

**Komoditas : Lada
Tahun 2004-2008 (346 judul)**

Antonio Vega-Galvez, Karina Di Scala, Katia Rodriguez, Roberto Lemus-Mondaca, Margarita Miranda, Jessica Lopez, Mario Perez-Won, Effect of air-drying temperature on physico-chemical properties, antioxidant capacity, colour and total phenolic content of red pepper (*Capsicum annum*, L. var. Hungarian), Food Chemistry, Volume 117, Issue 4, 15 December 2009, Pages 647-653, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.066.

(<http://www.sciencedirect.com/science/article/B6T6R-4W6XYK9-6/2/e987f6cda51640bd760ba6bfaa24dbb7>)

Abstract:

Red pepper has been recognised as an excellent source of antioxidants, being rich in ascorbic acid and other phytochemicals. Drying conditions, particularly temperature, leads to pepper modifications that can cause quality degradation. In this work, the effects of process temperatures between 50 and 90 [degree sign]C on physico-chemical properties, rehydration, colour, texture, vitamin C, antioxidant capacity and total phenolics during the drying of red pepper were studied. The rehydration ratio decreased with temperature and the maximum water holding capacity was achieved at 50 [degree sign]C. Both vitamin C content and the total phenolic content decreased as air-drying temperature decreased. The radical scavenging activity showed higher antioxidant activity at high temperatures (i.e. 80 and 90 [degree sign]C) rather than at low temperatures (i.e. 50, 60 and 70 [degree sign]C). Chromatic parameters (L^* , a^* , b^* , C^* and H [degree sign]), non-enzymatic browning compounds and extractable colour were affected by drying temperature, which contributed to the discolouring of pepper during this process.

Keywords: Pepper; Air-drying; Antioxidant properties; Total phenolic content; Radical scavenging activity; Vitamin C

Monika Mueller, Alois Jungbauer, Culinary plants, herbs and spices - A rich source of PPAR[gamma] ligands, Food Chemistry, Volume 117, Issue 4, 15 December 2009, Pages 660-667, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.04.063.

(<http://www.sciencedirect.com/science/article/B6T6R-4W6XW2X-7/2/9ed5cb42710e57aa0c24c45b5f583cfe>)

Abstract:

Obesity and the related disorders, diabetes, hypertension and hyperlipidemia have reached epidemic proportions world-wide. The influence of 70 plants, herbs and spices on peroxisome proliferators-activated receptor (PPAR)[gamma] activation or antagonism, a drug target for metabolic syndrome, was investigated. Approximately 50 different plant extracts bound PPAR[gamma] in competitive ligand binding assay, including pomegranate, apple, clove, cinnamon, thyme, green coffee, bilberry and bay leaves. Five plant extracts transactivated PPAR[gamma] in chimeric GAL4-PPAR[gamma]-LBD system: nutmeg, licorice, black pepper, holy basil and sage. Interestingly, nearly all plant extracts antagonized rosiglitazone-mediated coactivator recruitment in time resolved fluorescence resonance energy transfer coactivator assay. The five transactivating extracts may function as selective PPAR[gamma] modulators (SPPAR[gamma]Ms), and the other extracts seem to be moderate antagonists or undetectable/weak SPPAR[gamma]Ms. As SPPAR[gamma]Ms improve insulin resistance without weight gain and PPAR[gamma] antagonists exert antiobesity action, a combination of these plants in diet could reduce obesity and the incidence of metabolic syndrome.

Keywords: Obesity; PPAR[gamma]; Diabetes; Plants; SPPAR[gamma]Ms; PPAR[gamma]-antagonists

Takele Gadissa, Desalegn Chemed, Effects of drip irrigation levels and planting methods on yield and yield components of green pepper (*Capsicum annuum*, L.) in Bako, Ethiopia, *Agricultural Water Management*, Volume 96, Issue 11, November 2009, Pages 1673-1678, ISSN 0378-3774, DOI: 10.1016/j.agwat.2009.07.004.

(<http://www.sciencedirect.com/science/article/B6T3X-4WWPB0Y-1/2/253c21a41e1a8dcde8e852e7d6e5dc4f>)

Abstract:

A field experiment was conducted to investigate the effects of different levels of drip irrigation and planting methods on yield and yield components (number of fruits per plant, number of primary and secondary branches per plant, and plant height) of green pepper (*Capsicum annuum*, L.) in Bako, Ethiopia. Three irrigation levels (50, 75 and 100% of ET_c) and two planting methods (normal and paired-row planting) were applied. The experiment was laid out in a split plot design, with irrigation levels as main plots and planting methods as sub-plots, in three replications. It was found that the effects of both treatments on yield, number of fruits per plant and plant height of green pepper were highly significant ($p < 0.01$) whereas the number of primary and secondary branches per plant was affected significantly ($p < 0.05$). The maximum and minimum values of the yield and yield components were recorded from treatment plots I100P (full irrigation level with paired-row planting method) and I50P (50% of ET_c irrigation level with paired-row planting method), respectively, with the exception of plant height. However, the average plant height (cm) recorded from the I100N treatment plot was not significantly different from the I100P treatment plot. Moreover, it was found that the effect of treatment interactions on both yield and yield components of green pepper was found to be highly significant ($p < 0.01$). A 50% reduction in irrigation level caused a reduction in yield of about 48.3 and 74.4% under the normal and paired-row planting methods, respectively, whereas, a 25% reduction in irrigation level caused a reduction in yield of about 22.8 and 47.7% under the same planting methods. Under both deficit irrigation levels (I50 and I75), the normal planting method gave higher total yield and yield components of green pepper than the paired-row planting method. Yield response factor (ky) values of 0.96 and 1.57 were determined for the normal and paired-row planting methods, respectively, suggesting utmost precautions when using the paired-row planting in areas with limited water supply. The results revealed that full irrigation water supply under paired-row planting method (I100P) could be used for the production of green pepper in an area with no water shortage. Moreover, it was found that the average yields recorded from the I75 under the paired-row planting method is fairly greater than the national average.

Keywords: Deficit irrigation; Drip irrigation; Planting method; Green pepper; Yield and yield components; Ethiopia

Juan Eugenio Alvaro, Soraya Moreno, Fernando Dianez, Milagrosa Santos, Gilda Carrasco, Miguel Urrestarazu, Effects of peracetic acid disinfectant on the postharvest of some fresh vegetables, *Journal of Food Engineering*, Volume 95, Issue 1, November 2009, Pages 11-15, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.05.003.

(<http://www.sciencedirect.com/science/article/B6T8J-4W7RY8M-2/2/4c9257f3b808ee7afedd39c21d6691d2>)

Abstract:

Raw salad vegetables are typically consumed without being cooked. This study compared peracetic acid mix (PAA) and sodium hypochlorite (SH) as disinfectants on vegetables postharvest. Tomato, sweet pepper and cucumber were evaluated in three different experiments: (1) determination of organoleptic characteristics of vegetables by consumer preference; (2) disinfectant capacity comparison of PAA versus SH; and (3) measurement of phytotoxicity of disinfectant products, expressed as alteration of the surface of sweet peppers. Each treatment was replicated four times, and all procedures simulated the procedures carried out in industry. No differences in fruits washed with different treatments were found by the panel. Starting at Day 15,

the peracetic acid mixture (PAA) showed better disinfection performance than sodium hypochlorite (SH). The results indicate that the peracetic acid mix is better for washing fruit and improving postharvest life as it is better for the environment (due to low toxicity) and for health safety and does not affect the taste characteristics of the fruit.

Keywords: Shelf life; Sodium hypochlorite; Health safety; Tomato; Sweet pepper; Cucumber; Ecotoxicity on vegetables; *Rhizopus stolonifer*

M Antonia Murcia, Antonia M Jimenez, Magdalena Martinez-Tome, Vegetables antioxidant losses during industrial processing and refrigerated storage, Food Research International, Volume 42, Issue 8, October 2009, Pages 1046-1052, ISSN 0963-9969, DOI: 10.1016/j.foodres.2009.04.012.

(<http://www.sciencedirect.com/science/article/B6T6V-4W741X6-4/2/45a297923309e0d36bad61a29832f319>)

Abstract:

Twenty-five vegetables (artichoke, asparagus, beetroot, broad bean, broccoli, Brussels sprout, carrot, cauliflower, celery, chicory, cucumber, eggplant, endive, garlic, green bean, leek, lettuce, maize, onion, pea, pepper, radish, spinach, Swiss chard and zucchini) were used to evaluate their antioxidant activity. All fresh vegetables studied were able to scavenge lipoperoxyl and hydroxyl radicals. All the vegetables also presented good total capacity antioxidant by TEAC assay except cucumber, endive, carrot and zucchini.

Vegetables stored (7 days) in a home refrigerator recorded the same antioxidant activity as fresh samples, except cucumber and zucchini (lipid peroxidation) and broccoli, Brussels sprout and leek (TEAC).

Canned vegetables showed a more pronounced loss of antioxidant activity than frozen vegetables compared with fresh vegetables.

During the shelf life of the processed vegetables (8 months for frozen and 18 months for canned vegetables), some products showed losses (19-48%) of their lipoperoxyl radical scavenging capacity and total antioxidant activity.

Keywords: Fresh vegetables; Antioxidant activity; Free radicals; Storage; Refrigerated; Frozen and canned

Pathompong Penchaiya, Els Bobelyn, Bert E. Verlinden, Bart M. Nicolai, Wouter Saeys, Non-destructive measurement of firmness and soluble solids content in bell pepper using NIR spectroscopy, Journal of Food Engineering, Volume 94, Issues 3-4, October 2009, Pages 267-273, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.018.

(<http://www.sciencedirect.com/science/article/B6T8J-4VY2C2H-5/2/e1797b8defda2f4f2cc082234fc2834c>)

Abstract:

The potential of near infrared (NIR) reflectance spectroscopy over the range 780-1690 nm was investigated to measure the soluble solids content (SSC) and firmness of bell pepper fruit. Partial least squares (PLS) calibration models were constructed based on a calibration dataset which included data from two cultivars (Solution and Ferrari) and two harvest times (2005 and 2006). The effect of Savitzky-Golay second derivative preprocessing and extended multiplicative signal correction (EMSC) on the accuracy of the calibration models was investigated and the best results were obtained with the former. The SECV were equal to 5.9 N and 0.59 [degree sign]Brix for firmness and SSC, respectively. When the model was applied to an external data set including data from cv. Solution and a different harvest season, the satisfactory SEP values of 4.49 N and 0.7 [degree sign]Brix were obtained, but for firmness a bias of 5.6 N was observed. From these results it can be concluded that NIR spectroscopy can be used as a non-destructive technique for measuring the SSC in bell pepper, but that further research is needed to make it robust for firmness prediction.

Keywords: Near infrared; Reflectance; Non-destructive method; Soluble solids content; Firmness; Bell pepper; Vegetable; Fruit

R. Moreira, F. Chenlo, M.D. Torres, Simplified algorithm for the prediction of water sorption isotherms of fruits, vegetables and legumes based upon chemical composition, *Journal of Food Engineering*, Volume 94, Issues 3-4, October 2009, Pages 334-343, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.03.026.

(<http://www.sciencedirect.com/science/article/B6T8J-4W0R0G2-2/2/a22fc8b36358fcae3ca28ecc2db05cf1>)

Abstract:

A simplified algorithm of prediction of water sorption isotherms for some foods was developed. This model is based on the composition of the main compounds of foods (glucose, fructose, sucrose, salt, protein, fibre and starch) and the influence of temperature was included (it was tested at 25 and 40 [degree sign]C). Reported experimental data were employed as reference to validate the developed prediction model. Sorption isotherms for apple, apricot, banana, chestnut, loquat, quince, raisin, carrot, garlic, pepper, pumpkin, turnip, potato, bean, chickpea and lupine were predicted and compared to those reported in literature. The proposed model was able to predict the presence or absence of crossing between sorption isotherms at different temperatures for the same food. Using the prediction model could be calculated equilibrium moisture content with a determination coefficient (R²) of (>0.982), a mean relative error (E) of (<9.43%) and a standard error (ERMS) of (<0.042 kg (kg d.b.)⁻¹).

Keywords: Water activity; Equilibrium moisture content; Food composition; Temperature

K.A. Gopinath, Supradip Saha, B.L. Mina, Harit Pande, A.K. Srivastva, H.S. Gupta, Bell pepper yield and soil properties during conversion from conventional to organic production in Indian Himalayas, *Scientia Horticulturae*, Volume 122, Issue 3, 1 October 2009, Pages 339-345, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.05.016.

(<http://www.sciencedirect.com/science/article/B6TC3-4WS227T-1/2/bfe963f4fcf6252e666f2725b6c20ace>)

Abstract:

A conversion period of at least two years is required for annual crops before produce may be certified as organically grown. There is a need for better understanding of the various management options for implementing from conventional to organic production. The purpose of this study was to evaluate the effects of three organic amendments on growth and yield of bell pepper (*Capsicum annuum* L.), the benefit:cost ratio, soil fertility and enzymatic activities during conversion to organic production. For that purpose six treatments were established: composted farmyard manure (FYMC, T1); vermicompost (VC, T2); poultry manure (PM, T3) along with biofertilizers (BF) [*Azotobacter* + phosphorus solubilizing bacteria (*Pseudomonas striata*)] and mix of three amendments (FYMC + PM + VC + BF, T4); integrated crop management (FYMC + NPK, T5) and unamended control (T6). The bell pepper yield under organic management was markedly lower (33-53% and 18-40% less in first and second year of conversion, respectively) than with the integrated crop management (FYMC 10 Mg ha⁻¹ + NPK - 100:22:41.5 kg ha⁻¹) treatment (T5). Combined application of three organic amendments (FYMC 10 Mg ha⁻¹ + PM and VC each 1.5 Mg ha⁻¹ + BF, T4) and T1 produced similar but significantly higher bell pepper yield (27.9 and 26.1 Mg ha⁻¹, respectively) compared with other organic amendment treatments. Both T4 and T1 greatly lowered soil bulk density (1.15-1.17 Mg m⁻³), and enhanced soil pH (7.1) and oxidizable organic carbon (1.2-1.3%) compared with T5 and unamended control (T6) after a two-year transition period. However, the N, P and K levels were highest in the plots under integrated management. T1 plots showed higher dehydrogenase activity values. However, acid phosphatase and [beta]-glucosidase activities were higher in T6 plots whereas urease activity was greater in T5 plots compared with other treatments. Among the treatments involving organic amendments alone,

T1 gave a higher gross margin (US \$ 8237.5 ha⁻¹) than other treatments. We conclude that T1 was found more suitable for enhancing bell pepper growth and yield, through improved soil properties, during conversion to organic production.

Keywords: Crop yield; Economics; Organic conversion; Organic farming; Soil properties

L.H. Wang, X.H. Gu, M.Y. Hua, S.L. Mao, Z.H. Zhang, D.L. Peng, X.F. Yun, B.X. Zhang, A SCAR marker linked to the N gene for resistance to root knot nematodes (*Meloidogyne* spp.) in pepper (*Capsicum annuum* L.), *Scientia Horticulturae*, Volume 122, Issue 2, 17 September 2009, Pages 318-322, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.04.011.

(<http://www.sciencedirect.com/science/article/B6TC3-4WF2NN2-1/2/645aa31ad751b1d7e32b9507a5ebb635>)

Abstract:

The root-knot nematodes (*Meloidogyne* spp.) are important nematode pests and cause serious diseases in pepper in the world. No molecular markers linked to the nematodes resistance N gene have been reported. In this paper, 'Carolina Wonder' (*Capsicum annuum* L.), a sweet pepper line resistant to root-knot nematode with N gene, '20080-5-29' (*C. annuum* L.), an inbred line susceptible to root-knot nematode with good horticultural characteristics, and their F2 progeny with 320 individuals were used as materials. Evaluation of resistance and susceptibility of parental lines, F1 and F2 progeny inoculated with root-knot nematodes (*Meloidogyne incognita*) were carried out. 'Bulked segregant analysis' method was used to search for polymorphic markers from 512 pairs of AFLP primers. Based on the assessment of resistance and susceptibility and polymorphism of the AFLP marker in F2 population, the genetic linkage distance between the AFLP marker and the N gene was estimated. One AFLP marker E39/M41-339 was obtained and transferred to a SCAR marker amplifying a 315 bp DNA fragment linked to the N resistant allele and a 331 bp fragment linked to the N⁺ susceptible allele. The distance between the molecular marker and the nematodes resistance N gene is 6.3 cM. This research delivered a valuable tool for the marker assisted selection of nematodes resistance in pepper.

Keywords: Pepper; *Capsicum annuum* L.; Disease resistance; Root-knot nematode; *Meloidogyne* spp.; SCAR; N gene; Marker assisted selection

Karima Bakkali, Natividad Ramos Martos, Badredine Souhail, Evaristo Ballesteros, Characterization of trace metals in vegetables by graphite furnace atomic absorption spectrometry after closed vessel microwave digestion, *Food Chemistry*, Volume 116, Issue 2, 15 September 2009, Pages 590-594, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.03.010.

(<http://www.sciencedirect.com/science/article/B6T6R-4VT14M6-6/2/94f52346771eb2aa0444918c3fa1343f>)

Abstract:

A simple and expeditious method for the determination of trace metals (cadmium, chromium, copper, manganese and lead) is proposed. The metals are extracted from their matrix by using nitric acid and hydrogen peroxide in a closed-vessel microwave digestion system for their subsequent detection by graphite furnace atomic absorption spectrometry (GFAAS). The sample preparation procedure facilitates the overall analytical process and enables the construction of calibration curves from inorganic standards. The ensuing method provides good linearity and sensitivity for the five metals, with limits of detection and quantization spanning the ranges 0.05-2.20 and 0.15-7.34 [μ g/kg, respectively]. This sensitivity level is quite appropriate for the intended application. Accuracy was assessed by using a certified reference material (NCS ZC85006 Tomato), for which the proposed method provided amounts of metals consistent with their certified values. The proposed method was applied to tomato, pepper and onion, which are widely consumed in Mediterranean countries.

Keywords: Metals; Vegetables; Certified reference material; Microwave digestion; Graphite furnace atomic absorption spectrometry

Silvia Noemi Lopez, Andrea V. Andorno, Evaluation of the local population of *Eretmocerus mundus* (Hymenoptera: Aphelinidae) for biological control of *Bemisia tabaci* biotype B (Hemiptera: Aleyrodidae) in greenhouse peppers in Argentina, *Biological Control*, Volume 50, Issue 3, September 2009, Pages 317-323, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.05.002.

(<http://www.sciencedirect.com/science/article/B6WBP-4W9XDW4-1/2/0f562b1aef542e44c27be7183c08b243>)

Abstract:

Bemisia tabaci biotype B is a key pest in pepper crops in Argentina. The parasitoid *Eretmocerus mundus* is frequently found parasitizing this whitefly in greenhouses without pesticide applications. The present studies were carried out with the objective of evaluating control obtained with different rate and number of parasitoid releases under experimental conditions. Release rate: cages with pepper pots were positioned in an experimental greenhouse and randomly assigned to the release rate treatments (0, 1 and 3 pairs of *E. mundus*/plant/week with a total of three introductions). Number of releases: similar cages were assigned to the number of parasitoid introduction treatments (0, 1, 2 and 3) with the best release rate obtained in the previous trial. In both assays whitefly (adults and nymphs) and parasitoid (parasitized nymphs) population sizes in each cage were monitored weekly for a period of 10 weeks. Results suggested that the introduction of 2 *E. mundus*/plant/week was enough to suppress host population compared to control treatment (peaks of 7.75 adults and 58.75 nymphs/cage and 643.75 adults and 1598 nymphs/cage, respectively) ($p < 0.05$), with 85% of parasitism. *E. mundus* had to be introduced three times to achieve the best pest control (peaks of 1.17 adults and 20.33 nymphs/cage vs. 55.67 adults and 75 nymphs/cage in control treatment) with 84% of parasitism ($p < 0.05$). These results were then validated in a pepper crop under experimental greenhouse conditions. Whitefly population was lower in those greenhouses where *E. mundus* was released compared to control greenhouses (0.15 adults and 0.71 nymphs/4 leaves and 0.73 adults and 1.64 nymphs/4 leaves, respectively), with a peak of 54% of parasitism ($p < 0.05$). We concluded that good suppression of *B. tabaci* could be achieved using *E. mundus* under spring conditions in Argentina.

Keywords: *Bemisia tabaci* biotype B; *Eretmocerus mundus*; Biological control; Vegetable crops; Argentina

E. Medina, C. Paredes, M.D. Perez-Murcia, M.A. Bustamante, R. Moral, Spent mushroom substrates as component of growing media for germination and growth of horticultural plants, *Bioresource Technology*, Volume 100, Issue 18, September 2009, Pages 4227-4232, ISSN 0960-8524, DOI: 10.1016/j.biortech.2009.03.055.

(<http://www.sciencedirect.com/science/article/B6V24-4W75RNG-1/2/67c36813c34f4992a0f7a112d1e70b26>)

Abstract:

This research work was conducted in order to investigate the possibility of using spent mushroom substrate (SMS) in the production of horticultural seedlings replacing part of the peat in the growing media. Three vegetable species with different salt sensitivities, the less sensitive being tomato (*Lycopersicon esculentum* var. Muchamiel), the moderately salt-sensitive being courgette (*Cucurbita pepo* L. var. Afrodite F1) and the most salt-sensitive being pepper (*Capsicum annum* L. var. Lamuyo F1) were grown in 12 media containing SMS of two types of mushroom (*Agaricus bisporus* (SMS-AB) and *Pleurotus ostreatus* (SMS-PO)) or a mixture of both 50% (v/v) (SMS-50), as well as peat in various ratios. The proportions of each residue in the mixtures elaborated with peat were 25%, 50%, 75% and 100% v/v residue. A substrate of 100% peat was used as control. The experiment was arranged in a completely-randomised design with two replicates per treatment under greenhouse conditions. Prior to sowing, some physical, physico-chemical and chemical properties of the growing media were determined and seed germination and fresh weight of seedling were also measured. In most of the cases, the addition of SMS to the growing media

produced an increase in the pH values, salt contents, macro and micronutrient concentrations and a decrease in the water holding capacity contents in comparison to peat, whereas great differences were found in the air capacity values between SMS-based substrates and peat. Up to 75% SMS can be used in mixtures with peat for seed germination of the plant species studied. Regarding the most suitable SMS-based substrates for plant growth, any substrate could be used for tomato seedling production. However, all SMS-AB-based substrates and the media containing low dose of SMS-PO and SMS-50 were adequate for growth of courgette and pepper.

Keywords: Spent mushroom substrates; Growing media; Peat substitutes; Seedling production; Salt-sensitive plants

J.C. Beaulieu, H.S. Park, A.G. Ballew Mims, M.S. Kuk, Extension of green bell pepper shelf life using oilseed-derived lipid films from soapstock, *Industrial Crops and Products*, Volume 30, Issue 2, September 2009, Pages 271-275, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2009.05.003.

(<http://www.sciencedirect.com/science/article/B6T77-4WHDHS5-1/2/e19787a276cfe5c5bfad723aebdf06d8>)

Abstract:

Edible films have been used for decades on fresh produce to create a semipermeable membrane on the surface to suppress respiration, control moisture loss, and more recently to provide a delivery mechanism for the inclusion of functional components. Scientists at the Southern Regional Research Center (SRRRC) have previously demonstrated that a thin biodegradable film can be produced from soapstock, an underused byproduct from the vegetable oil industry. After physical and chemical treatments, a thin film was produced from various soapstocks (cottonseed and safflower). Different hydration ratios were tested since the initial soapstock solutions were rather viscous. To examine the potential use of an oilseed-derived lipid film for the extension of shelf life, different types of the oilseed-derived soapstocks were utilized to produce lipid films with different hydration ratios, and containing 0, 5, and 10% of paraffin wax for application on 'Camelot' bell peppers. Control bell peppers lost almost 25% weight per unit surface area (SA) in 78 h when stored under ambient conditions. Cottonseed film-coated peppers, hydrated at 1:4, lost only about 5% moisture per unit SA after 78 h and minimized weight loss by up to 79% compared to the control. However, since a 1:4 hydration ratio remained rather viscous, 1:8 was preferred and these cottonseed films reduced weight loss per unit SA by up to 48% during storage. Safflower-derived soapstock film resulted in the least effective water retention of the films and ratios tested, with roughly 21-25% reduction in weight loss per SA compared to controls. Safflower-derived soapstock was higher in unsaturated fatty acids, which are less efficient to control moisture migration because they are more polar than saturated lipid materials, as contained in cottonseed-derived materials. Addition of wax to the cottonseed-derived films decreased water loss slightly, similar to previous reports in the literature. An ANOVA supported the conclusion that the oilseed-derived lipid films significantly reduced moisture loss across the produce epidermis. To avoid potential allergenicity concerns in cottonseed soapstock, additional cleanup steps and tests with commonly used edible coating additives would be required before attaining food grade status.

Keywords: *Capsicum annuum*; Edible film; Lipid film; Oilseed; Postharvest; Shelf life extension; Water loss

Sunghoon Baek, Kijong Cho, Yoo Han Song, Joon-Ho Lee, Sampling plans for estimating pepper fruit damage levels by Oriental tobacco budworm, *Helicoverpa assulta* (Guenee), in hot pepper fields, *Journal of Asia-Pacific Entomology*, Volume 12, Issue 3, September 2009, Pages 175-178, ISSN 1226-8615, DOI: 10.1016/j.aspen.2009.03.003.

(<http://www.sciencedirect.com/science/article/B8JJN-4VYP9FR-1/2/2693ecc33ec00051b86795a88e519127>)

Abstract:

Sequential sampling programs for the management of Oriental tobacco budworm, *Helicoverpa assulta* (Guenee), on red hot peppers were developed using the data of damaged pepper fruits by *H. assulta*. Taylor's power law indicated that the damaged pepper fruits were distributed randomly in hot pepper fields. A fixed-precision-level sequential sampling plan for classifying fruit damage density levels at a critical density of 2 damaged fruits per plant was developed to assist in decision making. The sequential classification sampling plan was evaluated using the operating characteristic (OC) and the average sample size (ASN) curves. The OC and ASN curves indicated that this sampling plan was robust and properly classified the population density. A resampling simulation demonstrated that average actual sampling precision value at $D = 0.25$ was ≤ 0.25 . With sequential sampling for classifying the damaged fruit levels in terms of a critical density, sample size was fixed to 18 plants. The fixed-precision-level sequential sampling plan developed in this study should greatly enhance the monitoring efficacy and provide practical solutions suitable for reliable decision-making process in the management of *H. assulta*.

Keywords: Taylor power law; Spatial distribution pattern; Fixed-precision-level sampling; Hot pepper

J. Basilio Heredia, Luis Cisneros-Zevallos, The effects of exogenous ethylene and methyl jasmonate on the accumulation of phenolic antioxidants in selected whole and wounded fresh produce, *Food Chemistry*, Volume 115, Issue 4, 15 August 2009, Pages 1500-1508, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.01.078.

(<http://www.sciencedirect.com/science/article/B6T6R-4VJ0DSD-B/2/81553d0e841d4bf70e7714394cc48d7d>)

Abstract:

Selected fruits and vegetables were exposed to wounding, methyl jasmonate (MJ) or ethylene (ET) stress and effects on the phenylpropanoid metabolism were determined. Lettuce, cilantro, cabbage, green beans, apples, plums, peaches, table grapes, strawberries, bell peppers, asparagus, celery, carrots, radishes, potatoes, and jicama were evaluated for phenolic content and antioxidant capacity (AOX). The phenolic synthesis response to the stresses was tissue-dependent, including decreases, increases or no effects. The use of phytohormones enhanced the wound response on some crops, confirmed by an increase in phenylalanine ammonia lyase (PAL) activity and HPLC phenolic profiles. Several reasons could explain the phenolic accumulation, including the plant genetic machinery, the presence of a common signalling response and differences in phenolic synthesis and degradation kinetics. The synthesized phenolics increased the overall AOX ($[\mu\text{g trolox/g FW}]$) of the tissue. Furthermore, the specific AOX ($[\mu\text{g trolox/mg phenolics}]$) of the synthesized phenolic compounds was influenced by type of tissue and phytohormone used.

Keywords: Methyl jasmonate; Ethylene; Wounding; Phenolic compounds; Antioxidant capacity; PAL activity; Plant signalling

K. Hell, B.G.J. Gnonlonfin, G. Kodjogbe, Y. Lamboni, I.K. Abdourhamane, Mycoflora and occurrence of aflatoxin in dried vegetables in Benin, Mali and Togo, West Africa, *International Journal of Food Microbiology*, In Press, Accepted Manuscript, Available online 11 August 2009, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.07.039.

(<http://www.sciencedirect.com/science/article/B6T7K-4X01P5Y-1/2/3ea1a0d6ffb81f4bc9aa39a147955539>)

Abstract:

Fungal infection and aflatoxin contamination was evaluated on 180 samples of dried vegetables such as okra, hot chilli, tomato, melon seeds, onion and baobab leaves from Benin, Togo and Mali collected in September to October 2006. These products are dried to preserve them for lean periods and decrease their perishability. Fungal contamination was evaluated after plating on selective media with a total of 561 fungal isolates identified, ranging from 18 in tomato and 218 in

baobab leaves. Baobab leaves, followed by hot chilli and okra showed high incidence of fungal contamination compared to the other dried vegetables, while shelled melon seeds, onion leaves and dried tomato had lower levels of fungal contamination. Species of *Aspergillus* were dominant on all marketed dried vegetables irrespective of country. Mycotoxin assessment by Reversed-Phase High Performance Liquid Chromatography showed that only okra and hot chilli were naturally contaminated with aflatoxin B1 and aflatoxin B2, at concentrations of 6.0 [$\mu\text{g}/\text{kg}$] on okra and 3.2 [$\mu\text{g}/\text{kg}$] on hot pepper. This is the first time that mycotoxigenic fungi and resultant toxins were found on dried vegetable products sampled from African markets. Previous reports have mostly highlighted the risk of mycotoxin exposure from staple crops in Africa, but such risks now need to be evaluated for other products such as dried vegetables.

Keywords: dried vegetable products; natural contamination; fungi; mycotoxins; West Africa

Catherine W. Rico, Gui-Ran Kim, Jae-Jun Ahn, Hyun-Ku Kim, Masakazu Furuta, Joong-Ho Kwon, The comparative effect of steaming and irradiation on the physicochemical and microbiological properties of dried red pepper (*Capsicum annuum* L.), Food Chemistry, In Press, Accepted Manuscript, Available online 7 August 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.08.005.

(<http://www.sciencedirect.com/science/article/B6T6R-4WY6K30-2/2/859cd588044093009da12d4250e20702>)

Abstract:

The comparative effects of steaming and gamma irradiation on the physicochemical and microbiological properties of dried red pepper (*Capsicum annuum* L.) were investigated during post-treatment storage at refrigerated ($4\pm 2^\circ\text{C}$) and room ($20\pm 2^\circ\text{C}$) (RT) temperatures for 6 months. Whole dried peppers were either steamed, hot air-dried and processed into powder form or powderised, packed in PE bags and gamma-irradiated at 10 kGy. The commercial steam treatment led to a 1- to 2-log reduction in the initial microbial load (10^6 CFU/g) accompanied with changes in spice as indicated by low Hunter's colour values and reduced sensory scores in RT-stored samples. However, irradiation resulted in a 5-log reduction with minimal effects on the physicochemical properties, except for the decreased content of capsanthin in the irradiated samples. The functional components of spices were not apparently affected by both treatments. The refrigerated storage following irradiation is recommendable for powdered red pepper to minimise physicochemical changes.

Keywords: Red pepper; Steaming; Irradiation; Storage; Quality

Masaru Sakamoto, Reiko Tomita, Kappei Kobayashi, A protein containing an XYPPX repeat and a C2 domain is associated with virally induced hypersensitive cell death in plants, FEBS Letters, Volume 583, Issue 15, 6 August 2009, Pages 2552-2556, ISSN 0014-5793, DOI: 10.1016/j.febslet.2009.07.020.

(<http://www.sciencedirect.com/science/article/B6T36-4WSY4GH-3/2/02245748997b4a52df89d1ca3394>)

Abstract:

In this study, we characterized a *Capsicum* hypersensitive response (HR)-associated gene, SS52, which encodes a protein that contains an N-terminal C2 domain and a C-terminal XYPPX repeat. Expression analyses revealed that SS52 and its homologue in *Arabidopsis* were induced by infection with incompatible viruses, indicating the conserved function of this gene. SS52 was not induced by treatment with defense-related hormones, but was induced by abiotic stresses, including wounding. Overexpression of SS52 in tobacco plants suppressed the spread of HR cell death and restricted the spread of an incompatible virus from local lesions. Collectively, the results suggest that SS52 negatively regulates plant HR cell death.

Keywords: Abiotic stress; C2 domain; HR cell death; XYPPX repeat; *Capsicum*

M.I. Vieira, J.P. de Melo-Abreu, M.E. Ferreira, A.A. Monteiro, Dry matter and area partitioning, radiation interception and radiation-use efficiency in open-field bell pepper, *Scientia Horticulturae*, Volume 121, Issue 4, 4 August 2009, Pages 404-409, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.03.007.

(<http://www.sciencedirect.com/science/article/B6TC3-4W6N2TX-1/2/8348df690dad84e9107f48663187bc15>)

Abstract:

The objective of this study was to determine some key components of a model for bell pepper growth and yield under non-limiting water and nutrient conditions using data from field trials conducted in Southern Portugal. DM partitioning, at least before fruiting, and specific area indices for leaves, stems and fruits were conservative in relation to normalized thermal time. The interception model had a good performance. It was based on the exponential extinction of radiation on the area covered by the plants, the ellipsoidal leaf-angle distribution model (X-parameter 2.48 and 2.89), and absorptivities of the leaves for PAR and NIR, 0.8 and 0.2, respectively. Radiation-use efficiency (RUE) was determined and presented in four different forms. RUE did not change substantially throughout the growing season. RUE of irrigated pepper crops grown in our experiments was around 1.6 g MJ⁻¹ of intercepted PAR. The models and parameter values presented in this study may be useful to simulate the development and growth of field-grown pepper crop.

Keywords: *Capsicum annuum* L.; Dry matter distribution; Specific leaf area; Extinction of radiation; Light-use efficiency; Photosynthetic efficiency; Model

R. Anil Kumar, K. Vasu, K.T. Velayudhan, V. Ramachandran, R. Suseela Bhai, G. Unnikrishnan, Translocation and distribution of ³²P labelled potassium phosphonate in black pepper (*Piper nigrum* L), *Crop Protection*, In Press, Corrected Proof, Available online 3 August 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.06.016.

(<http://www.sciencedirect.com/science/article/B6T5T-4WXBTKR-1/2/6c2e2653215c8c4076d4b870202622ba>)

Abstract:

The aim of this project was to study the translocation of potassium phosphonate within black pepper (*Piper nigrum* L.) and to elucidate the amount of chemical distributed through out the plant based on a tracer technique. Potassium phosphonate is a potential fungicide used against the pathogen *Phytophthora capsici*, which causes *Phytophthora* foot rot (Quick wilt) in the plant. Reports indicate that translocation of phosphonate is ambimobile, but there is no visual evidence for this. Potassium phosphonate labelled with radioactive phosphorus, ³²P, was applied to the black pepper vine and bush pepper and its translocation to different parts of the pepper plant was studied using an autoradiography technique. The chemical which migrated to different parts of the plant was quantitatively estimated by measuring ³²P on a liquid scintillation spectrometer following Cerenkov counting. Only traces of the chemical were lost to the soil through root systems. These results indicate that foliar sprays of potassium phosphonate to pepper could be a viable method of application for soil and foliar pathogens.

Keywords: Autoradiography; Black pepper; Liquid scintillation counting; Phosphorus-32; Potassium phosphonate; *Phytophthora capsici*

Juan-xu LIU, Yi-xun YU, Jian-jun LEI, Guo-ju CHEN, Bi-hao CAO, Study on Agrobacterium-Mediated Transformation of Pepper with Barnase and Cre Gene, *Agricultural Sciences in China*, Volume 8, Issue 8, August 2009, Pages 947-955, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60299-0.

(<http://www.sciencedirect.com/science/article/B82XG-4X260DR-8/2/4a9c1f20fcf3e3848798b6f4149048a8>)

Abstract:

This study was designed to control plant fertility by cell lethal gene Barnase expressing at specific developmental stage and in specific tissue of male organ under the control of Cre/lox system, for heterosis breeding of chili pepper (*Capsicum annuum* L.). Chili pepper inbred lines (A, D, E, and I) were transformed with Cre gene and Barnase gene situated between loxp, separately, by means of *Agrobacterium* co-culture. In this study, we had established a high transformation system by extensive study of affecting factors including genotype, selection of marker, and lethal dose. Cotyledon with petiole from 9-11-day-old seeding was pre-cultured on media MR [MB (MS mineral +vitamine B5)+BA (6-Benzyladenine) 5.0 mg L⁻¹ + IAA (indoleacetic acid) 1.0 mg L⁻¹ + GA3 (gibberellic acid) 1.0 mg L⁻¹ + sucrose 3% + agar 6.5 g L⁻¹] for 2 d. The explants were infected by *Agrobacterium tumefaciens* when their OD600 (optical density at 600 nm) reached 0.6-0.9. After co-cultured for 4-5 d on media MC [MB + BA 5.0 mg L⁻¹ + IAA 1.0 mg L⁻¹ + GA3 1.0 mg L⁻¹ + sucrose 3% + agar 6.5 g L⁻¹ + AS (acetosyringone) 200 [mu]mol L⁻¹], these cotyledons with petiole were cultured on selective differentiation medium in the media MT [MB medium supplemented with BA [5.0 mg L⁻¹ + IAA 1.0 mg L⁻¹ + GA3 1.0 mg L⁻¹ + AgNO3 5.0 mg L⁻¹ + CW (coconut water) 5% + Km (kanamycin) 65 mg L⁻¹ + Cb (carbenicillin) 500 mg L⁻¹ + 3% sucrose + agar 6.5 g L⁻¹]. The Kmr (kanamycin resistant) bud rosettes were elongated on selective elongation medium and rooted on rooting medium. PCR and Southern blotting analysis of Kmr plantlet indicated that the foreign genes had been integrated into the genome of pepper. The transgenic plants with Cre gene developed well, blossomed out, and set fruit normally. The transgenic plants with Barnase gene grew well with normal appearance of flower, but they showed different fertility from complete sterility, partial sterility to complete fertility, and similar results were obtained from in vitro pollen germination experiments.

Keywords: pepper (*Capsicum annuum* L.); genetic transformation; male sterile; TA29-Barnase; Cre/lox system

Hossein Madadi, Annie Enkegaard, Henrik F. Brodsgaard, Aziz Kharrazi-Pakdel, Ahmad Ashouri, Jafar Mohaghegh-Neishabouri, Interactions between *Orius albidipennis* (Heteroptera: Anthocoridae) and *Neoseiulus cucumeris* (Acari: Phytoseiidae): Effects of host plants under microcosm condition, *Biological Control*, Volume 50, Issue 2, August 2009, Pages 137-142, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.03.015.

(<http://www.sciencedirect.com/science/article/B6WBP-4W0WJ6N-2/2/9900a4466fbc61b458400d3208c68987>)

Abstract:

In three-dimensional microcosm set-ups we explored the influence of host plant traits of cucumber, eggplant and sweet pepper on the interactions between minute pirate bugs, *Orius albidipennis* (Reuter) and predatory mites, *Neoseiulus cucumeris* (Oudemans) in the presence of extraguild prey, *Thrips tabaci* Lindeman. The host plant influenced the population development of thrips with sweet pepper being most inferior and cucumber being the best for egg laying and/or juvenile development and survival. No host plant effect was found on the survival of adult thrips. The host plant also influenced the biocontrol efficiency of *O. albidipennis* which, on its own, significantly reduced thrips populations on sweet pepper and eggplant, but not on cucumber. A similar host plant effect was not seen for *N. cucumeris* which, on its own, was unable to reduce thrips populations on either of the host plants. No additive or synergistic effect between the two predators was observed. Finally, the host plant influenced the interactions between the two predators--when both predators were present, a significant reduction in the density of adult mites was observed on cucumber and sweet pepper, presumably a result of intraguild predation from *O. albidipennis*. No influence of *O. albidipennis* on the predatory mites was found on eggplant and on none of the host plants was a negative influence observed on mite eggs or nymphs. The results point to the importance of including host plant aspects in studies aimed at evaluations of possible interactions between beneficials intended for simultaneous applications for biocontrol.

Keywords: Intraguild predation; Onion thrips; Orius albidipennis; Neoseiulus cucumeris; Thrips tabaci; Thripidae; Pirate bugs; Predators; Tritrophic interactions; Bottom-up effects

Rachel E. Down, Andrew G.S. Cuthbertson, James J. Mathers, Keith F.A. Walters, Dissemination of the entomopathogenic fungi, *Lecanicillium longisporum* and *L. muscarium*, by the predatory bug, *Orius laevigatus*, to provide concurrent control of *Myzus persicae*, *Frankliniella occidentalis* and *Bemisia tabaci*, *Biological Control*, Volume 50, Issue 2, August 2009, Pages 172-178, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.03.010.

(<http://www.sciencedirect.com/science/article/B6WBP-4VYP94Y-2/2/7f1e059ebe791ca6c46040dc8647663b>)

Abstract:

The simultaneous use of two biocontrol agents for the concurrent control of three pest species was investigated. Leaf disc bioassays were conducted to establish a suitable method (surface dosing) for the dissemination of an entomopathogenic fungus (*Lecanicillium longisporum* or *L. muscarium*) by the predatory bug *Orius laevigatus*. Predatory bugs surface dosed with fungal conidia successfully disseminated conidia onto sweet pepper leaf discs. Most (98%) of the peach-potato aphids (*Myzus persicae*) that were subsequently maintained on the leaf discs became infected with the pathogen and died within 5 days. However, fungal conidia disseminated by surface dosed predatory bugs did not infect and kill the western flower thrips (*Frankliniella occidentalis*) or the sweetpotato whitefly (*Bemisia tabaci*). Plant trials were performed to assess the efficacy of using predatory bugs surface dosed with *L. longisporum* as an effective means of controlling *M. persicae* and *F. occidentalis* populations. The results indicated that the number of aphids and thrips were significantly lower (66% and 95%, respectively) on the plants where surface dosed predatory bugs were used as a control measure compared with plants where the fungal pathogen alone was used and were statistically comparable to the numbers on plants where the predatory bug alone was used. The potential for using this dual approach is discussed in the context of improved biological control of glasshouse pests.

Keywords: Entomopathogenic fungi; Predatory bug; Plant-sucking insects; Greenhouse pests; *Lecanicillium* spp.; Dissemination

Y. Soysal, Z. Ayhan, O. Esturk, M.F. Arıkan, Intermittent microwave-convective drying of red pepper: Drying kinetics, physical (colour and texture) and sensory quality, *Biosystems Engineering*, Volume 103, Issue 4, August 2009, Pages 455-463, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2009.05.010.

(<http://www.sciencedirect.com/science/article/B6WXV-4WNPDMC-6/2/a10a1c9d703e13a3aac35f812eed71c7>)

Abstract:

In this research, effectiveness of various microwave-convective drying treatments were compared to convective air drying and commercial belt drying to establish the most favourable drying condition in terms of drying kinetics and dried product quality. Quality parameters were colour (L^* , a^* , b^* coordinates), textural characteristics (hardness), and sensory properties (visual appearance, colour, texture and overall acceptance). The microwave drying treatments were done both in the intermittent and continuous modes at two different microwave output powers (597.20 and 697.87 W) using two identical microwave-convective dryers.

Overall, the continuous microwave-convective drying had the lowest drying time among the drying treatments, but it resulted in poor quality product while intermittent microwave-convective drying gave good product quality comparable to convective air drying and commercial belt drying. The intermittent microwave-convective drying conducted at lower drying air temperature and microwave power level with relatively long power-off time resulted in a more stable and gentle drying process concerning dried product quality. Based on the results of this study, the intermittent microwave-convective drying at 35 [degree sign]C with a pulse ratio of 3.0 at 597.20 W provided

considerable savings in drying time when compared to convective air drying and should be the preferred method of drying to produce high quality product with better physical (colour and texture) and sensory attributes.

Czeslaw Slusarski, Stanislaw J. Pietr, Combined application of dazomet and *Trichoderma asperellum* as an efficient alternative to methyl bromide in controlling the soil-borne disease complex of bell pepper, *Crop Protection*, Volume 28, Issue 8, August 2009, Pages 668-674, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.03.016.

