Foods, 15 February 2008, Pages 1359-1365, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.01.081.
(http://www.sciencedirect.com/science/article/pii/S0308814607005882)
Abstract:
Certified reference materials (CRMs) are prepared from a wide variety of matrices. Water removal is an excellent way of achieving increased matrix lifetime and hence CRM stability. High-speed acousto-optical tuneable filter near-infrared spectrometry (AOTF-NIR) has been implemented for measurement of water content in powder matrix reference materials in amber glass vials. Almost 50,000 spectra were collected from 1300 to 2100 nm with a 2 nm increment for powders of meat, rye grass, potato, cotton seed and sugar beet. The AOTF-NIR instrument was placed in a capping machine, with a measurement frequency of 10–15 vials/min and a trigger signal for reproducible collection of spectra. The calibrants comprised 19 pork meat powder samples equilibrated with different hygrostatic solutions or subjected to oven drying to achieve different water concentrations. Mixtures of powders with different water content were also prepared in order to obtain a calibration range from 0.5 to 8.3% water (m/m). All calibration samples were measured by volumetric Karl Fischer titration (V-KFT), accredited under ISO 17025. The calibrants were then measured by AOTF-NIR together with the samples. Multiplicative scatter correction (MSC) was applied to the absorbance spectra in order to correct for the scattering of light in the different powders and scattering effects from the vials. A partial least squares regression model (PLS) based on two principal components was created and applied for prediction of water content in the samples with a standard error of 0.5% water (m/m).
The AOTF-NIR has the potential of rapidly monitoring a large number of samples of different materials with good accuracy as demonstrated by the good agreement with V-KFT. Nevertheless, it is necessary to expand the number of calibration models for different vial sizes as it turns out that MSC cannot correct properly for the influence of scattering of light due to the different vial sizes, in this case 100 mL and 10 mL vials. The influence of the matrix seems not to be critical because the prediction of the water content in a wide variety of matrices was successful using the meat powder as a universal calibrant.
Keywords: Certified reference materials; Reference material processing; Water content; AOTF-NIR; Karl Fischer titration; MSC; PLS; Pork meat; Cotton seed; Potato; Sugar beet; Rye grass

Biological control of potato Verticillium wilt under controlled and field conditions using selected bacterial antagonists and plant extracts/A.K. Uppal, A. El Hadrami, L.R. Adam, M. Tenuta, F. Daayf
Biological Control, Volume 44, Issue 1, January 2008, Pages 90-100, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.10.020.
(http://www.sciencedirect.com/science/article/pii/S1049964407002538)

Abstract:
Five pre-selected bacterial isolates and four plant extracts (canola, rapeseed, seaweed, and Canada milkvetch) were tested, under both growth room and field conditions during two growing seasons at two locations, for their ability to protect two potato cultivars (Russet Burbank, moderately susceptible and Kennebec, highly susceptible) against Verticillium dahliae. In growth room trials, Pseudomonas fluorescens Biotype F isolate DF37 significantly reduced the incidence, severity, and vascular discoloration of Verticillium wilt in both cultivars Kennebec and Russet Burbank over two seasons. Bacillus pumulis isolate M1 reduced wilt parameters only on cultivar Kennebec. Among the plant extracts tested, Canada milkvetch extract (MVE) was the most effective in reducing the wilt (55-84% reduction relative to the control). MVE reduced disease regardless of the method of application (incorporation into soil versus seed coating). In the first year of field testing, bacterial treatment DF37 and plant extract MVE were effective in reducing Verticillium wilt on Russet Burbank and Kennebec, respectively. Reductions in percent infection and vascular discoloration were estimated at 26% and 67% relative to the non-treated control for DF37 and 45% and 55% for MVE, respectively. In the second year of field trials, bacterial isolates DF37 and M1, and plant extract MVE reduced all wilt parameters by percentages ranging from 19% to 31% and increased yield (18%) on cultivar Kennebec. Bacterial isolate DF37 also reduced wilt (29-43%) and increased yield (24%) on cultivar Russet Burbank.
Keywords: Verticillium dahliae Kleb.; Solanum tuberosum L.; Verticillium wilt; Biocontrol; Bacteria; Plant extract; Growth room conditions; Field trials; Soil borne diseases

Fungistatic activity of flaxseed in potato dextrose agar and a fresh noodle system/Yingying Xu, Clifford Hall III, Charlene Wolf-Hall, Frank Manthey

International Journal of Food Microbiology, Volume 121, Issue 3, 10 February 2008, Pages 262-267, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2007.11.005.
(http://www.sciencedirect.com/science/article/pii/S0168160507005740)
Abstract:
Although numerous researchers have studied flaxseed as a food ingredient for its health benefits, flaxseed (Linum usitatissimum) has never been considered as a food preservative. The objective of this study was to investigate the effect of flaxseed flour (FF) concentration (0, 6, 9, 12, and 15% wt/wt), cultivar (`Omega' and brown) and source (four seed companies located in Minnesota and North Dakota) on flaxseed fungistatic activity. Fungal radial growth was used to assess the fungistatic activity of FF in both potato dextrose agar (PDA) medium and a fresh noodle system. Strains of Penicillium chrysogenum, Aspergillus flavus, Fusarium graminearum, and a Penicillium sp. isolated from molded noodles were used as the test microorganisms. Results showed that growth of F. graminearum was completely inhibited at all FF concentrations in PDA, and the inhibition of the other three test microorganisms increased with increasing FF concentrations. In the model noodle system, FF concentration at 9% or higher significantly reduced the mold count of fresh noodle during storage. In the inoculated noodle system, 6% FF addition was sufficient to significantly inhibit the growth of F. graminearum and A. flavus, whereas 9% FF concentrations showed fungistatic activity against P. chrysogenum and the Penicillium sp.

isolate. Differences in the degree of mold inhibition were found among FFs obtained from different sources and cultivars. Results suggested that flaxseed possesses fungistatic activity and could be used as a multifunctional food ingredient.
Keywords: Fungistatic; Flaxseed; PDA; Noodle/pasta; Food spoilage mold

Pigou and the potato: Whither farmers' rights?/Enrico E. Bertacchini, Coase
Ecological Economics, Volume 68, Issues 1-2, 1 December 2008, Pages 183-193, ISSN 0921-8009, DOI: 10.1016/j.ecolecon.2008.02.014. (http://www.sciencedirect.com/science/article/pii/S0921800908001079)
Abstract:
This paper explores the realization of farmers' rights in order to reward farming communities for their contribution in conserving and developing crop genetic resources. Current proposals to realize farmers' rights follow both Coasean and Pigouvian approaches, which try to solve the public good dilemma generated by traditional farmers in supplying agrobiodiversity. However, both the solutions not only may be difficult to realize but also provide just incomplete incentives to traditional farmers in enhancing in situ genetic diversity. In analogy with emerging open source models in the digital information economy, I contend that traditional farming systems, with the customary practices of seed saving and exchange, must be regarded as a common based peer organization for germplasm production and distribution. For this reason, new options for implementing farmers' rights should be devised in order to strengthen farmers' practices to use and exchange seeds within the traditional seed systems.
Keywords: Farmers' rights; Genetic resources; Agrobiodiversity; Conservation; Benefit sharing

Effect of traditional storage methods on germination and vigour of maize (Zea mays L.) from northern KwaZulu-Natal and southern Mozambique/V. Govender, T.A.S. Aveling, Q. Kritzinger
South African Journal of Botany, Volume 74, Issue 2, April 2008, Pages 190-196, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.10.006. (http://www.sciencedirect.com/science/article/pii/S0254629907003900)
Abstract:
In sub-Saharan Africa, maize (Zea mays L.) is one of the most nutritional crops and proper storage of seeds continues to be a challenge for subsistence farmers. Storage fungi, which reduce seed quality, become active in seeds when moisture levels are 14% or higher and this is influenced by the way seeds are stored. The aim of the present study was to test germination and vigour of maize seeds that were subjected to traditional storage during 2005 and to test germination of the maize seeds after storage for one year under conditions of fluctuating temperature. A preliminary survey was conducted and maize samples (white and yellow) were collected from small-scale subsistence farmers in northern KwaZulu-Natal (South Africa) and Mozambique. Seeds that were left in the field to dry and seeds that were commercially treated with Celest(R) XL served as controls. Germination was measured according to the International Seed Testing Association (ISTA) rules. The maize that was left in the field (NHS) to dry gave 100% germination in 2005. The treated control had a germination of 94.0%. Seeds that were imbibed for 40 h had the highest percentage weight increase following rapid imbibition but four of the six samples maintained germination above 70% following slow imbibition. The conductivity of the solute was read following imbibition. Field