(<http://www.sciencedirect.com/science/article/B6T5T-4W3P02J-2/2/7e86179481db1b9495ad6f1fbf8d5dbf>)

Abstract:

Bell pepper (*Capsicum annuum*) is an important greenhouse crop in central Europe. However, due to its monoculture cultivation soil-borne pathogens, especially *Verticillium dahliae*, are a significant yield-limiting factor. Apart from treatment with methyl bromide (MB) phytopathogens can be controlled by several alternative soil treatments. However, a universal control agent such as methyl bromide does not exist and there is crop specificity with respect to efficient treatments. Thus, the efficacy of chemical (dazomet), biological (*Trichoderma asperellum*) and combination of both treatments in the control of soil-borne pathogens of bell pepper in comparison with MB was examined. In 3 consecutive years six demonstration trials were conducted on commercial farms in Poland. In five of the six trials, the application of MB resulted in the best control of *Verticillium* wilt. However, there were no differences between the AUDPC values of MB and dazomet (DZ) alone or DZ combined with *T. asperellum* B35. Among tested alternatives, the most consistent effect on the yield, as well as on control of the root rot disease complex and *Verticillium* wilt, was observed for treatment with DZ in combination with *Trichoderma asperellum*. The average increase in yield induced by this treatment (40.1%) was similar to that of MB (41.4%). There was a correlation ($r = 0.790$) between *Verticillium* wilt disease severity and root rot symptom scores at the end of the vegetation season. *Verticillium* wilt reduced fruit yield to a larger extent than the root rot associated with a complex of pathogenic soil-borne fungi (*Colletotrichum coccodes*, *Fusarium* spp.). Dazomet, combined with *T. asperellum*, provided the highest net marginal return and a higher return on investment than MB. The efficacy of *T. asperellum* applied alone was too variable (coefficient of variation 76%) to be accepted by the pepper growers.

Keywords: Dazomet; Economic efficiency; Integrated control; Root diseases; *Verticillium* wilt

Y.M. Choi, Y.Y. Bae, K.H. Kim, B.C. Kim, M.S. Rhee, Effects of supercritical carbon dioxide treatment against generic *Escherichia coli*, *Listeria monocytogenes*, *Salmonella typhimurium*, and *E. coli* O157:H7 in marinades and marinated pork, *Meat Science*, Volume 82, Issue 4, August 2009, Pages 419-424, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2009.02.016.

(<http://www.sciencedirect.com/science/article/B6T9G-4VRP2B6-1/2/f900ceb44e9a3d6fb27240766b5e8740>)

Abstract:

This study was conducted to evaluate the effects of supercritical carbon dioxide (SC-CO₂) treatment on soy sauce and hot-pepper paste marinades, as well as in marinated pork products, for the inhibition of generic *Escherichia coli*, *Listeria monocytogenes*, *Salmonella typhimurium*, and *E. coli* O157:H7. SC-CO₂ was more effective at destroying foodborne pathogens when it was applied to the marinades than the marinated products. SC-CO₂ treatment at 14 MPa and 45 [degree sign]C for 40 min resulted in a greater reduction in soy sauce (2.52-3.47 log CFU/cm²) than in hot-pepper paste marinade (2.12-2.72 log CFU/cm²). In the case of the marinated pork, when SC-CO₂ was applied at 14 MPa and 45 [degree sign]C for 40 min, the reduction levels of *L. monocytogenes* were 2.49 and 1.92 log CFU/cm² in soy sauce and hot-pepper paste marinated pork, respectively. The results should be useful in the meat industry to help increase microbial safety and assure the microbial stability of marinades and marinated products.

Keywords: Marinade; Marinated pork; Supercritical carbon dioxide; Foodborne pathogenic bacteria

M.W.M. Elwan, M.A.M. El-Hamahmy, Improved productivity and quality associated with salicylic acid application in greenhouse pepper, *Scientia Horticulturae*, In Press, Corrected Proof, Available online 29 July 2009, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.07.001.

(<http://www.sciencedirect.com/science/article/B6TC3-4WW7NVT-1/2/e39bc308322b088325b94e0a01c2afb0>)

Abstract:

Previous studies have shown that salicylic acid (SA) plays a role in the response of plants to diverse conditions. Therefore, a factorial experiment block design was conducted to investigate the effects of foliar spray of salicylic acid (10⁻⁶ and 10⁻⁴ M) on fruit productivity and quality of pepper grown in a moderately salt-stressed greenhouse. SA application at low concentration (10⁻⁶ M) positively increased the foliage fresh and dry weight, fruit number, average fruit weight, fruit yield, vitamin C, carotenoids content, cuticle thickness of fruit pericarp and translocation of sugars from leaves to fruits. It was found that SA treatment (10⁻⁶ M) caused a reduction in peroxidase and increasing of invertase activities of pepper leaves and fruits. According to these results it is expected that, SA treatment regulated sugar contents (translocation from source to sink) and antioxidants and thus reduced stress-induced inhibition of plant growth.

Keywords: Pepper; Greenhouse; Salicylic acid; Fruit productivity and quality

Ahmet Korkmaz, Yakup Korkmaz, Ali Riza Demirkiran, Enhancing chilling stress tolerance of pepper seedlings by exogenous application of 5-aminolevulinic acid, *Environmental and Experimental Botany*, In Press, Accepted Manuscript, Available online 28 July 2009, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.07.009.

(<http://www.sciencedirect.com/science/article/B6T66-4WW2SKV-2/2/a91229802898ff5012f4b455ec8d0fb9>)

Abstract:

In this study, the possibility of enhancing chilling stress tolerance of pepper (*Capsicum annuum* L.) during early growth stages by exogenous application of 5-aminolevulinic acid (ALA) was investigated. To improve chilling tolerance during seedling stage, ALA was applied in various concentrations (0, 1, 10, 25 and 50 ppm) through three different methods (seed soaking, foliar spray, or soil drench). After ALA applications, the plants were subjected to chilling stress at 3 [degree sign]C for 2 days. Although all ALA application methods improved chilling stress tolerance in pepper seedlings, seed soaking and foliar spray provided better protection against chilling stress compared to soil drench. Exogenous application of ALA provided significant protection against chilling stress compared to non-ALA-treated seedlings, significantly enhancing plant mass and chlorophyll, sucrose, and proline contents. ALA pre-treatment also increased relative water content, stomatal conductance and superoxide dismutase (SOD) enzyme activity and reduced membrane permeability. Of the ALA concentrations, the highest chilling tolerance was obtained with 25 ppm ALA pre-treatment. Results indicate that ALA which is considered as an endogenous plant growth regulator could be used effectively to protect pepper seedlings from damaging effects of chilling stress without any adverse effect on seedling growth.

Keywords: Antioxidant enzymes; *Capsicum annuum*; Chilling stress tolerance; Electrolyte leakage; Gas exchange; Plant growth

T. Komprda, P. Sladkova, V. Dohnal, Biogenic amine content in dry fermented sausages as influenced by a producer, spice mix, starter culture, sausage diameter and time of ripening, *Meat Science*, In Press, Corrected Proof, Available online 8 July 2009, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2009.07.002.

(<http://www.sciencedirect.com/science/article/B6T9G-4WPTXVJ-1/2/30f55cb00d4f85fc1b446826f965ce65>)

Abstract:

Sixteen types of dry fermented sausages were commercially produced as combinations of two producers (designated K and R), two starter cultures (*Pediococcus pentosaceus*, C; *Lactobacillus curvatus* + *Staphylococcus carnosus*, F), two spicing mixtures (H; P) and two casing diameters (4.5 cm, T; 7 cm, W), and were sampled at days zero, 14, 28 (end of ripening), 49, 70, 91 and 112 (samples were stored at 15 [degree sign]C and relative humidity of 70% between days 28 and 112). Tyramine and putrescine content (Y, mg kg⁻¹) increased (P < 0.01) with increasing time of ripening/storage (X, days): $Y = 52.0 + 5.19X - 0.0275X^2$ (R² = 0.60) and $Y = 37.0 + 3.45X - 0.0192X^2$ (R² = 0.23), respectively. Smaller diameter (T), spice mix containing red pepper (P) and starter culture C decreased (P < 0.05) both tyramine and putrescine content in the sausages as compared to the W, H and F counterparts, respectively; content of both amines was lower (P < 0.05) in the K-sausages than in the R-sausages. Tyramine content in the sausages at the time interval 28 days of ripening + 21 days of storage was in the range from 170 (KHCU sausage combination) to 382 (RHFS) mg kg⁻¹.

Keywords: Tyramine; Putrescine; Polyamines; Food safety; Lactic acid bacteria; Enterococci

Boo-Ja Lee, Sung-Kyu Kim, Soo Bok Choi, Jungdon Bae, Ki-Jeong Kim, Young-Jin Kim, Kyung-Hee Paek, Pathogen-inducible CaUGT1 is involved in resistance response against TMV infection by controlling salicylic acid accumulation, *FEBS Letters*, Volume 583, Issue 13, 7 July 2009, Pages 2315-2320, ISSN 0014-5793, DOI: 10.1016/j.febslet.2009.06.028.

(<http://www.sciencedirect.com/science/article/B6T36-4WK43WG-3/2/d03af9f587d46ce313d76f239f555405>)

Abstract:

Capsicum annuum L. Bugang exhibits a hypersensitive response against Tobacco mosaic virus (TMV) P0 infection. The *C. annuum* UDP-glucosyltransferase 1 (CaUGT1) gene was upregulated during resistance response to TMV and by salicylic acid, ethephon, methyl viologen, and sodium nitroprusside treatment. When the gene was downregulated by virus-induced gene silencing, a delayed HR was observed. In addition, free and total SA concentrations in the CaUGT1-downregulated hot pepper were decreased by 52% and 48% compared to that of the control plants, respectively. This suggested that the CaUGT1 gene was involved in resistance response against TMV infection by controlling the accumulation of SA.

Keywords: Salicylic acid; Hot pepper UDP-glucosyltransferase; Tobacco mosaic virus

A. Valdez-Fragoso, C.M. Saenz-Hernandez, J. Welti-Chanes, H. Mujica-Paz, Cherry pepper pickling: Mass transport and firmness parameters and stability indicators, *Journal of Food Engineering*, In Press, Corrected Proof, Available online 23 June 2009, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2009.06.032.

(<http://www.sciencedirect.com/science/article/B6T8J-4WKK1F3-7/2/30f17827e9a5640919398778238fcb0>)

Abstract:

Mass transfer between whole red cherry pepper and pickling solution, as well as firmness and stability indicators of the pickled product, were studied. Experiments were conducted at atmospheric pressure with an initial vacuum pulse (50 cm Hg for 3 min) (PV) or without a vacuum pulse (PA), in sodium chloride (10-15 g/100 g) and acetic acid (2.3-3.5 g/100 g) solutions, during 0.3-30 days. Statistically significant equations were obtained (p [less-than-or-equals, slant] 0.05) to describe the pickling and firmness parameters of cherry pepper, and stability indicators. PA treatments mainly caused pepper dehydration, but PV promoted water and solutes gain. Firmness values were slightly lower in PV than in PA treatments. Vacuum pulse pickling allowed achieving lower pH and aw values (pH = 2.97, aw = 0.964) than pickling without the initial vacuum pulse (pH = 3.33, aw = 0.972). PV treatments resulted in weight gain of cherry peppers and succeeded in reducing pH and aw to levels that would enhance pepper stability.

Keywords: Pickling; Cherry pepper; Firmness; Mass transfer parameters

M. Navratil, P. Valova, R. Fialova, P. Lauterer, D. Safarova, M. Stary, The incidence of stolbur disease and associated yield losses in vegetable crops in South Moravia (Czech Republic), *Crop Protection*, In Press, Corrected Proof, Available online 21 June 2009, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.05.008.

(<http://www.sciencedirect.com/science/article/B6T5T-4WK3YBS-2/2/925e0b1c6df00337ddf1107d2a118406>)

Abstract:

The study was performed at a vegetable farm from 2006 to 2008 in the intensive horticultural area of Lednice (South Moravia, Czech Republic), where a stolbur (phytoplasma) epidemic had occurred. The study showed that the incidence of stolbur disease reached 15% in both tomato (*Lycopersicon esculentum*) and pepper (*Capsicum annuum*), and up to 6.7% in celeriac (*Apium graveolens*). There were significant yield losses in the stolbur-affected plants; total yield losses were up to 60% in tomato, 93% in pepper, and 100% in celeriac. The mean yield was significantly decreased in stolbur-affected plants, compared to healthy plants (i.e. from 42.79 to 17.21 fruits per plant in tomatoes; from 10.11 to 0.74 fruits per plant in peppers). In the locality studied, it was mainly the weed plants *Convolvulus arvensis* and *Cirsium arvense* (which were frequently interspersed among the crops), which tested positive for the stolbur phytoplasma and might have provided a reservoir for the phytoplasma infection.

Keywords: Tomato; Pepper; Celeriac; Stolbur phytoplasma; Epidemiology

Wilson Castro Silva, Joao Ricardo de Souza Martins, Hellen Emilia Menezes de Souza, Horacio Heinzen, Maria Veronica Cesio, Mauricio Mato, Francine Albrecht, Joao Lucio de Azevedo, Neiva Monteiro de Barros, Toxicity of *Piper aduncum* L. (Piperales: Piperaceae) from the Amazon forest for the cattle tick *Rhipicephalus (Boophilus) microplus* (Acari: Ixodidae), *Veterinary Parasitology*, In Press, Corrected Proof, Available online 17 June 2009, ISSN 0304-4017, DOI: 10.1016/j.vetpar.2009.06.006.

(<http://www.sciencedirect.com/science/article/B6TD7-4WJBC1G-1/2/3c8f203d01876f4e45bcdf286b595f65>)

Abstract:

The mortality of 14-21-day-old *Rhipicephalus (Boophilus) microplus* larvae, and the mortality and fertility of groups of engorged adult females exposed to different concentrations of hexane, ethyl acetate and ethanol extracts of spiked pepper (*Piper aduncum*) were evaluated, using a completely randomized design with five treatment groups, two control groups, and two replicates for the larvae and five replicates for the adult females. Similar methodology was used to investigate the toxicity of the essential oil hydro-distillate (94.84% dillapiole) obtained from the *P. aduncum* crude hexane extract. The LC₅₀ of the hexane extract was 9.30 mg ml⁻¹ for larvae and the reproduction reduction ranged from 12.48% to 54.22%, while 0.1 mg/ml⁻¹ of the essential oil induced 100% mortality in larvae. Literature reports on natural products active against *R. microplus* were listed and compared with the results presented here. These results indicate that *P. aduncum* extracts, and particularly its essential oil, are potential alternative control agents for *R. microplus*.

Keywords: Cattle ticks; *Rhipicephalus (Boophilus) microplus*; *Piper aduncum*; Plants extracts

Mohammad Isbat, Naheed Zeba, Seong Ryong Kim, Choo Bong Hong, A BAX inhibitor-1 gene in *Capsicum annuum* is induced under various abiotic stresses and endows multi-tolerance in transgenic tobacco, *Journal of Plant Physiology*, In Press, Corrected Proof, Available online 13 June 2009, ISSN 0176-1617, DOI: 10.1016/j.jplph.2009.04.017.

(<http://www.sciencedirect.com/science/article/B7GJ7-4WHDHKS-1/2/260433f42e5e8f0967f8baab04c38da8>)

Abstract: Summary

Programmed cell death (PCD) is a highly conserved cellular suicide process important in developmental processes and elimination of damaged cells upon environmental stresses. Among the important regulators of PCD, much interest has been centered on BCL2-associated x protein (BAX) as the pro-PCD factor. On the other hand, BAX inhibitor-1 (BI-1) has been implicated as an anti-PCD factor that balances out the activity of BAX in the developmental processes and responses to environment. A cDNA clone coding a BI-1 gene was isolated from a cDNA library of heat-stressed hot pepper (*Capsicum annuum*) and named as CaBI-1. This gene contains an open reading frame (ORF) of 248 amino acids encoding a BI-1 protein. Genomic DNA-blot analysis for CaBI-1 suggested one or two loci in the *C. annuum* genome. Transcription of CaBI-1 was induced in response to high or low temperatures, drought, high salinity, flooding and heavy metal stresses, and ABA. We introduced the ORF of CaBI-1 under the control of the CaMV 35S promoter (P35S) into tobacco (*Nicotiana tabacum* cv. Wisconsin 38) genome by *Agrobacterium*-mediated transformation. The P35S:CaBI-1 transgenic plants displayed markedly improved tolerance to high temperature, water deficit, and high salinity in comparison to the control plants. The results indicate that CaBI-1 is a BI-1 gene of which expression induced under various abiotic stresses and endows tolerance to several types of environmental stresses.

Keywords: Abiotic stresses; BAX inhibitor-1; *Capsicum annuum*; Transgenic tobacco

Ameh E.J. Okwori, Pilar Ortiz Martinez, Maria Fredriksson-Ahomaa, Samuel E. Agina, Hannu Korkeala, Pathogenic *Yersinia enterocolitica* 2/O:9 and *Yersinia pseudotuberculosis* 1/O:1 strains isolated from human and non-human sources in the Plateau State of Nigeria, Food Microbiology, In Press, Corrected Proof, Available online 10 June 2009, ISSN 0740-0020, DOI: 10.1016/j.fm.2009.06.001.

(<http://www.sciencedirect.com/science/article/B6WFP-4WGVPRV-1/2/3c8f190e90a64d061cf07bc783f6b49f>)

Abstract:

Foodborne yersiniosis, caused by enteropathogenic *Yersinia*, especially *Yersinia enterocolitica*, is an important cause of diarrhea in developed countries, especially in temperate zones. Since studies concerning the presence of enteropathogenic *Yersinia* in humans and foods are rare in developing countries and tropical areas, human and non-human samples were studied in Plateau state of Nigeria to obtain information on the epidemiology of *Y. enterocolitica* and *Yersinia pseudotuberculosis*. Surprisingly, ail-positive *Y. enterocolitica* and inv-positive *Y. pseudotuberculosis* were isolated in Plateau state of Nigeria from several samples of human and non-human origin. Bioserotype 1/O:1 was the only *Y. pseudotuberculosis* type found. *Y. enterocolitica* belonging to bioserotype 2/O:9 was the dominating type found in most samples. Bioserotype 4/O:3 was isolated only from one pig and one sheep. Using PFGE, 5 genotypes were obtained among 45 *Y. enterocolitica* 2/O:9 strains with NotI, Apal and XhoI enzymes and 3 among 20 *Y. pseudotuberculosis* 1/O:1 strains with NotI and SpeI enzymes. All human *Y. pseudotuberculosis* 1/O:1 strains were indistinguishable from pig, sheep or food strains. The dominating genotype of *Y. enterocolitica* 2/O:9 strains among humans was also found among strains isolated from pig, fermented cow milk and traditional intestine pepper soap samples.

Keywords: *Yersinia enterocolitica*; *Yersinia pseudotuberculosis*; Yersiniosis; Animal; Food; Typing

Cengiz Kaya, Muhammed Ashraf, Osman Sonmez, Salih Aydemir, Atilla Levent Tuna, Mehmet Ali Cullu, The influence of arbuscular mycorrhizal colonisation on key growth parameters and fruit yield of pepper plants grown at high salinity, *Scientia Horticulturae*, Volume 121, Issue 1, 2 June 2009, Pages 1-6, ISSN 0304-4238, DOI: 10.1016/j.scienta.2009.01.001.

(<http://www.sciencedirect.com/science/article/B6TC3-4VHS7T8-1/2/e0cce5da04049dc875e0b0a5fcd8a4db>)

Abstract:

This study investigated the effects of arbuscular mycorrhizal (AM) colonisation by *Glomus clarum* on growth and fruit yield of pepper (*Capsicum annum* cv. 11B 14) grown at high salinity. The experiment was conducted in pots containing a mixture of perlite and sand (1:1, v/v) under glasshouse conditions. Treatments were: (1) no added NaCl without arbuscular mycorrhizae (NS-AM), (2) no added NaCl with arbuscular mycorrhizae (NS + AM), (3) added 50 mM NaCl without arbuscular mycorrhizae (S1-AM) and (4) added 100 mM NaCl without arbuscular mycorrhizae (S2-AM), (5) added 50 mM NaCl with arbuscular mycorrhizae (S1 + AM) and (4) added 100 mM NaCl with arbuscular mycorrhizae (S2 + AM). The NaCl treatments reduced pepper shoot and root dry matter, and fruit yield compared with the non-saline treatments. The concentrations of N, P and K, in the leaves were significantly reduced by salinity stress, however, mycorrhizal colonisation of the salt-stressed plants restored leaf nutrient concentrations to the levels in non-stressed plants in most cases. AM inoculation improved pepper growth under salt or saltless conditions and reduced cell membrane leakage.

Keywords: Salinity; Mycorrhizae; Inorganic nutrients; Membrane permeability

A.F. Martinou, P.G. Milonas, D.J. Wright, Patch residence decisions made by *Aphidius colemani* in the presence of a facultative predator, *Biological Control*, Volume 49, Issue 3, June 2009, Pages 234-238, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.03.004.

(<http://www.sciencedirect.com/science/article/B6WBP-4VVGKM6-3/2/000fd23b8c1abf7d7daa08aadf9a1338>)

Abstract:

One of the key questions in ecology is how animals optimally allocate their time in an environment with patchily distributed resources and competing organisms. Here we investigate the effects that an aphid predator, *Macrolophus caliginosus* (Wagner) (Hemiptera: Miridae), has on the searching behavior and the patch residence decisions of an aphid parasitoid, *Aphidius colemani* (Viereck) (Hymenoptera: Aphidiidae). A computer programme was designed that allowed the recording and saving of direct observations. The time allocated to different activities by a female parasitoid wasp in the presence or absence of the predator *M. caliginosus* was investigated. The experiments were conducted under controlled environment conditions using leaves of sweet pepper, *Capsicum annum* L. (Solanaceae) and *Myzus persicae* (Sulzer) (Hemiptera: Aphididae) as the host plant-prey species system. The parasitoid spent significantly less time on 'secondary' activities, such as preening and resting, when the predator was present. Survival analysis showed that the parasitoid had a higher patch-leaving tendency when the predator was present.

Keywords: Intraguild predation; Multitrophic; Predator; Parasitoid; Behavior; *Myzus persicae*; Time allocation

D.R. George, O.A.E. Sparagano, G. Port, E. Okello, R.S. Shiel, J.H. Guy, Repellence of plant essential oils to *Dermanyssus gallinae* and toxicity to the non-target invertebrate *Tenebrio molitor*, *Veterinary Parasitology*, Volume 162, Issues 1-2, 26 May 2009, Pages 129-134, ISSN 0304-4017, DOI: 10.1016/j.vetpar.2009.02.009.

(<http://www.sciencedirect.com/science/article/B6TD7-4VKP44S-2/2/374041847c415eec91f9e9530b063fd7>)

Abstract:

With changes in legislation and consumer demand, alternatives to synthetic acaricides to manage the poultry red mite *Dermanyssus gallinae* (De Geer) in laying hen flocks are increasingly needed. These mites may cause losses in egg production, anaemia and even death of hens. It may be possible to use plant-derived products as *D. gallinae* repellents, especially if such products have a minimal impact on non-target organisms. An experiment was conducted with *D. gallinae* to assess the repellence of a range of plant essential oils, previously found to be of varying toxicity (relatively highly toxic to non-toxic) to this pest. Experiments were also undertaken to assess the toxicity of these products to mealworm beetles (*Tenebrio molitor* L.), a non-target invertebrate typical of

poultry production systems. Results showed that all seven essential oils tested (manuka, thyme, palmarosa, caraway, spearmint, black pepper and juniper leaf) were repellent to *D. gallinae* at 0.14 mg oil/cm³ (initial concentration) during the first 2 days of study. Thyme essential oil appeared to be the most effective, where repellence lasted until the end of the study period (13 days). At the same concentration toxicity to *T. molitor* differed, with essential oils of palmarosa and manuka being no more toxic to adult beetles than the control. There was neither a significant association between the rank toxicity and repellence of oils to *D. gallinae*, nor the toxicity of oils to *D. gallinae* (as previously determined) and *T. molitor*.

Keywords: Essential oil; Repellent; *Dermanyssus gallinae*; Toxicity; Non-target; *Tenebrio molitor*

Federica Menichini, Rosa Tundis, Marco Bonesi, Monica R. Loizzo, Filomena Conforti, Giancarlo Statti, Bruno De Cindio, Peter J. Houghton, Francesco Menichini, The influence of fruit ripening on the phytochemical content and biological activity of *Capsicum chinense* Jacq. cv Habanero, Food Chemistry, Volume 114, Issue 2, 15 May 2009, Pages 553-560, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.086.

(<http://www.sciencedirect.com/science/article/B6T6R-4TK92KM-4/2/bd8a22c5fa6ecdd3e4d9b9e800a46584>)

Abstract:

During the past decade, it has been reported that the consumption of certain foods and spices such as pepper may have a positive effect on health. The present study evaluates the influence of fruit ripening on total phenols, flavonoids, carotenoids and capsaicinoids content and antioxidant, hypoglycaemic and anticholinesterase activities of *Capsicum chinense* Jacq. cv Habanero. The chemical investigation showed a different composition between the two stages of ripening (immature and mature). Generally, the concentration of carotenoids and capsaicinoids increased as the peppers reached maturity, whereas the concentration of phenols declined. The immature fruits showed the highest radical scavenging activity (IC₅₀ of 97.14 [μ g/ml]). On the contrary, the antioxidant activity evaluated by the [β]-carotene bleaching test showed a significant activity for mature peppers (IC₅₀ value of 4.57 [μ g/ml] after 30 min of incubation). Mature peppers inhibited [α]-amylase with an IC₅₀ of 130.67 [μ g/ml]. The lipophilic fractions of both mature and immature peppers exhibited an interesting and selective inhibitory activity against [α]-amylase with IC₅₀ values of 29.58 and 9.88 [μ g/ml], respectively. Both total extracts of mature and immature peppers inhibited butyrylcholinesterase selectively. The obtained results underline the potential health benefits as a result of consuming *C. chinense* Habanero and suggest that it could be used as new valuable flavour with functional properties for food or nutraceutical products on the basis of the high content of phytochemicals and found biological properties.

Keywords: *Capsicum chinense* Jacq. cv Habanero; Phenolics; Carotenoids; Capsaicinoids; Antioxidant; Amylase inhibition; Glucosidase inhibition; Cholinesterase inhibition

Yong-Sheng Tao, Yong-qiang Liu, Hua Li, Sensory characters of Cabernet Sauvignon dry red wine from Changli County (China), Food Chemistry, Volume 114, Issue 2, 15 May 2009, Pages 565-569, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.09.087.

(<http://www.sciencedirect.com/science/article/B6T6R-4TK92KM-8/2/f19faadcbf25bd130234d23a5d01a931>)

Abstract:

The aromas of Cabernet Sauvignon red wines from eight vintages in Changli County (China) were evaluated by sensory analysis. A panel was trained to assess wine aroma by a 'Le Nez du Vin' aroma kit. Measurements of the olfactory threshold and aroma discrimination ability of panelists were taken before and after the training. Student t tests showed that training reduced the olfactory threshold and improved the aroma discrimination ability of the panelists. Sample wines were analyzed in duplicate by trained panelists over five sessions using a balanced, complete block design. Aroma description of wine was expressed by 'modified frequency (MF)'. Principal

component analysis (PCA) performed on 'MF' data showed that Cabernet Sauvignon wines from Changli County were characterized by blackcurrant, green pepper, smoke, redcurrant, cut hay, vanilla, bilberry, and cinnamon aromas.

Keywords: Cabernet Sauvignon; Red wine; Sensory analysis; Modified frequency; Changli

Maria Serrano, Pedro J. Zapata, Salvador Castillo, Fabian Guillen, Domingo Martinez-Romero, Daniel Valero, Antioxidant and nutritive constituents during sweet pepper development and ripening are enhanced by nitrophenolate treatments, *Food Chemistry*, In Press, Corrected Proof, Available online 13 May 2009, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2009.05.006.

(<http://www.sciencedirect.com/science/article/B6T6R-4W8VW6R-3/2/5643c83ed66e67fdb04db35a6ee2f078>)

Abstract:

A mix of nitrophenolates was applied to pepper plants in the irrigation system along the growth cycle. Fruits were labelled at fruit set to study the evolution of fruit growth and ripening based on fruit size and colour. In addition, at 3-day intervals, samples were taken in which the evolution of fruit weight, colour, nutritive (sugars and organic acids) and bioactive compounds (total phenolics, carotenoids, and ascorbic acid) was evaluated. Pepper fruit growth followed a simple sigmoid curve reaching its maximum size at 49 days after fruit set, although nitrophenolate treatments led to significant increases in fruit weight due to higher length, diameter, and pericarp thickness, without affecting the normal ripening process, since colour and carotenoid evolution was similar for both control and treated fruits. Glucose, fructose, ascorbic acid, citric acid, total antioxidant activity (TAA) and total phenolics increased during pepper development, and their levels were significantly enhanced by nitrophenolate applications. Thus, this treatment induced beneficial effects in terms of the improvement of fruit quality, and especially its nutritive and antioxidant constituents. Finally, it is advisable to consume peppers at the full red stage in order to achieve the maximum health-beneficial effects by consumers.

Keywords: *Capsicum annum* L.; Sweet pepper; Total antioxidant activity; Polyphenols; Sugars; Organic acids; Nitrophenolates

Simon Atsebeha, Tameru Alemu, Ferdu Azerefgne, Temesgen Addis, Population dynamics of aphids and incidence of Ethiopian Pepper Mottle Virus in the Central Rift Valley of Ethiopia, *Crop Protection*, Volume 28, Issue 5, May 2009, Pages 443-448, ISSN 0261-2194, DOI: 10.1016/j.cropro.2009.01.007.

(<http://www.sciencedirect.com/science/article/B6T5T-4VKVBPM-1/2/51feabd058147aee9a280a07ecffd7b3>)

Abstract:

Ethiopian Pepper Mottle Virus (EPMV) is an endemic and important disease of pepper in Ethiopia. Ethiopian Pepper Mottle Virus (EPMV) (genus *Potyvirus*, family *Potiviridae*) is transmitted by aphid non-persistently. However, the exact roles of aphid vectors in the field epidemiology of the virus were not known. This study was conducted to investigate the population dynamics of aphids in relation to weather and location and their role in transmitting EPMV in the Central Rift Valley of Ethiopia. Aphids were trapped weekly, at two different locations, from April 2006 to March 2007 by using yellow pan traps. The incidences of EPMV-infected plants were monitored. Data on temperature and rainfall were collected. Correlation was made between seasonal population build up of aphids and weather factors, on one hand, and with the incidence of EPMV on the other. The result revealed location and seasonal differences in population build up of aphids. More aphids were trapped at Ziway than Awassa. It was found that temperature had less influence than rainfall on seasonal flights and population build up of aphids at both locations. The incidences of EPMV were also highly correlated with the population build up aphids.

Keywords: Aphids; Awassa; Ethiopian Pepper Mottle Virus; Pepper (*Capsicum* spp.); Ziway

Maria M. Gonzalez-Real, He-Qin Liu, Alain Baille, Influence of fruit sink strength on the distribution of leaf photosynthetic traits in fruit-bearing shoots of pepper plants (*Capsicum annuum* L.), *Environmental and Experimental Botany*, Volume 66, Issue 2, May 2009, Pages 195-202, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2009.01.005.

(<http://www.sciencedirect.com/science/article/B6T66-4VK6NBJ-1/2/3b5ebdc116ffc146c55bbfc61873d55b>)

Abstract:

The influence of individual fruit sink strength and the acclimation to light on leaf photosynthetic attributes of greenhouse-grown sweet pepper (*Capsicum annuum* L., cv. Cornado) plants was investigated under Mediterranean glasshouse conditions during a winter-spring crop cycle. The photosynthetic parameters (net CO₂ assimilation, A, and stomatal conductance, gs) of source leaves close to fruits at different stages of growth were measured under controlled levels of photosynthetic photon flux density, air CO₂ concentration and leaf temperature. The light profile within the canopy was determined under the prevailing climate glasshouse conditions. Data were analysed and interpreted by distinguishing five classes of source leaves, each class corresponding to a given growth stage (i.e. sink strength) of the proximal fruit. Whatever the amount of light reaching the leaves (e.g. leaf area index of 0.8 and), those inserted near a fruit at near maximum growth rate exhibited the highest light-saturated values of A (A_m) and gs (g_{sm}) followed by leaves inserted near an open flower. Leaves inserted near a red ripe fruit or near a recently harvested fruit presented the lowest values. A similar hierarchy was observed for organic N-leaf content, expressed either on a leaf area basis or dry weight basis, while the residual (non-photosynthetic) N-leaf content was found to be rather conservative. Differences in A_m and g_{sm} among the leaf classes, and the lower attribution of photosynthetic N to leaves subjected to a low sink demand, suggest that leaf photosynthetic capacity along a fruit-bearing shoot is mainly driven by the sink demand of the most proximal fruit, and not by light acclimation.

Keywords: Leaf nitrogen content; Photosynthetic characteristics; Fruit sink strength; Light acclimation

Jae-Hyung Mah, Young Jun Kim, Han-Joon Hwang, Inhibitory effects of garlic and other spices on biogenic amine production in Myeolchi-jeot, Korean salted and fermented anchovy product, *Food Control*, Volume 20, Issue 5, May 2009, Pages 449-454, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.07.006.

(<http://www.sciencedirect.com/science/article/B6T6S-4T0MMFV-1/2/893f64d31b9f6a3c31045bb4a7fcbc1b>)

Abstract:

This study was carried out to reduce biogenic amine contents in Myeolchi-jeot, Korean salted and fermented anchovy (*Engraulis japonicus*). The effects of a variety of spices including ginger, garlic, green onion, red pepper, clove and cinnamon, on biogenic amine production were determined by HPLC. The greatest inhibitory effect on biogenic amine production was observed in the culture treated by garlic extract. In the culture, the contents of putrescine, cadaverine, histamine, tyramine and spermidine were reduced by up to 11.2%, 18.4%, 11.7%, 30.9% and 17.4%, respectively, compared to control. The other spice extracts tested showed less or no effect in reducing biogenic amine contents. In addition, the extract of garlic showed the highest antimicrobial activity against the amine producers tested. The extract of garlic at a concentration of 5% (weight basis) was finally applied to the ripening of Myeolchi-jeot in situ, and then overall production of biogenic amines in Myeolchi-jeot was found to be reduced by up to 8.7%, compared to control. Consequently, it is expected that the findings of this study might be helpful for enhancing the safety of Myeolchi-jeot.

Keywords: Biogenic amines; Korean salted and fermented fish product; Myeolchi-jeot; Spices; Garlic

P. Nisha, Rekha S. Singhal, Aniruddha B. Pandit, The degradation kinetics of flavor in black pepper (*Piper nigrum* L.), *Journal of Food Engineering*, Volume 92, Issue 1, May 2009, Pages 44-49, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2008.10.018.

(<http://www.sciencedirect.com/science/article/B6T8J-4TS6SDX-6/2/799822459f4f16e63c110417e9fbde55>)

Abstract:

Kinetics of flavor degradation in black pepper was studied at isothermal (50-120 [degree sign]C) and non-isothermal conditions. The degradation of flavor was also followed in three different cooking methods viz., open pan, pressure cooking and a newly developed slow cooker named 'EcoCooker'. Flavor was evaluated in terms of piperine for pungency and total extractable oleoresin. The degradation of flavor (piperine and total extractable oleoresin) was found to follow first order kinetics. A mathematical model has been developed using the isothermal kinetic parameters obtained to predict the flavor loss from the time-temperature data of non-isothermal heating/processing method.

Keywords: Flavor degradation; Kinetics; Black pepper; Piperine; Oleoresin; Cookers

Tae-Ho Kim, Sung Han Ok, Donghern Kim, Seok-Cheol Suh, Myung Ok Byun, Jeong Sheop Shin, Molecular characterization of a biotic and abiotic stress resistance-related gene *RelA/SpoT* homologue (*PepRSH*) from pepper, *Plant Science*, Volume 176, Issue 5, May 2009, Pages 635-642, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2009.02.004.

(<http://www.sciencedirect.com/science/article/B6TBH-4VKXBW9-1/2/188f4c245b1ce4bc89632eac1b9f76de>)

Abstract:

A gene encoding a putative guanosine 5'-diphosphate (or 5'-triphosphate) 3'-diphosphate ((p)ppGpp) synthetase, designated *PepRSH* (Pepper *RelA/SpoT* homologue), was isolated from hot peppers. *PepRSH* was found to contain five introns and six exons and a 2166-bp open reading frame encoding a protein of 721 amino acids; this protein displayed significant homology with other plant (p)ppGpp synthetases. A genomic DNA gel blot analysis revealed that the pepper genome has at least a single copy of *PepRSH*. *PepRSH* transcripts were highly accumulated in non-host resistance response-induced leaves and in leaves following induction with salicylic acid, methyl jasmonate, wounding, hydrogen peroxide, and ultraviolet-B. The expression of *PepRSH* was also influenced by abiotic stresses, such as flooding and high salinity. The deduced *PepRSH* protein has a putative chloroplast-targeting transit peptide at its N-terminus, and immunolocalization studies verified the translocation of *PepRSH* to the chloroplast. The predicted *PepRSH* protein is markedly similar to known plant and bacterial RSH proteins. Expression of a putative (p)ppGpp synthetase domain in an *Escherichia coli* single mutant (*RelA-SpoT*⁺) complemented growth of the mutant but not of an *E. coli* double mutant (*RelA-SpoT*⁻), demonstrating that *PepRSH* has (p)ppGpp synthetase activity only in the (p)ppGpp synthetase domain. Site-directed mutagenesis of the conserved histidine and aspartic acid (HD) site in the putative HD domain of *PepRSH* revealed that the histidine and aspartic acid dual sites were critical residues for the (p)ppGpp synthetase activity of *PepRSH* protein. Mutation of the HD site limited the tolerance of bacteria to both salt and osmotic stress. Our results indicate that pepper plants have a (p)ppGpp regulatory system that is similar to that of bacteria and which may transduce stress-related signals through the regulation of (p)ppGpp by *PepRSH* localized in chloroplasts.

Keywords: (p)ppGpp synthetase; Biotic and abiotic stress; Pepper

Sinan Gercek, Nuray Comlekcioglu, Murat Dikilitas, Effectiveness of water pillow irrigation method on yield and water use efficiency on hot pepper (*Capsicum annuum* L.), *Scientia Horticulturae*, Volume 120, Issue 3, 1 May 2009, Pages 325-329, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.11.028.

(<http://www.sciencedirect.com/science/article/B6TC3-4V8FFJS-3/2/4a3033dbd8eee1ca67ccba6303d3637a>)

Abstract:

A study was conducted to elucidate the effect of water pillow (WP) irrigation method, a new alternative method to furrow irrigation, on the yield and water use efficiency (WUE) of hot pepper in a semi-arid climatic condition. In this research, treatments used were: (i) WP method and its 7-day irrigation interval (WP7), (ii) WP method and its 9-day irrigation interval (WP9), (iii) WP method and its 11-day irrigation interval (WP11) and (iv) furrow irrigation (FI) method and its 5-day irrigation interval (control) were employed. Although the plants were grown under different irrigation methods and interval conditions, there were no statistical differences in yield and biomass of hot pepper plants between FI and WP treatments ($P < 0.05$). Water use efficiency (WUE) and irrigation water use efficiency (IWUE) values significantly increased with the application of WP irrigation method ($P < 0.05$). The highest WUE and IWUE values obtained from WP11 treatment in both years. As a result, we conclude that WP method is a way to save water and increase the yield in semi-arid areas where climatic conditions require repeated irrigation in the hot pepper production area.

Keywords: Water pillow irrigation method; Pepper; Water use efficiency

Manoj Kulkarni, Swati Phalke, Evaluating variability of root size system and its constitutive traits in hot pepper (*Capsicum annum* L.) under water stress, *Scientia Horticulturae*, Volume 120, Issue 2, 2 April 2009, Pages 159-166, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.10.007.

(<http://www.sciencedirect.com/science/article/B6TC3-4V4KCDS-1/2/fd33a5bd950bcc638d596cf3ebc71e25>)

Abstract:

The importance of root size system has long been recognized as crucial to cope with drought conditions. This investigation was conducted to: (i) evaluate the variability in root size system of hot pepper at maturity; (ii) estimate the effect of root size system on yield under drought conditions; and (iii) effect of water stress on xylem vessel development and total xylem cross-sectional area in roots of hot pepper cultivars. Twelve diverse hot pepper cultivars were grown in wooden boxes with two different water treatments, normal and in 50% water application as water deficit condition. Mean primary root length (PRL) showed a significant positive correlation with final fruit yield at normal as well as stressed condition. Total dry mass of fruit was reduced by 34.7% in drought treatments (DI) compared to full watered treatment (FI). At harvest, water-stressed plants had 21% lower root dry weight mass but higher root:shoot ratio other than FI. PRL, lateral root density, total xylem area per root cross-section showed a significant positive relationship with fruit yield. Also, lateral root density was higher in cultivars with higher xylem density, particularly in tolerant cultivars. Lateral root density ($r = 0.847$, $P < 0.001$) and total xylem cross-sectional area in root ($r = 0.926$, $P < 0.001$) were tightly related with total biomass production. The importance of root traits contributing to withstand drought in hot pepper is discussed.

Keywords: *Capsicum annum* L., Root length; Root weight; Xylem; Lateral root; Water stress

Rajesh Kumar, Sanjay Kumar, Neeraj Dwivedi, Sanjeet Kumar, Ashutosh Rai, Major Singh, Dasrath Singh Yadav, Mathura Rai, Validation of SCAR markers, diversity analysis of male sterile (S-) cytoplasm and isolation of an alloplasmic S-cytoplasm in *Capsicum*, *Scientia Horticulturae*, Volume 120, Issue 2, 2 April 2009, Pages 167-172, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.10.012.

(<http://www.sciencedirect.com/science/article/B6TC3-4V402P7-1/2/dd269b025ca10543a4598eef5e11d5fc>)

Abstract: Abstracts

Cytoplasmic male sterility (CMS) is increasingly being utilized for hybrid seed production of hot pepper (*Capsicum annum*). Two CMS specific sequenced characterized amplified regions

(SCARs), viz., atp6607 and coxII708 developed elsewhere were validated in an array of genotypes possessing male sterile (S-) and normal/male fertile (N-) cytoplasm and their feasible uses in CMS based pepper hybrid breeding have been elaborated. A set of eight maintainer and restorer inbreds were crossed on four CMS lines possessing two independently isolated and commercially utilized S-cytoplasm (Peterson's and Reddy's). Based on fertility restoration/maintenance reaction of 32 resulted F1s and on the presence of two SCARs (atp6607 and coxII708) in both the S-cytoplasm, it has been concluded that although two S-cytoplasm were isolated and commercially utilized independently, they are genetically same or similar. Through inter-specific hybridization between *C. chacoense* and *C. annum*, a new alloplasmic S-cytoplasm in the genus *Capsicum* has been isolated and the CMS F1 has been advanced to CMS BC1F1.

Keywords: Alloplasmic line; *Capsicum*; CMS; Inter-specific hybrid; ORF; Pepper; SCAR

Steven Arthurs, Cindy L. McKenzie, Jianjun Chen, Mahmut Dogramaci, Mary Brennan, Katherine Houben, Lance Osborne, Evaluation of *Neoseiulus cucumeris* and *Amblyseius swirskii* (Acari: Phytoseiidae) as biological control agents of chilli thrips, *Scirtothrips dorsalis* (Thysanoptera: Thripidae) on pepper, *Biological Control*, Volume 49, Issue 1, April 2009, Pages 91-96, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2009.01.002.

(<http://www.sciencedirect.com/science/article/B6WBP-4VDS8F6-1/2/68ccc704d8e8ef99d550a7a31b2b1e4f>)

Abstract:

The invasive chilli thrips, *Scirtothrips dorsalis* Hood poses a significant risk to many food and ornamental crops in the Caribbean, Florida and Texas. We evaluated two species of phytoseiid mites as predators of *S. dorsalis*. In leaf disc assays, gravid females of *Neoseiulus cucumeris* and *Amblyseius swirskii* both fed on *S. dorsalis* at statistically similar rates. Larvae were the preferred prey for both species, consuming on average 2.7/day, compared with 1.1-1.7 adults/day in no choice tests. Adult thrips were rarely consumed in subsequent choice tests when larvae were also present. Mite fecundity was statistically similar for both species feeding on thrips larvae ([approximate]1.3 eggs/day) but significantly less for *A. swirskii* restricted to a diet of adult thrips (0.5 eggs/day). In greenhouse tests with infested pepper plants, both mite species established and reduced thrips numbers significantly over 28 days following a single release (30 mites/plant). However, *A. swirskii* was the more effective predator, consistently maintaining thrips below 1 per terminal leaf, compared with up to 36 for *N. cucumeris* and 70 in control treatments. Similar results were obtained for plants maintained outside in the landscape, where *A. swirskii* continued to reproduce and control thrips up to 63 days post release.

Keywords: Chilli thrips; Predatory mite; *Capsicum annum*; Inoculative biological control

D. Isik, E. Kaya, M. Ngouajio, H. Mennan, Weed suppression in organic pepper (*Capsicum annum* L.) with winter cover crops, *Crop Protection*, Volume 28, Issue 4, April 2009, Pages 356-363, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.12.002.