stored maize had the lowest solute leakage (1181 [mu]S) and this correlated with the high percentage seeds with living tissue as indicated by the tetrazolium staining following rapid (94.4%) and slow (95.8%) imbibition. The number of fungi isolated from the samples reflected the initial condition of the samples with the fungicide treated control having the lowest percentage infection (11%), NHS had 33% and yellow maize that was stored on the cob and had with insect damage (SIH) had the highest, namely 71%. After the first set of experiments, samples were stored at 26-28 [degree sign]C to simulate the fluctuating original storage conditions. A year later the samples were subjected to the standard germination test. The decline in seed viability during the storage period was exhibited by results of the standard germination test. Maize that was left in the field had a 74.7% decrease in germination while the sample stored in potato bag (PHEL) and the treated control maintained germination above 80%. Two of the six samples failed to germinate. This study also showed that fungicide seed treatment is a viable option to maintain viability of the seeds, especially when the maize is to be stored until the next season.
Keywords: Germination; Maize; Seed treatment; Traditional storage

Sources of Food Group Intakes among the US Population, 2001-002/Jessica L. Bachman, Jill Reedy, Amy F. Subar, Susan M. Krebs-Smith
Journal of the American Dietetic Association, Volume 108, Issue 5, May 2008, Pages 804-814, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.02.026. (http://www.sciencedirect.com/science/article/pii/S0002822308001831)
Abstract:
BackgroundFood guides are typically built around a system of food groups. Accordingly, the US Department of Agriculture's MyPyramid includes both food groups and subgroups, as well as an allowance for discretionary calories, in its guidance.Objective
To identify the major dietary contributors to food group intake in the US population.Methods
This cross-sectional study used 2001-2002 National Health and Nutrition Examination Survey data to determine weighted population proportions for the contribution of each subgroup to its MyPyramid food group (ie, proportion), and the contribution of specific foods to the subgroups oils, solid fats, and added sugars (ie, major contributors). Food codes associated with each food were sorted into 96 categories, termed specific foods, and were linked to the MyPyramid Equivalents Database to obtain food group equivalents.Results
In regard to proportion, dark green vegetables (6%), orange vegetables (5%), and legumes (6%) fell well short of recommended levels. Intake of whole grains (10% of total) was far below the recommendation that at least half of all grains be whole. In regard to major contributors, top sources of oils were potato chips, salad dressing, and nuts/seeds; major contributors of solid fats were grain-based desserts, cheese, and sausages. Sweetened carbonated beverages provided 37% of added sugars.Conclusions
Americans do not, in general, consume the most nutrient-dense forms of basic food groups, instead consuming foods that are high in solid fats and added sugars. The main culprits--the foods that contribute most to discrepancies between recommendations and actual intake--are sweetened carbonated beverages and other sweetened beverages, grain-based desserts, nonskim dairy products, and fatty meats.

Expression pattern of a rice proteinase inhibitor gene OsPI8-1 implies its role in plant development/Jiang Wang, Zhen-Ying Shi, Xin-Shan Wan, Ge-Zhi Shen, Jing-Liu Zhang

Journal of Plant Physiology, Volume 165, Issue 14, 29 September 2008, Pages 1519-1529, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.08.008. (http://www.sciencedirect.com/science/article/pii/S0176161707002428)

Abstract:
A rice proteinase inhibitor (PI) gene OsPI8-1 was identified. Belonging to the potato inhibitor I family, this gene contains a 201 bp coding region with no introns and encodes a deduced protein of 66 amino acids which holds a PI domain. There are two uniform gene copies, OsPI8-1a and OsPI8-1b, with direct-repeat arrangement and an interval span of 13 kb on rice chromosome 8, corresponding to the site of BAC clone P0528B09 (Accession No. AP004703). Reverse transcription polymerase chain reaction (RT-PCR) assays showed that both OsPI8-1a and OsPI8-1b can be expressed in wild-type `Zhonghua No.11'. To investigate the physiological functions of OsPI8-1 in plant development, we analyzed the expression patterns of the reporter gene [beta]-glucuronidase (GUS) driven by OsPI8-1 promoter at different developmental stages and tissues. It was demonstrated that no GUS signals were detected in the roots. Despite that very high GUS expression was examined in the shoot apical meristem, no detectable GUS activity in the developmental domains of leaf primordium was observed. OsPI8-1 promoter showed an obvious wound-induced response in mature leaves. Little GUS activity was detected in young nodes and internodes at the seedling stage, but active GUS expression was observed near the nodes on mature culms. In the developing stage of the anther, GUS signal was specifically located in the middle layer and the endothecium between the epidermis and tapetum. In the germinating seed, GUS expression was gradually accumulated in the side of scutellar epithelium close to the embryo. These tissue-specific accumulations suggested that OsPI8-1 has multiple endogenous roles on developmental regulation. In this report, the inhibitor function of OsPI8-1 to proteolytic enzymes and the potential influence of their poise on plant development (such as seed germination, tapetum degeneration, programmed cell death, etc.) were discussed.

Keywords: Programmed cell death; Proteinase inhibitor; Rice; Tapetum degeneration; Wound induction

Food content of ubiquinol-10 and ubiquinone-10 in the Japanese diet/ Hiroshi Kubo, Kenji Fujii, Taizo Kawabe, Shuka Matsumoto, Hideyuki Kishida, Kazunori Hosoe

Journal of Food Composition and Analysis, Volume 21, Issue 3, May 2008, Pages 199-210, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.10.003. (http://www.sciencedirect.com/science/article/pii/S0889157507001755)

Abstract:
Seventy food items (8 types of meat, 16 types of fish and shellfish, 21 vegetables, 7 fruits, 6 pulses, 3 potatoes, 3 dairy products and 6 others) were analyzed using a simple and reliable method that can detect the reduced form of coenzyme Q10 (ubiquinol-10) and the oxidized form of coenzyme Q10 (ubiquinone-10) simultaneously. This method employed direct 2-propanol extraction and high performance liquid chromatography (HPLC) equipped with a reduction column and an electrochemical detector (ECD). Ubiquinol-10 was found in 63 out of 70 food items, while ubiquinone-10 was found in 66 of the 70 food items. In the food items in which ubiquinol-10 was found, its content ranged from 2.63 to 84.8 [mu]g/g in meat, 0.38 to 23.8 [mu]g/g in fish and

shellfish, 0.17 to 5.91 [mu]g/g in vegetables, 0.22 to 3.14 [mu]g/g in fruits, 0.68 to 1.82 [mu]g/g in potatoes, 0.72 to 4.3 [mu]g/g in pulses and 0.18 to 33.3 [mu]g/g in other food items including seeds, eggs, dairy products, soybean oil and miso (fermented soybean paste). Pork (shoulder), bovine liver, chicken heart, horse mackerel, young yellowtail and soybean oil showed a high ubiquinol-10 content of more than 20 [mu]g/g. On the other hand, total coenzyme Q10 content ranged from 13.8 to 192 [mu]g/g in meat, 1.25 to 130 [mu]g/g in fish and shellfish, 0.08 to 7.47 [mu]g/g in vegetables, 0.51 to 9.48 [mu]g/g in fruits, 1.05 to 3.01 [mu]g/g in potatoes, 2.31 to 6.82 [mu]g/g in pulses and 0.26 to 53.8 [mu]g/g in other food items. The estimated average daily intakes of ubiquinol-10 and total coenzyme Q10 calculated from our results and data on Japanese daily food consumption were 2.07 and 4.48 mg, respectively. Thus, intake of ubiquinol-10 accounted for 46% of the total coenzyme Q10 intake.