(<http://www.sciencedirect.com/science/article/B6T5T-4V7S8PJ-1/2/22f929b1e2fbb73c2aceca22059b319>)

Abstract:

Weed control is a major constraint for organic production around the world. Field studies were conducted in pepper (*Capsicum annum* L.) from 2004 to 2006 at the Black Sea Agricultural Research Institute experimental field in Turkey to determine the weed suppressive effects of winter cover crops. Treatments consisted of ryegrass (*Lolium multiflorum* L.), oat (*Avena sativa* L.), rye (*Secale cereale* L.), wheat (*Triticum aestivum* L.), gelemen clover (*Trifolium meneghinianum* Clem.), Egyptian clover (*Trifolium alexandrinum* L.), common vetch (*Vicia sativa* L.), hairy vetch (*Vicia villosa* Roth.) and a bare fallow with no cover crop. Weed density and total weed dry biomass were assessed at 14, 28, and 56 days after incorporation to quantify effects of cover crops during a subsequent pepper crop. Cover crop establishment was similar in both growing

seasons and individual species produced in the range of 1800-3500 kg/ha biomass. Ryegrass produced the greatest biomass compared with other species. Weed dry biomass production just before cover crop incorporation varied with year and cover crop species. Hairy vetch, ryegrass, oat and common vetch were the most competitive cover crops based on total weed dry biomass. Hairy vetch was the most promising cover crop and reduced weed density by 73% and 70% at 28 and 56 DAI, respectively. Pepper yields were higher following all cover crops except Egyptian clover. The highest yield was obtained from hairy vetch plots in both years. This research indicates that cover crops such as hairy vetch, ryegrass, oat and common vetch could be used in integrated weed management programs to reduce weed infestation in organic pepper.

Keywords: Hairy vetch; Ryegrass; Oat; Weed control; CDA; Vegetable

Donald A. Ukeh, Michael A. Birkett, John A. Pickett, Alan S. Bowman, A. Jennifer Mordue, Repellent activity of alligator pepper, *Aframomum melegueta*, and ginger, *Zingiber officinale*, against the maize weevil, *Sitophilus zeamais*, *Phytochemistry*, Volume 70, Issue 6, April 2009, Pages 751-758, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2009.03.012.

(<http://www.sciencedirect.com/science/article/B6TH7-4W4DVDT-1/2/33d1ef00da54862a325d7e4c68303d47>)

Abstract:

The repellent activity of alligator pepper, *Aframomum melegueta*, and ginger, *Zingiber officinale* (Zingiberaceae), against the maize weevil, *Sitophilus zeamais* (Coleoptera: Curculionidae), was investigated in four-way olfactometer bioassays. Results showed that vacuum distilled *A. melegueta* and *Z. officinale* extracts were repellent towards adult *S. zeamais* both in the absence and the presence of maize, *Zea mays*, grains. Bioassay-guided liquid chromatographic fractionation of the distillates showed that fractions containing oxygenated compounds accounted for the repellent activity. Coupled gas chromatography-mass spectrometry (GC-MS), followed by GC peak enhancement and enantioselective GC using authentic compounds, identified 3 major compounds in the behaviourally active fractions of *A. melegueta* and *Z. officinale* to be (S)-2-heptanol, (S)-2-heptyl acetate and (R)-linalool in a ratio of 1:6:3, and 1,8-cineole, neral and geranial in a ratio of 5.48:1:2.13, respectively. The identification of these behaviourally active compounds provides the scientific basis for the observed repellent properties of *A. melegueta* and *Z. officinale*, and demonstrates the potential for their use in stored-product protection at the small-scale farmer level in Africa.

Keywords: *Aframomum melegueta*; *Zingiber officinale*; Repellent; *Sitophilus zeamais*

Raffaella Di Cagno, Rosalinda F. Surico, Giovanna Minervini, Maria De Angelis, Carlo G. Rizzello, Marco Gobetti, Use of autochthonous starters to ferment red and yellow peppers (*Capsicum annum* L.) to be stored at room temperature, *International Journal of Food Microbiology*, Volume 130, Issue 2, 31 March 2009, Pages 108-116, ISSN 0168-1605, DOI: 10.1016/j.ijfoodmicro.2009.01.019.

(<http://www.sciencedirect.com/science/article/B6T7K-4VG7MNB-2/2/37e28e1748097f4e67830f6a206598f1>)

Abstract:

Strains of *Lactobacillus curvatus*, *Leuconostoc mesenteroides*, *Lactobacillus plantarum* and *Weissella confusa* were identified from raw red and yellow peppers (RYPs) by partial 16S rRNA gene sequence and subjected to typing by Random Amplified Polymorphic DNA-Polymerase Chain Reaction (RAPD-PCR) analysis. *L. plantarum* PE21, *L. curvatus* PE4 and *W. confusa* PE36 were selected based on the kinetics of growth and acidification, and used as the autochthonous mixed starter for the fermentation of RYPs. A protocol which included blanching at 85 [degree sign]C for 2 min, fermentation at 35 [degree sign]C for 15 h in brine (1%, w/v), and heat treatment at 85 [degree sign]C for 15 min, followed by storage at room temperature for 30 days with and without sunflower seeds oil was set up. Unstarted RYPs subjected to the same treatments were

used as the control. Cell numbers of autochthonous starter in the RYPs were ca. 1000 times higher than presumptive lactic acid bacteria in unstarted RYPs. As shown by RAPD-PCR analysis, all three autochthonous strains persisted during processing and storage. Presumptive lactic acid bacteria found in started RYPs progressively decreased during storage, leading to a microbiota mainly consisting of autochthonous starters. Started RYPs showed rapid decrease of pH (< 3.7), marked consumption of fermentable carbohydrates, and inhibition of total enterobacteria and yeasts. Unstarted RYPs were subjected to slight acidification (pH ca. 4.87) and considerable contamination by total enterobacteria and yeasts throughout storage. After 30 days of storage, started RYPs had significantly ($P < 0.05$) higher firmness and colour indexes with respect to unstarted RYPs. The microbial and sensory features of started RYPs stored with sunflower seeds oil were almost similar to those of RYPs stored without suspending liquid.

Keywords: Peppers; Autochthonous lactic acid bacteria; Shelf-life

Jose Fenoll, Encarnacion Ruiz, Pilar Hellin, Alfredo Lacasa, Pilar Flores, Dissipation rates of insecticides and fungicides in peppers grown in greenhouse and under cold storage conditions, *Food Chemistry*, Volume 113, Issue 2, 15 March 2009, Pages 727-732, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.08.007.

(<http://www.sciencedirect.com/science/article/B6T6R-4T5TPSB-B/2/f2afbe2c21cd141446c4c5a72673648d>)

Abstract:

The dissipation of three insecticides (pirimicarb, pyriproxyfen and buprofezin) and three fungicides (cyprodinil, fludioxonil and tebuconazole) in peppers was evaluated in a study carried out on an experimental greenhouse. Pepper samples were collected during 6 week period in which two successive applications of these pesticides were performed. Gas chromatography (GC) with nitrogen-phosphorus detection (NPD) was used to study the disappearance of these compounds in peppers. Confirmation analysis of pesticides was carried out by capillary gas chromatography coupled with mass spectrometry in the selected ion monitoring (SIM) mode. At the preharvest interval the residue levels were below the legal limit established in Spain. The disappearance rates of these compounds on peppers were described as pseudo-first-order kinetics (r between 0.953 and 0.997) and half-life in the range of 4.41 and 21.47 days. After thirty days under cold and darkness storage conditions, dissipation of buprofezin and pyriproxyfen were not observed. However, dissipation rate in pepper of pirimicarb cyprodinil, fludioxonil and tebuconazole in refrigerated were observed. This, the half-lives for these pesticides were 5-9 times greater under refrigeration.

Keywords: Pirimicarb; Pyriproxyfen; Buprofezin; Cyprodinil; Fludioxonil; Tebuconazole; Peppers; Residues; Disappearance

Ahmet Koluman, Lale Sariye Akan, Funda Pinar Cakiroglu, Occurrence and antimicrobial resistance of enterococci in retail foods, *Food Control*, Volume 20, Issue 3, March 2009, Pages 281-283, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2008.05.007.

(<http://www.sciencedirect.com/science/article/B6T6S-4SJP7BF-5/2/b1f693714ab64a519fc40633d2ec8150>)

Abstract:

This study aimed to show the vancomycin-resistant enterococci VRE contamination and antibiotic resistance profiles of *Enterococcus* spp. in different kinds of food acquired from various markets between January 2007 and June 2007. Two hundred samples were used in the research. They consisted of 50 samples of meat (20 chicken, 20 beef, 10 fish), 50 samples of cheese (20 cheddar, 20 Turkish white, 10 cream), 50 samples of RTE (10 burgers, 10 pizzas, 10 chicken nuggets, 10 milk deserts, 5 beef roast and 5 salads), 30 samples of spice (10 black pepper, 10 red pepper, 10 curry) and 20 samples of yogurt. The results of the study indicated high levels of contamination with *Enterococcus* spp. in 100 of all the samples (50 %). The highest resistance was recorded for

a cream cheese sample, with resistance to 12 types of antibiotics. The lowest resistance was in a chicken sample, with resistance to 2 types of antibiotics. Only 4 strains were identified as vancomycin-resistant enterococcus (VRE), four of which were *E. faecalis* and originated from chicken. The results of this study underline the public health implications of VRE and the urgency about the preventive measures that must be taken to control the antibiotic use at farm level.

Keywords: Enterococci; VRE; Antimicrobials; Retail food

Chang-Gi Kim, Kee Woong Park, Bumkyu Lee, Dae In Kim, Ji-Young Park, Hyo-Jeong Kim, Ji Eun Park, Joo Hee An, Kang-Hyun Cho, Soon-Chun Jeong, Kyung Hwa Choi, Chee Hark Harn, Hwan Mook Kim, Gene flow from genetically modified to conventional chili pepper (*Capsicum annum* L.), *Plant Science*, Volume 176, Issue 3, March 2009, Pages 406-412, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.12.012.

(<http://www.sciencedirect.com/science/article/B6TBH-4V88FJH-1/2/77056cc3eda62110ca769c8452b9028f>)

Abstract:

Gene flow from genetically modified (GM) chili pepper (*Capsicum annum* L.), containing the CMVP0-CP (cucumber mosaic virus pathotype 0 - coat protein) gene to a non-GM control variety 'P915' and two commercial F1 hybrids, 'Manidda' and 'Taesan', was assessed over two growing seasons in the field. Seeds were collected from non-GM chili peppers at a range of distances from the GM chili pepper plot, and hybrids between GM and non-GM plants were screened using the kanamycin assay. Event-specific PCR was performed to confirm the presence of transgenes in the kanamycin-resistant seedlings. From a total of 11,194 'P915' seeds, there were 67 hybrids; there were 40 hybrids of 7499 seeds, and 102 hybrids of 5340 seeds for 'Manidda' and 'Taesan', respectively. The gene flow frequency was as high as 17.89% between GM and 'Taesan' chili pepper at the closest distance from the GM plot.

Keywords: *Capsicum annum*; Chili pepper; Gene flow; Genetically modified crop

A. Manoj Kumar, Kalpana N. Reddy, Rohini Sreevathsa, Girija Ganeshan, M. Udayakumar, Towards crop improvement in bell pepper (*Capsicum annum* L.): Transgenics (uid A::hpt II) by a tissue-culture-independent *Agrobacterium*-mediated in planta approach, *Scientia Horticulturae*, Volume 119, Issue 4, 17 February 2009, Pages 362-370, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.08.034.

(<http://www.sciencedirect.com/science/article/B6TC3-4TRHC92-1/2/3fafafb09d0bcd4b38a225fc9dbc7795>)

Abstract:

Agrobacterium tumefaciens-mediated transformation has been one of the methods used to generate transgenic plants in bell pepper. An alternate transformation method that avoids/minimizes tissue culture would be beneficial for the improvement of bell pepper due to its recalcitrant nature. In this report, transgenic bell pepper plants have been developed by a tissue-culture-independent *A. tumefaciens*-mediated in planta transformation procedure. In the present study, two open pollinated varieties viz., Arka Gaurav and Arka Mohini were used for transformation. *Agrobacterium* strain EHA105 harboring the binary vector pCAMBIA1301 that carries the genes for [beta]-glucuronidase (uid A) and hygromycin phosphotransferase II (hpt II) was used for transformation. GUS histochemical analysis of T0 and T1 plants at various stages of growth followed by molecular analysis using PCR, Southern analysis and RT-PCR allowed selection of transgenics. The method resulted in 17.8% and 11.4% of the T0 plants in Arka Gaurav and Arka Mohini being selected as chimeric and 35.0% and 29.7%, respectively, were identified as stable transformants in the T1 generation based on PCR analysis.

Keywords: *Capsicum annum*; Bell pepper; In planta transformation; *Agrobacterium*; Marker genes; Transgenics

Josef Tanny, Markus Moller, Shabtai Cohen, Aerodynamic properties of boundary layers along screens, *Biosystems Engineering*, Volume 102, Issue 2, February 2009, Pages 171-179, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.11.015.

(<http://www.sciencedirect.com/science/article/B6WXV-4V995VY-1/2/b41c59b60d05aae0106c52b9e88e3fec>)

Abstract:

Agricultural screens that cover crops modify the exchange of heat, mass and momentum between the crop and the atmosphere. The properties of the boundary layer above an insect-proof greenhouse, in which sweet pepper was grown, were investigated experimentally. A flat-roof greenhouse 110 m long, 60 m wide and 3.2 m high was used. Wind and temperature sensors were mounted above the screen 60 m to the east of the western edge of the house and 30 m north of its southern edge. Aerodynamic properties of the wind profile, namely the friction velocity, roughness length, zero-plane displacement and aerodynamic resistance were calculated and presented with respect to the stability of the surface layer above the greenhouse. It was shown that neutral and stable conditions, when compared with unstable conditions, act to inhibit turbulence, to reduce the roughness length, to displace the wind profile upwards to just above the screen, and to increase the aerodynamic resistance. The results were compared with previous data obtained for a small shading screen. Good qualitative similarity was obtained between the two sets of data and the causes of the quantitative differences between the two studies under unstable conditions were discussed.

J.S. Rubio, F. Garcia-Sanchez, F. Rubio, V. Martinez, Yield, blossom-end rot incidence, and fruit quality in pepper plants under moderate salinity are affected by K⁺ and Ca²⁺ fertilization, *Scientia Horticulturae*, Volume 119, Issue 2, 6 January 2009, Pages 79-87, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.009.

(<http://www.sciencedirect.com/science/article/B6TC3-4T72K3M-3/2/2279d733e4d5d68e5ef78fb36df1dd4c>)

Abstract:

One of the most important factors limiting agricultural expansion and production is the restricted supply of good quality water. The present study examines the effects of K⁺ and Ca²⁺ fertilization on sweet pepper production, blossom-end rot (BER) incidence and fruit quality of pepper plants (*Capsicum annuum* L.) grown under moderate saline conditions. Pepper plants were grown in a controlled-environment greenhouse under hydroponic conditions with different nutrient solutions obtained by modifying the Hoagland solution. The experiment consisted on four K⁺ treatments (0.2, 2, 7 and 14 mM) +30 mM NaCl, and four Ca²⁺ treatments (0.2, 2, 4 and 8 mM) +30 mM NaCl, having in common a control without salt with 7 mM K⁺/4 mM Ca²⁺. Salinity decreased total fruit yield and marketable fruit yield by 23% and 37%, respectively. The marketable fruit yield reduction by salt treatment was mainly due to the increase in the number of fruit affected by BER. This typical physiopathy of the pepper fruits occurred between 18 and 25 days after anthesis (DAA), when the highest fruit growth rate was reached. Fruit quality parameters were also affected by salt treatment where the fruit pulp thickness and firmness were decreased, and fructose, glucose and myo-inositol fruit concentrations increased with salinity relative to fruits from control treatment. Under saline conditions an increased supply of K⁺ reduced the fruit fresh weight, the percentage of BER and the marketable yield although promoted the vegetative growth. However, increasing Ca²⁺ concentration in the nutrient solution increased the fruit production, and the marketable yield as consequence of decreasing the percentage of fruit affected with BER. Fruit quality parameters also were affected by the K⁺ and Ca²⁺ treatments.

Keywords: Moderate salinity; Mineral nutrition; Pepper; Fruit production parameters

Ahmet Korkmaz, Yakup Korkmaz, Promotion by 5-aminolevulinic acid of pepper seed germination and seedling emergence under low-temperature stress, *Scientia Horticulturae*, Volume 119, Issue 2, 6 January 2009, Pages 98-102, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.016. (<http://www.sciencedirect.com/science/article/B6TC3-4T8H3GB-4/2/90ae34e8f893090c6271eef7b744c036>)

Abstract:

The effects of incorporating 5-aminolevulinic acid (ALA) into the priming solution on low-temperature germination and emergence percentage performance of red pepper (*Capsicum annuum* cv. Sena) seeds before and after seed storage were investigated. Seeds were primed in 3% KNO₃ solution for 6 days at 25 [degree sign]C in darkness containing 0 ppm, 1 ppm, 10 ppm, 25 ppm, 50 ppm or 100 ppm ALA. Following priming, seeds were either immediately subjected to germination and emergence tests at 15 [degree sign]C or stored at 4 [degree sign]C or 25 [degree sign]C for 1 month after which they were subjected to germination and emergence tests at 15 [degree sign]C. Priming pepper seeds in the presence of ALA improved final germination percentage (FGP) and germination rate (MGT) at 15 [degree sign]C compared to non-primed seeds. The highest FGP was obtained from seeds primed in the presence of 25 ppm and higher ALA concentrations while the highest MGT was obtained from seeds primed in KNO₃ supplemented with 10 ppm ALA. Emergence percentages were the highest for the seeds primed in the presence of 25 ppm ALA and 50 ppm ALA while non-primed seeds had the lowest emergence percentage. Highest emergence rates (MET) and heaviest seedlings were also obtained from seeds primed in KNO₃ supplemented with 50 ppm ALA. Although all priming treatments improved germination and emergence performance of pepper seeds at 15 [degree sign]C following 1 month of storage under two different temperatures, inclusion of 25 ppm and 50 ppm ALA into the priming solution resulted in higher germination and emergence percentages and faster germination and emergence compared to seeds primed in KNO₃ only and non-primed seeds. These results indicate that priming seeds in 25 ppm and 50 ppm ALA incorporated into the KNO₃ solution can be used as an effective method to improve low-temperature performance of red pepper seeds and that these seeds can be stored for 1 month at 4 [degree sign]C or 25 [degree sign]C and still exhibit improved germination and emergence performance at 15 [degree sign]C.

Keywords: *Capsicum annuum*; Low-temperature stress; Seed treatment; Seed storage

Masahumi Johkan, Kazuhiko Mitukuri, Satoshi Yamasaki, Genjiro Mori, Masayuki Oda, Causes of defoliation and low survival rate of grafted sweet pepper plants, *Scientia Horticulturae*, Volume 119, Issue 2, 6 January 2009, Pages 103-107, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.015.

(<http://www.sciencedirect.com/science/article/B6TC3-4T8H3GB-3/2/ac27d5a18fb967e3bbe299dd71d93121>)

Abstract:

We investigated the cause of defoliation in sweet pepper (*Capsicum annuum* L.) plants after grafting. Grafted plants of old-stage sweet pepper showed a higher defoliation rate than young-stage grafted plants. Old-stage grafted plants had lower stomatal resistance and water potential than young-stage plants, and showed poorly developed xylem connections at the graft site. Foliar application of abscisic acid (ABA) to the grafted plants increased stomatal resistance and water potential, decreased the defoliation rate, and promoted graft take among old-stage plants. Our results indicated that low stomatal resistance under low humidity induces water stress, defoliation, and low survival rate in old-stage grafted sweet pepper plants. ABA treatment increased stomatal resistance, water potential, and survival rate, and decreased the defoliation rate among old-stage sweet pepper plants.

Keywords: ABA; *Capsicum*; Stomatal resistance; Xylem connection; Water potential

Sophie Malagarie-Cazenave, Nuria Olea-Herrero, Diana Vara, Ines Diaz-Laviada, Capsaicin, a component of red peppers, induces expression of androgen receptor via PI3K and MAPK pathways in prostate LNCaP cells, *FEBS Letters*, Volume 583, Issue 1, 5 January 2009, Pages 141-147, ISSN 0014-5793, DOI: 10.1016/j.febslet.2008.11.038.

(<http://www.sciencedirect.com/science/article/B6T36-4V3566T-6/2/03786714d6fc10f1b366839dc0477f05>)

Abstract:

In this study, capsaicin (trans-8-methyl-N-vanillyl-6-nonenamide) induced an increase in the cell viability of the androgen-responsive prostate cancer LNCaP cells, which was reversed by the use of the TRPV1 antagonists capsazepine, I-RTX and SB 366791. In further studies we observed that capsaicin induced a decrease in ceramide levels as well as Akt and Erk activation. To investigate the mechanism of capsaicin action we measured androgen (AR) receptor levels. Capsaicin induced an increase in the AR expression that was reverted by the three TRPV1 antagonists. AR silencing by the use of siRNA, as well as blocking the AR receptor with bicalutamide, inhibited the proliferative effect of capsaicin.

Keywords: Capsaicin; Ceramide; Androgen receptor; LNCaP cells; Prostate cancer

Guo-liang QIAN, Bai-shi HU, Ying-hua JIANG, Feng-quan LIU, Identification and Characterization of *Lysobacter* enzymogenes as a Biological Control Agent Against Some Fungal Pathogens, *Agricultural Sciences in China*, Volume 8, Issue 1, January 2009, Pages 68-75, ISSN 1671-2927, DOI: 10.1016/S1671-2927(09)60010-9.

(<http://www.sciencedirect.com/science/article/B82XG-4VFMC51-B/2/232e6220e21be8deee88a8d12c16095c>)

Abstract:

Strain OH11, a Gram-negative, nonspore forming, rod-shaped bacterium with powerful antagonistic activity, was isolated from rhizosphere of green pepper in Jiangsu Academy of Agricultural Sciences of China and characterized to determine its taxonomic position. 16S rRNA gene sequence analysis revealed that strain OH11 belongs to the Gammaproteobacteria and had the highest degree of sequence similarity to *Lysobacter* enzymogenes strain C3 (AY074793) (99%), *Lysobacter* enzymogenes strain N4-7 (U89965) (99%), *Lysobacter* antibioticus strain (AB019582) (97%), and *Lysobacter* gummosus strain (AB16136) (97%). Chemotaxonomic data revealed that strain OH11 possesses a quinone system with Q-8 as the predominant compound and C15:0 iso, C17:1 iso [ω 9]c as the predominant iso-branched fatty acids, all of which corroborated the assignment of strain OH11 to the genus *Lysobacter*. Results of DNA-DNA hybridization and physiological and biochemical tests clearly showed that strain OH11 was classified as *Lysobacter* enzymogenes. Strain OH11 could produce protease, chitinase, and [β]-1,3-glucanase. It showed strong *in vitro* antifungal activity against *Rhizoctonia solani*, *Sclerotinia sclerotiorum*, and several other phytopathogenic fungi. This is the first report of identification and characterization of *Lysobacter* enzymogenes as a biological control agent of plant diseases in China.

Keywords: *Lysobacter* enzymogenes; identification; characterization; biological control

Sota Tanaka, Sayaka Tachibe, Mohd Effendi Bin Wasli, Jonathan Lat, Logie Seman, Joseph Jawa Kendawang, Kozo Iwasaki, Katsutoshi Sakurai, Soil characteristics under cash crop farming in upland areas of Sarawak, Malaysia, *Agriculture, Ecosystems & Environment*, Volume 129, Issues 1-3, January 2009, Pages 293-301, ISSN 0167-8809, DOI: 10.1016/j.agee.2008.10.001.

(<http://www.sciencedirect.com/science/article/B6T3Y-4TWSWDX-2/2/c03e79dd1aa9bf44116489ce9c05589e>)

Abstract:

This study discusses soil fertility under perennial cash crop farming (para rubber, *Hevea brasiliensis*; black pepper, *Piper nigrum*; oil palm, *Elaeis guineensis*) conducted by local farmers

and an oil palm estate in an upland area of Sarawak, Malaysia, in comparison with the surrounding secondary forests. In the farmlands of the local farmers, rubber farming was conducted without fertilizer application, while 2-5 t ha⁻¹ of NPK compounds were applied annually on pepper farms. Soils under rubber farming were acidic with poor nutrient contents, resembling soils in secondary forests. In pepper farms, soils were less acidic and showed high nutrient contents, especially with respect to available P and exchangeable Ca. This trend became stronger with increasing farming duration. Fertilizers applied around pepper vines appeared to migrate and spread across the fields. Bulk density and hardness of surface soils were higher in pepper farms than in secondary forests, indicating soil compaction due to field works. In the oil palm estate, annual fertilizer application rates were moderate at 0.4-0.8 t ha⁻¹ of NPK compound fertilizers. However, the soil properties in the oil palm estate were similar to those of the small-scale pepper farms. Close to the bases of the palms where fertilizers usually are applied, the contents of exchangeable Ca and available P were high. Nutrient uptake by the dense root systems of the palms seemed to prevent excessive loss of nutrients through leaching. Loss of soil organic matter and deterioration of soil physical properties were brought about by terrace bench construction, but the soils seemed to recover to some extent over time. In conclusion, technologies such as intercropping and the appropriate allocation of different crops to specific locations as well as the proper selection and dosage of fertilizers should be developed and adopted to improve fertilizer efficiency and prevent water pollution due to fertilizer wash-off from farmlands.

Keywords: Para rubber; Black pepper; Oil palm; Soil fertility; Sarawak; Upland farming

Anat Yogev, Michael Raviv, Giora Kritzman, Yitzhak Hadar, Ron Cohen, Benny Kirshner, Jaacov Katan, Suppression of bacterial canker of tomato by composts, *Crop Protection*, Volume 28, Issue 1, January 2009, Pages 97-103, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.09.003.

(<http://www.sciencedirect.com/science/article/B6T5T-4TVFVD3-1/2/2c1bf8cbea32b2453ff5adfa65420a32>)

Abstract:

Suppression of *Clavibacter michiganense* subsp. *michiganensis* (CMM) by composts was studied in comparison to conducive peat. Composts based on tomato or pepper residues combined with cattle or chicken manure reduced disease caused by CMM by between 79% and 100% under both natural infection of mature plants and intentional inoculation. Populations of CMM in composts declined to undetectable levels within 15- 20 days, while those in peat remained high for 35- 40 days. Similarly, the colonization of compost-grown tomato-plant tissues by the pathogen was reduced (0- 20% colonization), compared to plants growing in peat (53- 90% colonization) or perlite (30- 90% colonization). We conclude that the plant-residue composts suppress CMM and can therefore serve as a component in integrated-management programs.

Keywords: Suppressiveness; Compost

R.M. Anjos, B. Mosquera, N. Sanches, C.A. Cambui, H. Mercier, Caesium, potassium and ammonium distributions in different organs of tropical plants, *Environmental and Experimental Botany*, Volume 65, Issue 1, January 2009, Pages 111-118, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2008.04.001.

(<http://www.sciencedirect.com/science/article/B6T66-4S85DKK-1/2/10cf31411caca07b2dbf7f60235d4791>)

Abstract:

In the present work the distribution of ions in aboveground plant parts was studied in order to establish the suitability of using radiocaesium as a tracer for the plant absorption of nutrients, such as potassium (K⁺) and ammonium (NH₄⁺). We present the results for the distributions of ¹³⁷Cs, ⁴⁰K and NH₄⁺ from four tropical plant species: lemon (*Citrus aurantifolia*), orange (*Citrus sinensis*), guava (*Psidium guajava*) and chili pepper (*Capsicum frutescens*). Activity concentrations of ¹³⁷Cs and ⁴⁰K were measured by gamma spectrometry and concentrations of free NH₄⁺ ions

by a colorimetric method. Similarly to potassium and ammonium, caesium showed a high mobility within the plants, exhibiting the highest values of concentration in the growing parts of the tree (fruits, new leaves, twigs, and barks). A significant correlation between activity concentrations of ^{137}Cs and ^{40}K was observed in these tropical plants. The K/Cs discrimination ratios were approximately equal to unity in different compartments of each individual plant, suggesting that caesium could be a good tracer for ^{40}K in tropical woody fruit species. Despite the similarity observed for the behaviour of caesium and ammonium in the newly grown plant compartments, ^{137}Cs was not well correlated with NH_4^+ . Significant temporal changes in the NH_4^+ concentrations were observed during the development of fruits, while the ^{137}Cs activity concentration alterations were not of great importance, indicating, therefore, that Cs^+ and free NH_4^+ ions could have distinct concentration ratios for each particular plant organ.

Keywords: Tropical woody fruit trees; ^{137}Cs , ^{40}K and NH_4 concentration ratios; K/Cs and NH_4/Cs discrimination ratios

Milagros Mezcuca, Carmen Ferrer, Juan F. Garcia-Reyes, Maria Jesus Martinez-Bueno, Mirna Sigrist, Amadeo R. Fernandez-Alba, Analyses of selected non-authorized insecticides in peppers by gas chromatography/mass spectrometry and gas chromatography/tandem mass spectrometry, Food Chemistry, Volume 112, Issue 1, 1 January 2009, Pages 221-225, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.05.076.

(<http://www.sciencedirect.com/science/article/B6T6R-4SMWFKC-2/2/2fab0ad5eb624b9932d3debfd44a7609>)

Abstract:

Two methods based on gas chromatography coupled with mass spectrometry and tandem mass spectrometry analyzers are described for the identification, confirmation and quantitation of two EU-banned insecticides: isocarbophos and isofenphos-methyl, detected in recent monitoring programmes in pepper samples. The proposed methodologies involved a liquid-liquid extraction with acetonitrile followed by a cleanup step by dispersive solid-phase extraction using primary-secondary amine as sorbent material. Recovery studies performed on peppers spiked at different fortification levels (10 and 50 $[\mu\text{g kg}^{-1}]$) yielded average recoveries in the range 85-98% with RSD values below 8%. Identification, confirmation and quantitation were carried out by gas chromatography/mass spectrometry (GC-MS) in selected ion monitoring mode and gas chromatography/tandem mass spectrometry (GC-MS/MS) using an ion trap operating in the multiple reaction monitoring (MRM) mode. The obtained limits of detection (LODs) were in the range 0.1-0.3 $[\mu\text{g kg}^{-1}]$, depending on the technique. The proposed methods were successfully applied to the analysis of suspected pepper samples.

Keywords: Insecticides; Food; Gas chromatography; Mass spectrometry; Pesticides

Nikos G. Tzortzakis, Impact of cinnamon oil-enrichment on microbial spoilage of fresh produce, Innovative Food Science & Emerging Technologies, Volume 10, Issue 1, January 2009, Pages 97-102, ISSN 1466-8564, DOI: 10.1016/j.ifset.2008.09.002.

(<http://www.sciencedirect.com/science/article/B6W6D-4TGS7H0-1/2/d94bf631fb62d169c35815f5c2897af8>)

Abstract:

Cinnamon (*Cinnamomum zeylanicum* L.) oil (ranging between 25 and 500 ppm) was tested for antifungal activity against *Colletotrichum coccodes*, *Botrytis cinerea*, *Cladosporium herbarum*, *Rhizopus stolonifer* and *Aspergillus niger* in vitro. Oil-enrichment resulted in significant ($P < 0.05$) reduction on subsequent colony development for the examined pathogens. Fungal spore production inhibited up to 63% at 25 ppm of cinnamon oil concentration when compared with equivalent plates stored in ambient air. In the highest oil concentration (500 ppm) employed, fungal sporulation (except for *B. cinerea*) was completely retarded. In vitro, cinnamon oil reduced spore germination and germ tube length in *C. coccodes*, *B. cinerea*, *C. herbarum* and *R. stolonifer*

with the effects were dependent on oil concentration. However, cinnamon oil (up to 100 ppm) accelerated spore germination for *A. niger*. Wound-inoculated pepper fruit accelerated *B. cinerea* and *C. coccodes* development following 3 days vapour exposure to cinnamon, and this effect was not persisted for longer exposure but no differences observed for tomato fruit. Pre-exposing tomato fruit to 500 ppm cinnamon vapours for 3 days, and then inoculated with fungi, reduced *B. cinerea* and *C. coccodes* lesion development. At the present, trials is currently focussing on the mechanisms underlying the impacts of essential oil volatiles on disease development with a major contribution to limiting the spread of the pathogen by lowering the spore load in the storage/transit atmospheres as well as the use of essential oil as an alternative food preservative. Industrial relevance

The data presented in this work suggest that the use of pure cinnamon essential oil is an innovative and useful tool as alternative to the use of synthetic fungicides or other sanitation techniques in storage/packaging. Oil enrichment may reduce disease development with a major contribution to limiting the spread of the pathogen by lowering the spore load (spore production) in the storage/transit atmospheres as well as the use of essential oil as an alternative food preservative. The effectiveness (oil concentration) of the oil depends on the target pathogen. The effects of natural compounds on individual microorganisms (fungi and bacteria), both responsible for spoilage and food-borne pathogens, as well as the minimum concentration to gain effectiveness without affecting fresh produce quality and storage deserve further research.

Keywords: Antifungal activity; Essential oils; Fungal growth; Fresh produce; Cinnamon

Emily Locke, Gloria D. Coronado, Beti Thompson, Alan Kuniyuki, Seasonal Variation in Fruit and Vegetable Consumption in a Rural Agricultural Community, *Journal of the American Dietetic Association*, Volume 109, Issue 1, January 2009, Pages 45-51, ISSN 0002-8223, DOI: 10.1016/j.jada.2008.10.007.

(<http://www.sciencedirect.com/science/article/B758G-4V6SCMB-C/2/f6d92e67f31001e12403b0519befe125>)

Abstract: Background

Seasonal variation in fruit and vegetable consumption has been documented in a limited number of previous investigations and is important for the design of epidemiologic investigations and in the evaluation of intervention programs. Objective

This study investigates fruit and vegetable consumption behaviors among Hispanic farmworkers and non-farmworkers in a rural agricultural community. Design

A larger study recruited 101 farmworker families and 100 non-farmworker families from the Yakima Valley in Washington State between December 2004 and October 2005. All families were Hispanic. An in-person administered questionnaire collected information on consumption of locally grown fruits and vegetables and sources of obtaining fruits and vegetables. Data on dietary intake asked whether or not the respondent had consumed a given fruit or vegetable in the past month. Data were collected longitudinally, coinciding with three agricultural seasons: thinning (summer), harvest (fall), and nonspray (winter). Statistical analyses performed

Generalized estimating equations were used to test for statistical significance between proportions of the population who consumed a given fruit or vegetable across agricultural seasons. Multivariable logistic regression was performed and corresponding odds ratios and 95% confidence intervals are reported. Results

The proportion of respondents who ate apples, pears, plums, peaches, apricots, peppers, corn, and cucumbers was highest in the fall harvest season, whereas the proportions of those who ate cherries and asparagus were highest in the summer thinning season. Compared to non-farmworkers, a higher proportion of farmworkers reported having eaten peaches, apricots, cherries, green beans, carrots, peppers, corn, pumpkin, squash, and onions, in the past month. Conclusions

Epidemiologic investigations and public health interventions that examine the consumption of fruits and vegetables should consider seasonal variation in consumption patterns, especially in agricultural communities.

Guang-Cheng Shao, Zhan-Yu Zhang, Na Liu, Shuang-En Yu, Weng-Gang Xing, Comparative effects of deficit irrigation (DI) and partial rootzone drying (PRD) on soil water distribution, water use, growth and yield in greenhouse grown hot pepper, *Scientia Horticulturae*, Volume 119, Issue 1, 10 December 2008, Pages 11-16, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.07.001. (<http://www.sciencedirect.com/science/article/B6TC3-4T71B08-1/2/1d81a32533fa89e40d5093fe30aa5d49>)

Abstract:

This study was conducted to compare two water-saving practices, deficit irrigation (DI) and partial rootzone drying (PRD), and examine how they affected soil water distribution, water use, growth and yield of greenhouse grown hot pepper compared to commercial irrigation (CI). Control (CI) in which irrigation water was applied to both sides of the system when soil water content was lower by 80% of field capacity; deficit irrigation (DI50, DI75) in which 50% and 75% irrigation water of CI supplied to both sides of the root system; 1PRD with half of the root system exposed to soil drying and other half kept well-watered with 50% irrigation water of CI, and 2PRD with 50% irrigation water of CI supplied, half to fixed side of the root system. The results showed mean soil volumetric water content of DI75, DI50, 1PRD and 2PRD were lower by 21.06%, 28.32%, 24.48% and 34.76%, respectively than that of CI after starting the experiment. Water consumption showed some significant effect of irrigation treatments during the growing period of drought stress application, and therefore decreased in DI75, DI50, 1PRD and 2PRD to a level around 75% and 50% of CI. All the DI and PRD treatments resulted in a reduction of total dry mass of 7.29-44.10%, shoot biomass of 24.97-47.72% compared to CI, but an increase in the root-shoot ratio of 12.50-35.42% compared to the control and with significant differences between 2PRD, 1PRD, DI50 and CI. The yield of 1PRD was significantly reduced by 23.98% compared to CI (19,566 kg hm⁻²) over a period of 109 days after transplanting. However, the 1PRD treatment had 17.21% and 24.54% additional yield over the DI50 and 2PRD treatments and had 52.05% higher irrigation water use efficiency (IWUE) than CI treatment. At harvest, although there was a significant difference recorded as single fruit weight and single fruit volume were reduced under the DI and PRD treatments, total soluble solids concentration of fruit harvested under the water-deficit treatments were higher compared to CI. Stomatal conductance measured in fresh leaf was the lowest under 1PRD treatment relative to CI and other treatments. The low stomatal conductance of fresh-leaf issue observed in the work supported the root signaling mechanism reported earlier in plants having undergone partial root drying cycles.

Keywords: PRD; DI; Dry matter biomass; Yield; Water use efficiency

M. Majcher, H.H. Jelen, Comparison of suitability of SPME, SAFE and SDE methods for isolation of flavor compounds from extruded potato snacks, *Journal of Food Composition and Analysis*, In Press, Corrected Proof, Available online 3 December 2008, ISSN 0889-1575, DOI: 10.1016/j.jfca.2008.11.006.

(<http://www.sciencedirect.com/science/article/B6WJH-4V2NKBX-1/2/e31a1dc8a7dcd370cc2263000a8eefec>)

Abstract:

The aim of this study was to compare the usefulness of three extraction methods: SPME (solid-phase microextraction), SAFE (solvent-assisted flavor evaporation) and SDE (simultaneous distillation and extraction) for isolation of flavor compounds from extruded potato snacks for their subsequent analysis using GC/AEDA and GC/MS techniques. Results showed that the most suitable extraction method for GC-olfactometry (GC-O) was SAFE, by which it was possible to isolate all 25 potent odorants which contribute to overall flavor of potato snacks due to the

application of high vacuum and low extraction temperature. Extraction using SDE method resulted in formation of 5 additional compounds: 2-furfurylthiol, 2,5-dimethyl-3-furanthiol, octanal, (E)-2-octenal and nonanal recognized as artifacts. On the other hand, sniffing extracts from SPME fiber did not reveal 7 important compounds such as: 1-octen-3-ol, 2-ethyl-3,5-dimethylpyrazine, 4-hydroxy-2,5-dimethyl-3(2H)-furanone, 3-hydroxy-4,5-dimethyl-2(5H)-furanone, 5-methyl-2,3-diethylpyrazine, [beta]-damascenone or an unknown with a flavor of fresh pepper. However, this extraction method was shown to be very precise (RSD 3-9%), sensitive (lowest LOD for 6 compounds) and suitable for analysis of low boiling compounds, co-eluting with solvent in SDE or SAFE extracts. Preferably both SPME and SAFE methods should be used for a full characterization of odor-active compounds in potato snacks.

Keywords: Extruded potato snack; Odor-active compound isolation; Flavor; Extraction methods; SPME; SAFE; SDE; GCO; Food composition; Food analysis

Suzanne T.E. Lommen, Cock W. Middendorp, Carola A. Luijten, Jeroen van Schelt, Paul M. Brakefield, Peter W. de Jong, Natural flightless morphs of the ladybird beetle *Adalia bipunctata* improve biological control of aphids on single plants, *Biological Control*, Volume 47, Issue 3, December 2008, Pages 340-346, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.09.002.

(<http://www.sciencedirect.com/science/article/B6WBP-4TDC0DH-1/2/f97e4dede5fe137fe420710f73952ddf>)

Abstract:

The challenge of using ladybird beetles for biological control of insect pests such as aphids is that the adult beetles tend to fly away from the host plants. Therefore, flightless ladybirds might improve biocontrol. There are several artificial ways to obtain flightless beetles, but it may be preferable to use natural variation in flight ability. We investigated, for the first time, biocontrol by inundative augmentation of natural flightless morphs of the ladybird beetle *Adalia bipunctata*. Microcosm experiments using single leaves with one of three species of aphid revealed no differences in consumption behavior between flightless and winged beetles. Monitoring for 48 h of single, caged pepper plants infested with aphids of *Myzus persicae nicotianae* or *Aulacorthum solani* showed that flightless beetles had a longer residence time on the plants than winged beetles. This only translated into significantly better biocontrol of *M. persicae*. Despite their difference in residence time, both beetle morphs reduced the population growth of *A. solani*. This is probably explained by the tendency of *A. solani* to drop from the plant upon disturbance, and we predict that flightless beetles may outperform winged ones in the long term. Overall, our results provide a proof of principle that natural flightless *A. bipunctata* can improve biocontrol of aphids by ladybird beetles. However, we recognize that the effect of biocontrol will vary with the species of aphid used and that further examination in long term and large scale experiments is required.

Keywords: *Adalia bipunctata*; Aphid pests; Biological control; Consumption; Dispersal behavior; Escape response; Flightless ladybird beetles; Predator

Atif Ahmed Khan, Martti Aho, Wiebren de Jong, Pasi Vainikka, Peter Johannes Jansens, Hartmut Spliethoff, Scale-up study on combustibility and emission formation with two biomass fuels (B quality wood and pepper plant residue) under BFB conditions, *Biomass and Bioenergy*, Volume 32, Issue 12, December 2008, Pages 1311-1321, ISSN 0961-9534, DOI: 10.1016/j.biombioe.2008.03.011.

(<http://www.sciencedirect.com/science/article/B6V22-4SM0XDM-3/2/225feb7c2a36d9ca9e1cdb27cddaf6f4>)

Abstract:

Combustion of two biomass fuels: demolition wood (DW) and pepper plant residue (PPR), was investigated from an emission viewpoint in a 20 kWth fluidized bubbling bed reactor and a 1 MWth fluidized bubbling bed test boiler. Fluidization velocity and boiler output were varied in the larger facility whereas they were kept constant in the smaller reactor. Traditional flue gases were

analyzed. In addition, impactor measurements were carried out to determine the mass flow of the finest fly ash and toxic elements. These measurements were compared with EU emission directives for biomass co-incineration. It was possible to combust DW without operational problems. However, the DW was contaminated with lead, which tended to get strongly enriched in the fine fly ash. Pb tends to be adsorbed on the measurement line surfaces stronger than many other toxic elements and therefore proved difficult to collect and measure. Enrichment of Pb in the fine fly ash can be weakened by co-firing DW with PPR. Increasing the share of PPR up to 50% markedly reduces the toxic metal concentration in the finest fly ash. This, however, leads to increased mass flow of fine fly ash and increases the potential risks of operational problems such as bed agglomeration and fouling.

Keywords: Fluidized bed; Biomass; Toxic emissions; Particulates; Heavy metals; Capsicum annuum

Godfred Darko, Osei Akoto, Dietary intake of organophosphorus pesticide residues through vegetables from Kumasi, Ghana, Food and Chemical Toxicology, Volume 46, Issue 12, December 2008, Pages 3703-3706, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.09.049.

(<http://www.sciencedirect.com/science/article/B6T6P-4TJ1HR5-1/2/ed2bc8bcfae33fa968bf464be38a3855>)

Abstract:

Contamination and health risk hazards of organophosphorus pesticides residues in vegetables were studied. Ethyl-chlorpyrifos, observed at an average level of 0.211 +/- 0.010 mg kg⁻¹ in 42% of tomato, 0.096 +/- 0.035 mg kg⁻¹ in 10% of eggplant and 0.021 +/- 0.013 mg kg⁻¹ in 16% of pepper was below the 0.5 mg kg⁻¹ MRL. Dichlorvos was the most frequently detected residue in all the samples analyzed. Levels of malathion in tomatoes (0.120 +/- 0.101 mg kg⁻¹) and pepper (0.143 +/- 0.042 mg kg⁻¹) exceeded the MRL of 0.1 mg kg⁻¹. Health risks were found to be associated with methyl-chlorpyrifos, ethyl-chlorpyrifos, and omethioate in tomatoes and methyl-chlorpyrifos, ethyl-chlorpyrifos, dichlorvos, monocrotophos and omethioate in eggplant. Routine monitoring of these pollutants in food items is required to prevent, control and reduce the pollution and to minimize health risks.

Keywords: ADI; Gas chromatography; Hazard index; MRL; Organophosphorus pesticides; Vegetables

Patricia Agudelo-Romero, Francisca de la Iglesia, Santiago F. Elena, The pleiotropic cost of host-specialization in Tobacco etch potyvirus, Infection, Genetics and Evolution, Volume 8, Issue 6, December 2008, Pages 806-814, ISSN 1567-1348, DOI: 10.1016/j.meegid.2008.07.010.

(<http://www.sciencedirect.com/science/article/B6W8B-4T708B8-1/2/c47bd46f7824f671dd86787a8c3964c9>)

Abstract:

Host-range expansion is thought to allow viruses to broaden their ecological niches by allowing access to new resources. However, traits governing the infection of multiple hosts may decrease fitness in the original one due to the pleiotropic effect of adaptive mutations that may give rise to fitness tradeoffs across hosts. Here, we have experimentally examined the consequences of host-specialization in the plant pathogen Tobacco etch potyvirus (TEV). Replicate populations of TEV were allowed to evolve for 15 serial undiluted passages on the original tobacco host or on pepper, a novel host. Virulence and biologically active viral load were evaluated during the course of the experiment for each lineage on both potential hosts. In agreement with the tradeoff hypothesis, lineages evolved in the novel host experienced substantial increases in virulence and virus accumulation in its own host, but suffered reduced virulence and accumulation on the original host. By contrast, lineages evolved on the ancestral host did not increase virulence or viral load on either host. Genomic consensus sequences were obtained for each lineage at the end time point.

The potential relevance for the evolution of virulence and virus fitness of the characterized mutations is discussed.

Keywords: Adaptation; Experimental evolution; Evolution of virulence; Plant virus; Specialization; Tradeoffs; Virus evolution

Romain Richoux, Marie-Bernadette Maillard, Jean-Rene Kerjean, Sylvie Lortal, Anne Thierry, Enhancement of ethyl ester and flavour formation in Swiss cheese by ethanol addition, *International Dairy Journal*, Volume 18, Issue 12, December 2008, Pages 1140-1145, ISSN 0958-6946, DOI: 10.1016/j.idairyj.2008.05.011.

(<http://www.sciencedirect.com/science/article/B6T7C-4STYTT6-1/2/bf7c8012ebb1b29a31df4a662dd92ce6>)

Abstract:

Esters are common flavour compounds of cheese. Our aim was to investigate the impact of esters on the flavour of Swiss cheese. Swiss cheeses were manufactured without (controls) or with (E) addition of ethanol to induce variations in ethyl ester concentrations. Cheese flavour was characterized by quantitative and qualitative (frequency of perception of 53 attributes) sensory evaluation. E cheeses contained ~9 times more ethanol (137 $\mu\text{g g}^{-1}$) and ~30 times more ethyl esters (26-172 ng g^{-1}) than the controls. All cheeses had a typical Swiss cheese flavour. However, E cheeses were characterized by greater frequencies of perception of 'apricot/peach', 'caramel', 'pear', and 'pepper' odours, 'walnut' aroma, and a lower frequency of 'soap' odour and 'cooked cabbage' aroma. These results confirm that ethanol limits ethyl ester synthesis in Swiss cheese, show that moderate concentrations of ethanol are sufficient to induce perceptible flavour changes, and open new possibilities to diversify cheese flavour.

M. Ozdemir, Banu F. Ozen, Lisa L. Dock, John D. Floros, Optimization of osmotic dehydration of diced green peppers by response surface methodology, *LWT - Food Science and Technology*, Volume 41, Issue 10, December 2008, Pages 2044-2050, ISSN 0023-6438, DOI: 10.1016/j.lwt.2008.01.010.

(<http://www.sciencedirect.com/science/article/B6WMV-4RR900R-4/2/46dcbbd93305236845185e995f673f09>)

Abstract:

Osmotic dehydration of diced green peppers was optimized with respect to temperature (20-40 $[\text{degree sign}]\text{C}$), time (15-600 min), salt (0-10 g/100 g) and sorbitol (0-10 g/100 g) concentrations through response surface methodology. Water loss (WL), solids gain (SG), salt uptake (SA) and sorbitol uptake (SO) were the responses in a 24 central composite rotatable design. Models developed for all responses were significant ($p \leq 0.01$) without significant lack of fit. Results suggested that optimum processing conditions of 5.5 g salt/100 g and 6 g sorbitol/100 g at 30 $[\text{degree sign}]\text{C}$ after 240 min would result in WL = 23.3%, SG = 4.1%, SA = 8 g/100 g dry pepper and SO = 2.4 g/100 ml extract.

Keywords: Osmotic dehydration; Green pepper; Optimization; Response surface methodology

Paul E. Hargraves, Allelopathy at the land/sea interface: Microalgae and Brazilian pepper, *Marine Environmental Research*, Volume 66, Issue 5, December 2008, Pages 553-555, ISSN 0141-1136, DOI: 10.1016/j.marenvres.2008.08.006.

(<http://www.sciencedirect.com/science/article/B6V7H-4T9CCVM-1/2/52e48cf90dcae862a5be8b183e66352f>)

Abstract:

Microalgae are significant contributors to biodiversity and primary production in shallow coastal habitats. The invasive Brazilian pepper (*Schinus terebinthifolius*) can occupy former mangrove habitats in disturbed areas, and its allelopathic capability can affect growth rates of microalgae. The four microalgae tested against dilution extracts of *Schinus* fruits varied in their growth

response, suggesting variable but unpredictable impacts on microalgal biodiversity, primary production, and community structure.

Keywords: Microalgae; Brazilian pepper; *Schinus terebinthifolius*; Diatom; Allelopathy; Invasive species; Land/sea interface

Ai Mey Chuah, Ya-Chi Lee, Tomoko Yamaguchi, Hitoshi Takamura, Li-Jun Yin, Teruyoshi Matoba, Effect of cooking on the antioxidant properties of coloured peppers, *Food Chemistry*, Volume 111, Issue 1, 1 November 2008, Pages 20-28, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2008.03.022.

(<http://www.sciencedirect.com/science/article/B6T6R-4S21TT4-6/2/2e520e65da4f7ccd126f049fb85c17b9>)

Abstract:

Pepper (*Capsicum annum* L.) has long been recognized as an excellent source of antioxidants, being rich in ascorbic acid and other phytochemicals. This study was conducted to investigate the effect of different cooking methods on the antioxidant properties of coloured peppers. Six varieties of peppers were subjected to different cooking methods, such as microwave heating, stir-frying and boiling in water, for 5 min individually. The cooked and raw peppers were analyzed for radical-scavenging activity (RSA) and total polyphenol content (TP) using 1,1-diphenyl-2-picrylhydrazyl-high-pressure liquid chromatography (DPPH)-HPLC and Folin-Ciocalteu methods, respectively. The samples were also evaluated for ascorbic acid content (AsA) by HPLC. Total carotenoid content was determined spectrophotometrically. Results suggest that there is no significant ($P > 0.05$) difference in RSA, TP, AsA and total carotenoid contents between the cooked and raw peppers when processed for 5 min. However, the cooked peppers show marked differences ($P < 0.05$) in the RSA, TP and AsA when cooked for 5 min in boiling water with further reduction observed after boiling for 30 min. This may be due to the leaching of antioxidant compounds from the pepper into the cooking water during the prolonged exposure to water and heat. Therefore, it is vital to use less water and cooking time and also to consume the water used for boiling so as to obtain the optimum benefits of bioactive compounds present in peppers. It is concluded that microwave heating and stir-frying without using water are more suitable cooking methods for pepper, to ensure the maximum retention of antioxidant molecules.

Keywords: Antioxidant properties; Pepper; Cooking; Radical scavenging activity; Ascorbic acid; Total polyphenol content

D.D. Wadikar, T.K. Majumdar, C. Nanjappa, K.S. Premavalli, A.S. Bawa, Development of shelf stable pepper based appetizers by response surface methodology (RSM), *LWT - Food Science and Technology*, Volume 41, Issue 8, November 2008, Pages 1400-1411, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.09.005.

(<http://www.sciencedirect.com/science/article/B6WMV-4PPW7B1-1/2/612b5caacb081224cd68a58603693453>)

Abstract:

The paper deals with three pepper-based appetizers developed in the form of convenient beverage mixes. The optimization of ingredients in the formulations of spiced drink mix, spiced tomato mix and chakota soup mix was achieved using response surface methodology with statistical design software. The active ingredient pepper was 1.5 and 2.8/100 g as black pepper and 9/100 g as white pepper with total pungency (expressed as piperine, g/100 g) of 0.08, 0.155, 0.155 in spiced drink mix, chakota soup mix and spiced tomato mix, respectively. The appetizer mixes packed in paper/Al foil/ polythene (PFP) and polypropylene (PP) pouches were stored at ambient temperature as well as 37 [degree sign]C. Periodic evaluation (2-months interval) revealed that spice drink mix and spiced tomato mix had a shelf life of 6 months, while it was 8 months for chakota soup mix packed in PFP pouches under ambient conditions (18-33 [degree sign]C).

Keywords: Appetizer; Pepper; Convenience beverage mixes; Response surface methodology (RSM); Pungency; Storage stability

Fabrice Houdusse, Maria Garnica, Angel M. Zamarreno, Jean Claude Yvin, Josemaria Garcia-Mina, Possible mechanism of the nitrate action regulating free-putrescine accumulation in ammonium fed plants, *Plant Science*, Volume 175, Issue 5, November 2008, Pages 731-739, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2008.07.008.

(<http://www.sciencedirect.com/science/article/B6TBH-4T4HP15-3/2/f96dd8594d8497c2ccc0e81ba4265200>)

Abstract:

In order to investigate the possible involvement of nitrate in regulating free-putrescine accumulation induced by ammonium nutrition, we studied the plant concentration of free, non-covalently conjugated and covalently conjugated polyamines associated with nitrogen nutrition involving different nitrogen forms (ammonium and nitrate) in two plant species: wheat and pepper grown in saline and no saline conditions.

Our results showed that the beneficial action of NO₃⁻ alleviating the negative effects of NH₄⁺ nutrition on plant growth seems to be mediated by a complementary action decreasing the pool of total putrescine within the plant, and increasing putrescine conjugation, principally in the non-covalent forms. This effect is accompanied by a clear decrease in the value of the free putrescine: (free spermidine + free spermine) ratio, which is also associated with a better plant growth under saline stress. Salinity affected the concentration of total polyamines, principally putrescine, in the plant differently depending on the nitrogen form. However, salinity did not significantly affect the conjugation pattern of putrescine.

Keywords: Pepper; Wheat; Polyamines; Putrescine; Nitrate; Ammonium

E. Balazs, A. Bukovinszki, M. Csanyi, G. Csillery, Z. Diveki, I. Nagy, J. Mityko, K. Salanki, V. Mihalka, Evaluation of a wide range of pepper genotypes for regeneration and transformation with an *Agrobacterium tumefaciens* shooter strain, *South African Journal of Botany*, Volume 74, Issue 4, November 2008, Pages 720-725, ISSN 0254-6299, DOI: 10.1016/j.sajb.2008.05.005.

(<http://www.sciencedirect.com/science/article/B7XN9-4T083FJ-1/2/59861eaf1f2f2a94aafc1b65ac3a0e63>)

Abstract:

A regeneration protocol developed for the *Agrobacterium tumefaciens*-mediated transformation of pepper (*Capsicum annum* L.) was used to evaluate the potential for genetic transformation of 107 doubled haploid (DH) pepper genotypes belonging to 12 main cultivar groups. The genotypes were scored on the basis of the ratio of regenerated shoots compared to the commercial cultivar Feherozon, which exhibited 30-70% regeneration from the total number of explants. Fifty DH genotypes responded, representing all the of the main cultivar groups, 31 of which showed regeneration frequencies similar to or better than cv. Feherozon. By using a shooter strain with a binary vector harbouring the cucumber mosaic virus (CMV) coat protein (CP) gene and selecting regenerants on media containing kanamycin, the transformability of the pepper genotypes as well as resistance to CMV were simultaneously analyzed. The regenerated plants were selected and tested by PCR to detect the CP gene. Eighteen PCR-positive DH plants and six PCR-positive commercial Feherozon cultivar plants were regenerated and rooted by grafting. In the case of three transgenic genotypes, presence of the CMV CP was confirmed by PCR in the T1 generation indicating the stable integration of the CP gene. In the progeny of one DH genotype of the Demre type, the presence of the transgene as well as resistance to the virus were demonstrated in the T2 generation.

Keywords: Doubled haploid transgenic cultivars; Pepper regeneration; Transgenic virus resistance

Marleny Burkett-Cadena, Nancy Kokalis-Burelle, Kathy S. Lawrence, Edzard van Santen, Joseph W. Kloepper, Suppressiveness of root-knot nematodes mediated by rhizobacteria, *Biological Control*, Volume 47, Issue 1, October 2008, Pages 55-59, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.07.008.

(<http://www.sciencedirect.com/science/article/B6WBP-4T3DCVF-5/2/ff0cbb18c6ae2197c4acffaf3167372d>)

Abstract:

Plant growth-promoting rhizobacteria (PGPR) are beneficial bacteria that colonize the rhizosphere and plant roots resulting in enhancement of plant growth or protection against certain plant pathogens. Studies were conducted to test the hypothesis that induction of soil suppressiveness against *Meloidogyne incognita* using rhizobacterial inoculants is related to soil microbial activity and rhizosphere bacterial populations. Commercially-available rhizobacterial inoculants (Equity(R), BioYield(R), and AgBlend(R)) and FZB42, strain in the product RhizoVital(R), were selected based on elicitation of growth promotion in tomato and pepper in previous tests. The inoculants Equity (multiple strains), BioYield (two strains), and FZB42 induced significant reductions in nematode eggs per gram root, juvenile nematodes per ml of soil, and galls per plant on tomato. AgBlend, containing microbial metabolites, reduced number of galls. Treatment with each of the inoculants also increased root weight. Rhizosphere populations of total bacteria and aerobic endospore-forming bacteria (AEFB) were increased following treatment with AgBlend, BioYield and FZB42. Strain FZB42 had a unique colony morphology, allowing its detection in the rhizosphere where it became the dominant strain. Soil microbial activity, as assessed by fluorescein diacetate hydrolysis, was not affected by inoculants. These results indicate that the selected microbial inoculants increase rhizosphere bacterial populations, and in the case of FZB42, actively colonize the rhizosphere, thereby inducing suppressiveness to nematodes, without necessarily enhancing soil microbial activity. Further, induction of soil suppressiveness against *M. incognita* was related to bacterial population size in the rhizosphere, when inoculants that contained two PGPR strains and also microbial metabolites were used.

Keywords: Bacterial density; *Bacillus amyloliquefaciens*; Fluorescein diacetate hydrolysis; Microbial activity; Rhizobial inoculants; Root-knot nematode; Suppressiveness; *Meloidogyne incognita*

Tyler L. Harp, Ken Pernezny, Melanie L. Lewis Ivey, Sally A. Miller, Paul J. Kuhn, Lawrence Datnoff, The etiology of recent pepper anthracnose outbreaks in Florida, *Crop Protection*, Volume 27, Issue 10, October 2008, Pages 1380-1384, ISSN 0261-2194, DOI: 10.1016/j.cropro.2008.05.006.

(<http://www.sciencedirect.com/science/article/B6T5T-4SVD171-1/2/494e083a11ba82552f5f77559e70a5eb>)

Abstract:

Within the last 4-6 years, anthracnose has become an increasingly serious disease on un-ripe, immature (green) pepper fruit in Florida. This contrasts with earlier reports of anthracnose as strictly a ripe-rot disease of ripened (usually red) pepper fruit. The species of *Colletotrichum* associated with anthracnose on both immature and ripe pepper fruit in Florida was identified. Based on reactions with polymerase chain reaction (PCR)-specific primers, 28 of 50 isolates associated with anthracnose lesions from Florida were identified as *Colletotrichum acutatum*, including 22 of 22 recovered from immature fruit. Six of the *C. acutatum* isolates were associated with typical lesions on ripe fruit, but only in fields where lesions on immature fruit were also observed. In contrast, all 17 isolates identified by PCR as *Colletotrichum gloeosporioides* were recovered from lesions found only on ripe fruit from fields where no lesions on immature fruit were initially observed. No isolates were identified as *Colletotrichum capsici* or *Colletotrichum coccodes*. Isolates of *C. gloeosporioides* grew up to twice as fast in vitro as isolates of *C. acutatum*, suggesting a way to tentatively differentiate pepper isolates without PCR testing. In addition, *C.*

gloeosporioides produced conidia that were longer and wider than those produced by *C. acutatum*. The name 'early anthracnose' is proposed for the disease on immature fruit caused by *C. acutatum*.

Keywords: *Capsicum annuum*; Hemi-biotroph; Necrotroph

Jorg Fichtel, Henrik Sass, Jurgen Rullkotter, Assessment of spore contamination in pepper by determination of dipicolinic acid with a highly sensitive HPLC approach, *Food Control*, Volume 19, Issue 10, October 2008, Pages 1006-1010, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2007.09.006.

(<http://www.sciencedirect.com/science/article/B6T6S-4PV2RVT-1/2/d2dd8919ada0fe677adf01bbb350c086>)

Abstract:

A protocol for quantification of dipicolinic acid (DPA) in spices by high-performance liquid chromatography (HPLC) with post-column complexation and fluorescence detection was developed. DPA is a specific component of bacterial endospores and can be used for rapid assessment of endospore contamination without the need of cultivation. The highly sensitive approach was used to determine the DPA contents of whole black, white and green peppercorns. For conversion into endospore numbers, the DPA content of endospores of *Bacillus subtilis*, one of the most frequently detected species of spore-forming bacteria in pepper, was used. Estimated total spore numbers were highest for black pepper (1.6×10^8 spores g^{-1}), for white and green pepper lower endospore loads were determined (about 8×10^7 spores g^{-1} in each case).

Keywords: Pepper; Spices; Endospores; Dipicolinic acid; HPLC; Post-column complexation; Terbium dipicolinate fluorescence; Difference chromatograms

Mee Kyung Sang, Se-Chul Chun, Ki Deok Kim, Biological control of *Phytophthora* blight of pepper by antagonistic rhizobacteria selected from a sequential screening procedure, *Biological Control*, Volume 46, Issue 3, September 2008, Pages 424-433, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.03.017.

(<http://www.sciencedirect.com/science/article/B6WBP-4S6P214-2/2/68f131a40906edb6eed67d52883b90ba>)

Abstract:

This study was conducted to select antagonistic rhizobacteria against *Phytophthora capsici* using a sequential screening procedure and to evaluate control efficacy of drench or root-dip treatments with the selected strains against *Phytophthora* blight of pepper in the field. Out of 439 bacterial strains, 16 potentially antagonistic strains were screened through radicle and seedling assays and in planta trials, and five candidate strains, CCR04, CCR80, GSE09, ISE13, and ISE14, were selected for field tests. In 2005 and 2006 tests, the control efficacy of the five strains was examined against *Phytophthora* blight of pepper plants drenched with the bacterial suspension in artificial pathogen inoculation. Three strains, CCR04, CCR80, and ISE14, consistently reduced the disease in both tests. As another form of application, the control efficacy of root-dip treatment was examined on pepper plants just prior to transplanting in the field with natural inoculation in 2006 and 2007. In these tests, four strains, CCR04, CCR80, GSE09, and ISE14, showed consistently good control efficacy against *P. capsici*, and strains CCR80 and ISE14 increased pepper fruit yield. The strain-treated roots had less infection rates by *P. capsici* compared with control roots regardless of drench or root-dip treatments. In addition, the strains did not affect the populations of bacteria and fungi in the rhizosphere soil. Therefore, the antagonistic strains selected from the screening procedure provided significant protection against *P. capsici* through pepper root colonization. These strains could be applied by either drench or root-dip treatment as alternatives to agricultural chemicals to control *Phytophthora* blight of pepper.

Keywords: Antagonistic bacteria; Biological control; Pepper; *Phytophthora capsici*

J.P. Kapongo, L. Shipp, P. Kevan, J.C. Sutton, Co-vectoring of *Beauveria bassiana* and *Clonostachys rosea* by bumble bees (*Bombus impatiens*) for control of insect pests and suppression of grey mould in greenhouse tomato and sweet pepper, *Biological Control*, Volume 46, Issue 3, September 2008, Pages 508-514, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.05.008.

(<http://www.sciencedirect.com/science/article/B6WBP-4SM1TD4-4/2/d1c6bc6b13dfa83bbb679740d224c0fe>)

Abstract:

Greenhouse cage trials were conducted to assess the effectiveness of bumble bee pollinators for the co-vectoring of two fungi (*Beauveria bassiana* [Balsamo] Vuillemin [BotaniGard 22WP(R) formulation] and *Clonostachys rosea* Lnk: Fr. [Endofine(R)]), in greenhouse tomato and sweet pepper for control of insect pests (greenhouse whitefly, *Trialeurodes vaporariorum* Westwood; and tarnished plant bug, *Lygus lineolaris* [Palisot de Beauvois]), and grey mould (*Botrytis cinerea* Pers: Fr.). Three treatments were evaluated: 6.24×10^{10} conidia of *B. bassiana* + 1.38×10^7 conidia of *C. rosea*/g of inoculum vectored by bees (active inoculum); heat-inactivated inoculum vectored by bees; and a control with no inoculum and no bees. In each crop, the treatments were arranged in a completely randomized block design with four replications. When applied in the tomato crop, the active inoculum killed 49% of the *T. vaporariorum* and suppressed grey mould by 57% and 46%, respectively, on the flowers and leaves. In sweet pepper, mortality of *L. lineolaris* was 73% and grey mould was suppressed by 59% and 47%, respectively, on the flowers and leaves in the active inoculum treatment. The incidence of grey mould in sweet pepper and tomatoes treated with the heat-inactivated inoculum or no inoculum (control) was approximately 80% on the flowers and leaves. Thus, the combined inoculum of *B. bassiana* and *C. rosea* can potentially control *T. vaporariorum* and *L. lineolaris*, and suppress grey mould in greenhouse tomatoes and sweet peppers, when vectored simultaneously by bumble bees. Commercial greenhouse trials need to be conducted next to determine control efficacy under large scale production conditions.

Keywords: *Beauveria bassiana*; *Bombus impatiens*; *Botrytis cinerea*; *Clonostachys rosea*; *Lygus lineolaris*; *Trialeurodes vaporariorum*; Greenhouse tomato and sweet pepper

Abdulrahman O. Musaiger, Jassim H. Al-Jedah, Reshma D'souza, Occurrence of contaminants in foods commonly consumed in Bahrain, *Food Control*, Volume 19, Issue 9, September 2008, Pages 854-861, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2007.08.011.

(<http://www.sciencedirect.com/science/article/B6T6S-4PJ04VH-3/2/3b5032a7b3b59136f0927e560e0ac0fb>)

Abstract:

The occurrence of mycotoxins (aflatoxins, zearalenone, deoxynivalenol), heavy metals and pesticide residues in 198 susceptible food commodities available in Bahrain was determined. Aflatoxins were found in many of the foods tested and three samples of red chili powder (35.9, 52.6 and 69.2 ng/g), one sample of black pepper powder (27.7 ng/g) and one sample of unshelled pistachio nuts (81.6 ng/g) exceeded the maximum allowable limit of aflatoxins. Zearalenone was present in some samples including cornflakes (3.1 ng/g) and crushed wheat (0.3 ng/g). Although many samples contained heavy metals, one sample of cinnamon powder (13.0 [µg/g]) and one sample of black pepper powder (11.2 [µg/g]) exceeded the maximum allowable limit for lead. The average levels of cadmium were highest in cinnamon powder (0.3 [µg/g]) and ginger powder (0.3 [µg/g]). Some amount of pesticides was found in cumin powder (0.06 [µg/g] of lindane), turmeric powder (0.04 [µg/g] heptachlor) and coriander powder (0.4 [µg/g] permethrin). Almonds, peanuts, cashew nuts infant formulas were free of contaminants. Although the contamination of most foods in Bahrain was within the limit, strengthening of the food control systems is important.

Keywords: Mycotoxins; Heavy metals; Pesticides

Jintanaporn Wattanathorn, Pennapa Chonpathompikunlert, Supaporn Muchimapura, Aroonsri Priprem, Orathai Tankamnerdthai, Piperine, the potential functional food for mood and cognitive disorders, *Food and Chemical Toxicology*, Volume 46, Issue 9, September 2008, Pages 3106-3110, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.06.014.

(<http://www.sciencedirect.com/science/article/B6T6P-4SW145J-2/2/eaf4189ce8e4765e578012714dbd8b71>)

Abstract:

The effect of piperine, the main alkaloid from *piper nigrum*, on the central nervous system is not clearly known until now. In the present study, male Wistar rats were administered piperine at various doses ranging from 5, 10 and 20 mg/kg BW once daily for 4 weeks and the animals were determined the neuropharmacological activity after single, 1, 2, 3 and 4 weeks of treatment. The results showed that piperine at all dosage range used in this study possessed anti-depression like activity and cognitive enhancing effect at all treatment duration. Therefore, piperine may be served as the potential functional food to improve brain function. However, further investigations about precise underlying mechanism are still required.

Keywords: Piperine; Anti-depression like activity; Cognitive enhancing effect; Spatial memory

M.M. Gonzalez-Real, A. Baille, H.Q. Liu, Influence of fruit load on dry matter and N-distribution in sweet pepper plants, *Scientia Horticulturae*, Volume 117, Issue 4, 18 August 2008, Pages 307-315, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.05.026.

(<http://www.sciencedirect.com/science/article/B6TC3-4SXS3FF-6/2/71031cf00ef8b077675e9d06105a9458>)

Abstract:

The influence of fruit load on the leaf characteristics and on the distribution of dry matter (DM) and nitrogen (N) in sweet pepper (*Capsicum annuum* L., cv. Cornado) plants was investigated under Mediterranean glasshouse conditions during a winter-spring production cycle (from December till June). DM weight of all organs (roots, stems + petioles, leaves and fruits) and N content were determined throughout the growing cycle over a 3-week interval. The results showed that the cyclic fruit load pattern (production flushes) was associated with strong variations of N-leaf content on an area basis and specific leaf weight, SLW. On a whole plant scale, the value of SLW dramatically decreased ([approximate]30%) with increasing fruit load; the reverse held true as long as the fruit dry weight remained low (<30 g pl⁻¹). The decline in SLW was coincident with a shift in distribution of DM and N in the plant, both preferentially diverted to the fruits. The time evolution of DM and N fractions in organs exhibited periodic fluctuations, with a duration close to the length of a fruit growth cycle (about 70 days, from anthesis to harvest). Linear relationships were found between the fraction of dry mass and N in fruits, and those of the other organs. The slope of these relationships was considered as an indicator of the response and sensitivity of the organ growth to an increase in fruit load. The root dry mass fraction was the most affected by increases in fruit load (slope of -0.75), while the N fraction in roots and in leaves was affected to a similar extent (slope of -0.50 and of -0.40, respectively). We conclude that, in the sweet pepper, the cyclic pattern of fruit load induces opposite cyclic patterns of dry matter and N content in the other aerial organs as well as in the roots, thereby reflecting close shoot-root coordination in the allocation of carbon and nitrogen resources among the organs. Finally, we discuss the possible implications that could derive from these findings for modelling dry matter partitioning in plants subjected to continuous fruit harvesting.

Keywords: Plant nitrogen partitioning; Leaf nitrogen content; Fruit sink strength; Organs dry mass fraction; Organs nitrogen fraction; Functional equilibrium

F.M. del Amor, A. Serrano-Martinez, M.I. Fortea, P. Legua, E. Nunez-Delicado, The effect of plant-associative bacteria (*Azospirillum* and *Pantoea*) on the fruit quality of sweet pepper under limited

nitrogen supply, *Scientia Horticulturae*, Volume 117, Issue 3, 23 July 2008, Pages 191-196, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.04.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4SMF2HH-2/2/75655f6a3e340ab80b0ed27e2949560e>)

Abstract:

This study investigates the influence of a commercial product, Biopron(R), consisting of the bacteria *Azospirillum brasilense* and *Pantoea dispersa* on sweet pepper fruits (*Capsicum annuum* L.) under limited N supply. When the N supply was reduced from 12 (control) to 7 mmol L⁻¹, the concentration of total-N in the fruits was significantly reduced in both inoculated and non-inoculated plants. The N supply or inoculation did not affect the dry matter content or fruit firmness, but non-inoculated fruit with low N showed a decrease in pericarp thickness and a significant increase in the color parameter a* compared with the control. Under limited N, inoculation increased the concentration of citric, ascorbic and succinic acids in green fruit compared with non-inoculated fruit, which showed lower values than control fruit. At a later (yellow) stage of development, only succinic acid showed a response to inoculation. Fruit peroxidase (EC 1.11.1.7) activity in fruit of inoculated plants was lower than that observed for non-inoculated fruit grown at both high- and low-N. In contrast, in yellow fruit, total phenolic compounds were increased under N limitation, with no inoculation effect. Our study shows that the effect of plant associative bacteria is not directly related with the increased potential availability of nutrients for uptake, especially for fruit quality characteristics.

Keywords: Rhizobacteria; Biofertilizers; N efficiency; Color; Organic acids; Peroxidase; Phenolics; Soilless

Cristina Silvar, Fuencisla Merino, Jose Diaz, Differential activation of defense-related genes in susceptible and resistant pepper cultivars infected with *Phytophthora capsici*, *Journal of Plant Physiology*, Volume 165, Issue 10, 7 July 2008, Pages 1120-1124, ISSN 0176-1617, DOI: 10.1016/j.jplph.2007.11.008.

(<http://www.sciencedirect.com/science/article/B7GJ7-4RW4RRK-6/2/ab5c4dfbcd42296158f8626232bbb45b>)

Abstract: Summary

This study investigated the expression pattern of genes encoding for a basic PR-1 protein, a basic [beta]-1,3-glucanase, a peroxidase, and a sesquiterpene cyclase involved in defense responses in three pepper cultivars with different levels of resistance to *Phytophthora capsici*. All genes were up-regulated in infected stems of the pepper cultivars, with expression being detected 8 h post-inoculation. mRNA levels of these genes increased markedly by 24 h post-inoculation, and maximal induction levels were observed for the PR-1 and sesquiterpene cyclase genes. PR-1, peroxidase, and sesquiterpene genes were always expressed at higher levels in resistant cultivars than in the susceptible cultivar, although up-regulation was observed in both, suggesting that the differences between these pepper genotypes in susceptibility and resistance are a matter of the timing and magnitude of the defense response.

Keywords: *Capsicum annuum*; Glucanase; Peroxidase; PR-1; Sesquiterpene cyclase

P. Pittia, R. Furlanetto, M. Maifreni, F. Tassan Mangina, M. Dalla Rosa, Safe cooking optimisation by F-value computation in a semi-automatic oven, *Food Control*, Volume 19, Issue 7, July 2008, Pages 688-697, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2007.07.008.

(<http://www.sciencedirect.com/science/article/B6T6S-4P7FSB9-2/2/79781f0ab47147a3123a74d71a30111f>)

Abstract:

Cooking represents an important step in food processing for both sensorial and safety aspects. Aim of this study was to optimise the cooking cycles of a semi-automatic oven by definition and settling of minimum thermal conditions to guarantee safety while keeping sensorial quality of

cooked foods. To this purpose, the heat penetration curves and the correspondent thermal lethality effect (FT) of cooking cycles conventionally adopted to prepare some foods and dishes characterised by different microbial risk (high: lasagne pie, meat minced roll, meat filled peppers; standard: spinach and salmon), were determined. On the basis of the microbial quality and the desired safety level, minimum thermal conditions ($F_{71.1} = 5$ min and $T = 75$ [degree sign]C at the slowest heating point of the food) were defined and settled in the electronics of the oven. These conditions were found to determine a sufficient number of log reduction of both total microbial count and coliforms able to guarantee safety as well as sensory quality at consumption. The oven with modified electronics during the heating step of cooking cycles records in real time the temperature in the product by a multipoint thermocouple, detects the slowest heat penetration curve and computes, by an internal computer the correspondent $F_{71.1}$. After initial setting of the food category, this semi-automatic oven is able to find automatically the proper process conditions during cooking to obtain the correspondent FT, to let the cooking stop at the end of the recipe or to conduct the thermal treatment till the reaching of the set FT according to the risk category chosen before cooking start.

Keywords: $F_{71.1}$; Safety; Semi-automatic oven; Cooking; Food quality

P. Pagamas, E. Nawata, Sensitive stages of fruit and seed development of chili pepper (*Capsicum annuum* L. var. Shishito) exposed to high-temperature stress, *Scientia Horticulturae*, Volume 117, Issue 1, 12 June 2008, Pages 21-25, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.03.017.

(<http://www.sciencedirect.com/science/article/B6TC3-4SFR7W6-1/2/8b73bdb41c463ad908e02cfabe153411>)

Abstract:

The sensitivity of developmental stages to high temperature was investigated in chili pepper (*Capsicum annuum* L. var. Shishito). Plants were subjected to heat stress (38/30 [degree sign]C day/night) immediately after anthesis for 5 or 10 days, or from 10 to 30 days after anthesis (DAA), from 30 DAA until harvest of the seeds, or immediately after anthesis until harvest of the seeds. Control plants were grown at 30/22 [degree sign]C (day/night). Exposure to high temperature (heat stress) during different periods of development after anthesis adversely affected fruit growth, seed yield, and seed quality in chili pepper. Heat stress for the whole period after anthesis, and from 30 DAA until harvest reduced the growth period of chili fruits by 15 and 10 days, respectively. Heat stress from 10 to 30 DAA reduced fruit width and fruit weight. The early stage of seed development from anthesis until 10 DAA was sensitive to high temperature, which affected fruit length, fruit weight and seed set. Applying high temperatures to plants for 10 DAA increased the proportion of abnormal seeds per fruit. High temperatures from 10 DAA until 30 DAA inhibited carbohydrate accumulation and adversely affected seed germinability and vigor. These results suggest that the stage of development at which chili peppers are exposed to high temperatures is an important factor in fruit and seed growth and in seed quality.

Keywords: Fruit growth; Germination; Heat; Seed vigor

Ekaterini Riga, Lawrence A. Lacey, Neussa Guerra, *Muscodor albus*, a potential biocontrol agent against plant-parasitic nematodes of economically important vegetable crops in Washington State, USA, *Biological Control*, Volume 45, Issue 3, June 2008, Pages 380-385, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2008.01.002.

(<http://www.sciencedirect.com/science/article/B6WBP-4RJYV69-2/2/406af32d1c70973e57a433eba0ecf554>)

Abstract:

The fungus, *Muscodor albus*, was tested for nematocidal and nematostatic potential against four plant-parasitic nematode species with three different feeding modes on economically important vegetable crops in the Pacific Northwest. *Meloidogyne chitwoodi*, *Meloidogyne hapla*, *Paratrichodorus allius*, and *Pratylenchus penetrans* were exposed for 72 h to volatiles generated

by *M. albus* cultured on rye grain in sealed chambers at 24 [degree sign]C in the laboratory. In addition, the nematodes were inoculated into soil fumigated with *M. albus*, and incubated for 7 days prior to the introduction of host plants under greenhouse conditions. The mean percent mortality of nematodes exposed to *M. albus* in the chamber was 82.7% for *P. allius*, 82.1% for *P. penetrans*, and 95% for *M. chitwoodi*; mortality in the nontreated controls was 5.8%, 7%, and 3.9%, respectively. Only 21.6% of *M. hapla* juveniles died in comparison to 8.9% in controls. However, 69.5% of the treated juveniles displayed reduced motility and lower response to physical stimulus by probing, in comparison to the control juveniles. This is evidence of nematostasis due to *M. albus* exposure. The greenhouse study showed that *M. albus* caused significant reduction to all nematode species in host roots and in rhizosphere soil. The percent mortality caused by *M. albus* applied at 0.5% and 1.0% w/w in comparison to the controls was as follows: 91% and 100% for *P. allius* in the soil; 100% for *P. penetrans* in bean roots and soil; 85% and 95% for *M. chitwoodi* in potato roots, and 56% and 100% in the soil; 100% for *M. hapla* both in pepper roots and soil. In this study, *M. albus* has shown both nematostatic and nematocidal properties.

Keywords: Biological control; *Muscodor albus*; *Meloidogyne chitwoodi*; *Meloidogyne hapla*; Nematocidal; Nematostatic; *Paratrichodorus allius*; *Pratylenchus penetrans*; Vegetable crops

M.A.B. Herman, B.A. Nault, C.D. Smart, Effects of plant growth-promoting rhizobacteria on bell pepper production and green peach aphid infestations in New York, *Crop Protection*, Volume 27, Issue 6, June 2008, Pages 996-1002, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.12.004.

(<http://www.sciencedirect.com/science/article/B6T5T-4RN485J-1/2/f7a443e0838e1b44a50c52d0655a0d4c>)

Abstract:

Plant growth-promoting rhizobacteria (PGPR) are known in various cropping systems to increase plant growth and vigor, as well as induce resistance to pathogens and pests. A commercial soil amendment containing a mixture of two species of *Bacillus* PGPR (*Bacillus subtilis* and *Bacillus amyloliquefaciens*) was evaluated for impact on germination and initial growth of bell pepper plants, efficacy against the green peach aphid, *Myzus persicae* Sulzer, and yield enhancement. Studies in the greenhouse revealed that pepper germination rate and dry weight of seedlings grown with or without *Bacillus* spp. did not differ significantly. In the field, the PGPR did not significantly reduce aphid populations compared to control plants, whereas imidacloprid was highly effective. An increase in yield compared with control plants was observed in the 2003 season, but not the following two seasons. Aphid pressure was high in 2003, and plants grown in the presence of *Bacillus* spp. exhibited substantial tolerance to aphids. That is, there were significantly higher populations of the green peach aphid on both control and PGPR-treated plants compared with imidacloprid-treated plants. However, fruit yield in the *Bacillus* spp. treatment was significantly greater than yield in the control treatment and similar to yield in insecticide-treated plots. *Bacillus* PGPR could be useful in a *M. persicae* management program for pepper plants grown in locations with consistently high aphid pressure.

Keywords: *Bacillus* spp.; Biological control; *Capsicum annuum*; *Myzus persicae*; Plant growth-promoting rhizobacteria (PGPR)

Karina Di Scala, Guillermo Crapiste, Drying kinetics and quality changes during drying of red pepper, *LWT - Food Science and Technology*, Volume 41, Issue 5, June 2008, Pages 789-795, ISSN 0023-6438, DOI: 10.1016/j.lwt.2007.06.007.

(<http://www.sciencedirect.com/science/article/B6WMV-4P0X5JT-1/2/37f752ec3c85cdb6cbea0adea8316c51>)

Abstract:

A mathematical model is proposed to simulate the process of drying of individual pieces of red pepper under constant external conditions and to predict changes in some nutritional and organoleptic attributes of the product. The model was solved numerically to obtain moisture

content and temperature as well as ascorbic acid and carotenoids concentration in the product as a function of time. A good agreement between predictions and experimental data at different drying temperatures was obtained.

Water sorption isotherms of red pepper were determined in the range 20-50 [degree sign]C and represented by two different sorption equations. Drying kinetics were represented by a diffusive model, the effective moisture diffusivity ranging from 5.01 to 8.32x10⁻¹⁰ m²/s with an activation energy of 23.35 kJ/mol. Degradation kinetics for ascorbic acid and total carotenoids were measured in the range 50-70 [degree sign]C and modelled as first-order reactions. The rate constants increased with temperature and product moisture content. Average activation energies for carotenoids and vitamin C degradation were 50.1 and 26.9 kJ/mol, respectively.

Keywords: Drying; Sorption isotherm; Ascorbic acid; Carotenoids; Red pepper

Masahumi Johkan, Masayuki Oda, Genjiro Mori, Ascorbic acid promotes graft-take in sweet pepper plants (*Capsicum annuum* L.), *Scientia Horticulturae*, Volume 116, Issue 4, 20 May 2008, Pages 343-347, ISSN 0304-4238, DOI: 10.1016/j.scienta.2008.02.004.

(<http://www.sciencedirect.com/science/article/B6TC3-4S5640W-2/2/8c30fb47668a7c0d005d0d2717dea312>)

Abstract:

The cause of the low survival rate of sweet pepper plants after grafting was investigated and compared with findings of eggplant and tomato plants, and the promotive effect of ascorbic acid (AA) was determined. Sweet pepper plants formed less callus at the cut surfaces of the stem compared to eggplant and tomato plants. Foliar application with 100 mg L⁻¹ AA promoted callus formation at the cut surfaces of the scion stems and improved the survival rate after grafting. We suggest that the low survival rate of grafted sweet pepper plants is caused by their low rate of callus formation, and that AA can be used to promote graft-take through the acceleration of callus formation at the cut surfaces of the stems.

Keywords: Callus; *Capsicum*; Grafting; Survival rate

Alon Ben-Gal, Eviatar Ityel, Lynn Dudley, Shabtai Cohen, Uri Yermiyahu, Eugene Presnov, Leah Zigmond, Uri Shani, Effect of irrigation water salinity on transpiration and on leaching requirements: A case study for bell peppers, *Agricultural Water Management*, Volume 95, Issue 5, May 2008, Pages 587-597, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.12.008.

(<http://www.sciencedirect.com/science/article/B6T3X-4RTTKT4-1/2/dc20a716243560bee704951d7dc102a0>)

Abstract:

Maximization of crop yields when the salinity of irrigation water is high depends on providing plant transpiration needs and evaporative losses, as well as on maintaining minimum soil solution salinity through leaching. The effect of the amount of applied irrigation water was studied regarding transpiration, yields, and leaching fractions as a function of irrigation water salinity. Bell pepper (*Capsicum annuum* L. vars. Celica and 7187) in protected growing environments in the Arava Valley of Israel was used as a case study crop to analyze water quantity-salinity interactions in a series of lysimeter, field and model simulation experiments. Leaching fraction was found to be highly influenced by plant feedback, as transpiration depended on root zone salinity. Increased application of saline irrigation water led to increased transpiration and yields. The higher the salinity level, the greater the relative benefit from increased leaching. The extent of leaching needed to maximize yields when irrigating with saline water may make such practice highly unsustainable.

Keywords: Leaching fraction; Irrigation management; Evapotranspiration; Drainage; Lysimeters; Yield; *Capsicum annuum*

Andreas de Neergaard, Jakob Magid, Ole Mertz, Soil erosion from shifting cultivation and other smallholder land use in Sarawak, Malaysia, *Agriculture, Ecosystems & Environment*, Volume 125, Issues 1-4, May 2008, Pages 182-190, ISSN 0167-8809, DOI: 10.1016/j.agee.2007.12.013.

(<http://www.sciencedirect.com/science/article/B6T3Y-4RTTKK8-1/2/a388b198ec713d5ddcf5dabc3773ecdf>)

Abstract:

The sustainability of shifting cultivation systems and their impact on soil quality continues to be debated, and although a growing body of literature shows a limited impact on, e.g. soil carbon stocks, shifting cultivation still has a reputation as detrimental to the environment. We wished to compare soil erosion from three land use types in a shifting cultivation system, namely upland rice, pepper gardens and native forest. We used two sample sites within the humid tropical lowland zone in Sarawak, Malaysia. Both areas had steep slopes between 25[degree sign] and 50[degree sign], and were characterised by a mosaic land use of native forest, secondary re-growth, upland rice fields and pepper gardens. Soil samples were collected to 90 cm depth from all three land use types, and analysed for various chemical parameters, including texture, total organic matter and ¹³⁷Cs content. ¹³⁷Cs is a radioactive isotope derived from nuclear fallout, and was used to estimate the retention of topsoil in the profiles. Soil chemical parameters in upland rice fields, such as extractable cations, pH and conductivity, indicated limited soil transportation downslope, and depletion of cations from upslope samples are most likely caused by leaching and losses via ashes after clearing and burning. The position on slope had no significant effect on soil texture, carbon or P content, indicating very limited physical movement of soil downslope. A soil carbon inventory to 90 cm depth on the three land uses only showed a higher carbon concentration in the top 5 cm of forest and upland rice plots. When corrected for soil density, there was no effect of land use on the carbon inventory. Moreover, the carbon content in the top 30 cm contributed <50% of the total carbon inventory, hence even significant effects of land use on carbon content in the upper soil layers, are unlikely to change the carbon inventory dramatically. ¹³⁷Cs content in the soil profile indicated largest retention of original topsoil in the native forest plots, and a loss of 18 and 35% of topsoil from upland rice and pepper gardens, respectively, over the past 40 years. When comparing to 30 cm depth, soil loss was 30% from both upland rice and pepper fields. Low ¹³⁷Cs activity in deeper soil layers rendered a total profile inventory impossible. It is concluded that shifting cultivation of upland rice in the current system is not leading to degradation of soil chemical and physical quality. The soil carbon inventory is not affected by land use in this analysis, due to the contribution from the deeper soil layers.

Keywords: ¹³⁷Cs; Erosion; Upland rice; Black pepper; Soil carbon; Slash-and-burn; Swidden farming

G.R. Bachman, J.D. Metzger, Growth of bedding plants in commercial potting substrate amended with vermicompost, *Bioresource Technology*, Volume 99, Issue 8, May 2008, Pages 3155-3161, ISSN 0960-8524, DOI: 10.1016/j.biortech.2007.05.069.

(<http://www.sciencedirect.com/science/article/B6V24-4PC4DMS-2/2/5790b5cb4d25bd91a20f24c7b85a33a7>)

Abstract:

Vermicompost has been promoted as a viable alternative container media component for the horticulture industry. The purpose of this research was to investigate the use of vermicompost at different points in the production cycle of tomato, marigold, pepper, and cornflower. The incorporation of vermicompost of pig manure origin into germination media up to 20% v/v enhanced shoot and root weight, leaf area, and shoot:root ratios of both tomato and French marigold seedlings; however amendment with vermicompost had little influence on pepper and cornflower seedling growth. Moreover there was no effect on the germination of seed of any species. When seedlings of tomato, French marigold, and cornflower were transplanted into 6-cell packs there was greater plant growth in media amended with vermicompost compared to the

control media, and the greatest growth when vermicompost was amended into both the germination and transplant media. This effect was increased when seedlings in the transplant media were irrigated with water containing fertilizer.