Keywords: Coenzyme Q10; Ubiquinol-10; Ubiquinone-10; Food; Dietary intake; HPLC; Japan; Japanese daily food consumption

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Targeted insecticide regimes perform as well as a calendar regime for control of aphids that vector viruses in seed potatoes in New Zealand/ R.F. van Toor, G.M. Drayton, R.A. Lister, D.A.J. Teulon

Crop Protection, Volume 28, Issue 7, July 2009, Pages 599-607, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.03.019.
(http://www.sciencedirect.com/science/article/pii/S0261219409000672)

Abstract:
Over two seasons (2002-03; 2003-04) at Pukekohe in the North Island and three seasons (2002-03; 2003-04; 2004-05) at Lincoln in the South Island of New Zealand, a common calendar-based insecticide regime was compared with a targeted insecticide regime for control of aphids on potatoes, and for any subsequent change in potato virus transmission by aphids. Treatments were an untreated control (1), calendar-applied fortnightly applications of methamidophos to foliage grown from untreated seed (2) and seed treated with imidacloprid (3), [lambda]-cyhalothrin applied at an aphid threshold to foliage from untreated (4) or imidacloprid-treated seed (5) and pymetrozine at an aphid threshold to foliage from untreated seed (6). The action threshold for spraying was when apterous aphid populations exceeded 10 per 150 potato leaves. As indicated from suction traps at the trial sites, aphid flights peaked in autumn and spring. At Pukekohe in both years, aphids were not found on the potato foliage in any treatments until late January (midsummer), making 3-4 of the 5-7 methamidophos applications for the season unnecessary. Further applications of methamidophos kept apterous aphid populations at negligible levels until late summer, but populations in autumn tended to be higher than in untreated plots, due probably to the suppression of aphid predators (syrphids and lacewings) by the insecticide. No apterous aphids were found on potato foliage above the threshold in imidacloprid-treated or untreated plots until 3 weeks before desiccation of the foliage, necessitating only one application of [lambda]-cyhalothrin or pymetrozine for each season. At Lincoln over all years, the imidacloprid seed treatment and the calendar-based 7-11 foliar applications of methamidophos kept plots free of aphids. However, the imidacloprid seed treatment alone, or one foliar application of [lambda]-cyhalothrin alone or pymetrozine alone,

were all that were required to keep aphid populations below the threshold during two of the three seasons, and were not required in the 2003-04 season. The incidence of tubers infected with potato leafroll virus (PLRV) and potato virus Y (PVY) at both sites was not significantly reduced by any insecticide treatment compared with the untreated control. The insecticide treatments also had no significant effect on total potato yields. In New Zealand, an imidacloprid seed treatment followed by a foliar application of [lambda]-cyhalothrin or pymetrozine whenever apterous aphid populations exceed 10 per 150 potato leaves appears sufficient to maintain aphid populations below the action threshold, without compromising yields or increasing virus risk in tubers.

Keywords: Myzus persicae; Aphids; Potato; Virus; PVY; PLRV; Insecticides; Insecticide programmes; Aphid threshold

Effects of plant density on the yield and yield components of true potato seed (TPS) hybrids in early and main crop potato production systems/Mehmet Emin Caliskan, Noyan Kusman, Sevgi Caliskan

Field Crops Research, Volume 114, Issue 2, 10 November 2009, Pages 223-232, ISSN 0378-4290, DOI: 10.1016/j.fcr.2009.08.002.
(http://www.sciencedirect.com/science/article/pii/S0378429009002093)