Keywords: Alternative media; Worm castings; Organic by-products

David L. Ehret, Bernard D. Hill, David A. Raworth, Brad Estergaard, Artificial neural network modelling to predict cuticle cracking in greenhouse peppers and tomatoes, *Computers and Electronics in Agriculture*, Volume 61, Issue 2, May 2008, Pages 108-116, ISSN 0168-1699, DOI: 10.1016/j.compag.2007.09.011.

(<http://www.sciencedirect.com/science/article/B6T5M-4R3BW4C-1/2/52f1db55cd3576272887f577870202cd>)

Abstract:

Cuticle cracking in pepper and tomato fruit was studied in relation to fruit development and modelled with respect to environmental and cultural conditions. All data were collected over a 26-week period from seven commercial greenhouses in British Columbia, Canada. In terms of fruit development, cuticle cracking began one week after the period of maximum fruit growth rate in pepper and progressed the most rapidly over the next two weeks. In tomato, cracking started two weeks after the time of maximum fruit growth rate, increasing steadily thereafter until harvest. Feed-forward artificial neural networks were used to relate cuticle cracking to greenhouse and crop conditions. The incidence of cuticle cracking was initially related to over 20 input variables averaged over one or four weeks prior to the date of cracking assessment. All models were developed using a portion of the data and validated with the remainder. For each dataset, 30 models were analyzed at a time, from which the best models were chosen on the basis of a suitable architecture with a high R² value and a low root mean square error when tested against the validation set using a 10-fold cross-validation procedure. Sensitivity analysis was used to determine the relative importance of each input and to reduce the number of inputs. The best week-1 and week-4 models for pepper consisted of nine inputs, with R² values of 0.71 and 0.70, respectively. Day and night temperature, day-time CO₂, day and night relative humidity, radiation and growing media were inputs held in common by both models. Growing media and cultivar were also important in the week-1 models while EC and week of the year (time) were important in the week-4 models. The best week-1 and week-4 models for tomato also used nine inputs, with R² values of 0.70 and 0.64, respectively. In this case, week of the year, day and night relative humidity, day and night temperature, yield and the number of leaves were common to both models. Fruit size and fruit mass were also important in the week-1 models, while daytime CO₂ and radiation were important in the week-4 models. The study shows that artificial neural networks can be used to predict cuticle cracking in greenhouse peppers and tomatoes up to four weeks in advance of harvest.

Keywords: Artificial neural networks; Cuticle cracking; Greenhouse; Pepper; Russeting; Tomato

Ledicia Rey-Salgueiro, Elena Martinez-Carballo, Mercedes Sonia Garcia-Falcon, Jesus Simal-Gandara, Effects of a chemical company fire on the occurrence of polycyclic aromatic hydrocarbons in plant foods, *Food Chemistry*, Volume 108, Issue 1, 1 May 2008, Pages 347-353, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.10.042.

(<http://www.sciencedirect.com/science/article/B6T6R-4PYGW4W-5/2/e760db05e198e00f3e12f8f6b9731342>)

Abstract:

On Friday, September 1, 2006, the facilities of a chemicals distributor in the Spanish town of Caldas de Reis, were almost completely destroyed as a result of a fire. Comprehensive liquid chromatography-fluorescence detection (LC-FD) analyses were performed on plant foods to determine the toxic impact of this kind of accident on population. PAHs from a polluted atmosphere are generally transferred to plants by particle-phase deposition on the waxy leaf

cuticle or by uptake in the gas phase through stomata. PAH levels in all samples were not alarming (total PAHs were below 4.240 ng/g) and the PAH profiles were similar, with the exception of peppers, in all vegetal materials (5-to-4 rings ratio of 1-2), suggesting the similarity in source type (the fire). PAH concentrations in plants were related to their surface exposed to air, indicating that the contribution of soil/water PAHs to plants (aerial part) accumulation was insignificant.

Keywords: PAHs; Firing; Pollution; Residues in plants

Mustafa Ardic, Yakup Karakaya, Mustafa Atasever, Hisamettin Durmaz, Determination of aflatoxin B1 levels in deep-red ground pepper (isot) using immunoaffinity column combined with ELISA, Food and Chemical Toxicology, Volume 46, Issue 5, May 2008, Pages 1596-1599, ISSN 0278-6915, DOI: 10.1016/j.fct.2007.12.025.

(<http://www.sciencedirect.com/science/article/B6T6P-4RJ3WH2-1/2/f2a41054cf95da5e0d10e73bf5516b9e>)

Abstract:

Deep-red ground pepper, a variety of red ground pepper, is a special spices belonging to Sanliurfa and consumed both in Sanliurfa and other provinces of Turkey. The aim of this study was to determine the aflatoxin B1 (AFB1) levels of deep-red ground pepper. For this purpose, 75 samples of deep-red ground pepper (isot) marketed in Sanliurfa (Turkey) were purchased from bazaars and herbal shops. The occurrence and concentration range of AFB1 in the samples were investigated by microtitre plate Enzyme Linked Immunosorbent Assay (ELISA) method using immunoaffinity columns. Seventy-two of the 75 ground deep-red pepper samples (96%) contained AFB1 in the range of 0.11-24.7 [μ]g/kg. Eleven (14.7%) samples were above the regulatory limits used in the European Union and in Turkey. More precaution should be taken on hygiene controls in order to prevent microbiological and chemical hazards.

Keywords: Aflatoxin B1; Red ground pepper; Deep-red ground pepper; Spices

Ana G. Cabado, Susana Aldea, Corina Porro, Gonzalo Ojea, Jorge Lago, Cristina Sobrado, Juan M. Vieites, Migration of BADGE (bisphenol A diglycidyl-ether) and BFDGE (bisphenol F diglycidyl-ether) in canned seafood, Food and Chemical Toxicology, Volume 46, Issue 5, May 2008, Pages 1674-1680, ISSN 0278-6915, DOI: 10.1016/j.fct.2008.01.006.

(<http://www.sciencedirect.com/science/article/B6T6P-4RJYV9N-2/2/9f9d1efe9ca112225335a512f5d45ef9>)

Abstract:

Migration of potentially toxic materials used for the lining of commercial can goods remains an important issue, especially with respect to certain types of processed foods. Seafood is one type where more information is needed with respect to other ingredients used for adding value to fishery products. Most cans are internally coated with starters of resins such as bisphenol A diglycidyl-ether (BADGE) and bisphenol F diglycidyl-ether (BFDGE), both considered as toxic compounds. Several seafood products, sardines, tuna fish, mackerel, mussels, cod and mackerel eggs, were manufactured in different conditions changing covering sauce, time and temperature of storage and heat-treated for sterilization in cans. Migration kinetics of BADGE and BFDGE from varnish into canned products were evaluated by HPLC in 70 samples after 6, 12 or 18 months of storage.

Results showed that there is no migration of BADGE in tuna fish, sardines, mussels or cod. However, migration of BFDGE occurs in all species, in a storage time-dependent way and content of fat, although migration of these compounds is not affected by sterilization conditions. All samples analyzed presented values lower than 9 mg BADGE/kg net product without exceeding European limits. However, concerning BFDGE migration, European legislation does not allow the use and/or the presence of BFDGE. Main migration takes place in mackerel reaching the highest values, 0.74 mg BFDGE/kg and 0.34 mg BADGE/kg net product, in red pepper sauce.

Keywords: BADGE; BFDGE; Migration; Canned seafood

Jacques Kaloustian, Kamel Alhanout, Marie-Jo Amiot-Carlin, Denis Lairon, Henri Portugal, Alain Nicolay and Technical collaboration, Effect of water cooking on free phytosterol levels in beans and vegetables, Food Chemistry, Volume 107, Issue 4, 15 April 2008, Pages 1379-1386, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.061.

(<http://www.sciencedirect.com/science/article/B6T6R-4PT0Y83-3/2/98791ec824f0fd1ffebe4a967054437a>)

Abstract:

Plant sterols (phytosterols) are known to decrease plasma cholesterol, mainly the atherogenic LDL cholesterol. In an earlier study, the thermal stability of phytosterols in vegetable oils was reported. The aim of this present work was to investigate the potential effect of cooking (30 min in boiling water), for eight plant products (broad bean, celery, cabbage, courgette, carrot, cauliflower, onion, pepper), on the free phytosterol level. Sitosterol was the most abundant sterol, followed by campesterol. After cooking, the level of total sterols was higher in all vegetables than that before cooking, if dry matter is considered. Acid hydrolysis (active for glycosylated phytosterols) yielded a higher sterol value than alkaline hydrolysis alone (active for esterified phytosterols). This indicated that studied vegetables contained appreciable amounts of steryl glycosides. Their cooking induced higher values of free phytosterols. Cooked vegetables could give better protection against cardiovascular diseases thanks to higher phytosterol levels.

Keywords: Cardiovascular diseases; Cooking; Free phytosterol determination; GC; Plant products; Vegetables

Michael J. O' Riordan, Martin G. Wilkinson, A survey of the incidence and level of aflatoxin contamination in a range of imported spice preparations on the Irish retail market, Food Chemistry, Volume 107, Issue 4, 15 April 2008, Pages 1429-1435, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.073.

(<http://www.sciencedirect.com/science/article/B6T6R-4PT0Y83-K/2/cc0e96b8bba425c1cd8c749a4de81467>)

Abstract:

The aflatoxin contents of 130 commercial spice preparations, including pepper, chilli, curry powder, cayenne, paprika, cinnamon, coriander, turmeric and cumin, were determined using high performance liquid chromatography (HPLC). Samples were obtained from various retail outlets in Ireland, including supermarkets, shops and market stalls. Aflatoxin B1 gave the highest incidence of contamination in spice preparations and was found in 20 of the 130 samples. The highest concentration of aflatoxin, 27.5 [μ]g/kg, was detected in a sample of chilli powder; next highest was in a sample of cayenne pepper which contained 18.5 [μ]g/kg. Five samples (3.8%), consisting of chilli, cayenne pepper and turmeric pepper, were above the regulatory limits of the European Union. Aflatoxin contamination was not detected in cumin or cinnamon samples at a level of quantitation (LOQ) <0.2, <0.1, <0.5, <0.3 [μ]g/kg for B1, B2, G1 and G2, respectively.

Keywords: Aflatoxins; Spices; HPLC; Ireland

Sonia M. Castro, Jorge A. Saraiva, Jose A. Lopes-da-Silva, Ivonne Delgadillo, Ann Van Loey, Chantal Smout, Marc Hendrickx, Effect of thermal blanching and of high pressure treatments on sweet green and red bell pepper fruits (*Capsicum annuum* L.), Food Chemistry, Volume 107, Issue 4, 15 April 2008, Pages 1436-1449, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.09.074.

(<http://www.sciencedirect.com/science/article/B6T6R-4PT0Y83-J/2/ecf81eff6a33b27505a9882b8079d74b>)

Abstract:

The effect of pressure treatments of 100 and 200 MPa (10 and 20 min) and of thermal blanching at 70 [degree sign]C, 80 [degree sign]C and 98 [degree sign]C (1 and 2.5 min), on sweet green and red bell peppers was compared. Pressure treated peppers showed a lower reduction on soluble

protein and ascorbic acid contents. Red peppers presented even an increased content of ascorbic acid (15-20%), compared to the untreated peppers. Peroxidase and pectin methylesterase (whose activity was only quantifiable in green peppers) showed a higher stability to pressure treatments, particularly the latter enzyme, while polyphenol oxidase was inactivated to the same final level by the thermal blanching and pressure treatments. Pressure treatments resulted in comparable (in green pepper) to higher (in red pepper) microbial loads compared to blanching. Pressure treated green and red peppers presented similar to better firmness before and after tunnel freezing at -30 [degree sign]C, compared to thermally blanched peppers, particularly those blanched at 98 [degree sign]C. The results indicated that pressure treatments of 100 and 200 MPa can be used to produce frozen peppers with similar to better nutritional (soluble protein and ascorbic acid) and texture (firmness) characteristics, comparable activity of polyphenol oxidase and higher activity of pectin methylesterase, while pressure treated peppers show a higher level of peroxidase activity. It would be interesting to use higher pressures in future studies, as an attempt to cause a higher reduction on microbial load and on enzymatic activity.

Keywords: Bell pepper; *Capsicum annuum*; Pressure; Blanching; Freezing; Vitamin C; Texture; Enzymes

G.F. Barbero, A. Liazid, M. Palma, C.G. Barroso, Fast determination of capsaicinoids from peppers by high-performance liquid chromatography using a reversed phase monolithic column, *Food Chemistry*, Volume 107, Issue 3, 1 April 2008, Pages 1276-1282, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.06.065.

(<http://www.sciencedirect.com/science/article/B6T6R-4PGPVXF-1/2/98204dfae2175da9f32e27d1c4fa2af6>)

Abstract:

This article reports the development of a rapid and reproducible method of HPLC with fluorescence detection for the determination and quantification of the main capsaicinoids (nordihydrocapsaicin, capsaicin, dihydrocapsaicin, homocapsaicin and homodihydro-capsaicin) present in hot peppers by employing a monolithic column. The type of column employed is a RP-18e (100 mm x 4.6 mm) monolithic column. A gradient method was utilised for the chromatographic separation: solvent A: water (0.1% acetic acid) and solvent B: methanol (0.1% acetic acid). A study was also made of the robustness of the method in respect of the conditions of temperature in the separation column (15-40 [degree sign]C), the solvent flowrate (4-7 mL min⁻¹), the injection volume (10-50 [mu]L), and the percentage of methanol in the sample (25-100%). The repeatability and reproducibility of the method showed relative standard deviations of less than 2%. The robustness of the method was determined by utilising different injection volumes and different percentages of methanol in the extracts. The method developed has then been utilised for the quantification of the major capsaicinoids present in different varieties of hot peppers grown in Spain. The capsaicinoids have been separated in a time of less than 8 min.

Keywords: Capsaicinoids; Peppers; Liquid chromatography; Monolithic column

Sung-Hye Cho, Chang-Hee Lee, Mi-Ran Jang, Young-Wook Son, Sang-Mok Lee, In-Sun Choi, So-Hee Kim, Dai-Byung Kim, Aflatoxins contamination in spices and processed spice products commercialized in Korea, *Food Chemistry*, Volume 107, Issue 3, 1 April 2008, Pages 1283-1288, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.08.049.

(<http://www.sciencedirect.com/science/article/B6T6R-4PJ052P-1/2/7a14f3da52151d5617749b6af1de7ee7>)

Abstract:

A survey for total aflatoxins (aflatoxins B1, B2, G1, and G2) was conducted on 88 spices and processed spice products commercialized in Korea. The presence of aflatoxins was determined by high-performance liquid chromatography (HPLC) with fluorescence detector using immunoaffinity column clean-up. Total aflatoxins (AFs) are detected in 12 samples (13.6% of incidence) including

seven red pepper powder, two red pepper pastes (Kochujang), two curry and one ginger product. The contamination levels are 0.08-4.45 [μ]g/kg as aflatoxin B1 and 0.08-4.66 [μ]g/kg as AFs. The liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis on contaminated samples was conducted for the confirmation of detected aflatoxins. The 12 samples which showed aflatoxins by HPLC/FLD were confirmed as aflatoxins by LC-MS/MS.

Keywords: Aflatoxins; Spices; Immunoaffinity column; HPLC-FLD; LC-MS/MS

M. Rajkumar, K.J. Lee, H. Freitas, Effects of chitin and salicylic acid on biological control activity of *Pseudomonas* spp. against damping off of pepper, *South African Journal of Botany*, Volume 74, Issue 2, April 2008, Pages 268-273, ISSN 0254-6299, DOI: 10.1016/j.sajb.2007.11.014.

(<http://www.sciencedirect.com/science/article/B7XN9-4RWJW34-1/2/275b581f0a9dc0cb7b1d9e2a34f4b1ef>)

Abstract:

Fluorescent pseudomonads (SE21 and RD41) and resistance inducers (chitin and salicylic acid) were examined for plant growth promotion and biological control of damping off of pepper caused by *Rhizoctonia solani*. The antagonists SE21 and RD41 isolated from the rhizosphere of pepper were found to be effective in inhibiting the mycelial growth of *R. solani* in a dual culture assay and increasing the seedling vigour in a roll towel assay. Both antagonists were further characterized for biocontrol and plant growth promoting features. The addition of inducers (chitin alone) increased the antagonist's population in the culture medium. In a further study, seed treatment with antagonists showed an increase in plant growth and controlled the damping off under in vivo conditions. Amendment with inducers alone showed a moderate degree of plant protection against *R. solani*. However, the reduction in disease was more pronounced when inducers were applied with antagonists. Amendment with chitin alone enhanced biocontrol efficiency of both SE21 and RD41. However, amendment with SA alone or in conjunction with chitin showed a moderate effect on biocontrol efficiency of the antagonists. These results show that the biocontrol efficiency of antagonists SE21 and RD41 may be stimulated by chitin resulting in a significant increase in their population density and antagonistic effect against *R. solani*.

Keywords: Biocontrol; Chitin; Damping off; Pepper; Salicylic acid; Siderophores

Melinda J. Donnelly, Danielle M. Green, Linda J. Walters, Allelopathic effects of fruits of the Brazilian pepper *Schinus terebinthifolius* on growth, leaf production and biomass of seedlings of the red mangrove *Rhizophora mangle* and the black mangrove *Avicennia germinans*, *Journal of Experimental Marine Biology and Ecology*, Volume 357, Issue 2, 31 March 2008, Pages 149-156, ISSN 0022-0981, DOI: 10.1016/j.jembe.2008.01.009.

(<http://www.sciencedirect.com/science/article/B6T8F-4S02897-1/2/21eda0ab4aa2e8ce6cbcd18c139404c5>)

Abstract:

Exotic plant species can negatively affect native flora and fauna by changing the diversity and productivity of the system and altering successional processes. The novel weapons hypothesis has been suggested as one mechanism for invasion and spread of exotic plant species. It states that exotic species with 'new weapons', such as allelopathic chemicals, may have greater impacts on species in the invaded range without co-evolved defense strategies against the exotic chemicals. In Florida, one successful exotic species, *Schinus terebinthifolius* (Brazilian pepper), has invaded nearly every habitat throughout the state. Past studies have documented allelopathic properties of *S. terebinthifolius* negatively impacting the growth of native terrestrial flora. Here we document the effect of *S. terebinthifolius* for the first time on mangrove systems. We examined growth and survival of *Rhizophora mangle* (red mangrove) and *Avicennia germinans* (black mangrove) seedlings when exposed to a range of densities of intact and crushed *S. terebinthifolius* fruits (0, 25, 50) at two different salinities (15, 30 ppt). We also documented the natural density of *S. terebinthifolius* fruits beneath the tree canopy after fruit production in mangrove habitat. Growth

and biomass were significantly reduced in *A. germinans* when exposed to the highest density of intact *S. terebinthifolius* fruits growing in 30 ppt saltwater. Trials with intact fruits had no significant effects on *R. mangle*; however, crushed fruits significantly decreased growth, and leaf production. The ecological importance of the different effects of crushed and intact fruits is supported by field observations which found equal or greater numbers of crushed fruits compared to intact fruits beneath the tree canopy of female *S. terebinthifolius*. In addition, abiotic factors, such as salinity, may interact with allelopathic chemicals in natural systems and needs to be addressed when planning future allelopathic studies.

Keywords: Estuary; Exotic; Inhibition; Invasive species; Mangrove; Salt marsh

Lara Bosco, Emanuela Giacometto, Luciana Tavella, Colonization and predation of thrips (Thysanoptera: Thripidae) by *Orius* spp. (Heteroptera: Anthocoridae) in sweet pepper greenhouses in Northwest Italy, *Biological Control*, Volume 44, Issue 3, March 2008, Pages 331-340, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.10.027.

(<http://www.sciencedirect.com/science/article/B6WBP-4R2H7WK-2/2/0acb591e50b522455b772c773d1c096e>)

Abstract:

Frankliniella occidentalis (Pergande) and *Thrips tabaci* Lindeman (Thysanoptera: Thripidae) are major pests of sweet pepper for direct damage and tospovirus transmission. To control their infestations, *Orius laevigatus* (Fieber) (Heteroptera: Anthocoridae) is produced by many commercial insectaries and widely used on IPM vegetable crops of Europe. This predator is naturally widespread along the Mediterranean and Atlantic coasts, and not in more continental areas, where other *Orius* spp. are more common. Research was conducted in a continental area of Northwest Italy in 2002-2003 to assess the natural presence of anthocorids on pepper, and to compare their colonization and predatory ability with those of the species artificially introduced. Experiments were conducted in 12 sweet pepper greenhouses, in six of which *O. laevigatus* release was made. From late May to early October, thrips and anthocorids were sampled on pepper by collecting flowers; *Orius* spp. were also collected on neighboring wild flora. Independently of the releases, *Orius* specimens were found in all surveyed greenhouses, but *O. niger* Wolff, also captured on various wild plants, was the most abundant species. It naturally colonized crops from late June and proved to be the most efficient predator on sweet pepper in the surveyed area, if not disturbed by pesticide application. Contrarily, *O. laevigatus* was rarely found and only in the greenhouses in which it had been released. However its introduction resulted in thrips control before natural colonization by the native species occurred.

Keywords: *Frankliniella occidentalis*; *Orius laevigatus*; *O. niger*; Thrips biological control; Seasonal abundance; Crop and noncrop plants

Hye Sook Kim, Mee Kyung Sang, Yong-Chull Jeun, Byung Kook Hwang, Ki Deok Kim, Sequential selection and efficacy of antagonistic rhizobacteria for controlling *Phytophthora* blight of pepper, *Crop Protection*, Volume 27, Issues 3-5, March-May 2008, Pages 436-443, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.07.013.

(<http://www.sciencedirect.com/science/article/B6T5T-4PJ6BCY-2/2/42d92a3aa39d2f0d29ce49a491bd9d66>)

Abstract:

This research was conducted to develop a sequential screening procedure for bacteria antagonistic against *Phytophthora capsici*, and to evaluate control efficacy by candidate antagonistic bacteria selected by this procedure against *Phytophthora* blight of pepper in the field. A total of 231 bacterial strains were isolated from soils and roots of cucumber, pepper, and tomato plants grown in fields at 12 locations in Korea in 2000 and 2001. From these, 88 strains were pre-selected using a radicle assay. These strains were then screened in a seedling assay with 2-week-old pepper seedlings inoculated with 1000 zoospores of *P. capsici* g-1 potting mixture, a

concentration which caused complete death of the seedlings. Based on the results of this screen, 15 potentially antagonistic strains with at least 50% control efficacy of seedling infection by *P. capsici* were selected and further tested in 5-week-old pepper plants. In the in planta trials, four bacterial strains, KJ1R5, KJ2C12, KJ9C8, and 11S16, consistently showed significant ($P=0.05$) disease suppression against *P. capsici* infection and were examined as candidate biocontrol agents for their antagonistic effects in the field by artificial inoculation in 2001 and 2002. Plants treated with the bacterial strains KJ1R5, KJ2C12, and KJ9C8 had significantly ($P=0.05$) lower disease severity and incidence than untreated controls in at least one test. These field test results have demonstrated that the radicle and seedling assays are very effective as part of the screening procedure to select candidate antagonistic bacteria against *P. capsici* on pepper. Therefore, effective biocontrol agents for Phytophthora blight of pepper could be selected through the sequential screening procedure developed in this study.

Keywords: Antagonistic bacteria; Biological control; Pepper disease; *Phytophthora capsici*; Screening method

Madelaine Venzon, Maria Consolacao Rosado, Adrian Jose Molina-Rugama, Vanessa Silveira Duarte, Rondinelli Dias, Angelo Pallini, Acaricidal efficacy of neem against *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae), *Crop Protection*, Volume 27, Issues 3-5, March-May 2008, Pages 869-872, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.10.001.

(<http://www.sciencedirect.com/science/article/B6T5T-4R5G31P-1/2/eb3c767dcfacao2b9480b2afad595d48>)

Abstract:

The broad mite, *Polyphagotarsonemus latus*, is one of the most serious pests attacking chilli pepper in Brazil. Aiming to offer an additional tool to be used for its control, we tested the acaricidal effect of neem, *Azadirachta indica*, on *P. latus*. Chilli pepper seedlings were sprayed with neem seed extract (NeemAzal T/S, 1% of azadiractin) at concentrations of 0.05, 0.10, 0.15 and 0.20 g a.i./l, with abamectin 1.8% (Vertimec 18 CE) and with water. Adult females of *P. latus* were transferred to each treated plant and after 6 d, the instantaneous rate of increase (r_i) was calculated. All mites on plants treated with abamectin died without ovipositing before the end of the experiment. The r_i for *P. latus* decreased linearly with increasing neem concentration, with the population growth rate becoming negative when mites were exposed to plants treated with neem at concentrations higher than 0.13 g a.i./l.

Keywords: Broad mite; *Capsicum frutescens*; *Azadirachta indica*; Instantaneous rate of increase

A. Serrano-Martinez, M.I. Fortea, F.M. del Amor, E. Nunez-Delicado, Kinetic characterisation and thermal inactivation study of partially purified red pepper (*Capsicum annuum* L.) peroxidase, *Food Chemistry*, Volume 107, Issue 1, 1 March 2008, Pages 193-199, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.08.028.

(<http://www.sciencedirect.com/science/article/B6T6R-4PFDDV3-1/2/40d02295b9e1c25af7e6acd8853a484b>)

Abstract:

Peroxidase (POD) from red sweet pepper cultured under an integrated system was partially purified, using a combination of phase partitioning with Triton X-114 and ammonium sulphate fractionation between 30 and 80%. The enzyme presented a single band in PAGE only when 4-MN was used as substrate. Optimum activity using ABTS as the H-donor was obtained at pH 4.5 and the apparent kinetic parameters V_m and K_M were calculated for both ABTS and H_2O_2 , showing a K_M value in the same order in both cases (0.495 and 1.32 mM, respectively). The effect of several reducing agents was studied, ascorbic acid being the most active. The study of thermal inactivation showed a first-order inactivation kinetic, and the Arrhenius plot yielded a straight line with a slope equivalent to an activation energy of 151 kJ/mol. Significant inactivation occurred at temperature >40 [degree sign]C and the D value for 5 min was 44.5 [degree sign]C.

Keywords: Peroxidase; Pepper; Triton X-114; Thermostability

Leila Denise Falcao, Gilles de Revel, Jean Pierre Rosier, Marilde T. Bordignon-Luiz, Aroma impact components of Brazilian Cabernet Sauvignon wines using detection frequency analysis (GC-olfactometry), *Food Chemistry*, Volume 107, Issue 1, 1 March 2008, Pages 497-505, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.07.069.

(<http://www.sciencedirect.com/science/article/B6T6R-4PB0PW9-6/2/7a3bc1c4167114755efa1ccffe003237>)

Abstract:

The aroma profiles of Cabernet Sauvignon wines from a new grape growing region, Santa Catarina State, Brazil, were established for the first time using a Gas-chromatography-olfactometry (GC-O). Two wines were submitted to detection frequency analysis (DFA) (n = 8), one having vegetative characteristics (SJA wine) and one with red fruits and jam aromas (BR wine) in a prior sensory analysis. Fourteen impact aroma descriptors were selected for judging by DFA analysis. Among these, nine compounds were identified using GC-MS, chromatographic retention times and characteristic odours: acetic acid, butyric acid, isovaleric acid, 2-phenylethanol, methional, 2-methoxy-3-isobutylpyrazine (MIBP), [beta]-damascenone, [beta]-ionone and furaneol. In most, furaneol was associated with jam or caramel aroma by GC-O and its average concentrations in BR wines (252 [mu]g/l) were significantly higher than those in SJA wine (112 [mu]g/l). In contrast, the amount of MIBP, reported as vegetative or bell pepper aroma by GC-O analysis, was much higher in SJA (0.040 [mu]g/l) than BR (0.018 [mu]g/l) wine samples. In the two wines evaluated, [beta]-damascenone was measured at concentrations that are probably responsible for positive fruity notes and by to mask the vegetal aroma of MIBP in BR wine sensory analysis.

Keywords: GC-olfactometry; Detection frequency analysis (DFA); Brazilian Cabernet Sauvignon wines; GC-FID/FPD/MS

C.T. Murthy, Suwendu Bhattacharya, Cryogenic grinding of black pepper, *Journal of Food Engineering*, Volume 85, Issue 1, March 2008, Pages 18-28, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.06.020.

(<http://www.sciencedirect.com/science/article/B6T8J-4P6VD18-1/2/7551e1f1766786b06336f8bb629fd956>)

Abstract:

Cryogenic grinding of black pepper at different temperatures and feed rates was conducted, and was compared with that of conventional grinding at ambient temperature to ascertain the different quality parameters employing subjective and objective methods. The loss of volatile oil in the case of ambient grinding was about 50% as compared to cryogenic grinding. The loss of monoterpenes was high in ambient grinding, as there was a loss of volatile oil in terms of every monoterpene compounds. Cryogenic grinding technique was superior to ambient grinding in terms of monoterpenes retention in the powder. Sensory assessment of the ground samples indicated that cryogenically ground samples were distinctly high in top notes which represented freshness, and marginally high in basic notes also.

A pilot plant model pin mill was employed for cryogenic grinding of black pepper at different feed rates and product temperatures. These two variables had significant effects on dependent variables, viz., volatile oil, and monoterpenes and sesquiterpenes contents. The optimum cryogenic conditions for maximum volatile oil content and a reasonable quantity of monoterpenes were 47 to 57 kg h⁻¹ of feed rate, and -20 to -15 [degree sign]C of product temperature.

Keywords: Liquid nitrogen; Volatile oil; Chromatographic analysis; Monoterpenes; Sesquiterpenes

A. Vega-Galvez, R. Lemus-Mondaca, C. Bilbao-Sainz, P. Fito, A. Andres, Effect of air drying temperature on the quality of rehydrated dried red bell pepper (var. Lamuyo), *Journal of Food*

Engineering, Volume 85, Issue 1, March 2008, Pages 42-50, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2007.06.032.

(<http://www.sciencedirect.com/science/article/B6T8J-4PB6VP2-1/2/ec2171b97bf070cfccd96be3a9221638>)

Abstract:

Red pepper samples (*Capsicum annuum* L.) were dried at four air inlet temperatures from 50 to 80 [degree sign]C and rehydrated in water at 30 [degree sign]C to study the influence of air drying temperature on the quality and microstructural properties of the rehydrated tissue. A determination was made on the effects of sample pretreatment on the drying process; samples were immersed in a solution containing NaCl, CaCl₂ and Na₂S₂O₅ prior to drying at 70 [degree sign]C. At the end of the rehydration process several quality parameters were analyzed, including the rehydration ratio, water retention capacity, colour, firmness, vitamin C content and microstructure. The results showed that the best quality product was obtained when samples were pretreated before drying. Microscopic examination of the rehydrated pepper samples suggested that damage to cellular structure was minimized by pretreatment of samples; the resulting rehydrated peppers displayed comparatively improved vitamin C retention, colour, and firmness.

Keywords: Red pepper; Air drying; Rehydration; Quality; Microstructure

Kenji Kobata, Hitomi Tate, Yusaku Iwasaki, Yoshiyuki Tanaka, Keigo Ohtsu, Susumu Yazawa, Tatsuo Watanabe, Isolation of coniferyl esters from *Capsicum baccatum* L., and their enzymatic preparation and agonist activity for TRPV1, *Phytochemistry*, Volume 69, Issue 5, March 2008, Pages 1179-1184, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.11.017.

(<http://www.sciencedirect.com/science/article/B6TH7-4RJKX2T-1/2/c46138a6085c9387ce02dbf1fcdcec04>)

Abstract:

Coniferyl esters--capsiconiate and dihydrocapsiconiate--were isolated from the fruits of the pepper, *Capsicum baccatum* L. var. *praetermissum*. Their structures were determined by spectroscopic methods to be coniferyl (E)-8-methyl-6-nonenoate (capsiconiate) and coniferyl 8-methylnonanoate (dihydrocapsiconiate). This finding was further confirmed by the lipase-catalyzed condensation of coniferyl alcohol with its corresponding fatty acid derivative. The agonist activity of the esters for transient receptor potential vanilloid 1 (TRPV1) was evaluated by conducting an analysis of the intracellular calcium concentrations in TRPV1-expressing HEK293 cells. The EC₅₀ values of capsiconiate and dihydrocapsiconiate were 3.2 and 4.2 [mu]M, respectively.

Keywords: *Capsicum baccatum* L. var. *praetermissum*; Solanaceae; Coniferyl ester; Capsiconiate; Dihydrocapsiconiate; Spectroscopic analysis; Lipase-catalyzed preparation; Transient receptor potential vanilloid 1 (TRPV1); Calcium influx

Feng-shou DONG, Shuang YANG, Xin-gang LIU, Jian-peng SUN, Yong-quan ZHENG, Chong-jiu LI, Jim-ren YAO, Fate of Fluazinam in Pepper and Soil After Application, *Agricultural Sciences in China*, Volume 7, Issue 2, February 2008, Pages 193-199, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60039-5.

(<http://www.sciencedirect.com/science/article/B82XG-4S09P2M-8/2/6a9c129ebfb38dd2df80fb0ad368873f>)

Abstract:

To discover the fate of fluazinam after its application in pepper field, an efficient residual analytical method for determining fluazinam in pepper and soil was developed. The samples were extracted by acetone, cleaned up by solid-phase extraction (SPE) florisil cartridge, and determined by gas chromatography with electronic capture detector (ECD). The recoveries ranged from 80 to 94.6%, with repeatability relative standard deviation <= 9.3% at spiking levels of 0.1-1 mg kg⁻¹. The residue dynamics of fluazinam in pepper and soil were studied in a field plot. The experiment data showed that the half-lives of fluazinam in peppers and soils were 2.5-3.7 days and 1.2-4.2 days,

respectively. When the pepper was treated by fluazinam 50% suspension concentrate (SC) at 495 g ha⁻¹ 4 times at 7-day intervals, the fluazinam in pepper on the 7th day after the last application was all below 0.06 mg kg⁻¹, which was below the maximum residue limit (MRL) fixed in Korea (0.3 mg kg⁻¹). It is implied that fluazinam in pepper is nonpersistent. The results suggested that fluazinam 50% SC should be used in a pepper field at most for 4 times, and the pre-harvest interval should be 7 days.

Keywords: fluazinam; residue; pepper; soil

D. Savvas, E. Chatzieustratiou, G. Pervolaraki, G. Gizas, N. Sigrimis, Modelling Na and Cl concentrations in the recycling nutrient solution of a closed-cycle pepper cultivation, *Biosystems Engineering*, Volume 99, Issue 2, February 2008, Pages 282-291, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2007.10.008.

(<http://www.sciencedirect.com/science/article/B6WXV-4RCPPH5-1/2/a42e720f3fe514e80c70f2e39fdb6a42>)

Abstract:

A mass balance model relating the concentrations of Na or Cl in the recycled nutrient solution to the cumulative uptake of water by the plants was calibrated and validated in greenhouse sweet pepper crops grown in closed-cycle cultivation systems. The results indicated that the model allows for simulation of the courses of Na and Cl accumulation in closed-cycle cultivations of pepper, provided that the fluctuations in the volume of drainage solution and the moisture status of the substrate during the cropping period are small. Furthermore, the model predicts a delay in the process of salt accumulation in closed-cycle hydroponic systems when the drainage percentage is relatively high due to enhanced irrigation frequency, in comparison with standard irrigation frequency. The proposed model may be incorporated into intelligent automation systems to automatically adjust the target total salt concentration in the outgoing irrigation solution to levels allowing for a constant nutrient supply, despite the Na and Cl accumulation in the recycled leachate. As a result, the entire amount of drainage solution can be recycled without risking depletion of essential nutrients in the root zone.

Ken Pernezny, Russell Nagata, Nikol Havranek, Jairo Sanchez, Comparison of two culture media for determination of the copper resistance of *Xanthomonas* strains and their usefulness for prediction of control with copper bactericides, *Crop Protection*, Volume 27, Issue 2, February 2008, Pages 256-262, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.05.012.

(<http://www.sciencedirect.com/science/article/B6T5T-4P47TWR-3/2/595b667cecf9795ce2aed42621da006>)

Abstract:

Two bacteriological culture media were compared for determination of copper resistance among strains of *Xanthomonas euvesicatoria* and *Xanthomonas perforans* from pepper and tomato and *Xanthomonas campestris* pv. *vitians* from lettuce. Of 94 strains tested, 73 grew on glucose-nutrient agar (GNA) amended with 200 [μ]g ml⁻¹ of copper sulfate. None of the 94 strains grew on modified casitone-yeast extract (CYE) agar amended with copper. In vitro population studies supported the preliminary classification of strains as copper resistant. Reduction in populations of strains found to be resistant on GNA+Cu were less than one log unit after 2-h exposure to copper hydroxide suspensions in vitro. Addition of mancozeb to the copper hydroxide resulted in population reductions of 4-8 log units. Therefore, GNA+Cu is more appropriate for screening of Florida *Xanthomonas* strains for resistance to copper. Copper hydroxide alone, mancozeb alone, or a combination of these two compounds reduced bacterial spot of tomato and pepper significantly under low disease pressure. Reductions in disease ratings were as much as ten-fold in some experiments. Only the combination of copper and mancozeb was effective at higher disease levels.

Keywords: *Capsicum annuum*; *Lycopersicon esculentum*; *Latuca sativa*; Copper bactericides; *Xanthomonas*

Jin-Yuarn Lin, Ching-Yin Tang, Total phenolic contents in selected fruit and vegetable juices exhibit a positive correlation with interferon-[gamma], interleukin-5, and interleukin-2 secretions using primary mouse splenocytes, *Journal of Food Composition and Analysis*, Volume 21, Issue 1, February 2008, Pages 45-53, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.06.002.

(<http://www.sciencedirect.com/science/article/B6WJH-4P29K9W-1/2/5b29cb77ce3e3f571f20b66778026f1a>)

Abstract:

We hypothesized that some fruits and vegetables have an immuno-modulatory potential on T helper type 1 (Th1) and Th2 cytokine secretions. Therefore, Th1 cytokines including interleukin (IL)-2, and interferon (IFN)-[gamma], and Th2 cytokines including IL-4 and IL-5, produced by mouse splenocytes administrated with 13 selected fruits and vegetables were determined. The results showed that low dose (10 [mu]g/ml) administration with oriental plum, mulberry, peppers (including green, yellow, and red color varieties), ceylon spinach, and red onion significantly ($P < 0.05$) increased IL-2 secretion. Administration with high dose (500 [mu]g/ml) strawberry significantly increased the secretion ratio of IFN-[gamma]/IL-5 (Th1/Th2). Further analysis showed that the stimulatory effects of selected fruits and vegetables on IL-2, IFN-[gamma], and IL-5 secretions demonstrated a significantly ($P < 0.05$) positive correlation with the total phenolic (including flavonoid) content in the selected fruits and vegetables. The correlation coefficient (r) between total phenolic content (including flavonoid) and cytokine secretions varied in magnitude: IFN-[gamma] > IL-5 > IL-2. The coefficients from total phenolic content were much greater than those from the total flavonoid content. The total phenolic and flavonoid contents of oriental plum, mulberry, green pepper, and red onion II showed a significantly positive correlation with the IFN-[gamma] secretion. This study suggests that in vitro supplementation with phenolic-rich fruits and vegetables might demonstrate an immuno-modulatory potential via the regulation of Th1/Th2 cytokine secretions, especially Th1 cytokines. The Th1/Th2 immuno-modulatory potentials of these selected fruits and vegetables will be important and useful for the future exploitation of food materials to develop a novel functional food.

Keywords: Strawberry; *Fragaria ananassa*; Mulberry; *Morus alba*; Ceylon spinach; *Basella rubra* L.; Interferon-[gamma]; Interleukin-2; Primary mouse splenocytes

Yan Ma, Zhi-zhou Chang, Jiang-tao Zhao, Ming-guo Zhou, Antifungal activity of *Penicillium striatisporum* Pst10 and its biocontrol effect on *Phytophthora* root rot of chilli pepper, *Biological Control*, Volume 44, Issue 1, January 2008, Pages 24-31, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.10.005.

(<http://www.sciencedirect.com/science/article/B6WBP-4PWKSN3-1/2/1f30249257cc93158b1ea7b317ab5f0a>)

Abstract:

Penicillium striatisporum Pst10 was isolated from the rhizosphere of chilli peppers. In dual culture agar plate assays, this isolate showed very high antagonistic effects on mycelium growth of *Phytophthora* spp., *Cladosporium cucumerium*, and *Sclerotinia sclerotiorum*. In in vitro assays, the toxicity of sterilized liquid culture filtrates (SLCF) of Pst10 grown in potato-dextrose broth (PDB) was tested against *Phytophthora capsici* mycelium growth and sporangia/spore formation or germination. The SLCF completely inhibited mycelium growth and even at a 100-fold dilution led to abnormal mycelium. A 20-fold dilution of SLCF inhibited formation and germination of sporangia and spores. Three antifungal substances were separated by thin-layer chromatography (TLC) from organic solvent extracts of liquid culture filtrate of Pst10. Composted pig manure slightly increased the colonization of the chilli rhizosphere by Pst10. In pot tests, the incidence of *Phytophthora* root

rot of chilli was significantly reduced when artificially infested soil was treated with conidia and SLCF of Pst10.

Keywords: *Penicillium striatisporum*; *Phytophthora capsici*; Antagonistic mechanism; Biocontrol

Paul Whittaker, Jane J. Clarke, Richard H.C. San, Joseph M. Betz, Harold E. Seifried, Lowri S. de Jager, Virginia C. Dunkel, Evaluation of commercial kava extracts and kavalactone standards for mutagenicity and toxicity using the mammalian cell gene mutation assay in L5178Y mouse lymphoma cells, *Food and Chemical Toxicology*, Volume 46, Issue 1, January 2008, Pages 168-174, ISSN 0278-6915, DOI: 10.1016/j.fct.2007.07.013.

(<http://www.sciencedirect.com/science/article/B6T6P-4P9SNJ0-1/2/a64ae91a6d111453cce1cde1999b2dde>)

Abstract:

Kava (*Piper methysticum*) is a member of the pepper family and has been cultivated by South Pacific islanders for centuries and used as a social and ceremonial drink. Traditionally, kava extracts are prepared by grinding or chewing the rhizome and mixing with water and coconut milk. The active constituents of kava are a group of approximately 18 compounds collectively referred to as kavalactones or kava pyrones. Kawain, dihydrokawain, methysticin, dihydromethysticin, yangonin, and desmethoxyyangonin are the six major kavalactones. Kava beverages and other preparations are known to be anxiolytic and are used for anxiety disorders. Dietary supplements containing the root of the kava shrub have been implicated in several cases of liver toxicity in humans, including several who required liver transplants after using kava supplements. In order to study the toxicity and mutagenicity, two commercial samples of kava, Kaviar and KavaPure, and the six pure kavalactones including both d-kawain and dl-kawain, were evaluated in L5178Y mouse lymphoma cells. Neither the kava samples nor the kavalactones induced a mutagenic response in the L5178Y mouse lymphoma mutation assay with the addition of human liver S9 activation.

Keywords: *Piper methysticum*; Kava; Kava pyrones; Kavalactones; Mutagenicity; Mouse lymphoma

Rizana M. Mahroof, Thomas W. Phillips, Life history parameters of *Lasioderma serricorne* (F.) as influenced by food sources, *Journal of Stored Products Research*, Volume 44, Issue 3, 2008, Pages 219-226, ISSN 0022-474X, DOI: 10.1016/j.jspr.2007.12.001.

(<http://www.sciencedirect.com/science/article/B6T8Y-4S0359W-1/2/a113953d1bc97aff2fecaa333de6c689>)

Abstract:

Fecundity, egg to adult survival rate, developmental time, and adult body weight of the cigarette beetle, *Lasioderma serricorne* (Coleoptera: Anobiidae) were evaluated on seven food sources at 28 [degree sign]C. Ground chili, paprika, cayenne pepper, chewing leaf tobacco, cigar tobacco, a commercial insect bait referred to as NOW bait, and wheat flour were used to evaluate mean lifetime fecundity. The highest fecundity (52.4+/-4.8 eggs/female) was observed in wheat flour, whereas the lowest fecundity (5.8+/-0.8 eggs/female) was observed in cigar tobacco. Among the seven food sources, beetles reared in wheat flour showed the highest survival rate of 91.0+/-2.7%. Only 15% of the eggs laid in NOW bait developed to the adult stage. In the three food sources containing *Capsicum* spp. the survival rate ranged from 30% to 40%. The egg, larval, and pupal development times varied from 3 to 5, 38 to 92 and 4 to 18 d, respectively, among food sources. Body weight and adult longevity studies showed that the heavier adults also had the longest life span. Ovipositing female *L. serricorne* appear to discriminate among different food sources. Although *L. serricorne* laid eggs in all food sources evaluated, larval and pupal survival were lowest in NOW bait. Information on the biology and host use pattern of *L. serricorne* may help to explain how various stored commodities are affected by this species and may lead to develop appropriate pest management strategies for this insect pest.

Keywords: Lasioderma serricorne; Cigarette beetle; Development; Survival; Fecundity

Emmanuel Kokkinakis, Georgios Boskou, Georgios A. Fragkiadakis, Aikaterini Kokkinaki, Nikolaos Lapidakis, Microbiological quality of tomatoes and peppers produced under the good agricultural practices protocol AGRO 2-1 & 2-2 in Crete, Greece, Food Control, Volume 18, Issue 12, December 2007, Pages 1538-1546, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.12.002.

(<http://www.sciencedirect.com/science/article/B6T6S-4MMWHGK-4/2/2310b8e650b8353eba9a24244c35b491>)

Abstract:

The efficiency of the good agricultural practices (GAP) protocol AGRO 2-1 & 2-2, in advancing microbiological-quality of tomatoes and peppers, was studied in greenhouses at Ierapetra, Crete, Greece. The 240 tested vegetables-samples, produced under AGRO 2-1 & 2-2, showed satisfactory quality: *Listeria monocytogenes* absent per 25 g; *Escherichia coli* < 20 Colony Forming Units per gram (CFU/g); total coliforms 4.37-4.68 log CFU/g; aerobic plate counts 5.78-5.92 log CFU/g. Based on actual results and practices evaluation, we conclude that AGRO 2-1 & 2-2 can reduce microbial hazards for consumers and furthermore can establish practices in compliance to basic Euro-Retailer-Produce GAP (EUREPGAP) requirements.

Keywords: Microbiological quality; Vegetables; Good agricultural practices; EUREPGAP

A. Piedra Buena, A. Garcia-Alvarez, M.A. Diez-Rojo, C. Ros, P. Fernandez, A. Lacasa, A. Bello, Use of pepper crop residues for the control of root-knot nematodes, Bioresource Technology, Volume 98, Issue 15, November 2007, Pages 2846-2851, ISSN 0960-8524, DOI: 10.1016/j.biortech.2006.09.042.

(<http://www.sciencedirect.com/science/article/B6V24-4MBCBDC-3/2/05f6bd3c7e2e2bf830121e4b5ca1558c>)

Abstract:

The biofumigant effect of pepper crop residues (PCR) for controlling *Meloidogyne incognita* populations was evaluated. Under laboratory conditions, 0, 5, 10 and 20 g PCR were applied to 500 g nematode infested soil, with four replicates per treatment. After 20 days at 25 [degree sign]C, PCR reduced significantly *M. incognita* populations and root galling indices in susceptible tomato cv. Marmande, and increased K, N and organic C in soil. In the field, biofumigation with PCR combined with fresh animal manures (with and without plastic cover), methyl bromide, and a control were evaluated through root galling indices on a pepper crop. Each treatment, except for the control, had a grafted and non-grafted susceptible pepper sub-treatment, with three replicates. Root galling indices were lower, and yields higher, on grafted plants, biofumigation with PCR and plastic cover, with similar values as MB treatment, suggesting that biofumigation with PCR is an efficient non-chemical alternative to control *M. incognita* populations, especially when applied with plastic cover, nitrogen-rich organic matter and followed by grafting on resistant pepper.

Keywords: Organic amendments; Biofumigation; Solarization; *Meloidogyne incognita*; Integrated crop management

H. Ozgonen, A. Erkilic, Growth enhancement and *Phytophthora* blight (*Phytophthora capsici* Leonian) control by arbuscular mycorrhizal fungal inoculation in pepper, Crop Protection, Volume 26, Issue 11, November 2007, Pages 1682-1688, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.02.010.

(<http://www.sciencedirect.com/science/article/B6T5T-4NH6N0N-1/2/abf822be4de59314acc59230f7327fb8>)

Abstract:

The effects of selected arbuscular mycorrhizal (AM) fungi, *Glomus mosseae*, *Glomus etunicatum*, *Glomus fasciculatum* and *Gigaspora margarita*, on growth of pepper seedlings and *Phytophthora* blight caused by *Phytophthora capsici* and the role of the phytoalexin, capsidiol were investigated.

Root colonization by AM fungi reached between 61.3% and 68.1% in roots of pepper 4 weeks after transplanting. All tested AM fungi increased the shoot height between 23.4% and 31.7% and fresh and dry weights of shoots and roots of plants were enhanced by *G. etunicatum*, *G. fasciculatum* and *Gigaspora margarita* compared to uninoculated plants in pot experiments. *G. fasciculatum* increased yield significantly by 22% under greenhouse conditions. *G. mosseae* reduced the disease severity of *P. capsici* by 91.7%, 43.0% and 57.2% under pot, greenhouse and field conditions, respectively. Compared to the control, the capsidiol level was increased by preinoculation with *G. mosseae* and in the necrotic stems of *P. capsici*-inoculated pepper plants. In conclusion, AM fungi, especially *G. mosseae* enhanced the development of plants and reduced *Phytophthora* blight of pepper.

Keywords: Pepper; *Phytophthora capsici*; Growth enhancement; Arbuscular mycorrhizal fungi; Capsidiol

S.S. Shekarforoush, A.H.K. Nazer, R. Firouzi, M. Rostami, Effects of storage temperatures and essential oils of oregano and nutmeg on the growth and survival of *Escherichia coli* O157:H7 in barbecued chicken used in Iran, *Food Control*, Volume 18, Issue 11, November 2007, Pages 1428-1433, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.10.006.

(<http://www.sciencedirect.com/science/article/B6T6S-4MJJC2S-1/2/1afbe6fcc7e32da6aa95887b1fec6582>)

Abstract:

Traditional Iranian barbecued chicken (TIBC) consists of cubed chicken breast, lemon juice, onion, saffron, salt, red pepper, vegetable oil and various spices such as oregano and nutmeg with pH value about 5.5. As this product is sometimes consumed under-cooked, there is growing concern that it may pose health hazards to consumers related to pathogenic bacteria such as *Escherichia coli* O157:H7. We studied the influence of storage temperature and essential oils (EOs) of oregano and nutmeg on the growth and survival of *E. coli* O157:H7 in ready-to-cook TIBC. Ready-to-cook TIBC was prepared according to the traditional practice using different concentrations of oregano and nutmeg EOs. The TIBC and control samples (TIBC without the EOs) were spiked with *E. coli* O157:H7 to a final concentration of 6-7 log₁₀ CFU g⁻¹ and stored at 3, 8 and 20 [degree sign]C. *E. coli* O157:H7 was counted after 0, 24, 48 and 72 h storage using MacConkey sorbitol agar supplemented with cefixime and tellurite. The EOs of oregano and nutmeg had a bactericidal effect on *E. coli* O157:H7 in broth culture with 0.6 and 10 [mu]l ml⁻¹ concentration, respectively. The log₁₀ CFU g⁻¹ of *E. coli* O157:H7 count in the spiked samples, containing 1, 2 and 3 [mu]l g⁻¹ of EOs of oregano and nutmeg that were stored at different temperatures for up to 72 h relative to the control samples did not change. Increasing the storage temperatures from 3 [degree sign]C to 20 [degree sign]C up to 72 h significantly increased the log₁₀ CFU g⁻¹ of *E. coli* O157:H7 in both experimental and control samples. The results showed that the *E. coli* O157:H7 had the ability to survive in ready-to-cook TIBC at refrigeration condition (3 [degree sign]C) and multiplied significantly at the higher temperature, e.g. 8 [degree sign]C and the ambient temperature of 20 [degree sign]C. The results from our study showed that contrary to the inhibitory effect of EOs of oregano and nutmeg against *E. coli* O157:H7 in broth system, they had no any inhibitory effect against *E. coli* O157:H7 in ready-to-cook TIBC.

Keywords: *E. coli* O157:H7; Oregano; Nutmeg; Chicken; Essential oil

Ayhan Topuz, Feramuz Ozdemir, Assessment of carotenoids, capsaicinoids and ascorbic acid composition of some selected pepper cultivars (*Capsicum annum* L.) grown in Turkey, *Journal of Food Composition and Analysis*, Volume 20, Issue 7, November 2007, Pages 596-602, ISSN 0889-1575, DOI: 10.1016/j.jfca.2007.03.007.

(<http://www.sciencedirect.com/science/article/B6WJH-4NG3T94-2/2/a98b61bf2b2d63623e8b8e08bafc29e7>)

Abstract:

Carotenoid, capsaicinoid and ascorbic acid composition of ripe fruits of five *Capsicum annuum* cultivars (730 F1, 1245 F1, Amazon F1, Serademre 8 and Kusak 295F1), grown as principle breeding material in Turkey, were quantitatively investigated by means of HPLC technique. Seven main carotenoids, five analogues of capsaicinoids and ascorbic acid were quantified in the fruits grown for 2 year replication. From the capsaicinoids and carotenoids data, Scoville Heat Unit (SHU) and retinol activity equivalent (RAE) values of the fruits were also calculated, respectively. The findings determined that the cultivars of 730 F1 and 1245 F1 had higher carotenoids (2310-2390 mg/kg in dry basis), capsaicinoids (471.3-688.1 mg/kg in dry basis), vitamin A (218.8-243.0 [μ]g RAE/100 g in wet basis) and vitamin C (63.1-64.9 mg/100 g in wet basis) content, without any significant difference among each of them. Furthermore, the cultivars which had higher capsaicinoids contents had higher ascorbic acids content as well. With their high nutritional and functional components, the cultivar of 730 F1 and 1245 F1 can be considered to be selected breeding material for cultivar development.

Keywords: *Capsicum annuum*; Carotenoids; Capsaicinoids; Ascorbic acid; Cultivars

Tomasz Jelinski, Cheng-Jin Du, Da-Wen Sun, Jozef Fornal, Inspection of the distribution and amount of ingredients in pasteurized cheese by computer vision, *Journal of Food Engineering*, Volume 83, Issue 1, Future of Food Engineering - Selected Papers from the 2nd International Symposium of CIGR Section VI on Future of Food Engineering, November 2007, Pages 3-9, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.12.020.

(<http://www.sciencedirect.com/science/article/B6T8J-4MV0M61-1/2/c3e9a6468a74705a915d133a755194bc>)

Abstract:

As a consequence of market competition, the production and manufacture of cheese products are at the stage of innovative dynamics. Pasteurized cheese with vegetable ingredients is one of the new products that may be added to sandwiches, salads, sauce, toast and pizza. Since vegetable ingredients can improve the nutritive value and flavour of cheese, it will probably become more and more popular in the future. Such new products require new techniques for monitoring and evaluating their quality in order to satisfy the increased awareness and expectations of consumers. Computer vision methods have been used increasingly in the food industry for inspection and evaluation purposes as they provide a rapid, economical, consistent and objective assessment. The aim of this study was to develop a computer vision method for inspecting two major quality attributes of pasteurized cheese, i.e. the distribution and amount of ingredients. An image pre-processing algorithm was first developed to delete the border area of cheese. Next a three-step method for ingredient extraction was developed, comprising colour quantification, ingredient location, and mask operation. Finally, the distribution and amount of each ingredient was calculated automatically. Two kinds of pasteurized cheese were evaluated using the above method, i.e. (a) cheese with garlic and parsley and (b) cheese with a mixture of vegetables composed mainly of pepper and parsley. It was found that the distribution and amount of ingredients in the first set of samples were determined within an accuracy of over 88%, compared with the results of a sensory method. As for the second set of samples, accuracies of over 81% and over 71% were achieved for measuring the distribution and amount of ingredients, respectively.

Keywords: Pasteurized cheese; Computer vision; Ingredients; Distribution; Quality evaluation

Francisco J. Cabanero, Micaela Carvajal, Different cation stresses affect specifically osmotic root hydraulic conductance, involving aquaporins, ATPase and xylem loading of ions in *Capsicum annuum*, L. plants, *Journal of Plant Physiology*, Volume 164, Issue 10, 19 October 2007, Pages 1300-1310, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.08.010.

(<http://www.sciencedirect.com/science/article/B7GJ7-4M7CM95-C/2/708776423b9f454e3b0e0758318777e8>)

Abstract: Summary

In order to study the effect of nutrient stress on water uptake in pepper plants (*Capsicum annuum* L.), the excess or deficiency of the main cations involved in plant nutrition (K^+ , Mg^{2+} , Ca^{2+}) and two different degrees of salinity were related to the activity of plasma membrane H^+ -ATPase, the pH of the xylem sap, nutrient flux into the xylem (J_s) and to a number of parameters related to water relations, such as root hydraulic conductance (L_0), stomatal conductance (g_s) and aquaporin activity. Excess of K^+ , Ca^{2+} and NaCl produced a toxic effect on L_0 while Mg^{2+} starvation produced a positive effect, which was in agreement with aquaporin functionality, but not with ATPase activity. The xylem pH was altered only by Ca treatments. The results obtained with each treatment could suggest that detection of the quality of the nutrient supply being received by roots can be related to aquaporins functionality, but also that each cation stress triggers specific responses that have to be assessed individually.

Keywords: Aquaporins; ATPase; Calcium stress; Root hydraulic conductance; Salinity

V. Gonzalez-Dugo, F. Orgaz, E. Fereres, Responses of pepper to deficit irrigation for paprika production, *Scientia Horticulturae*, Volume 114, Issue 2, 2 October 2007, Pages 77-82, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.05.014.

(<http://www.sciencedirect.com/science/article/B6TC3-4P5RM4X-3/2/c40f8d5b9a8971a839dd7d4568d78513>)

Abstract:

Pepper (*Capsicum annuum* L.) production is normally carried out under irrigation as the crop is very susceptible to water shortage. Deficit irrigation strategies in pepper for paprika could increase production and facilitate mechanical harvest and, at the same time, save water. We conducted a field experiment that imposed water deficits, either during ripening (T1) or throughout the season (T2), and compared them to a fully irrigated control (T3). Stem water potential varied from -0.6 MPa in T3, early in the season to -1.5 MPa in T2 prior to harvest. Applied irrigation water for T1, T2, and T3 was 456, 346 and 480 mm, respectively. Water deficits depress leaf area and biomass production but did not affect the proportion of flowers that set fruit. Dry fruit weight in T2 at harvest was 66% of T3, but did not differ significantly between T1 and T3. However, commercial yield (based on colour production) was significantly higher in T3 than in the other two treatments, as the late water deficits imposed in T1 delayed harvest. We concluded that water deficits, either sustained or applied at fruit ripening, required for mechanical harvest do not hasten ripening and are detrimental to commercial yields and that pepper plants should be well supplied with water until harvest for maximum paprika production.

Keywords: *Capsicum annuum*; Paprika; Irrigation scheduling; Deficit irrigation; Stem water potential; Drip irrigation

Yuji Oka, Nurit Shapira, Pinchas Fine, Control of root-knot nematodes in organic farming systems by organic amendments and soil solarization, *Crop Protection*, Volume 26, Issue 10, October 2007, Pages 1556-1565, ISSN 0261-2194, DOI: 10.1016/j.cropro.2007.01.003.

(<http://www.sciencedirect.com/science/article/B6T5T-4NBY8H2-2/2/4d8d0adfc10538ec41ece1029b4cc14a>)

Abstract:

The efficacy of organic amendments, with or without soil solarization, for the control of the root-knot nematodes *Meloidogyne incognita* and *M. javanica* in organic farming systems was tested in pot, container and greenhouse experiments. Broiler litter, cottonseed meal, feather meal or soybean oilcake, which had been effective in reduction of galling caused by *M. javanica* on tomato plants in pot experiments, were applied to a field at 0.75-2.0 kg m⁻². In three experiments, soil solarization alone reduced nematode populations in the soil and galling indices on tomato and pepper plants, whereas the amendments alone were not effective. Combinations of the amendments with soil solarization were more effective than the amendments or soil solarization

alone in reducing nematode populations and galling indices in most cases. High soil temperatures and accumulation of ammonium/ammonia in these treatments seemed to be involved in controlling root-knot nematodes. Nematode control efficacy on the edges of solarized beds, with or without amendments, was lower than that in the middle of beds. Soil solarization in combination with organic amendments could be used for root-knot nematode control in organic farms.

Keywords: Ammonia; Ammonium; Chicken litter; Meloidogyne incognita; Meloidogyne javanica; Soil pH; Solarization

Sylwester Furmaniak, Artur P. Terzyk, Piotr A. Gauden, The general mechanism of water sorption on foodstuffs - Importance of the multitemperature fitting of data and the hierarchy of models, 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/B6T8J-4N987VR-5/2/c657b9be7185a78e192f4c8dbd47a2d9>)

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

Nancy C. Flores, Dawn VanLeeuwen, Roy D. Pennock, The effect of calcium on microbial quality and consistency of chile pepper (*Capsicum annuum* cv. Mesilla Cayenne) mash during fermentation, LWT - Food Science and Technology, Volume 40, Issue 8, October 2007, Pages 1482-1487, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.08.005.

(<http://www.sciencedirect.com/science/article/B6WMMV-4M3BGY6-1/2/b7c6f19441f88f3da7ab616f468d3890>)

Abstract:

The fermentation of chile peppers (*Capsicum annuum* cv. Mesilla Cayenne) is dependent on several factors: temperature, acidity, salt concentration, dissolved air, microbial flora, carbohydrate and enzymes. This study measured the effect of two levels (8 or 15 g/100 g) of calcium citrate (CaCit, $[\text{Ca}_3(\text{C}_6\text{H}_5\text{O}_7)_2]$), calcium chloride (CaCl_2) or sodium chloride (NaCl) added to 24 h after pepper was mashed. Viscosity, pH, alcohol, soluble solids and microbial contamination were measured at day 1 and day 21 of fermentation. After 21 days of fermentation the Ca Cit 15 and CaCl_2 8 treatments improved viscosity compared to control ($P \leq 0.05$), but were not different from other calcium treatments or NaCl 15. The addition of calcium in the form of CaCl_2 at 8 or 15 g/100 g affected the fermentation of pepper mash by releasing more soluble sugars, increasing alcohol and reducing pH compared to control or other treatments. Also CaCl_2 treatments were effective in controlling microbial growth. Further studies are needed to evaluate

color, texture, consistency and flavor of the combination of 8 g/100 g NaCl and 0.04 g/100 g CaCl₂ added to cayenne pepper mash to assess the value in an industrial setting. The effect of calcium on microbial quality and consistency of chile pepper (*Capsicum annum* cv. Mesilla Cayenne) mash during fermentation.

Ji-Hye Kang, Chu-Sook Kim, In-Seob Han, Teruo Kawada, Rina Yu, Capsaicin, a spicy component of hot peppers, modulates adipokine gene expression and protein release from obese-mouse adipose tissues and isolated adipocytes, and suppresses the inflammatory responses of adipose tissue macrophages, *FEBS Letters*, Volume 581, Issue 23, 18 September 2007, Pages 4389-4396, ISSN 0014-5793, DOI: 10.1016/j.febslet.2007.07.082.

(<http://www.sciencedirect.com/science/article/B6T36-4PDSXM1-9/2/ac0ce26eec3a49fd599b94897dce5a69>)

Abstract:

Adipokines are involved in the obesity-induced chronic inflammatory response that plays a crucial role in the development of obesity-related pathologies such as type II diabetes and atherosclerosis. We here demonstrate that capsaicin, a naturally occurring phytochemical, can suppress obesity-induced inflammation by modulating adipokine release from and macrophage behavior in obese mice adipose tissues. Capsaicin inhibited the expressions of IL-6 and MCP-1 mRNAs and protein release from the adipose tissues and adipocytes of obese mice, whereas it enhanced the expression of the adiponectin gene and protein. The action of capsaicin is associated with NF- κ B inactivation and/or PPAR γ activation. Moreover, capsaicin suppressed not only macrophage migration induced by the adipose tissue-conditioned medium, but also macrophage activation to release proinflammatory mediators. Capsaicin may be a useful phytochemical for attenuating obesity-induced inflammation and obesity-related complications.

Keywords: Capsaicin; Obesity; Inflammation; Adipokine; MCP-1; IL-6; Adiponectin; Macrophage; Migration; Proinflammatory mediator

A. Pineda, I. Morales, M.A. Marcos-Garcia, A. Fereres, Oviposition avoidance of parasitized aphid colonies by the syrphid predator *Episyrphus balteatus* mediated by different cues, *Biological Control*, Volume 42, Issue 3, September 2007, Pages 274-280, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.05.017.

(<http://www.sciencedirect.com/science/article/B6WBP-4NXRMHP-3/2/4811bdd45a7dcd030f1f5a24c0ee52b7>)

Abstract:

Oviposition decisions made by members of a guild of natural enemies can have evolved to avoid intraguild predation, potentially avoiding the disruption of the extraguild prey control. We have studied the oviposition preference of the aphidophagous predator *Episyrphus balteatus* De Geer (Diptera: Syrphidae) within colonies of *Myzus persicae* Sulzer (Homoptera: Aphididae) in the presence of two developmental stages of the aphid parasitoid *Aphidius colemani* Viereck (Hymenoptera: Aphididae). Results from a greenhouse choice experiment showed that *E. balteatus* females lay significantly fewer eggs in colonies with mummified aphids than in unparasitized colonies. Colonies of parasitized, but not yet mummified did not contain significantly fewer eggs than colonies with unparasitized aphids. In three no-choice experiments, we assessed stimuli coming from aphid honeydew, from the aphids themselves and also from extracts of the aphid bodies, and all of these stimuli mediate the discrimination of mummified aphids from healthy aphids. To a lesser extent these stimuli also contribute to the discrimination against aphids that are parasitized but not yet mummified. These results suggest that the effects of these two species could be complementary for the control of *M. persicae*, since the species that acts as an intraguild predator, *E. balteatus*, avoids ovipositing on aphid colonies parasitized by the intraguild prey, *A. colemani*.

Keywords: Episyrrhus balteatus; Aphidius colemani; Myzus persicae; Sweet pepper; Intraguild predation; Oviposition preference; Syrphidae

Joel Felix, Douglas J. Doohan, Dain Bruins, Differential vegetable crop responses to mesotrione soil residues a year after application, *Crop Protection*, Volume 26, Issue 9, September 2007, Pages 1395-1403, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.11.013.

(<http://www.sciencedirect.com/science/article/B6T5T-4MW900C-1/2/c33b3cec11b87e28a8f752724355428c>)

Abstract:

Field experiments were conducted in 2002 and 2003 at Fremont and Wooster, Ohio to characterize the effect of mesotrione herbicide soil residues 12 months after application to field maize on rotational snapbean, cabbage, bell pepper, processing tomato, pickling cucumber, and red clover. Mesotrione was applied either pre-emergence or post-emergence to field maize in 2002 at 0, 210, 420, and 840 or 0, 105, 210, and 420 (0, 1x, 2x, 4x rate), respectively. The response of rotational vegetable crops to mesotrione soil residues varied by site with plants at Fremont displaying greater injury. Snapbean was the most affected, and the yield was lowest at Fremont ranging from 0 to 0.18 T/ha for 4x rate to 0.27 and 0.9 T/ha for 1x, pre-emergence and post-emergence, respectively. Snapbean yield was reduced by 60% and 31% when grown in residues of mesotrione 4x rate, pre-emergence and post-emergence, respectively, when compared to the untreated treatment (14.24 T/ha). Cabbage injury was very high at Fremont regardless of the use rate, but there was no reduction in yield at Wooster. When grown in soil residues from 2x to 4x rates, processing tomato yield was reduced to 32% and 33%, and 28% and 23% compared to untreated control (85 T/ha). A similar trend was observed for bell peppers growing at Wooster. Similarly, the yield for pickling cucumber was reduced 18% when grown in 4x rate mesotrione soil residues at Wooster compared to the untreated control (30 T/ha). At Fremont, the pickling cucumber yield was reduced regardless of the application timing and rate. The levels of injury are too high for growers to rotate vegetables 12 months following application of mesotrione to field maize.

Keywords: Mesotrione; Herbicide soil residues; Carryover; Rotational crops; Vegetable crops

A. Aydin, M. Emin Erkan, R. Baskaya, G. Ciftcioglu, Determination of Aflatoxin B1 levels in powdered red pepper, *Food Control*, Volume 18, Issue 9, September 2007, Pages 1015-1018, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.03.013.

(<http://www.sciencedirect.com/science/article/B6T6S-4JS7J4H-5/2/c4a3391e88fdb34102bf13143e4e4>)

Abstract:

Insufficient hygiene conditions during drying, transport and storage stages in the production of red pepper could cause microbiological and mycological growth which could result in the formation of mycotoxins. This study was designed to assess the aflatoxin B1 levels in 100 samples of powdered red pepper randomly obtained from markets in Istanbul using microtitre plate Enzyme Linked Immunosorbent Assay (ELISA). Aflatoxin B1 levels were below the minimum detection limit (0.025 [μ g/kg) in 32 samples, between 0.025 and 5 [μ g/kg) in 50 samples, whilst 18 samples had unacceptable contamination levels higher than the maximum tolerable limit (5 [μ g/kg), according to the Turkish Food Codex and the European Commission.

Keywords: Aflatoxin B1; Powdered red pepper; Traditional food; ELISA

Shoji Koide, John Shi, Microbial and quality evaluation of green peppers stored in biodegradable film packaging, *Food Control*, Volume 18, Issue 9, September 2007, Pages 1121-1125, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.07.013.

(<http://www.sciencedirect.com/science/article/B6T6S-4KV2RJ1-2/2/885ef1765a10d119ae595d3bea608b65>)

Abstract:

The effects of polylactic acid (PLA) based biodegradable film packaging on the microbial and physicochemical quality of green peppers (*Capsicum annuum* L.) were compared to the effects of low-density polyethylene (LDPE) film packaging, and perforated LDPE film packaging. Each package containing green peppers was heat-sealed and stored for 7 days at 10 [degree sign]C. The microbial levels (aerobic bacteria, coliform bacteria, and yeast and moulds) and physicochemical properties such as colour, weight loss, hardness, ascorbic acid concentration, O₂ and CO₂ concentrations, were monitored during storage. Results indicated that the physicochemical properties of colour, hardness, ascorbic acid concentration, and microbial levels (total aerobic bacteria, and moulds and yeasts) did not show remarkable changes during storage period. The microbial levels in coliform bacteria were increased by less than 1 log CFU/g (0.2 log CFU/g) in the biodegradable film packaging, 2.3 log CFU/g in LDPE film package, and less than 1 log CFU/g (0.9 log CFU/g) in the perforated LDPE film package, after 7 days storage period. The results suggest that the biodegradable film with higher water vapor permeability can be used to maintain the quality and sanitary conditions (protection from microbial and insect contamination) of freshly harvested green peppers in modified atmosphere packaging.

Keywords: Biodegradable film; Packaging; Green pepper; Microbial quality; Physicochemical quality

J.M.F. Faustino, M.J. Barroca, R.P.F. Guine, Study of the Drying Kinetics of Green Bell Pepper and Chemical Characterization, *Food and Bioproducts Processing*, Volume 85, Issue 3, September 2007, Pages 163-170, ISSN 0960-3085, DOI: 10.1205/fbp07009.

(<http://www.sciencedirect.com/science/article/B8JGD-4S1T0R4-3/2/705e56c985cff67b922b58f9ac92e84c>)

Abstract:

The present work aimed, on one hand, the study of the drying of green peppers, in terms of drying kinetics evaluated at 30[degree sign]C, 40[degree sign]C, 50[degree sign]C, 60[degree sign]C and 70[degree sign]C, having the experimental data been fitted to different empirical kinetic models from literature. This kinetic study was then complemented with the modelling in terms of Fick's diffusion equation.

On the other hand, the chemical characterization in fresh and after drying at the lowest and highest temperatures was analysed, for evaluation of the effect of drying and drying temperature on the chemical composition of the product. In this way, the analyses made were: moisture content, sugar content, proteins, ash, fat, fibre and acidity.

From the results obtained, it was concluded that the empirical models that best describe the dehydration kinetics were the Page and Newton models. From the experimental data was possible to estimate the diffusivities, which range between 9.0×10^{-10} at 30[degree sign]C and 8.0×10^{-9} m² s⁻¹ at 70[degree sign]C.

Moreover, it was verified that drying influences the chemical composition of the peppers, but, conversely, the influence of the drying temperature was not very significant.

Keywords: bell pepper; *capsicum annuum*; dried bell pepper; drying kinetics; chemical characterization; nutritional value

Michael Netzel, Gabriele Netzel, Qingguo Tian, Steven Schwartz, Izabela Konczak, Native Australian fruits -- a novel source of antioxidants for food, *Innovative Food Science & Emerging Technologies*, Volume 8, Issue 3, 4th International Congress on Pigments in Food: Pigments in Food - A Challenge to Life Sciences, September 2007, Pages 339-346, ISSN 1466-8564, DOI: 10.1016/j.ifset.2007.03.007.

(<http://www.sciencedirect.com/science/article/B6W6D-4NCSGPH-6/2/b363da7076a6b2f28879a0bb8431b36a>)

Abstract:

Twelve native Australian fruits, finger lime (red and yellow), riberry, brush cherry, Cedar Bay cherry, muntries, Illawarra plum, Burdekin plum, Davidson's plum, Kakadu plum, Molucca raspberry and Tasmanian Pepper, were investigated for their antioxidant capacity and presence of phenolic compounds, anthocyanins and ascorbic acid. The radical scavenging activities of five of the evaluated fruits were significantly higher (3.1 to 5.2-fold in the TEAC assay and 1.2 to 4.2-fold in the PCL assay, respectively) than that of the control blueberry, cv. Biloxi. The total phenolics level (Folin-Ciocalteu assay) in six of the twelve fruits was 2.5 to 3.9-fold of that of blueberry. Kakadu plum was identified as the richest source of ascorbic acid (938-fold of that of control). A high correlation between total phenolics (but not anthocyanins) and antioxidant capacity was observed. The HPLC-DAD/ESI/MS-MS profiles revealed simple anthocyanin composition (one to four individual pigments) with cyanidin as the dominating type. Australian native fruits investigated in this study are shown to be a novel rich source of antioxidant compounds. Industrial relevance

The search for world unique food ingredients and flavors with enhanced health-beneficial properties is at present one of the key market trends. Botanicals from the regions linked to wellness and natural functionality with exotic fruits called 'superfruits', such as acai from Amazonia, are becoming a popular target of health-conscious consumers and industry managers. Sustainability and responsibility for the environment is another important reason which brings a commitment to ethical products. Utilization of local and seasonal fruits will not only enhance the variety of exotic fruits available on international market, but will contribute toward sustainable agriculture. Our research program addresses all these essential issues. In this manuscript we are describing for the first time twelve native Australian fruits as a rich source of antioxidants. We propose these exotic fruits to be considered as a potential source of bioactive phytochemicals for application in health promoting foods.

Keywords: Native Australian fruits; Antioxidant capacity; Total phenolics; Anthocyanins; Ascorbic acid

Krissana Boonsiri, Saichol Ketsa, Wouter G. van Doorn, Seed browning of hot peppers during low temperature storage, *Postharvest Biology and Technology*, Volume 45, Issue 3, September 2007, Pages 358-365, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.03.014.

(<http://www.sciencedirect.com/science/article/B6TBJ-4NVCFV5-3/2/39da4b99b3dce7268dbd10b5eff9cef3>)

Abstract:

Fresh hot pepper (*Capsicum annum* L.) fruit were harvested on days 15, 20 or 25 after flowering (DAF) and were stored at 5 and 10 [degree sign]C. Seed browning was severe in fruit stored at 5 [degree sign]C, but only if harvested at 15 DAF. Severe browning was positively correlated with visible cell damage, the rate of electrolyte leakage, initial levels of free phenolics, and levels of thiobarbituric acid (TBA) reactive compounds. Browning was related to initial higher levels of saturated fatty acids and lower levels of unsaturated fatty acids. Browning was also positively correlated with higher initial activities of polyphenol oxidase (PPO), and continuously higher activities of phenylalanine ammonia lyase (PAL), superoxide dismutase (SOD), and lipoxygenase (LOX). In contrast, browning was negatively correlated with the activities of catalase (CAT) and peroxidase (POD). The results suggest that loss of membrane integrity in young seeds is a cause of browning at low temperature, and that the higher levels of unsaturated fatty acids of older seeds might protect against chilling-induced browning. The negative correlation of browning with CAT and POD might indicate that these enzymes protect against chilling injury.

Keywords: Pepper; Chilling injury; Seed browning; Maturity; Lipid peroxidation; Antioxidant enzymes; Fatty acids

K. Jetiyanon, Defensive-related enzyme response in plants treated with a mixture of *Bacillus* strains (IN937a and IN937b) against different pathogens, *Biological Control*, Volume 42, Issue 2, August 2007, Pages 178-185, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2007.05.008.

(<http://www.sciencedirect.com/science/article/B6WBP-4NT84S6-1/2/8947133007e148369d53430e464065b5>)

Abstract:

In previous research, a mixture of *Bacillus amyloliquefaciens* strain IN937a and *Bacillus pumilus* strain IN937b consistently provided systemic protection against multiple diseases in various crops. The objective of this study was to investigate defense-related enzyme responses in plants induced by a mixture of IN937a and IN937b against different pathosystems. Four plant/pathosystems, tomato with *Sclerotium rolfsii* and *Ralstonia solanacearum* and pepper with *S. rolfsii* and *Colletotrichum gloeosporioides*, were used to test the efficacy of the mixture in greenhouse assays. Treatments consisted of non-challenged healthy control, nonbacterized pathogen control, and bacterized with a mixture of IN937a and IN937b and challenged later with pathogens. Total superoxide dismutase (SOD) and peroxidase (PO) activities were investigated. Before pathogen inoculation, higher levels of SOD and PO activities were observed in plants treated with a mixture of IN937a and IN937b compared with non-challenged healthy and nonbacterized pathogen controls. After challenge with all pathogens, plants treated with the bacterial mixture had SOD and PO activity levels 25-30% greater than the nonbacterized pathogen control. Additionally, significant disease protection in each plant pathosystem was observed with the bacterial mixture. Low levels of natural SOD and PO activities in the non-challenged healthy control occurred during the assay. In conclusion, a mixture of IN937a and IN937b induced similar responses of SOD and PO activities against different pathogens, and these physiological changes were associated with disease protection with all the tested pathogens.

Keywords: Defensive-related enzymes; Different pathosystems; Induced systemic resistance; Plant growth-promoting rhizobacteria; Peroxidase; Superoxide dismutase

Nick Kalogeropoulos, Anastasia Mylona, Antonia Chiou, Maria S. Ioannou, Nikolaos K. Andrikopoulos, Retention and distribution of natural antioxidants ([alpha]-tocopherol, polyphenols and terpenic acids) after shallow frying of vegetables in virgin olive oil, *LWT - Food Science and Technology*, Volume 40, Issue 6, August 2007, Pages 1008-1017, ISSN 0023-6438, DOI: 10.1016/j.lwt.2006.07.003.

(<http://www.sciencedirect.com/science/article/B6WMMV-4KPFKY7-2/2/95334508ef44224ed0026c1b7f7227a4>)

Abstract:

Potatoes, green peppers, zucchinis and eggplants were shallow fried in virgin olive oil (VOO) according to the Mediterranean traditional culinary practice. Zucchini and eggplants were also blanketed with wheat flour or batter prior to frying. Polyphenols and hydroxy pentacyclic triterpene acids (HPTAs) were determined by GC/MS, while [alpha]-tocopherol was determined by high-performance liquid chromatography. Among 12 polyphenols determined, tyrosol predominated in frying oils and zucchini samples, while chlorogenic acid was the major phenolic species in the other vegetable samples. The triterpene acids maslinic, oleanolic and ursolic were determined in frying oils and fried vegetables, while [alpha]-tocopherol was present in all samples. Besides water loss and oil absorption, shallow frying resulted in partial loss of all the antioxidants studied in frying oils and enrichment of fried vegetables with olive oil antioxidants, which was in some extent affected by the type of vegetable fried and the culinary practice followed. The overall retention of the antioxidants in oil and food ranged from 32% to 64% for [alpha]-tocopherol, 25% to 70% for polyphenols and 35% to 83% for HPTA. It appears that vegetables fried in VOO provide an additional intake of [alpha]-tocopherol, terpenic acids and polyphenols as tyrosol and chlorogenic acid.

Keywords: Polyphenols; Terpenic acids; [alpha]-Tocopherol; Potato; Zucchini; Green pepper; Eggplant; Shallow frying (pan frying); Virgin olive oil

D. Savvas, E. Stamati, I.L. Tsirogiannis, N. Mantzos, P.E. Barouchas, N. Katsoulas, C. Kittas, Interactions between salinity and irrigation frequency in greenhouse pepper grown in closed-cycle hydroponic systems, *Agricultural Water Management*, Volume 91, Issues 1-3, 16 July 2007, Pages 102-111, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.05.001.

(<http://www.sciencedirect.com/science/article/B6T3X-4NYBMDD-2/2/aaa20117ae6c99944b3ff42308bdaf25>)

Abstract:

Two different irrigation regimes with two different salinity levels were applied to peppers (*Capsicum annum* L.) grown in closed hydroponic systems in a glasshouse. The two salinity levels were attained by adding NaCl to the irrigation water used to prepare nutrient solution to obtain concentrations of 0.8 and 6 mol m⁻³, and allowing the salts to progressively accumulate in the recycled nutrient solution. The two salinity levels were combined with two different levels of irrigation frequency in a two-factorial experimental design. Initially, the Na and Cl concentrations increased rapidly in the recycled effluents, but nearly three months after treatment initiation they converged gradually to maximal levels depending on the NaCl treatment. The low irrigation frequency imposed a more rapid salt accumulation in the root zone, which was ascribed to restriction of the volume of drainage solution. However, the maximal salt concentrations in the root zone were independent of the watering schedule. This finding agrees with previous research revealing that the maximal salt accumulation in the root zone of plants, grown in closed hydroponics, is dictated merely by the NaCl concentration in the irrigation water. Total and Class I yields were suppressed by salt accumulation but the high irrigation frequency significantly mitigated the deleterious salinity effects. At low salinity, the low irrigation frequency raised significantly the weight percentage of fruits with blossom-end rot (BER), whereas at high salinity the incidence of BER was further increased without significant differences due to the irrigation regime. Frequent irrigation resulting in high drainage fractions in closed hydroponic systems may delay the rate of salt accumulation in the root zone, thereby enhancing yield and improving fruit quality, without increasing the discharge of polluting fertigation effluents to the environment.

Keywords: *Capsicum annum*; Closed hydroponics; Irrigation frequency; Nutrient solution; Salt stress; Soilless culture

P.C. Vengaiah, J.P. Pandey, Dehydration kinetics of sweet pepper (*Capsicum annum* L.), *Journal of Food Engineering*, Volume 81, Issue 2, July 2007, Pages 282-286, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.04.053.

(<http://www.sciencedirect.com/science/article/B6T8J-4K0D7W5-3/2/8d353e0daf6c7cc59014f3fc14e0fa91>)

Abstract:

Experiments were conducted to study the dehydration kinetics of sweet pepper of both blanched and unblanched at drying air temperature of 40-70 [degree sign]C with an increment of 5 [degree sign]C and constant air velocity of 1.5 m/s. Exponential model, Generalized exponential model, Page's model, Logarithmic model and Power law models were fitted for dehydration data to study the drying behavior of sweet pepper. From the experimental results it was observed that blanching improves the drying rate and Logarithmic model describes the dehydration behavior of sweet pepper.

Keywords: Dehydration-blanching-model

Carlos A. Gabaldon-Leyva, Armando Quintero-Ramos, John Barnard, Rene R. Balandran-Quintana, Ricardo Talamas-Abbud, Jorge Jimenez-Castro, Effect of ultrasound on the mass transfer and physical changes in brine bell pepper at different temperatures, *Journal of Food Engineering*, Volume 81, Issue 2, July 2007, Pages 374-379, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.11.011.

(<http://www.sciencedirect.com/science/article/B6T8J-4MR1JVF-3/2/fa5119300ab2e9a14265907e1b2b12d1>)

Abstract:

Mass transfer and physical attributes of red bell pepper were evaluated. Pepper strips were placed into brine of constant concentration at different temperatures (25-55 [degree sign]C) with immersion times ranging from 15 to 480 min with and without ultrasound treatment. Diffusion coefficients were evaluated for calcium, sodium, citric acid, soluble and total solids, impregnation and water loss. Firmness, kinetic coefficients and color were determined for each treatment. Ultrasound increased the uptake of solutes ($p < 0.05$) with the exception of calcium, sodium ions, and acidity, where diffusion coefficients did not significantly differ among treatments. Loss of water, total and soluble solids in tissue significantly increased at 55 [degree sign]C with 47 kHz, with diffusion coefficients of $13.23 \times 10^{-10} \text{ m}^2/\text{s}$, $7.26 \times 10^{-10} \text{ m}^2/\text{s}$ and $14.42 \times 10^{-10} \text{ m}^2/\text{s}$, respectively. These increases may be attributed to increased cell wall permeability, facilitating transport of water and solute, as evidenced by product firmness, where ultrasound treatments had a negative effect on firmness.

Keywords: Ultrasound treatments; Bell pepper; Mass transfer; Physical properties; Brine

Andres Conesa, Bert E. Verlinden, Francisco Artes-Hernandez, Bart Nicolai, Francisco Artes, Respiration rates of fresh-cut bell peppers under supertamospheric and low oxygen with or without high carbon dioxide, *Postharvest Biology and Technology*, Volume 45, Issue 1, July 2007, Pages 81-88, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2007.01.011.

(<http://www.sciencedirect.com/science/article/B6TBJ-4NMKVDT-1/2/c79c29b8421fee4f29518141a5eb37cd>)

Abstract:

The respiration rates of fresh-cut bell peppers under diverse high and low O₂ levels, with or without 20 kPa CO₂, at 2, 7 and 14 [degree sign]C, were studied. Weight loss and off-odor development were also monitored. A constant respiration rate of pepper dices throughout 3 days under different conditions was found. Fresh-cut peppers exposed to 0, 0.5, 1, 3 and 9 kPa O₂ (all CO₂-free), and to 0 kPa O₂ + 20 kPa CO₂, had a lower respiration rate than peppers in the range 20-100 kPa O₂ with or without CO₂. Under high O₂, 20 kPa CO₂ increased the respiration rate by about 20-40% compared to that in free-CO₂ atmospheres, this effect being lower at low temperature. High O₂ had little (at 14 [degree sign]C) or no effect (at 2 and 7 [degree sign]C) in stimulating both CO₂ production and O₂ consumption compared to normal air. High CO₂ in the range 20-100 kPa O₂ increased the respiratory activity of pepper dices, probably because physiological injury occurred at 14 [degree sign]C. However, 20 kPa CO₂ combined with superatmospheric O₂ neither induced a poor visual appearance nor off-odors. Consequently 50-80 kPa O₂ combined with 20 kPa CO₂ could be used in innovative modified atmosphere packaging of pepper dices to avoid fermentation and inhibit growth of spoilage microorganisms.

Keywords: Capsicum annum; Minimal processing; High and low O₂; High CO₂; O₂ consumption; CO₂ production; Controlled atmosphere; Modified atmosphere packaging

M. Isabel Garcia, Mercedes Lozano, Vicente Montero de Espinosa, M. Concepcion Ayuso, M. Josefa Bernalte, M. Carmen Vidal-Aragon, M. Milagros Perez, Agronomic characteristics and carotenoid content of five Bola-type paprika red pepper (*Capsicum annum* L.) cultivars, *Scientia Horticulturae*, Volume 113, Issue 2, 26 June 2007, Pages 202-207, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.02.003.

(<http://www.sciencedirect.com/science/article/B6TC3-4NBY8WD-1/2/caef2aa66edd648b2fe9cadf9c99a895>)

Abstract:

The production of sweet paprika in Spain uses exclusively fruit of Bola-type *Capsicum annum* L. This work describes the evaluation of the agronomic behaviour of five new cultivars of the Bola-

type paprika red pepper, selected in the Instituto Murciano de Investigacion y Desarrollo Agrario y Alimentario (IMIDA), and grown in Extremadura for 3 years. The colour and the pigment content of the paprika elaborated following the traditional procedure of La Vera were also studied.

The cultivars studied are very similar in morphology of the plants, and precocity of the crop, also presenting few differences in their yield of fresh and dry red fruit. The cultivars RR-1 and RR-2 had the best yields in dry red fruit, weight of fruit, ripening synchronicity, and resistance of the fruit against rotting. With respect to the parameters of the paprika's quality, the cultivars RR-5, RR-4 and RR-3 stood out in ASTA colour and pigment content. RR-1 and RR-2 are recommended according to the pepper yield, however RR-5, RR-4 and RR-3 cultivars are the best in colour. The recommended cultivars to the growers will depend on the payment criteria of the industry, yield or colour.

Keywords: *Capsicum annuum*; Red pepper; Paprika; Agronomic traits; ASTA; Carotenoids

Suat Sensoy, Semra Demir, Onder Turkmen, Ceknas Erdinc, Orcun Burak Savur, Responses of some different pepper (*Capsicum annuum* L.) genotypes to inoculation with two different arbuscular mycorrhizal fungi, *Scientia Horticulturae*, Volume 113, Issue 1, 5 June 2007, Pages 92-95, ISSN 0304-4238, DOI: 10.1016/j.scienta.2007.01.023.

(<http://www.sciencedirect.com/science/article/B6TC3-4N3P9M9-3/2/2e17e03ba37159f38ffd2c819e8c3357>)

Abstract:

Eight different pepper genotypes inoculated by two different arbuscular mycorrhizal fungi (AMF) [*Glomus intraradices* (Gi) and *Gigaspora margarita* (Gm)] in a growth chamber experiment under normal seedling growing conditions were evaluated for seedling traits, colonization and relative mycorrhizal dependency (RMD). In general, inoculated plants had greater dry weights compared to non-inoculated plants. Five cultivars responded positively to inoculation with AM fungi and three responded negatively. A great variation in mycorrhizal colonization dependency was observed among the pepper genotypes, with the N52 genotype showing the highest RMD and the Karaisali genotype the lowest. RMD and dry weights of pepper genotypes were inversely correlated.