Abstract:
This study was conducted to evaluate true potato seed (TPS) technology for use in ware or seed potato production in two contrasting environments in Turkey during 2002 and 2003. The field experiments were carried out in the Hatay and Nevsehir provinces in Turkey, which represent a Mediterranean early crop potato production area and a temperate main crop potato production area, respectively. The plug seedlings of six TPS hybrids were transplanted to the fields at four densities (15, 20, 25 or 30 plants m-2). The seed tubers of the medium early cultivar Marfona were also planted in the experimental plots to compare the performance of the TPS hybrids with traditional seed tubers. Transplanting of the seedlings was significantly delayed in Hatay due to unsuitable weather conditions in both years. The seedlings needed an adaptation period of 2-4 weeks after transplanting depending on the location and the growing conditions. The adaptation period was longer in Hatay due to high air temperatures after transplanting. Although the yield performance of the TPS hybrids differed depending on the location and year, the TPS hybrids produced noticeably higher total tuber yields in Nevsehir location (ranging from 43.1 to 62.5 t ha-1 in 2002 and from 39.5 to 50.6 t ha-1 in 2003) than in Hatay (ranging from 15.3 to 19.6 t ha-1 in 2002 and from 15.1 to 19.1 t ha-1 in 2003). The percentage of marketable tubers (>28 mm) was also considerably higher in Nevsehir. The optimal plant density varied between 25 and 30 plants m-2 with regard to the total yield, while the optimal density with regard to the marketable yield was 20 or 25 plants m-2 depending on hybrids in Nevsehir. However, none of the tested plant densities caused competition between plants in Hatay, where the environmental conditions during the growing period considerably restricted the growth of individual TPS seedlings.
It was concluded that transplanting of TPS seedlings can be considered a feasible alternative for ware or seed potato production in temperate environments like Nevsehir that have growing periods of at least 4 months. However, there are several obstacles, such as difficulties with the timing of transplanting, long adaptation period that threaten the practicability of TPS technology in Mediterranean-type environments. Further agronomical studies focused on reducing inter- and intra-plant

competition are needed for both environments in order to improve the acceptability of TPS technology to farmers.
Keywords: TPS; Hybrid; Seedling transplanting; Mediterranean; Temperate; Turkey

Bromoethane induces dormancy breakage and metabolic changes in tubers derived from true potato seed/Alexios A. Alexopoulos, George Aivalakis, Konstantinos A. Akoumianakis, Harold C. Passam
Postharvest Biology and Technology, Volume 54, Issue 3, December 2009, Pages 165-171, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2009.07.004. (http://www.sciencedirect.com/science/article/pii/S0925521409001380)
Abstract:
Bromoethane breaks the dormancy of potato tubers thus enabling early planting after harvest. Because of the increasing importance of true potato seed (TPS) for potato propagation in tropical and subtropical regions, we examined the efficacy of bromoethane on the dormancy breakage of mini-tubers grown from TPS, as well as the physiological changes induced. Bromoethane treatment of mini-tubers induced a rapid increase in respiration and ethylene production, which subsequently declined. Bromoethane stimulated the rate of sprouting and increased tuber weight loss. There was also a transient increase in the sucrose and glucose concentration in the tissues near the buds and in the parenchyma of bromoethane-treated tubers, whereas a transient increase in fructose was observed only in the tissues near the buds. Of the enzymes studied, invertase (acid and alkaline), fructokinase and glucose 6 phosphate dehydrogenase showed no change in activity following bromoethane treatment. However, hexokinase, UGPase and AGPase were more active in bromoethane-treated tubers than in the corresponding controls, while [alpha]-glucosidase showed a higher level of activity in bromoethane treated tubers, especially 2 d after treatment. It is concluded that bromoethane induces dormancy breakage in potato mini-tubers, partly through the exertion of stress, and significant metabolic changes within the tubers may be detected before the visible onset of sprouting.
Keywords: Carbohydrate metabolism; Enzyme activity; Ethylene; Respiration

Carbon sequestration by a crop over a 4-year sugar beet/winter wheat/seed potato/winter wheat rotation cycle/M. Aubinet, C. Moureaux, B. Bodson, D. Dufranne, B. Heinesch, M. Suleau, F. Vancutsem, A. Vilret
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/pii/S0168192308002475)
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

Effect of crop plant density on critical period of weed competition in potato/Goudarz Ahmadvand, Farzad Mondani, Farid Golzardi

Scientia Horticulturae, Volume 121, Issue 3, 2 July 2009, Pages 249-254, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.02.008.
(http://www.sciencedirect.com/science/article/pii/S0304423809000855)

Abstract:
A field study was conducted in Hamedan western Iran in 2006 to establish the critical period of weed competition (CPWC) in potato (Solanum tuberosum L.) for commercial and seed production plant densities. A quantitative series of treatments concerned with both increasing duration of interference and length of weed-free period were imposed within each commercial and seed potato production plant density. The beginning and end of the CPWC based on a 10% loss of tuber yield was determined by fitting logistic and Gompertz equations to the relative tuber yield data representing increasing duration of weed interference and weed-free period, respectively. At a 10% tuber yield loss level, the duration of weed interference for 571 and 676 growing degree days (GDDs) from crop emergence, corresponding to 40% and 50% canopy closure, marked out the beginning of the CPWC for commercial and seed production plant densities, respectively. When maintained weed-free for 1163 and 1014 (GDD), corresponding to 100% and 80% canopy closure, weed emerging later caused tuber yield losses of less than 10% for commercial and seed production plant densities, respectively. Practical implications of this study are that post-emergence herbicides or other weed control methods should be used in western Iran to eliminate weeds from 19-24 days post-crop emergence up to 43-51 days. Such an approach would keep yield loss levels below 10%. Interactions between plant density and weed competition durations indicated that weed management in commercial plant density of potato could be less

intensive than that of seed production plant density, reducing herbicide use and risk of herbicide carryover to sensitive rotation crops.

Keywords: Critical period; Weed control; Weed infestation; Weed-free; Potato

Mustard biofumigation disrupts biological control by Steinernema spp. nematodes in the soil/Donna R. Henderson, Ekaterini Riga, Ricardo A. Ramirez, John Wilson, William E. Snyder

Biological Control, Volume 48, Issue 3, March 2009, Pages 316-322, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.12.004.
(http://www.sciencedirect.com/science/article/pii/S104996440800306X)

Abstract:
Mustard green manures or seed meal high in glucosinolates, which produce a natural biofumigant upon incorporation into the soil, form an alternative to synthetic fumigants. However, the non-target impacts of these biofumigants in the field are unclear. We examined the effectiveness of soil incorporation of Brassica carinata seed meal both in controlling the plant-parasitic Columbia root-knot nematode (Meloidogyne chitwoodi), and on the biological control exerted by the entomopathogenic nematodes Steinernema feltiae and Steinernema riobrave on root-knot nematodes and the Colorado potato beetle (Leptinotarsa decemlineata). Singly, both the seed meal and Steinernema spp. reduced root-knot nematode damage to potato tubers and increased marketable tuber yields. However, there was a negative interaction between the two bioagents such that their combination did not further improve suppression of plant-parasitic nematodes. Thus, mustard seed meal applications harmful to the target root-knot nematode also disrupted the ability of Steinernema spp. to act as biocontrol agents. Further, we observed modest disruption of the biological control of potato beetles following biofumigation. But, the potato beetles were less likely to lay eggs on potato plants grown in mustard-amended soil, suggesting a counteracting benefit of mustard application. Multiple, complementary controls must be integrated to replace the very effective pest suppression typical of synthetic soil fumigants. Our study suggests significant interference between biofumigation and biocontrol agents in the soil, presenting challenges in combining these two environmentally friendly approaches to managing plant-parasitic nematodes and other pests.

Keywords: Biofumigant; Non-target effects; Colorado potato beetle; Plant-parasitic nematode; Entomopathogenic nematode; Leptinotarsa decemlineata; Meloidogyne chitwoodi

Isolation of a Plasmalemma Aquaporin Encoding Gene StPIP1 from Solanum tuberosum L. and Its Expression in Transgenic Tobacco/Wang-ze WU, Xiao-li Peng, Di Wang

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Abstract:
Aquaporin (AQP) belongs to a highly conserved group of membrane proteins considered as major intrinsic proteins, which facilitate water transport across biological membranes. The discovery of AQPs in plants has resulted in a paradigm shift in the understanding of plant-water relations, however, the potential relationship between the role of aquaporins in regulating plant water balance and drought tolerance still remains elusive. In this study, the gene encoding potato AQP