Keywords: Arbuscular mycorrhizae; Genotypes; Growth; Pepper; Responsiveness; Symbiosis

Yoshiko Mitsuya, Yoshihiro Takahashi, Yukiko Uehara, Thomas Berberich, Atsushi Miyazaki, Hideki Takahashi, Tomonobu Kusano, Identification of a novel Cys2/His2-type zinc-finger protein as a component of a spermine-signaling pathway in tobacco, *Journal of Plant Physiology*, Volume 164, Issue 6, 4 June 2007, Pages 785-793, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.05.011.

(<http://www.sciencedirect.com/science/article/B7GJ7-4KJ5T2F-1/2/5bcfcf1a384ca285d422e10acd690d93>)

Abstract: Summary

In a previous work, we identified a Cys2/His2-type zinc-finger transcription repressor, (ZFT1), that functions in a spermine-mediated signal transduction pathway in tobacco plants. Database search disclosed the presence of another Cys2/His2-type zinc-finger protein ZFP1 (accession number AAC06243) in tobacco plants. In this work, we characterized ZFP1 and investigated whether this protein is also involved in a Spm-signaling pathway. This factor showed the highest identity to petunia ZPT2-2 and higher similarity to petunia ZPT2-3, Arabidopsis STZ/ZAT10, soybean SCOF-1, red pepper CAZFP1/CaPIF1 as well as to tobacco ZFT1. ZFP1 localized to the nucleus and had a specific DNA-binding activity, supportive to be a transcription factor. Furthermore, the protein had a mild repression activity on transcription in plant cells. The expression of ZFP1, encoding ZFP1, was upregulated during tobacco mosaic virus-induced hypersensitive response. ZFP1 expression was also induced by exogenously applied spermine and its induction was repressed by inhibitors of amine oxidase/polyamine oxidase. Collectively, our data indicate that ZFP1 is a new transcription factor which functions in a spermine-signaling pathway in tobacco.

Keywords: Biotic stress; Polyamine catabolism; Spermine; Tobacco; Transcription factor

M. Siegmund-Schultze, B. Rischkowsky, J.B. da Veiga, J.M. King, Cattle are cash generating assets for mixed smallholder farms in the Eastern Amazon, *Agricultural Systems*, Volume 94, Issue 3, Special Section: sustainable resource management and policy options for rice ecosystems, International symposium on sustainable resource management and policy options for rice ecosystems, June 2007, Pages 738-749, ISSN 0308-521X, DOI: 10.1016/j.agsy.2007.03.005. (<http://www.sciencedirect.com/science/article/B6T3W-4NT57V8-2/2/950fe6793655cd889f6497f9731f3302>)

Abstract:

The presence of cattle in the Amazon region is controversial in terms of their ecological suitability and profitability compared with crops. Nevertheless, they are widely distributed in the study area in north-eastern Para and, contrary to the common image of cattle on large ranches, a high proportion of them are kept on smallholder farms. To explain their presence, cattle are assumed to have benefits beyond physical production, such as complementing resource use or representing capital. To test this hypothesis, the costs and benefits of the three main agricultural activities, cattle, cassava and black pepper production, in terms of land, labour and capital productivity, were recorded in 37 small farms over a period of 15 months. To provide a longer perspective, benefits and costs of these activities were calculated for their assumed lifetime, which in the case of cattle, assumed a stable herd, derived from a deterministic herd model. The resultant values for land, labour and capital productivity of cattle were much lower than the values derived from direct observations during the study period, and were not as high as those for cassava and black pepper. Furthermore, the analysis of resource use in the farms showed that cattle production was not usually integrated with cropping activities, did not improve the use of available labour, and competed for land. Therefore, there had to be a reason for keeping cattle beyond their physical productivity. It was deduced to be their functional quality. Cattle could be disposed of quickly and easily at any time, in order to acquire large sums of cash or the equivalent in kind. The liquidity derived from keeping living stock was not matched by other agricultural activities or by the financial market. Hence, cattle turned out to be the best instrument of finance for the smallholder. Farmers were not interested in the continuous development of their herds, or sustainable production practices, and favoured low input management. Consequently, development plans relying on long-term, continuous commitments to pasture and cattle management are inappropriate. Instead, research and extension work should focus on simple, flexible and low-cost improvements to cattle keeping on crop-livestock smallholder farms, until credit programmes are available that replace the financing function of cattle.

Keywords: Cattle; Cash generating asset; Smallholder; Eastern Amazon; Systems approach; Modelling

B. Romagnoli, V. Menna, N. Gruppioni, C. Bergamini, Aflatoxins in spices, aromatic herbs, herb-teas and medicinal plants marketed in Italy, *Food Control*, Volume 18, Issue 6, June 2007, Pages 697-701, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2006.02.020. (<http://www.sciencedirect.com/science/article/B6T6S-4JKJGH5-1/2/346b1f445c7c1e79d17196fc0f0dd7ad>)

Abstract:

Twenty-seven aromatic herbs, 28 spices and 48 herbal infusions and med plants were analysed for estimation of aflatoxins by high-performance liquid chromatography (HPLC) using a post-column derivatisation procedure (Kobra cell) and a fluorescence detection. Samples were randomly collected, from 2000 to 2005, from markets, shops and bonded warehouse in Emilia Romagna Region, Italy. Of the 103 samples analysed only 7 spices resulted positives: 5 chilli-peppers, 1 nut meg and 1 cinnamon. Two samples contained the toxin at non-permissible levels. It's interesting to note that none of the aromatic herb, herb-tea and medicinal-plant samples analysed was contaminated, even if they are from tropical countries.

Keywords: Aflatoxins; Aromatic herbs; Herb-teas; Medicinal plants; Moulds; Mycotoxins; Spices

Luis Almela, Virginia Rabe, Blas Sanchez, Francisco Torrella, Jose P. Lopez-Perez, Jose A. Gabaldon, Lucia Guardiola, Ochratoxin A in red paprika: Relationship with the origin of the raw material, *Food Microbiology*, Volume 24, Issue 4, June 2007, Pages 319-327, ISSN 0740-0020, DOI: 10.1016/j.fm.2006.08.001.

(<http://www.sciencedirect.com/science/article/B6WFP-4M3RP3M-2/2/db0dcab92aea0569a559a0921f2b5990>)

Abstract:

The occurrence of ochratoxin A (OA) in paprika elaborated from peppers grown in several countries (Peru, Brazil, Zimbabwe and Spain) was studied, using an immunoaffinity clean-up column coupled to liquid chromatography and fluorescence detection. The preparation of the methyl ester (OA-Me) and liquid chromatography-electrospray-ion trap-mass spectrometry was used both to confirm the identity of the chromatographic peak that correspond to OA and to quantify it at low levels or in dirty fractions. A total of 115 strains of moulds were isolated; 85 of the fungal strains were obtained from OA contaminated paprika samples and identified as belonging to the *Aspergillus* Section *Circumdati* group (*A. ochraceus*) and Section *Nigri* group (*A. niger*, *A. carbonarius*). Among the latter ones, 31% of the *A. ochraceus* isolates and one *A. niger* were OA producers *in vitro*. None of the mould strains isolated from paprika samples with undetectable levels of OA or concentrations below 1 [μ]g kg⁻¹ were toxin producers. Great differences in OA content in paprika samples were found, and a relationship with the climatic conditions of the geographic origin of the samples, and with cultural and technical practices in pepper manipulation is suggested.

Keywords: Ochratoxin A; Paprika; Toxigenic fungi; Immunoaffinity; Liquid chromatography/fluorescence detection; Liquid chromatography/mass spectrometry

Andrew J. Simkin, Joel Gaffe, Jean-Pierre Alcaraz, Jean-Pierre Carde, Peter M. Bramley, Paul D. Fraser, Marcel Kuntz, Fibrillin influence on plastid ultrastructure and pigment content in tomato fruit, *Phytochemistry*, Volume 68, Issue 11, June 2007, Pages 1545-1556, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2007.03.014.

(<http://www.sciencedirect.com/science/article/B6TH7-4NKB1YK-2/2/8aac3cf0ae7886a41f3d0c6da8d15121>)

Abstract:

The protein termed fibrillin is involved in the formation of lipoprotein structures, such as plastoglobules and fibrils in certain chromoplast types, which have been implicated in the over-production of pigments due to a sink effect. In order to examine its effect in differentiating chromoplasts of a non-fibrillar type, the pepper fibrillin gene was expressed in tomato fruit. Both the transcript and protein were found to accumulate during tomato fruit ripening from an early mature green stage. However, formation of carotenoid deposition structures in tomato chromoplasts, such as fibrils, was not observed. Nevertheless, a two-fold increase in carotenoid content and associated carotenoid derived flavour volatiles (6-methyl-5-hepten-2-one, geranylacetone, [β]-ionone and [β]-cyclocitral) was observed. An unexpected phenotypic observation in the transgenic fruit was the delayed loss of thylakoids in differentiating chromoplasts, leading to the transient formation of plastids exhibiting a typical chromoplastic zone adjacent to a protected chloroplastic zone with preserved thylakoids. An *in vitro* assay has been developed to monitor fibrillin activity on thylakoids: data were obtained suggesting a membrane protection role for fibrillin, more specifically against moderate uncoupling effects.

Keywords: Chloroplast; Chromoplast; Fruit ripening; *Lycopersicon esculentum*; Membrane pore; Thylakoid integrity

M.D. Fernandez, A.M. Gonzalez, J. Carreno, C. Perez, S. Bonachela, Analysis of on-farm irrigation performance in Mediterranean greenhouses, *Agricultural Water Management*, Volume 89, Issue 3, 10 May 2007, Pages 251-260, ISSN 0378-3774, DOI: 10.1016/j.agwat.2007.02.001. (<http://www.sciencedirect.com/science/article/B6T3X-4N9MYP5-2/2/08f18502a8765e5692d8e7e5be712234>)

Abstract:

A comprehensive irrigation assessment was conducted using on-farm water use information and simulated crop water requirements in a Mediterranean greenhouse area, mainly dedicated to horticultural crops, located on the Almeria coast.

The mean irrigation water supply (IWS) for the main greenhouse crop cycles was 228 mm and ranged from 158 mm (autumn green bean) to 362 mm (autumn-spring sweet pepper). Besides, the mean AIWS value for the main crop rotations was 444 mm and ranged between 363 mm for autumn-spring sweet pepper and 502 mm for autumn-winter pepper and spring melon.

Mean relative irrigation supply (RIS) values were close to 1 for most greenhouse vegetable crops, indicating that, on average, the irrigation supply matched the maximum water requirements of these crops. By contrast, the mean RIS value of autumn-winter cucumber was 1.6, indicating that, on average, the irrigation supply clearly exceeded the calculated optima. However, for most crops, the high CV values observed for RIS and the analysis of the RIS dynamics throughout the cycles indicate that there are greenhouse crops and crop cycle periods for which the IWS clearly does not match the crop water requirements. Greenhouse irrigation water use in the Almeria coastal region can, therefore, be improved.

Mean irrigation water use efficiency (IWUE) values for greenhouse horticultural crops ranged from 15.3 kg m⁻³ (autumn-winter green bean) to 35.6 kg m⁻³ (spring watermelon). They were, in general, higher than those found when these crops were grown outdoors in similar climatic regions. Water productivity (WP) varied from 7.8 to 15.9 [euro] m⁻³ and were highest for green bean crops. WP values of greenhouse crops were generally much higher than those found in other irrigation districts around the world, including Mediterranean areas, due to the low IWS and, especially, to the high value of the vegetable crops grown off-season.

Keywords: Water use; Drip irrigation; Horticultural crops; Performance indicators; Greenhouse; Mediterranean

Hye-Seung Jun, Taesun Park, Chang Ki Lee, Mi Kyung Kang, Mi Sun Park, Ho Il Kang, Young-Joon Surh, Ok Hee Kim, Capsaicin induced apoptosis of B16-F10 melanoma cells through down-regulation of Bcl-2, *Food and Chemical Toxicology*, Volume 45, Issue 5, May 2007, Pages 708-715, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.10.011.

(<http://www.sciencedirect.com/science/article/B6T6P-4M6RXKD-1/2/996eb471e5bb3a8c5e5d5a886b901d0f>)

Abstract:

Capsaicin (8-methyl-N-vanillyl-6-nonenamide), a pungent ingredient of hot chili peppers, has been reported to possess substantial anticarcinogenic and antimutagenic activities. In the present study, we investigated the effect of capsaicin on induction of apoptosis in highly metastatic B16-F10 murine melanoma cells. Capsaicin inhibited growth of B16-F10 cells in a concentration-dependent manner. Proapoptotic effect of capsaicin was evidenced by nuclear condensation, internucleosomal DNA fragmentation, in situ terminal nick-end labeling of fragmented DNA (TUNEL), and an increased sub G1 fraction. Treatment of B16-F10 cells with capsaicin caused release of mitochondrial cytochrome c, activation of caspase-3, and cleavage of poly (ADP-ribose) polymerase in a dose-dependent manner. Furthermore, Bcl-2 expression in the B16-F10 cells was slightly down-regulated by capsaicin treatment. In contrast, there were no alterations in the levels of Bax in capsaicin-treated cells. Collectively, these findings indicate that capsaicin-induces apoptosis of B16-F10 melanoma cells via down-regulation the Bcl-2.

Keywords: Capsaicin; Apoptosis; B16-F10 melanoma cells; DNA fragmentation; Flow cytometry; Bcl-2

D. Suresh, H. Manjunatha, Krishnapura Srinivasan, Effect of heat processing of spices on the concentrations of their bioactive principles: Turmeric (*Curcuma longa*), red pepper (*Capsicum annum*) and black pepper (*Piper nigrum*), *Journal of Food Composition and Analysis*, Volume 20, Issues 3-4, The essential balance: Risks and benefits in food safety and quality, May 2007, Pages 346-351, ISSN 0889-1575, DOI: 10.1016/j.jfca.2006.10.002.

(<http://www.sciencedirect.com/science/article/B6WJH-4MR1RRF-2/2/e12a42701f016eca482615890c2c0c8f>)

Abstract:

Studies were made to examine the loss of curcumin, capsaicin and piperine, the active principles of turmeric (*Curcuma longa*), red pepper (*Capsicum annum*) and black pepper (*Piper nigrum*), respectively, as a result of subjecting the spices to domestic cooking processes. This involved heat treatment of each of these spices by: (i) boiling for 10 min, (ii) boiling for 20 min and (iii) pressure cooking for 10 min. Quantitation of the spice principles in the organic solvent extracts of the freeze-dried cooked spice samples was made with an appropriate HPLC method. Significant loss of spice active principles was observed when the spices were subjected to heat processing. Curcumin loss from heat processing of turmeric was 27-53%, with maximum loss in pressure cooking for 10 min. Curcumin loss from turmeric was similar even in the presence of red gram. In the presence of tamarind, the loss of Curcumin from turmeric was 12-30%. Capsaicin losses from red pepper ranged from 18% to 36%, with maximum loss observed in pressure cooking. Presence of either red gram or tamarind or both did not influence the loss of capsaicin. Piperine losses from black pepper ranged from 16% to 34%, with maximum loss observed in pressure cooking. The loss was somewhat lower in the presence of red gram. The results of this investigation indicated diminished availability of spice active principles from cooked foods when the food ingredients have been subjected to either boiling or pressure cooking for few minutes.

Keywords: Capsaicin; Curcumin; Piperine; Loss during heat processing; Spice principles; Turmeric; *Curcuma longa*; Red pepper; *Capsicum annum*; Black pepper; *Piper nigrum*

M.D. Amador-Ramirez, F. Mojarro-Davila, R. Velasquez-Valle, Efficacy and economics of weed control for dry chile pepper, *Crop Protection*, Volume 26, Issue 4, April 2007, Pages 677-682, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.06.015.

(<http://www.sciencedirect.com/science/article/B6T5T-4KTMTN5-1/2/45f744eebb8192ce431421b15ae76c14>)

Abstract:

Regional production of dry chile pepper (*Capsicum annum* L.) is usually limited by an inappropriate weed management. Traditionally, weeds are mainly controlled by mechanical means such as cultivation and hand hoeing increasing production costs. The purpose of this research was to: (1) evaluate the efficacy of preplant-incorporated, premergence, and postmergence herbicides and (2) estimate the net profit of weed control treatments. In 2004, all herbicide treatments reduced weed density in comparison to the mechanical weeding 135 DAP, although trifluralin treatments were the less effective among herbicide treatments. In 2005, weed control with herbicides was similar to the mechanical weeding treatment, even though plots conventionally sprayed with oxyfluorfen showed the lowest weed dry matter. Whereas plots treated with oxyfluorfen through furrow irrigation showed the highest marketable yield in 2004, marketable yields from plots treated with oxyfluorfen, oxadiazon, or prometryne conventionally applied or glyphosate were higher than those from plots treated with premergence herbicides sprayed through furrow irrigation in 2005. In both years, the use of trifluralin on wet soil resulted in the lowest benefit/cost relationship, whereas the use of prometryn sprayed through furrow irrigation requires of more study because of the low benefit/cost relationship.

Keywords: Capsicum annum; Preplant-incorporated herbicide; Preemergence herbicides; Postemergence herbicides; Mechanical weeding; Benefit/cost relationship

A. Valdez-Fragoso, S.I. Martinez-Monteagudo, F. Salais-Fierro, J. Welti-Chanes, H. Mujica-Paz, Vacuum pulse-assisted pickling whole jalapeno pepper optimization, Journal of Food Engineering, Volume 79, Issue 4, April 2007, Pages 1261-1268, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.04.041.

(<http://www.sciencedirect.com/science/article/B6T8J-4JXR8Y8-1/2/3ef37164f6d1d68db5859003c48ac28b>)

Abstract:

Response surface methodology (RSM) was used for the optimization of the pickling process of whole jalapeno pepper, using a vacuum pulse. The pickling variables were the brine to pepper mass ratio ($R = 1-10$, w/w), sodium chloride concentration in the pickling brine ($[NaCl]_{brine} = 10-15\%$), and processing time ($t_2 = 10-30$ d). The main response variables were solutes gain to water loss ratio (SG/WL), weight reduction (WR), concentration of sodium chloride ($[NaCl]_{pepper}$), acetic acid ($[CH_3COOH]_{pepper}$) in the pepper tissue, and water activity of treated pepper and pickling solution. The polynomial models developed by RSM were highly significant to describe the relationships between the studied factors and the responses ($p < 0.0001$). Analytical optimization gave water activity values near equilibrium, the highest SG/WL ratio (2.1), and up to 6% of $[NaCl]_{pepper}$ and 2% of $[CH_3COOH]_{pepper}$, when using a $[NaCl]_{brine} = 12\%$, $R = 4.6$ and $t_2 = 22$ d.

Keywords: Response surface methodology; Jalapeno pepper; Pickling; Dehydration-impregnation; Optimization

Sami Kooli, Abdelhamid Fadhel, Abdelhamid Farhat, Ali Belghith, Drying of red pepper in open sun and greenhouse conditions.: Mathematical modeling and experimental validation, Journal of Food Engineering, Volume 79, Issue 3, April 2007, Pages 1094-1103, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.03.025.

(<http://www.sciencedirect.com/science/article/B6T8J-4JRT32V-6/2/2e91167bc7e3886b28e250207aa6dcfe>)

Abstract:

In order to study the drying of red pepper in open sun and greenhouse conditions drying experiments at constant laboratory conditions and at varying outdoor conditions were carried out. Laboratory drying experiments were undertaken, inside a wind tunnel where solar radiation was simulated by a 1000 W lamp, for different external parameters (incident radiation, ambient temperature and air velocity). Effect of drying parameters on moisture content and drying time were determined. A simple drying model of red pepper related to water evaporation process was developed and verified. Outdoor drying experiments were carried out in open sun and greenhouse conditions respectively to validate the drying model obtained at laboratory under constant conditions. It was found that the laboratory model overestimates the drying process under time varying conditions. A correction factor was then introduced in the formulation of the model to adjust these predictions.

In studying the consistency of the model coefficient of determination and reduced chi-square were used. The results of these tests have confirmed the consistency of the model at laboratory under constant conditions and in open sun and greenhouse conditions.

Keywords: Open sun drying; Greenhouse drying; Solar radiation; Modeling; Pepper

A. Vega, P. Fito, A. Andres, R. Lemus, Mathematical modeling of hot-air drying kinetics of red bell pepper (var. Lamuyo), Journal of Food Engineering, Volume 79, Issue 4, April 2007, Pages 1460-1466, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2006.04.028.

(<http://www.sciencedirect.com/science/article/B6T8J-4JWDY22-7/2/e3606732a37bc4361a60d1e10de7f19e>)

Abstract:

The drying kinetics of the red bell pepper (var. Lamuyo) was studied and modeled at different temperatures (50, 60, 70 and 80 [degree sign]C), using an air velocity of 2.5 m s⁻¹. Only the falling rate period could be observed during the experiment. Effective moisture diffusivity was estimated to be between 3.2 x 10⁻⁹ and 11.2 x 10⁻⁹ m² s⁻¹ within the temperature range studied. The effect of temperature on the diffusivity was described by the Arrhenius equation with an activation energy (E_a) of 39.70 kJ mol⁻¹. The Newton, Henderson-Pabis, Page and Page modified models were applied to the experimentally obtained moisture data. The fit quality of the models was evaluated using the correlation coefficient, sum square error, root mean square error, and Chi-square. Comparisons of the experimental values with the calculated values demonstrated that the Page modified model produced the best fit for every drying curve, representing an excellent tool for estimation of the drying time.

Keywords: Red bell pepper; Drying; Diffusivity; Fick; Modeling; Arrhenius; Page modified

Trabelsi Darine, M.B. Allagui, M. Rouaissi, A. Boudabbous, Pathogenicity and RAPD analysis of *Phytophthora nicotianae* pathogenic to pepper in Tunisia, *Physiological and Molecular Plant Pathology*, Volume 70, Issues 4-6, April-June 2007, Pages 142-148, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2007.08.002.

(<http://www.sciencedirect.com/science/article/B6WPC-4PJCYB4-1/2/90be7a02f811a93eacf4ae80f7afd756>)

Abstract:

Nine isolates of *Phytophthora nicotianae* were isolated from infected pepper plants. Their pathogenicity was studied in *Capsicum annuum* in comparison with *P. nicotianae* isolates from tomato and tobacco. The pathogenicity test showed that pepper isolates of *P. nicotianae* are adapted to their host. Banding patterns obtained by RAPD analysis with six oligonucleotide primers revealed polymorphism that grouped the isolates independently of the plant host. The polygenic dendrogram showed that pepper isolates were more similar to tomato isolates than to tobacco isolates. The RAPD bands of 1300 and 1500 bp, detected with primers OPD-01 and OPD-10, respectively, appeared specific to the most pathogenic pepper isolates. The OPK-08-1950 seems specific to the isolates of *P. nicotianae* from tomato. These results suggest that host specified might occur in *P. nicotianae* and that may be due to interspecific hybridization events resulting in novel pathogenic behavior.

Keywords: *Phytophthora nicotianae*; RAPD pathogenicity

K. Raja Reddy, V.G. Kakani, Screening *Capsicum* species of different origins for high temperature tolerance by in vitro pollen germination and pollen tube length, *Scientia Horticulturae*, Volume 112, Issue 2, 26 March 2007, Pages 130-135, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.12.014.

(<http://www.sciencedirect.com/science/article/B6TC3-4MSHTJ9-1/2/f032580341583f9f63cf14533ba439b8>)

Abstract:

Successful fruit set depends on several reproductive processes including pollen germination and tube growth processes. An experiment was conducted to determine the effects of temperature on pollen germination characteristics and to identify species/genotypic differences in *Capsicum* using the cumulative temperature response index (CTRI) concept. Pollen was collected from plants of seven genotypes from five *Capsicum* species, adapted to various parts of the world and grown outdoors in large pots. The pollen was subjected to in vitro temperatures ranging from 15 to 50 [degree sign]C at 5 [degree sign]C intervals. Pollen germination and tube lengths were recorded for all species after 24 h of incubation at the respective treatments. Species/genotypes differed significantly for in vitro pollen germination percentage and pollen tube length with mean values of

78% and 734 μm , respectively. The mean cardinal temperatures (T_{min} , T_{opt} , and T_{max}) averaged over genotypes, were 15.2, 30.7, and 41.8 $^{\circ}\text{C}$ for pollen germination and 12.2, 31.2, and 40.4 $^{\circ}\text{C}$ for pollen tube growth. The CTRI of each species/genotype calculated as the sum of eight relative individual stress response values, such as maximum pollen germination, maximum pollen tube length; T_{min} , T_{opt} , and T_{max} temperatures of pollen germination, and pollen tube lengths, identified species tolerance to high temperatures. *Capsicum annum* cv. Mex Serrano from Mexico was identified as tolerant, *C. chacoense* cv. 1312 and *C. spp.* cv. Cobanero from Argentina and Guatemala, respectively as intermediate and *C. frutescens* cv. Early Spring Giant from China, *C. annum* cv. Long Green from South Korea, *C. spp.* cv. NM89C130 and *C. pubescens* cv. 90002 from Guatemala as sensitive to high temperatures. The tolerant species/genotypes can be used in breeding programs to develop new genotypes that can withstand high temperature conditions both in the present climate and particularly in a future warmer climate.

Keywords: *Capsicum*; Cardinal temperatures; Cumulative temperature response index; Pepper; Screening tool

R.B. Thompson, M. Gallardo, L.C. Valdez, M.D. Fernandez, Using plant water status to define threshold values for irrigation management of vegetable crops using soil moisture sensors, *Agricultural Water Management*, Volume 88, Issues 1-3, 16 March 2007, Pages 147-158, ISSN 0378-3774, DOI: 10.1016/j.agwat.2006.10.007.

(<http://www.sciencedirect.com/science/article/B6T3X-4MFJJ7V-1/2/72e2f582dfeed7ef8f157c9b4208619e>)

Abstract:

Thresholds of soil matric potential (SMP) and available soil water content (AWC) required to prevent water limitations between irrigations were determined for bell pepper, melon, and spring and winter tomato grown in Mediterranean-type greenhouses on the south-eastern coast of Spain. Thresholds were identified by measuring the divergence of leaf water potential of un-watered plants from that of well-watered plants. Soil matric potential thresholds were -58 kPa for pepper, -35 kPa for melon, and -38 to -58 kPa for tomato. In general, SMP thresholds were more negative under lower evaporative demand conditions such as during autumn and winter months. Available soil water content thresholds, for a given crop and drying cycle, differed appreciably depending on soil depth and the method used to calculate the values. For the four crops studied, AWC thresholds calculated at 0-40 cm were 13-15% higher than those calculated at 0-20 cm. Each AWC threshold for 0-20 cm depth was 21-29% lower when AWC was based on laboratory rather than field determinations of field capacity and permanent wilting point. For a given method of calculating AWC, AWC threshold values were similar for different crops and drying cycles, suggesting limited sensitivity of the AWC approach. Using the manufacturer's calibration, the capacitance sensor used for SWC measurements overestimated SWC by an average of 36%. An in situ calibration provided generally good agreement with the actual SWC between 0.15 and 0.22 $\text{cm}^3 \text{cm}^{-3}$; however, for higher SWC values, the in situ calibration underestimated SWC. The results of this study demonstrated the uncertainty of using recommended fixed AWC threshold values for irrigation management, using SWC sensors, because of issues related to the definition of rooting depth, measurement of FC and PWP, sensor calibration, and sensor accuracy across the relevant range of water contents. These data suggest that SMP thresholds are much more reliable than AWC thresholds for scheduling irrigations in greenhouse-grown vegetable crops. Technical issues regarding on-farm measurement of SMP and SWC are discussed.

Keywords: Irrigation scheduling; Soil matric potential; Available water content; Capacitance sensor; EnviroSCAN; Volumetric soil water content; Tomato; Pepper; Melon

F. Madrid, R. Lopez, F. Cabrera, Metal accumulation in soil after application of municipal solid waste compost under intensive farming conditions, *Agriculture, Ecosystems & Environment*,

Volume 119, Issues 3-4, March 2007, Pages 249-256, ISSN 0167-8809, DOI: 10.1016/j.agee.2006.07.006.

(<http://www.sciencedirect.com/science/article/B6T3Y-4KSSW42-1/2/e019b31133d3cff3d7adf56dcd10d32e>)

Abstract:

Intensive farming generally needs large additions of organic matter (OM) to avoid losses of fertility or low yields. Application of compost is a common source of OM for agricultural soils. Metal accumulation and DTPA-extractability in a sandy soil after three successive applications of municipal solid waste compost (MSWC) under intensive farming conditions are described in this paper. MSWC was applied for three consecutive crops in a plot of the soil in a greenhouse at a rate of 2.1, 2.1, and 1.8 kg m⁻² on a dry matter basis, respectively. One more crop was planted, but no compost was applied to monitor residual effects of the treatment. A control plot did not receive any compost during the experiment. As is done in actual agricultural practice, a rotation of crops was used during the experiment. Tomato (*Lycopersicon esculentum*) was the first crop, followed by zucchini (*Cucurbita pepo* var. *melopepo*), green pepper (*Capsicum annuum*), and finally tomato again. The experiment lasted 2 years and 7 months.

Although moderate rates of MSWC were used and metal content of the compost was below the legal limits in Spain, increases in metal contents were observed in the soil, compared with the control treatment without the MSWC. After the second application of compost, increases in aqua regia-extractable (pseudo-total content) Zn and Pb were found in the 0-25 cm layer, and after the third application, Cu and Ni contents were also increased. Furthermore, increases in DTPA-extractable (available content) concentrations of metal contents were observed at higher rates than in aqua-regia extractable contents, suggesting that metals added with compost were more available than native metals in soils. In the 25-50 cm depth in the soil, increases due to MSWC also were found for aqua regia- and DTPA-extractable Zn and Pb after three applications of MSWC. The increases in the available fraction of the metal after MSWC application, the sandy characteristics of the soil, and the high irrigation rate could have favoured metal leaching through the soil profile. The results suggest that Spanish legislation for allowable limits of metals in MSWC is not protective enough, and lower limits in compost are necessary.

Keywords: Urban compost; Intensive farming; Trace metal; DTPA extraction; Aqua regia extraction

Biol Engin, Thermoluminescence parameters and kinetics of irradiated inorganic dust collected from black peppers, Food Control, Volume 18, Issue 3, March 2007, Pages 243-250, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.10.002.

(<http://www.sciencedirect.com/science/article/B6T6S-4HNYMFF-1/2/d1077408ec386f1a96eb6e165072b8e9>)

Abstract:

Irradiated foods can be detected by thermoluminescence (TL) of contaminating inorganic dust particles. In this study, black peppers were irradiated with gamma rays at doses of 1, 3, 5 and 10 kGy. The inorganic dust particles collected from irradiated black pepper are investigated. This study reports the mineral composition of this dust being, mainly quartz, feldspar and little amount clay minerals. The TL detection method is clearly able to distinguish irradiated and non-irradiated black peppers at the doses ranging from 1 to 10 kGy. The paper provides a detailed calculation of the activation energy (E), frequency factor (s) and the order of kinetics of the 240 [degree sign]C TL identification peak in polymineral dust material. The experimental and computerized deconvolution results are consistent with the presence of a closely overlapping second-order TL peaks in the identification peak at 240 [degree sign]C. The TL kinetic parameters of overlapping peaks were estimated by computerized deconvolution method. The computer deconvolution shows the existence of four well-defined TL peaks at 118, 210, 270 and 305 [degree sign]C. These four peaks probably due to the combined TL of quartz and feldspar minerals.

Keywords: Detection method; Food irradiation; Thermoluminescence; Black pepper

Christiane Asturiano Ristori, Marco Antonio dos Santos Pereira, Dilma Scala Gelli, Behavior of *Salmonella* Rubislaw on ground black pepper (*Piper nigrum* L.), Food Control, Volume 18, Issue 3, March 2007, Pages 268-272, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.10.015.

(<http://www.sciencedirect.com/science/article/B6T6S-4J9N0PH-1/2/b8bc194b0a61325079abc8884dbc97ad>)

Abstract:

Among spices, black pepper is highly appreciated and Brazil is one of the largest producers of it in the world. However, spices may reach consumers presenting poor quality, due to the loss of volatile compounds, microbial contamination or even due to insect infestation. *Salmonella* spp. frequently contaminate ground black pepper and may be recovered from products with low levels of free water, even after they have been submitted to high temperatures. The objective of this trial was to evaluate the behavior of a *Salmonella* Rubislaw strain on ground black pepper (*Piper Nigrum* L.), as well as to study the effects of water activity (A_w) and storage temperature (5, 25 and 35 [degree sign]C) for 2 and 15 days. The most probable number technique was used for the quantification of the *S. Rubislaw*. Data obtained in the present trial indicate that differences in the reduction in counts were observed in relation to A_w ($P = 0.006$) and storage temperature ($P = 0.000$). Nevertheless, there was no significance as to the interaction of the two factors (P 's > 0.05). Bonferroni multiple comparisons tests have shown significant differences only when related to the A_w : 0.663, 0.815 and 0.887 (P 's < 0.05). When the product is stored at 5 [degree sign]C, the number of surviving cells is even greater ($P = 0.000$). Considering the data obtained, we may conclude that, after contamination, *S. Rubislaw* remains viable in pepper for up to 15 days.

Keywords: Ground black pepper; *Salmonella* Rubislaw; Water activity; Storage temperature

Hong-Hyun Park, Joon-Ho Lee, Ki-Baik Uhm, Economic Thresholds of Western Flower Thrips (Thysanoptera: Thripidae) for Unripe Red Pepper in Greenhouse, Journal of Asia-Pacific Entomology, Volume 10, Issue 1, March 2007, Pages 45-53, ISSN 1226-8615, DOI: 10.1016/S1226-8615(08)60330-1.

(<http://www.sciencedirect.com/science/article/B8JJN-4V6TFFF-9/2/e1060b9b869722f67dcb0aa67d402fcf>)

Abstract:

This study was conducted to develop economic thresholds of western flower thrips (*Frankliniella occidentalis* Pergande) for unripe red pepper in greenhouses. To investigate the relationship between the density of thrips and resulting damages, experimental plots with five treatments (0, 4, 16, 48, 96 adults per plot) as initial release densities were established at the National Institute of Agricultural Science and Technology, Suwon, Korea, in 2004. Western flower thrips density was monitored using flower samplings and yellow sticky trap (8x13 cm) counts. Western flower thrips density was directly related to increased numbers of damaged fruits and reduced fruit yield. The number of marketable fruits produced decreased as the thrips densities increased. The major damage to pepper fruits caused by thrips was cosmetic scars that resulted from immature feeding. When flower samples or yellow trap caches were used to determine the density of thrips, which were collected on a previous sampling date, thrips densities were determined to be related to the percentage of fruits that were damaged, and a significant relationship was found for the flower samples ($y = 0.3219x + 1.0792$, $r^2 = 0.8640$ and for trap catches ($y = 11.9209 \log(x) - 2.158$, $r^2 = 0.8306$). The economically-tolerable ratio of damaged fruits based on control cost and market values under current greenhouse cultivation was estimated as 3.4 to 8.0%. Economic thresholds of western flower thrips ranged from 0.7 to 2.1 adults or nymphs per flower, and 2.3 to 5.7 adults per four-day sticky card count.

Keywords: Economic thresholds; *Frankliniella occidentalis*; Unripe red pepper; Greenhouse

Luis Martinez, Irene Cilla, Jose Antonio Beltran, Pedro Roncales, Effect of illumination on the display life of fresh pork sausages packaged in modified atmosphere. Influence of the addition of rosemary, ascorbic acid and black pepper, *Meat Science*, Volume 75, Issue 3, March 2007, Pages 443-450, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2006.07.021.

(<http://www.sciencedirect.com/science/article/B6T9G-4M4KR76-1/2/89e8a17e21661bd2cae04b7b8baf51a4>)

Abstract:

Pork forelegs were used for manufacturing fresh sausages, treated with different natural antioxidants (rosemary, ascorbic acid and black pepper), packaged in 80% O₂ + 20% CO₂ atmosphere and displayed at 2 ± 1 [degree sign]C under different lightings (darkness, standard fluorescent, low-UV colour-balanced lamp and standard fluorescent plus a UV-filter). Two packs for each treatment were opened every 4 days for subsequent analysis of colour CIE L*, a*, b*, TBARS, microbial psychrotrophic aerobes and sensory discolouration and off-odour. Lighting with standard fluorescent was highly deleterious for sausage display life, which fell from 12 to 8 days due mainly to early discolouration. Inserting a UV-filter extended display life to 12 days, while the use of a low-UV lamp was not effective in protecting from discolouration. Addition of rosemary plus ascorbic acid, in the absence of black pepper, retarded discolouration only in sausages illuminated with the UV-filter, reaching a display life of 16 days, equal to that of sausages maintained in the dark.

Keywords: Pork fresh sausages; Modified atmosphere packaging; Lighting; Antioxidants; Colour; Lipid oxidation

Mun-Chual Rho, Seung Woong Lee, Hye Ran Park, Jung-Ho Choi, Ji Yun Kang, Koanhoi Kim, Hyun Sun Lee, Young Kook Kim, ACAT inhibition of alkamides identified in the fruits of *Piper nigrum*, *Phytochemistry*, Volume 68, Issue 6, March 2007, Pages 899-903, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2006.11.025.

(<http://www.sciencedirect.com/science/article/B6TH7-4MMP2KP-2/2/7c3d77e0f5cf169903d54ffe827dc975>)

Abstract:

In this study, via a bioactivity-guided fractionation of MeOH extracts of the fruits of *Piper nigrum*, alkamide (5) and five previously-identified alkamides were isolated. Their structures were elucidated via spectroscopic analysis (1H, 13C NMR and ESI-MS), as follows: retrofractamide A (1), pipericide (2), piperchabamide D (3), pellitorin (4), dehydroretrofractamide C (5) and dehydropiperonaline (6). The IC₅₀ values determined for the compounds were 24.5 (1), 3.7 (2), 13.5 (3), 40.5 (4), 60 (5) and 90 [μ]M (6), according to the results of an ACAT enzyme assay system using rat liver microsomes. These compounds all inhibited cholesterol esterification in HepG2 cells.

Keywords: *Piper nigrum* L.; Piperaceae; Alkamides; Acyl CoA: cholesterol acyltransferase (ACAT); Atherosclerosis; HepG2 cells; Cellular cholesterol esterification

E. Portis, I. Nagy, Z. Sasvari, A. Stigel, L. Barchi, S. Lanteri, The design of *Capsicum* spp. SSR assays via analysis of in silico DNA sequence, and their potential utility for genetic mapping, *Plant Science*, Volume 172, Issue 3, March 2007, Pages 640-648, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.11.016.

(<http://www.sciencedirect.com/science/article/B6TBH-4MJJMV-1/2/c1500eb45f13579e9bde33e645d71cbf>)

Abstract:

Various types of molecular marker have been used to conduct phylogenetic and mapping studies in pepper (*Capsicum annuum*), among which microsatellites (SSRs) have been shown to be particularly valuable because of their co-dominant and multi-allelic nature. Of the approximately 180 pepper SSRs available in public domain, only a few have been either inter-and/or

intraspecifically mapped so far. This paper reports the development of a set of new EST-based SSR assays. This class of SSRs is more transferable between species than those based on genomic sequence, and so can provide anchor markers in cross-species comparative mapping. A search of >8000 *Capsicum* ESTs, corresponding to approximately 4.1 Mbp of DNA, yielded 1325 SSRs present in 899 sequences. A cluster analysis was employed to obtain non-redundant SSR-containing sequences, leading to the definition of 576 non-redundant sequences containing 783 SSRs. Primer pairs were designed to amplify 348 SSRs, and a subset of 204 was used to screen for polymorphism within a parental set of four *C. annuum* inbred lines and one *C. frutescens* accession, used as parents of three mapping populations. The resulting 49 polymorphic SSRs provided the basis for assessing genetic diversity within an extended *Capsicum* spp. genotype set. Keywords: *Capsicum* spp.; Expressed sequence tags; Linkage mapping; Simple sequence repeats

Shang-Jing Guo, Hai-Yan Zhou, Xian-Sheng Zhang, Xin-Guo Li, Qing-Wei Meng, Overexpression of CaHSP26 in transgenic tobacco alleviates photoinhibition of PSII and PSI during chilling stress under low irradiance, *Journal of Plant Physiology*, Volume 164, Issue 2, 23 February 2007, Pages 126-136, ISSN 0176-1617, DOI: 10.1016/j.jplph.2006.01.004.

(<http://www.sciencedirect.com/science/article/B7GJ7-4JCSJVD-1/2/47d8cdf23f38cddd2746e3114edd4f9a>)

Abstract: Summary

A sweet pepper cDNA clone, CaHSP26 encoding the chloroplast (CP)-localized small heat shock protein (sHSP), was isolated and characterized with regard to its sequence, response to various temperatures and function in transgenic tobacco plants. The deduced amino acid sequence contained three highly conserved regions, showing high identities with other plant sHSPs. Expression of the CaHSP26 gene showed that the mRNA accumulation of CaHSP26 was induced by heat stress. Higher transcript levels were observed when sweet pepper leaves were treated at 42 [degree sign]C for 3 h. However, the expression of the CaHSP26 gene was not induced by chilling stress (4 [degree sign]C) in the absence of heat shock (HS). But the transcripts were still detected at 48 h at 4 [degree sign]C after HS while not at 25 [degree sign]C. The photochemical efficiency of PSII (Fv/Fm) and the oxidizable P700 in transgenic tobacco overexpressing CaHSP26 were higher than that in wild type tobacco during chilling stress under low irradiance. These results suggest that CP sHSP protein plays an important role in protection of PSII and PSI during chilling stress under low irradiance.

Keywords: Chilling stress under low irradiance; Chloroplast small heat shock protein; Photoinhibition; Sweet pepper; Transgenic tobacco

Sanjeet Kumar, Vineeta Singh, Major Singh, Shubha Rai, Sanjeev Kumar, Sunil Kumar Rai, Mathura Rai, Genetics and distribution of fertility restoration associated RAPD markers in inbreds of pepper (*Capsicum annuum* L.), *Scientia Horticulturae*, Volume 111, Issue 3, 5 February 2007, Pages 197-202, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.10.021.

(<http://www.sciencedirect.com/science/article/B6TC3-4MGVJD3-2/2/3f9ce7ef93e786ac5dfa6976937bf07e>)

Abstract:

Experiments were conducted to study genetics of fertility restoration and to examine distribution of RAPD markers (OPW19800 and OPP131400) linked with fertility restoration gene (Rf) in pepper (*Capsicum annuum* L.) inbreds. Forty-two hot and five sweet pepper inbreds were crossed on a cytoplasmic male sterile (cms) line CCA-4261 and F1s were evaluated for fertility restoration under open field conditions. DNA of 5 plants of CCA-4261 and individual plants of 47 inbreds was isolated and PCR reaction was performed using OPW19 and OPP13 primers. The results revealed that most of the hot pepper lines possess Rf gene. The Rf gene associated two markers, viz., OPW19800 and OPP131400 were not frequently distributed in the restorer inbred lines because

presence of marker bands often does not coincide with the presence of Rf gene identified in many restorer inbreds. The case specific applications of both the RAPD markers have been described.

Keywords: Capsicum; cms; Fertility restoration; Markers; Pepper; RAPD

ZOU Xue-xiao, MA Yan-qing, LIU Rong-yun, ZHANG Zhu-qing, CHENG Wen-chao, DAI Xiong-ze, LI Xue-feng, ZHOU Qun-chu, Combining Ability Analyses of Net Photosynthesis Rate in Pepper (*Capsicum annuum* L.), *Agricultural Sciences in China*, Volume 6, Issue 2, February 2007, Pages 159-166, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60030-3.

(<http://www.sciencedirect.com/science/article/B82XG-4N7RX4X-5/2/2786b9cc4cc25fe2c21063c2862e55db>)

Abstract:

In perspective of breeding high-yield hybrid pepper varieties, combining ability analysis of net photosynthesis rate at different phases of flowering and fruit setting in pepper was made with 15 cross combinations from 6 parents by $(1/2)n(n-1)$ diallel crosses. There are relatively large differences not only in general combining ability (GCA) effect among different parents and at different phases of flowering and fruit setting, but also in specific combining ability (SCA) effect among different hybrids. There are relatively large GCA effects in late parents but relatively less GCA effects in early parents. No obvious laws have been found in the relationship between SCA effects and maturity of hybrids. Variances of SCA are larger than those of GCA. Heritability is less but influence of environment is larger. Correlation analysis of combining ability between net photosynthesis rate and agronomic character or resistances to main diseases has showed that correlation coefficients of GCA are relatively large at the medium phase and the late phase of flowering and fruit setting. Net photosynthesis rate is more relative to leaf characters and fruit characters. Correlation coefficients of SCA are relatively large at the early phase and the late phase of flowering and fruit setting. Net photosynthesis rate is more relative to leaf characters and plant characters at the early phase but to plant characters and fruit characters at the late phase. Correlation coefficients of SCA between net photosynthesis rate and resistances to main diseases are larger than those of GCA. The combining abilities of net photosynthesis rate at different phases of flowering and fruit setting are positively correlated with those of yield per plant. The combining ability is an important parameter of breeding of high photosynthesis hybrid pepper varieties.