cDNA, StPIP1 (GenBank accession no. DQ999080), was cloned from the leaf of potato cultivar Gannongshu 2 by reverse transcription-PCR (RT-PCR). Sequence alignment was made by BLASTn in GenBank, the phylogenetic analysis was conducted using PHYLIPWY, the 3D structure was predicted in Swiss-Model server. Subcellular localization of StPIP1 was performed by constructing CaMV35S-StPIP1-GFP and rd29A-StPIP1-GFP fusion proteins and transient expression in onion epidermis. To understand StPIP1 physiological functions in potato under various stress conditions, the StPIP1 gene in a reverse orientation was transformed into tobacco driven by the Cauliflower mosaic virus (CMV) 35S promoter. The expression levels of transgenic and wild-type plants were assessed under various abiotic stress conditions using semi-quantitative RT-PCR, and the morphological and physiological responses of transgenic plants to different stress conditions were investigated. The expression of StPIP1 mRNA decreased in transgenic plants under non-stress and stress conditions, however, the reduction was more severer under drought stress. In both non-stress and stress conditions, StPIP1 was expressed predominantly in root. The morphological and physiological investigation showed no significant differences in growth rate, germination rate, and root fresh weight (FW) between transgenic and wild-type plants when grown under favorable conditions. In contrast, under drought stress, the reduction in StPIP1 expression leads to a delay in seed germination and seedling growth, accelerated seedling wilt, and leaf morphological abnormity. Under 'enough' water conditions (i.e., water culture), the aerial parts of anti-sense plants showed no differences. However, for the aerial parts to accumulate the same amount of biomass, transgenic plants needed about 3 times more abundant root system to transport water for plant growth than wild-type plants. Morphological investigation showed that the reduction in StPIP1 expression increased the root system in transgenic plants under drought stress. As a result, the increase of root mass might compensate the reduced cellular water permeability in order to ensure a sufficient water supply for the plant. Results demonstrated that StPIP1 plays an important role for water transportation in potato, especially under drought stress conditions. The reduced expression of StPIP1 decreases the cellular water transport and influences the expression of endogenous AQPs genes and thereby, has impacts on seed germination, seedling growth, and stress responses of potato to drought conditions.

Keywords: aquaporin; Solanum tuberosum L.; drought stress; gene cloning; sequence analysis; gene expression

Model analysis of sorption isotherms/Stavros Yanniotis, Jiri Blahovec
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Abstract:
The equation developed by Blahovec and Yanniotis, which is based on surface adsorption and solution water, was applied for fitting experimental sorption data for starchy and high protein foods, fruits and vegetables, nuts, legumes, and seeds. Analysis of sorption isotherms shows that surface adsorption is more important than solution water in the isotherms for cereals, potatoes, legumes and seeds, while in vegetables, fruits, meat, milk products and some nuts solution water is more important. The ratio of solution water to surface adsorption increases as water activity increases, it is higher for the adsorption isotherm than the desorption isotherm at any water activity value and decreases as temperature increases.

Keywords: Water activity; Sorption isotherm; Sorption models; Sorption mechanism; Classification; Desorption; Adsorption; Langmuir

A 90-day toxicology study of transgenic lysine-rich maize grain (Y642) in Sprague-Dawley rats/Xiao Yun He, Mao Zhi Tang, Yun Bo Luo, Xin Li, Si Shuo Cao, Jing Juan Yu, Bryan Delaney, Kun Lun Huang

Food and Chemical Toxicology, Volume 47, Issue 2, February 2009, Pages 425-432, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.11.032. (http://www.sciencedirect.com/science/article/pii/S0278691508006686)

Abstract:
The gene for a lysine-rich protein (sb401) obtained from potatoes (Solanum berthaultii) was inserted into maize seed to produce Y642 transgenic maize. Compositional analysis of Y642 grain demonstrated that the concentrations of lysine and total protein were higher than those observed in maize grain from a near-isogenic non-genetically modified (non-GM) commercially available control quality protein maize (Nongda 108). The safety of Y642 maize grain was assessed by comparison of toxicology response variables in Sprague-Dawley (SD) rats consuming diets containing Y642 maize grain with those containing Nongda 108 maize grain. Maize grains from Y642 or Nongda 108 were incorporated into rodent diets at low (30%) or high concentrations (76%) and administered to SD rats (n = 10/sex/group) for 90 days. An additional group of negative control group of rats (n = 10/sex/group) were fed AIN93G diets. No adverse diet-related differences in body weights, feed consumption/utilization, clinical chemistry, hematology, absolute and relative organ weights were observed. Further, no differences in gross or microscopic pathology were observed between rats consuming diets with Y642 maize grain compared with rats consuming diets containing Nongda 108 maize grain. These results demonstrated that Y642 lysine-rich maize is as safe and nutritious as conventional quality protein maize.

Keywords: Transgenic; Lysine-rich Maize; Feeding study; Rats; Safety; Nutrition