Keywords: pepper (*Capsicum annuum* L.); net photosynthesis rate; combining ability; stability; correlation analysis

DU Jin-hua, FU Mao-run, LI Miao-miao, XIA Wei, Effects of Chlorine Dioxide Gas on Postharvest Physiology and Storage Quality of Green Bell Pepper (*Capsicum frutescens* L. var. Longrum), *Agricultural Sciences in China*, Volume 6, Issue 2, February 2007, Pages 214-219, ISSN 1671-2927, DOI: 10.1016/S1671-2927(07)60037-6.

(<http://www.sciencedirect.com/science/article/B82XG-4N7RX4X-D/2/9d31795abd57c00d5ab17d79fca9c801>)

Abstract:

The effects of treatment of chlorine dioxide (ClO_2) gas on postharvest physiology and preservation quality of green bell peppers were studied. Green bell peppers were collected in bags and treated with 0, 5, 10, 20, and 50 mg L⁻¹ ClO_2 gas at 10 \pm 0.5[degree sign]C for over 40 d, and the changes in postharvest physiology and preservation quality of the peppers were evaluated during the storage. The inhibition of rot of the peppers was observed for all the tested ClO_2 gas treatments. The rot rates of the treated samples were 50% lesser than those of the control after day 40 of storage. The highest inhibitory effect was obtained after 50 mg L⁻¹ ClO_2 gas treatment, where the peppers did not decay until day 30 and showed only one-fourth of the rot rate of the control at day 40 of storage. The respiratory activity of the peppers was significantly ($P < 0.05$) inhibited by 20 and 50 mg L⁻¹ ClO_2 treatments, whereas no significant effects on respiratory

activity were observed with 5 and 10 mg L⁻¹ ClO₂ treatments (P>0.05). Except for 50 mg L⁻¹ ClO₂, malondialdehyde (MDA) contents in the peppers treated with 5, 10, or 20 mg L⁻¹ ClO₂ were not significantly (P>0.05) different from those in the control. Degradation of chlorophyll in the peppers was delayed by 5 mg L⁻¹ ClO₂, but promoted by 10, 20, or 50 mg L⁻¹ ClO₂. The vitamin C content, titratable acidity, and total soluble solids of the peppers treated by all the tested ClO₂ gas did not significantly change during the storage. The results suggested that ClO₂ gas treatment effectively delayed the postharvest physiological transformation of green peppers, inhibited decay and respiration, maintained some nutritional and sensory quality, and retarded MDA accumulation. Keywords: green bell pepper (*Capsicum frutescens* L. var. Longrum); chlorine dioxide gas; post-harvest physiology; storage quality

Sung Chul Lee, Dae Sung Kim, Nak Hyun Kim, Byung Kook Hwang, Functional analysis of the promoter of the pepper pathogen-induced gene, CAPIP2, during bacterial infection and abiotic stresses, *Plant Science*, Volume 172, Issue 2, February 2007, Pages 236-245, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.08.015.

(<http://www.sciencedirect.com/science/article/B6TBH-4M0J32W-1/2/383eb07a515aa8564bc24adf66ba6341>)

Abstract:

Promoter is a region of DNA to which transcription factor binds before initiating the transcription of DNA into RNA. The pepper pathogen-induced protein gene, CAPIP2, was locally or systemically induced in pepper plants infected by *Xanthomonas campestris* pv. *vesicatoria*. In this study, we isolated and transiently characterized the CAPIP2 promoter in tobacco leaves to identify the cis-acting regulatory sequences involved in CAPIP2 gene expression. The 991-bp DNA sequence upstream of the CAPIP2 gene was assessed for the activity of the CAPIP2 promoter fused to the [beta]-glucuronidase (GUS) reporter gene, via an *Agrobacterium*-mediated transient expression assay. Several cis-acting elements, including GT1, MYB, RAV, and W-box, resided within the genomic sequence upstream of the CAPIP2 gene. The activation of the CAPIP2 promoter was induced by *Pseudomonas syringae* pv. *tabaci*, salicylic acid, methyl jasmonate and abscisic acid, NaCl and cold stress. The expression of the pepper transcription factors, CARAV1 and CAZFP1, was shown to activate the CAPIP2 promoter. Analysis of a series of 5'-deletions of the CAPIP2 promoter suggests that novel cis-acting elements necessary to induce gene expression by pathogens and environmental stresses are specifically localized in the CAPIP2 promoter region.

Keywords: Cis-acting elements; Environmental stress; Pathogenesis-related gene; Promoter analysis; Systemic acquired resistance; Transient assay

Andres Conesa, Francisco Artes-Hernandez, Sabine Geysen, Bart Nicolai, Francisco Artes, High oxygen combined with high carbon dioxide improves microbial and sensory quality of fresh-cut peppers, *Postharvest Biology and Technology*, Volume 43, Issue 2, February 2007, Pages 230-237, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.08.016.

(<http://www.sciencedirect.com/science/article/B6TBJ-4M0J4GS-3/2/e5fc3b1cd65c2f2aaec608c4625aefa0>)

Abstract:

The effects of high O₂ and high CO₂ throughout storage on the microbial and sensory quality of fresh-cut bell peppers from two commercial 'California' cultivars grown under different climatic conditions were studied. The 'Meteor' cultivar was minimally processed in Leuven (Belgium) and the 'Requena' cultivar in Cartagena (Murcia, Spain). The storage conditions were (kPa O₂/kPa CO₂/kPa N₂) 100/0/0, 80/15/5, 60/0/40, 50/15/35, 20/15/65 and 21/0.03/[congruent with]79 as control. Bell peppers freshly-cut in cubes were stored at 5 [degree sign]C up to 9-10 days. Changes in total counts of mesophilic, psychrotrophic, yeasts and mould as well as Enterobacteriaceae were monitored. Individual and total sugars and organic acids contents, visual appearance, color, shriveling, off-aroma, crunchiness, flavor and overall quality were also

evaluated. The results in both experiments showed that 80 or 50 kPa O₂ combined with 15 kPa CO₂ maintained the main sensory quality attributes and inhibited growth of the spoilage microorganisms and Enterobacteriaceae in minimally processed bell peppers.

Keywords: Minimal processing; Quality attributes; Bacteria; Yeast and mould; Food safety

Liljana R. Koleva-Gudeva, Mirko Spasenovski, Fidanka Trajkova, Somatic embryogenesis in pepper anther culture: The effect of incubation treatments and different media, *Scientia Horticulturae*, Volume 111, Issue 2, 4 January 2007, Pages 114-119, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.10.013.

(<http://www.sciencedirect.com/science/article/B6TC3-4MD959T-2/2/a120818fa6e2776f4000cbd96e287b74>)

Abstract:

The frequency of obtained androgenic plants depends highly on the genotype; therefore the low rate of haploid recovery limits the utility of anther culture in pepper breeding. The need for incubation treatment and adequate nutrition media supplemented with plant growth regulators, especially auxins, are suggested as important factors to obtain somatic haploid embryos in pepper anther culture. The effect of three incubation treatments of the androgenic potential in pepper anther culture on MS, N, LS, NN and CP medium are summarised, and the results demonstrate that:

- by incubating treatment in cold conditions (at 7 [degree sign]C) in darkness for 7 days, and then transferring the explants to light conditions (12-h photoperiod at 25 [degree sign]C) for 4 weeks, on LS and NN mediums, anthers produced callus;
- by incubating treatment in heat conditions (at 25 [degree sign]C) in darkness for 7 days, and then transferring the explants to light conditions (12-h photoperiod at 25 [degree sign]C) for 4 weeks, on MS and N mediums, anthers produced callus;
- by incubating treatment in heat conditions (at 35 [degree sign]C) in darkness for 8 days, the next 4 days to light conditions (12-h photoperiod at 25 [degree sign]C) on CP medium, and then transferring the explants to R1 medium for 4 weeks, anthers produced embryos.

Keywords: Androgenesis; Thermal shock; Embryo formation; In vitro; *Capsicum annuum* L

Rodrigo Lasa, Carmen Ruiz-Portero, Maria D. Alcazar, Jose E. Belda, Primitivo Caballero, Trevor Williams, Efficacy of optical brightener formulations of *Spodoptera exigua* multiple nucleopolyhedrovirus (SeMNPV) as a biological insecticide in greenhouses in southern Spain, *Biological Control*, Volume 40, Issue 1, January 2007, Pages 89-96, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.06.015.

(<http://www.sciencedirect.com/science/article/B6WBP-4KCXF85-1/2/19c77cd80fb185626f28e19bd2dd35b8>)

Abstract:

The efficacy of optical brightener formulations of a native Spanish isolate of *Spodoptera exigua* multiple nucleopolyhedrovirus (SeMNPV) was determined for control of *S. exigua* on greenhouse grown sweet pepper (*Capsicum annuum*) in Almeria, Spain. In laboratory bioassays involving diet surface contamination, the 50% lethal concentration in fourth instars was reduced 25-fold and 5731-fold, compared to SeMNPV occlusion bodies (OBs) alone, or in mixtures with 0.1% and 1% of the stilbene-derived optical brightener leucophor AP, respectively. The efficacy of spray applications of 1 x 10¹² OBs/Ha SeMNPV alone, or in mixtures with 0.1% leucophor AP, was tested in a greenhouse planted with sweet pepper. The prevalence of virus infection in larvae collected at intervals post-application and reared on artificial diet in the laboratory was very high (62-97% mortality). Compared to the treatment involving SeMNPV OBs alone, OBs applied in mixtures with leucophor AP resulted in a significant increase in the prevalence of infection in larvae collected at 2 days post-application, but not in insects collected subsequently. In contrast, a chemical insecticide treatment, lufenuron, performed poorly (<45% mortality). Persistence of OBs

on leaf surfaces was examined by subjecting leaf samples to laboratory bioassay in second instar *S. exigua*. The reduction in OB activity over an 8 day period was greater in leaves sampled from the upper crop canopy compared to those from the lower part of the plant but persistence was not improved in the presence of leucophor AP. The plastic greenhouse structure reduced the intensity of incident UV-B (280-315 nm) readings by ~90% compared to external readings. Applications of leucophor AP did not adversely affect the growth of sweet pepper plants over a 14-day period. We conclude that SeMNPV should be adopted as a biological insecticide in greenhouses of this region.

Keywords: Baculovirus; Efficacy; Formulation; Greenhouse crops; Nucleopolyhedrovirus; Persistence; Sweet pepper

Luna Greco, Rossella Riccio, Sabina Bergero, Attilio A.M. Del Re, Marco Trevisan, Total reducing capacity of fresh sweet peppers and five different Italian pepper recipes, *Food Chemistry*, Volume 103, Issue 4, 2007, Pages 1127-1133, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.10.013. (<http://www.sciencedirect.com/science/article/B6T6R-4MCWB4M-1/2/6490193003f7a018e3b9ff4998892043>)

Abstract:

Processing and preparation methods are generally believed to result in a depletion of naturally occurring antioxidants in food. To evaluate the antioxidant properties of fresh sweet peppers (*Capsicum annuum*) and five different Italian recipes based on sweet peppers (pickled; 'peperonata'; grilled; in sour-sweet condiment; salted), water- and lipid-soluble extracts from fresh and processed peppers were analysed using high-performance liquid chromatography coupled with an electrochemical detector. Total reducing capacity (TRC) and contributions of hydrophilic reducing capacity (HRC) and lipophilic reducing capacity (LRC) to the TRC were determined in all the samples. Three important antioxidant compounds were measured: ascorbic acid, [beta]-carotene and lycopene. The contribution of these individual compounds to TRC was estimated.

Fresh pepper had the highest TRC, the highest HRC and the greatest content of ascorbic acid. HRC and ascorbic acid content decreased with processing, whilst LRC was generally increased. Ascorbic acid was the major component of HRC in all samples (ranging from 72% in peperonata to 88% in fresh pepper), confirming the high content of this vitamin in peppers. Lycopene was detected only in peperonata. Many liposoluble compounds present in the lipophilic extract were not identified (only 6-20% of LRC was [beta]-carotene).

Keywords: HPLC; Electrochemical detector; Canned food; Mediterranean diet

Suchandra Chatterjee, Zareena Niaz, S. Gautam, Soumyakanti Adhikari, Prasad S. Variyar, Arun Sharma, Antioxidant activity of some phenolic constituents from green pepper (*Piper nigrum* L.) and fresh nutmeg mace (*Myristica fragrans*), *Food Chemistry*, Volume 101, Issue 2, 2007, Pages 515-523, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.02.008.

(<http://www.sciencedirect.com/science/article/B6T6R-4JJ884V-4/2/7ef094f85ce17f2b2c117ecbbaa161c0>)

Abstract:

Antioxidant potential of phenolic compounds from green pepper (*Piper nigrum* L.) and lignans from fresh mace (*Myristica fragrans*) were evaluated for their ability to scavenge 1,1'-diphenyl-2-picrylhydrazyl (DPPH) radical, inhibit lipid peroxidation and protect plasmid DNA damage upon exposure to gamma radiation. EC50 values of the major phenolic compounds of green pepper namely, 3,4-dihydroxyphenyl ethanol glucoside, 3,4-dihydroxy-6-(N-ethylamino) benzamide and phenolic acid glycosides were found to be 0.076, 0.27 and 0.12 mg/ml, respectively, suggesting a high radical scavenging activity of these phenolics. These results were further confirmed with cyclic voltammetry. Acetone extract of nutmeg mace and its subsequent TLC isolated fractions constituted mainly of lignans as revealed by GC-MS analysis. The major compounds were tentatively identified from their mass spectral fragmentation pattern. DPPH radical scavenging

capacity of the acetone extract as well as its fractions was comparatively lower than that of green pepper phenolics. In contrast, these fractions had a greater ability to inhibit lipid oxidation than phenolics from pepper as revealed by [beta]-carotene-linoleic acid assay. A DNA protecting role of these compounds even at doses as high as 5 kGy further suggested the potential use of green pepper and fresh nutmeg mace and their extracts as a nutraceutical in preventing oxidative damage to cells.

Keywords: Antioxidant activity; DNA protection; Lignans; Mace; Pepper; Phenolics

Filomena Conforti, Giancarlo A. Statti, Francesco Menichini, Chemical and biological variability of hot pepper fruits (*Capsicum annuum* var. *acuminatum* L.) in relation to maturity stage, *Food Chemistry*, Volume 102, Issue 4, 2007, Pages 1096-1104, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.06.047.

(<http://www.sciencedirect.com/science/article/B6T6R-4KV8TM9-2/2/4a189e38b0f94ff0ea833651c7063998>)

Abstract:

The aim of the present work was to evaluate the chemical composition and the radical-scavenging and antioxidant activities of hot pepper fruits (*Capsicum annuum* L. var. *acuminatum*) at three maturity stages (small green, green and red). GC-MS analysis of n-hexane and chloroform fractions showed a different composition between the three stages of ripening. The first stage of maturation (small green) showed the highest radical-scavenging activity (IC₅₀ of 129 [μg/ml]). Using the bovine brain peroxidation assay, the methanolic extract of green pepper showed significant antioxidant activity (IC₅₀ of 522 [μg/ml]). Addition of methanolic extract of red and green pepper inhibited oxidation of linoleic acid. Methanolic extract of red pepper showed greater antioxidative potency than the others (IC₅₀ of 3 [μg/ml]). The different composition of lipophilic compounds and the various amount of phenolics, showed in the three stage of ripening of *C. annuum* var. *acuminatum* fruits, modifies the antioxidant activity.

Keywords: *Capsicum annuum* L. var. *acuminatum*; Radical scavenger; Antioxidant activity; Biodiversity; Phenolic content

Eiji Yamazaki, Minoru Inagaki, Osamu Kurita, Tetsuji Inoue, Antioxidant activity of Japanese pepper (*Zanthoxylum piperitum* DC.) fruit, *Food Chemistry*, Volume 100, Issue 1, 2007, Pages 171-177, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.09.036.

(<http://www.sciencedirect.com/science/article/B6T6R-4HHH62S-2/2/e92600608f5c8927cb33edb6010ec713>)

Abstract:

Antioxidants were extracted from Japanese pepper (*Zanthoxylum piperitum* DC.) fruit and characterized. The antioxidant activity of the methanol extract from Japanese pepper fruit was found to be equal to that of [alpha]-tocopherol and stable under heat treatment. The main compounds that gave a significant antioxidant activity from the methanol extract were identified to be hyperoside (quercetin-3-O-galactoside) and quercitrin (quercetin-3-O-rhamnoside) as determined by HPLC, mass spectrometry, UV/Vis spectroscopy, and TLC. Radical-scavenging activities of hyperoside and quercitrin from Japanese pepper fruit were evaluated using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) method. As a result, hyperoside and quercitrin scavenged DPPH radical strongly with IC₅₀ values of 16 and 18 [μM], respectively. These observations show the presence of strong antioxidants, namely hyperoside and quercitrin in Japanese pepper fruit.

Keywords: Japanese pepper; Antioxidant; 1,1-Diphenyl-2-picrylhydrazyl; Hyperoside; Quercitrin

G. Oboh, R.L. Puntel, J.B.T. Rocha, Hot pepper (*Capsicum annuum*, Tepin and *Capsicum* chinese, Habanero) prevents Fe²⁺-induced lipid peroxidation in brain - in vitro, *Food Chemistry*, Volume 102, Issue 1, 2007, Pages 178-185, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.05.048.

(<http://www.sciencedirect.com/science/article/B6T6R-4KJTNS0-1/2/b328e43c8d36205e2726774d6893a087>)

Abstract:

Iron is an essential metal for normal cellular physiology, but excess iron results in cell injury; it reacts with superoxide anions (O_2^-) and hydrogen peroxide (H_2O_2) to produce the hydroxyl radical (OH^\bullet) and other reactive oxygen species (ROS) which can cause damage to body cells. Free radical damage can be prevented by food rich in antioxidants such as fruit and vegetables. In the present study, the ability of aqueous extracts of ripe (red) and unripe (green) hot peppers [*Capsicum annum*, Tepin (CAT) and *Capsicum chinese*, Habanero (CCH)] (3.3-16.7 mg/ml) to prevent 25 μ M Fe^{2+} -induced lipid peroxidation in Rat's brain (In vitro) were assessed using TBARS (Thiobarbituric acid reactive species). The total phenol and vitamin C content, as well as Fe^{2+} -chelating ability, and the ability of the pepper extracts to prevent Fe^{2+}/H_2O_2 -induced decomposition of deoxyribose was also determined. The results of the study revealed that incubating the brain tissues in the presence of 25 μ M Fe^{2+} caused a significant increase ($p < 0.05$) in MDA (Malondialdehyde) production in the rat's brain (260%) when compared with the basal (100%). However, the pepper extracts (unripe and ripe) caused a significant decrease ($p < 0.05$) in the MDA production in both the basal and the Fe^{2+} -induced lipid peroxidation in the Rat's brain. However, CAT [ripe and unripe] had a significantly ($p < 0.05$) higher inhibitory effect on both basal and Fe^{2+} -induced lipid peroxidation in the brain tissues than that of CCH (ripe and unripe). In addition, CAT (ripe and unripe) had a significantly higher ($p < 0.05$) total phenol, vitamin C and Fe^{2+} chelating ability than CCH (ripe and unripe). The unripe CAT had a significantly ($p < 0.05$) higher total phenol, Fe^{2+} chelating ability and inhibitory effect on the basal and Fe^{2+} -induced lipid peroxidation in the brain tissues than the ripe pepper, while the reverse is the case with CCH where the red pepper had a higher values for the same parameters. However, ripe CAT and CCH had a significantly higher ($p < 0.05$) vitamin C content than the unripe; meanwhile both ripe and unripe peppers (CAT&CCH) did not significantly inhibit ($p < 0.05$) Fe^{2+}/H_2O_2 -induced decomposition of deoxyribose (Fenton reaction). The inhibitory effect of the pepper on lipid peroxidation (basal and Fe^{2+} induced) and Fe^{2+} chelating effect of the extracts were dose dependent. It was therefore concluded that hot peppers prevent Fe^{2+} -induced lipid peroxidation, however CAT (ripe and unripe) are more potent inhibitors of Fe^{2+} -induced lipid peroxidation than CCH (unripe and ripe), meanwhile unripe CAT had the highest protective ability and this is probably due to its higher total phenol content and Fe^{2+} chelating ability.

Keywords: Pepper; Fe^{2+} ; Rat; Brain

T.S. Kahlon, M.H. Chapman, G.E. Smith, In vitro binding of bile acids by spinach, kale, brussels sprouts, broccoli, mustard greens, green bell pepper, cabbage and collards, Food Chemistry, Volume 100, Issue 4, 2007, Pages 1531-1536, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.12.020.

(<http://www.sciencedirect.com/science/article/B6T6R-4J624X2-3/2/23a47ec4dabebcd133869081e3513595>)

Abstract:

The in vitro binding of bile acids by spinach (*Spinacia oleracea*), kale (*Brassica oleracea acephala*), Brussels sprouts (*Brassica oleracea gemmifera*), broccoli (*Brassica oleracea italica*), mustard greens (*Brassica juncea*), green bell peppers (*Capsicum annum*), cabbage (*Brassica oleracea capitata*) and collards (*Brassica oleracea acephala*) was determined using a mixture of bile acids secreted in human bile at a duodenal physiological pH of 6.3. Six treatments and two blank incubations were conducted testing various fresh raw green vegetables on an equal dry matter basis. Considering cholestyramine (bile acid binding, cholesterol lowering drug) as 100% bound, the relative in vitro bile acid binding of various vegetables tested on equal dry matter and total dietary fibre basis was 2-9% and 6-32%, respectively. Bile acid binding for spinach, kale and brussels sprouts was significantly higher than for broccoli and mustard greens. For broccoli and

mustard greens binding values were significantly higher those for cabbage, bell pepper and collards. These results point to the health promoting potential of spinach = kale = brussels sprouts > broccoli = mustard greens > cabbage = green bell peppers = collards, as indicated by their bile acid binding on dry matter basis.

Keywords: Spinach; Kale; Brussels sprouts; Broccoli; Mustard greens; Green bell pepper; Cabbage; Collards; Bile acid binding

Jose Fenoll, Pilar Hellin, Carmen M. Martinez, Marta Miguel, Pilar Flores, Multiresidue method for analysis of pesticides in pepper and tomato by gas chromatography with nitrogen-phosphorus detection, Food Chemistry, Volume 105, Issue 2, 2007, Pages 711-719, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.12.060.

(<http://www.sciencedirect.com/science/article/B6T6R-4MW323F-6/2/985060129e138c3a6b1b09329990eb2b>)

Abstract:

An analytical multiresidue method for the simultaneous determination of various classes of pesticides in vegetables (pepper and tomato) was developed. Vegetable samples are extracted with acetone and the pesticides are partitioned into ethyl acetate/cyclohexane. Final determination was made by gas chromatography with nitrogen-phosphorus detection. Confirmation analysis of pesticides was carried out by gas chromatography coupled with mass spectrometry in the selected ion monitoring (SIM) mode. The identification of compounds was based on retention time and on comparison of the primary and secondary ions. Recovery studies were performed at 0.05, 0.1 and 0.02 mg kg⁻¹ fortification levels of each compound and the recoveries obtained ranged from 70.1% to 128.5% with relative standard deviations lower than 7%. The method showed good linearity over the range assayed 50-1500 [µg] l⁻¹ and the detection and quantification limits for the pesticides studied varied from 0.1 to 4.4 [µg] kg⁻¹ and 0.4 to 14.5 [µg] kg⁻¹, respectively. The proposed method was used to determine pesticides levels in peppers and tomatoes grown in experimental greenhouses.

Keywords: Multiresidue; Pepper; Tomato; Pesticides; Gas chromatography

Erdal Ertas, Hayrettin Ozer, Cesarettin Alasalvar, A rapid HPLC method for determination of Sudan dyes and Para Red in red chilli pepper, Food Chemistry, Volume 105, Issue 2, 2007, Pages 756-760, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.01.010.

(<http://www.sciencedirect.com/science/article/B6T6R-4MWXR0M-H/2/6de99469fdadf24f6a1c7a557f0e03ae>)

Abstract:

A rapid high-performance liquid chromatography (HPLC) system consisting of an ultraviolet-visible (UV-VIS) detector was developed for the separation and determination of Sudan dyes (I, II, III, and IV) and Para Red in red chilli peppers. The chromatographic separation was achieved on a reverse phase C18 column with isocratic elution, using a mobile phase of acetonitrile/methanol (80:20, v/v); detector was set at 506 nm. All four Sudan dyes and Para Red were separated in less than 9 min. Among 80 red chilli peppers screened, only one of them contained 0.10, 0.04, and 0.05 mg/kg Sudans I, III, and IV, respectively. No Sudan II and Para Red were detected in any of the red chilli peppers analysed. The method was 'in-house' validated using red chilli peppers based on following criteria: limit of detection (LOD), limit of quantification (LOQ), recovery, repeatability, reproducibility, and linearity in red chilli peppers. Depending on the dye involved, LOD and LOQ were in the range of 1.2-5.4 and 4-18 [µg]/kg in red chilli, respectively. The recovery, repeatability (expressed as coefficient of variation, CVr), and reproducibility (CVR) varied from 89 to 98%, from 0.82 to 4.09%, and from 1.33 to 4.65%, respectively. Linearity obtained for all dyes and Para Red were all r² > 0.9999 (in the range of 0.01-5 mg/l). The applicability of the method to the determination of Sudan dyes and Para Red in red chilli peppers was demonstrated.

This method has potential to be used for illegal Sudan dyes and Para Red in red chilli peppers and some foodstuffs due to its simple, reliable, rapid, and excellent precision.

Keywords: Sudan dyes; Para Red; Red chilli peppers; HPLC-UV-VIS

Yasemen Yanar, Hakan Buyukcapar, Mahmut Yanar, Mustafa Gocer, Effect of carotenoids from red pepper and marigold flower on pigmentation, sensory properties and fatty acid composition of rainbow trout, Food Chemistry, Volume 100, Issue 1, 2007, Pages 326-330, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.09.056.

(<http://www.sciencedirect.com/science/article/B6T6R-4HNYMT1-2/2/0f79236b84be99b3eee4dd4b2d7f51ad>)

Abstract:

Effects of carotenoid sources on pigmentation, sensory properties and fatty acid composition of rainbow trout (*Onchorhynchus mykiss*) were investigated. The fish (120.51 +/- 0.75 g) were fed with diets containing 1.8% marigold flower, 5% red pepper, 70 mg kg⁻¹ commercial astaxanthin and compared with a control group for 60 days. Commercial astaxanthin provided the highest carotenoid accumulation in the fish, and this was followed by red pepper and marigold flower ($p < 0.05$). Dietary carotenoid sources did not significantly affect fatty acid composition of the fish filets. Trout muscle coloured with commercial astaxanthin was more preferred than the others by the sensory panellists.

Keywords: Rainbow trout; Pigmentation; Sensory property; Fatty acid composition; Red pepper; Marigold flower

Alejandro Hernandez, Alberto Martin, Emilio Aranda, Teresa Bartolome, Maria de Guia Cordoba, Application of temperature-induced phase partition of proteins for the detection of smoked paprika adulteration by free zone capillary electrophoresis (FZCE), Food Chemistry, Volume 105, Issue 3, 2007, Pages 1219-1227, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.02.044.

(<http://www.sciencedirect.com/science/article/B6T6R-4N85BC7-1/2/366b91b471cc5abe65e392ed6579a1b4>)

Abstract:

A procedure for protein extraction was developed for use in the determination, by free zone capillary electrophoresis (FZCE), of smoked paprika 'Pimenton de La Vera' adulteration with paprika elaborated from varieties of pepper foreign to the 'La Vera' region, in the centre-west of Spain. Two autochthonous varieties of pepper, Jaranda and Bola, and the varieties Papri Queen, Papri King and Sonora, foreign to the 'La Vera' region, were used in the study. Several Tris-HCl buffer concentrations and pH values were tested for the extraction of the hydrophilic and hydrophobic protein fractions obtained by temperature-induced phase partition with Triton X-114. On the basis of the results, 0.5 mM Tris-HCl buffer, pH 7.4, with 150 mM sodium chloride, was adopted as the optimal extraction buffer. Five peaks found in the FZCE electropherograms of the hydrophilic protein fraction were investigated as a basis for detecting and estimating the adulteration of smoked paprika. The adulteration detection limits varied from 10% to 40% of paprika elaborated from foreign varieties within a satisfactory working range of admixture (5-80%) sufficiently large to cover the adulteration levels of interest. In addition, a peak of this fraction was identified as a marker for the smoke-drying process. With respect to the hydrophobic proteins, the use of the peak denominated M and the ratio of peaks M and K as markers for determining adulteration gave the best results, with an adulteration detection limit of 5% (w/w), and correlation coefficients greater than 0.965.

Keywords: Paprika; Adulteration; Temperature-induced phase partition; FZCE

Edmundo Castillo, Alejandro Torres-Gavilan, Patricia Severiano, Navarro Arturo, Agustin Lopez-Munguia, Lipase-catalyzed synthesis of pungent capsaicin analogues, Food Chemistry, Volume 100, Issue 3, 2007, Pages 1202-1208, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.11.026.

(<http://www.sciencedirect.com/science/article/B6T6R-4J2M0P0-5/2/57cafa3adf23897305592fba6200663a>)

Abstract:

Pungency in peppers (*Capsicum* spp.) is a sensation produced by a group of molecules known as capsaicinoids. Capsaicin has been reported as the capsaicinoid with the strongest pungency. Based on the molecular structure of capsaicin the enzymatic synthesis and pungent properties of structural analogues was investigated. These analogues were based on modification of the length of the acyl chain (from C4 to C16) and the chemical substituents of the aromatic ring (-OH and -OCH₃). The syntheses were carried out in 2-methyl-2-butanol with lipase B of *Candida antarctica*, with conversions ranging from 83% to 97.5%. The initial reaction rates were not significantly influenced by the nature of acyl-donor but rather by the substituents in the aromatic ring of the evaluated amines. The relative pungency of 10 capsaicin analogues was sensorially evaluated, using a sensory method for relative pungency. All the compounds were tested at a dose equivalent to 20 times the threshold capsaicin concentration. Two analogues were found pungent; the vanillylamides of caprylic (C-8) and capric (C-10) acids, showing a relative pungency of 66% and 36%, respectively, while the vanillylamides of caproic (C-6) and lauric (C-12) acids had a very low relative pungency (2.1% and 1.2%, respectively). From these results structural features related to pungency are discussed.

Keywords: Lipase; *Candida antarctica*; Amide synthesis; Capsaicin; Capsaicin analogues; Pungency; Sensory analysis

Jorge Pino, Marilu Gonzalez, Liena Ceballos, Alma Rosa Centurion-Yah, Jorge Trujillo-Aguirre, Luis Latournerie-Moreno, Enrique Sauri-Duch, Characterization of total capsaicinoids, colour and volatile compounds of Habanero chilli pepper (*Capsicum chinense* Jack.) cultivars grown in Yucatan, *Food Chemistry*, Volume 104, Issue 4, 2007, Pages 1682-1686, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.12.067.

(<http://www.sciencedirect.com/science/article/B6T6R-4NRVV1T-1/2/2277ad5481fa35d8f640bdfdc7684c3e>)

Abstract:

Total capsaicinoids, colour and volatile compounds of 10 Habanero chilli pepper (*Capsicum chinense* Jack.) cultivars grown in Yucatan, grouped by their colours: four red, five orange and one brown, were determined. The content of capsaicinoids, responsible for the pungency of chilli peppers, varied between 41.8 and 65.9 mg g⁻¹ dry fruit. Mean concentration of orange cultivars was 55.0 mg g⁻¹, while red cultivars had 45.0 mg g⁻¹ dry fruit, indicating that the first ones are more pungent. The composition of volatile compounds of the Habanero chilli peppers differs clearly for the different cultivars. Orange and brown cultivars have in general higher amounts of esters, with their fruity odour notes, than red cultivars. These differences are reflected in the amount of total volatiles, which is higher in orange and brown cultivars in comparison with red cultivars. From these results it can be concluded that orange and brown cultivars are better in terms of their flavour-relevant chemical composition than red cultivars.

Keywords: Chilli pepper; *Capsicum chinense*; Capsaicinoids; Colour; Volatile compounds

Yukitomo Arao, Namiko Kanamori, Eri Kikkawa, Hiroko Otsuka, Yasushi Arimoto, Kazuhiro Ikeda, Takahiro Inakuma, Fujio Kayama, A two-step screening method, using estrogen receptor-mediated transactivation, to measure estrogenicity in edible plants, *Food Chemistry*, Volume 104, Issue 3, 2007, Pages 1288-1294, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2007.01.076.

(<http://www.sciencedirect.com/science/article/B6T6R-4NNPCPY-1/2/a595831bce4c6b5b05fd1be8ad0c042b>)

Abstract:

Estrogenic activity in 88 edible plants was screened using a human ovarian carcinoma cell line stably transformed with estrogen-responsive elements (ERE) fused to a luciferase (luc) reporter

gene (BG1Luc4E(2)). We found 18 plants (ashitaba, avocados, chinese mustard, chinese chive (yellow), chrysanthemum, dokudami, shantung greens, green soybeans, soybean seeds, soybean sprouts, hop, japanese pepper, kidney beans, kuromame, perilla, peas (immature), plantain, and pomegranate juice) expressing estrogenic activity in BG1Luc4E(2) cells. To confirm that the phytoestrogenic activity occurred via estrogen receptors (ER), the reporter vector (ERE-tk-luc) and an expression vector, containing either ER[alpha] or ER[beta], were used to transiently transfect 293T cells. Extracts from avocados, plantain and dokudami did not activate ER[alpha]- and ER[beta]-mediated transcription. In conclusion, we report a simple and quick screening method for phytoestrogenic activity in plant extracts using BG1Luc4E(2) cells and confirmation of the results by ER[alpha]- or ER[beta]-transfected 293T cells. This two-step screening method has a practical application in screening estrogenic substances in edible plants.

Keywords: Phytoestrogen; Estrogen receptor; Transcription; Screening

Olga Cisneros-Pineda, Luis W. Torres-Tapia, Luis Carlos Gutierrez-Pacheco, Fernando Contreras-Martin, Tomas Gonzalez-Estrada, Sergio R. Peraza-Sanchez, Capsaicinoids quantification in chili peppers cultivated in the state of Yucatan, Mexico, Food Chemistry, Volume 104, Issue 4, 2007, Pages 1755-1760, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2006.10.076.

(<http://www.sciencedirect.com/science/article/B6T6R-4MJJCDM-6/2/e9fe44ea591efdcb135a69d810932f3c>)

Abstract:

Capsaicinoids are a group of 12 or more related alkaloids responsible of the pungent sensation in fruits of the genus *Capsicum*. Capsaicin [(E)-N-(4-hydroxy-3-methoxybenzyl)-8-methyl-6-nonenamide] and dihydrocapsaicin are responsible for more than 90% of the pungency. This work describes the quantitative analyses by gas chromatography of the content of capsaicin and dihydrocapsaicin in the pericarp, placenta, and seeds of seven cultivars of chili peppers cultivated in the state of Yucatan, Mexico [chawa, dulce, sukurre, xcat'ik (*Capsicum annum* L. var. *annuum*), maax (*Capsicum annum* L. var. *aviculare*), and habanero orange and habanero white (*Capsicum chinense* Jacq.)]. Capsaicin content was higher, as expected, in the fruits of habanero orange and habanero white, followed by sukurre, chawa, xkat'ik, and maax. Dihydrocapsaicin content did not follow the same scheme, being higher in the fruits of sukurre, followed by chawa, habanero white, habanero orange, and maax. Xcat'ik showed minor quantities of dihydrocapsaicin, while dulce chili contained only traces of these two alkaloids.

Keywords: Chili peppers; *Capsicum annum*; *Capsicum chinense*; Chawa; Dulce; Habanero orange; Habanero white; Maax; Sukurre; Xkat'ik; GC quantification; Capsaicin; Dihydrocapsaicin; Yucatan

Mouin Rouatbi, Albert Duquenoy, Pierre Giampaoli, Extraction of the essential oil of thyme and black pepper by superheated steam, Journal of Food Engineering, Volume 78, Issue 2, January 2007, Pages 708-714, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.11.010.

(<http://www.sciencedirect.com/science/article/B6T8J-4HWX8J4-5/2/d8fafa077eac66ae6ffe5e97c6e2a8d>)

Abstract:

Superheated heated steam was used to extract volatiles from thyme leaves and black pepper fruits. Steam and extracted volatiles are collected in a condenser and essential oils are separated from the collected mixture by solvents and analysed by GC. Results show that the yield of extraction has an asymptotical evolution with time and increase with steam temperature and flow and it is higher for ground black pepper fruits. However, the quality of the extract is lower when the steam temperature is higher than 175 [degree sign]C.

Keywords: Superheated steam distillation; Thyme; Black pepper; Quality

F. Inan, M. Pala, I. Doymaz, Use of ozone in detoxification of aflatoxin B1 in red pepper, *Journal of Stored Products Research*, Volume 43, Issue 4, 2007, Pages 425-429, ISSN 0022-474X, DOI: 10.1016/j.jspr.2006.11.004.

(<http://www.sciencedirect.com/science/article/B6T8Y-4N7Y8BT-1/2/d5dacedbd1f39bceb17e923e30c0f7b9>)

Abstract:

Red pepper (*Capsicum annuum*) is one of the most important agricultural products of Turkey. For public health and export requirements, red pepper must be produced free of hazardous contaminants. However, previous investigations showed that red pepper could be contaminated by aflatoxin above the limits that may be critical for health. In this study, use of the high oxidising power of ozone achieved detoxification of aflatoxin. Samples were subjected to ozonation at various ozone concentrations (16, 33, 66 mg/l) and exposure times (7.5, 15, 30, 60 min). In summary, the reductions of content of aflatoxin B1 in flaked and chopped red peppers were 80% and 93% after exposures to 33 mg/l ozone and 66 mg/l ozone for 60 min, respectively.

Keywords: Red pepper; Ozonation; Aflatoxin B1; Detoxification

N. Deepa, Charanjit Kaur, Binoy George, Balraj Singh, H.C. Kapoor, Antioxidant constituents in some sweet pepper (*Capsicum annuum* L.) genotypes during maturity, *LWT - Food Science and Technology*, Volume 40, Issue 1, January 2007, Pages 121-129, ISSN 0023-6438, DOI: 10.1016/j.lwt.2005.09.016.

(<http://www.sciencedirect.com/science/article/B6WMV-4HHGNYD-1/2/226dd43123ca27edecaa89bf0c5e8a7e>)

Abstract:

Changes in total phenolics, antioxidant activity (AOX), carotenoids, capsaicin and ascorbic acid were monitored during three maturity stages in 10 genotypes of sweet pepper. In an attempt to explain the variations during maturity stages (green, intermediate and red/yellow), the data was expressed both on fresh and dry weight basis. All the antioxidant constituents (phenolics, ascorbic acid and carotenoids) and AOX, when expressed on fresh weight basis in general, showed an overall increasing trend during maturity in all the genotypes studied. On dry weight basis, phenolic content declined in majority of the genotypes during maturity to red stage. This decline was significant ($P < 0.05$) in Parker, Torkel, HA-1038 and Flamingo. Genotype Flamingo and Golden Summer had the highest phenolic content of 852.0 mg 100 g⁻¹ and 720.5 mg 100 g⁻¹, at their final red and yellow maturity stages, respectively. With maturation, most of the cultivars showed a declining trend with regard to capsaicin content while total carotenoids and [beta]-carotene content increased significantly. Anupam was a promising genotype in terms of both total carotenoids and [beta]-carotene content. Ascorbic acid content declined progressively with advancing maturity. Genotype HA-1038 had the maximum content (3030 mg 100 g⁻¹ dwb) at the green stage. AOX in general, increased with maturity and registered a 1.30-1.95fold increase from green to red stage.

The study proposes the nutritional significance of consuming sweet peppers at the red maturity stage because of enhanced functional properties. Overall genotype Flamingo and Anupam represent superior genotypes for both nutrition and germplasm improvement.

Keywords: *Capsicum*; Antioxidant activity; [beta]-carotene; Total phenolics

Arreola-Cortes Araceli, Castro-Mercado Elda, Lozoya-Gloria Edmundo, Garcia-Pineda Ernesto, Capsidiol production in pepper fruits (*Capsicum annuum* L.) induced by arachidonic acid is dependent of an oxidative burst, *Physiological and Molecular Plant Pathology*, Volume 70, Issues 1-3, January-March 2007, Pages 69-76, ISSN 0885-5765, DOI: 10.1016/j.pmp.2007.07.002.

(<http://www.sciencedirect.com/science/article/B6WPC-4P59X6H-1/2/7208836bed587b7a6ba05f72a35420c1>)

Abstract:

The oxidative burst and the role of H₂O₂ in regulating the capsidiol accumulation were investigated in pepper fruit (*Capsicum annuum* L.). Immediately after arachidonic acid (AA) treatment an initial burst of reactive oxygen species (ROS) occurred. O₂- radicals and lipid peroxidation were evident at 30 min and 4 h, respectively and the maximum H₂O₂ production was reached within 6 h. Treatment with the DPI inhibitor indicated that the putative source of ROS was a plasma membrane NADPH-dependent oxidase. Exogenous treatment with H₂O₂ induced capsidiol phytoalexin accumulation. Addition of lisophylline, an inhibitor of phospholipase D, decreased capsidiol accumulation in presence of AA. To investigate the involvement of the redox metabolism during defense activation, we analyzed the effect of AA on the ascorbate oxidase (APX) activity, which is an important enzyme to detoxify H₂O₂. APX activity decreased after 4 h of AA treatment, suggesting that this enzyme may be important to regulate the H₂O₂ accumulation in pepper. In addition to AA, other elicitors of plant defense responses like cellulase and salicylic acid were able to decrease the APX activity. The relevance and role of ROS and redox metabolism in pepper defense responses will be discussed.

Keywords: Arachidonic acid; Hydrogen peroxide; Ascorbate peroxidase; Capsidiol; *Capsicum annuum*

Da Eun Lee, Kiyoon Kang, Seong-Gene Lee, Kyoungwhan Back, Enhanced synthesis of feruloyltyramine and 4-coumaroyltyramine is associated with tyramine availability in transgenic rice expressing pepper tyramine N-hydroxycinnamoyltransferase, *Plant Science*, Volume 172, Issue 1, January 2007, Pages 57-63, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2006.07.012.

(<http://www.sciencedirect.com/science/article/B6TBH-4KMYT09-1/2/3efa49092e415a28b9a267c5a794e8ff>)

Abstract:

Tyramine N-hydroxycinnamoyltransferase (THT) is a 28-kDa soluble protein that catalyzes the condensation of hydroxycinnamates and tyramine via the thioesters. The representative products synthesized by THT include feruloyltyramine (FT) and 4-coumaroyltyramine (CT). The THT gene of *Capsicum annuum* was introduced into the rice genome using *Agrobacterium*-mediated transformation. Eight independent transgenic rice plants were selected and characterized. The transgenic lines had a single- or two-copy insertion of the THT transgene. Abundant THT mRNA with high THT enzyme activity was detected in transgenic leaves, but not in wild-type leaves. In young leaves, the level of CT + FT was very low, but differed significantly between transgenics and the wild type. However, in old and senesced leaves, a high level of CT + FT was detected in both transgenics and the wild type, at 32 times higher in the best transgenic line than in the wild type. Tyramine applied exogenously to roots was directly coupled with the increased synthesis of CT + FT in young leaves in a dose-dependent manner. Our data suggest that CT and FT synthesis is developmentally regulated and closely associated with the presence of tyramine substrate in rice plants.

Keywords: Tyramine N-hydroxycinnamoyltransferase; Transgenic rice; Feruloyltyramine; 4-Coumaroyltyramine; Tyramine

Choong-Min Ryu, Jinwoo Kim, Okhee Choi, Seuk Hyun Kim, Chang Seuk Park, Improvement of biological control capacity of *Paenibacillus polymyxa* E681 by seed pelleting on sesame, *Biological Control*, Volume 39, Issue 3, December 2006, Pages 282-289, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2006.04.014.

(<http://www.sciencedirect.com/science/article/B6WBP-4JVBVCK-3/2/4fa06c28bc5c2d8af47336c52f3bd9dc>)

Abstract:

Sesame is an important vegetable crop for the production of oil in Korea. The main obstacle of sesame cultivation is the occurrence of damping-off diseases and wilt caused by a complex of soil-borne pathogens in fields cultivated for two or more successive years. To protect sesame

seedlings against these diseases, *Paenibacillus polymyxa* E681, a plant growth-promoting rhizobacterium (PGPR) previously shown to suppress disease incidence and promote growth on cucumber and pepper in the greenhouse and field experiments, was evaluated for its capacity for biological control and growth promotion *in vitro* and *in situ*. Seed treatment with strain E681 alone did not show consistent protection. Therefore, seed pelleting with strain E681 was attempted to increase the seed size and improve the stability and effectiveness of biocontrol capacity by strain E681. Through screening of pelleting materials, a combination of clay and vermiculite was selected for further experiments to enhance seed germination and root colonization of strain E681 on sesame. In greenhouse trials, formulations of strain E681 reduced disease incidence in disease-conducive soil. In the field, pelleting of sesame seeds with strain E681 significantly reduced pre- and post-emergence damping-off compared to the non-treated or pelleting alone controls; pelleting also promoted the plant growth and the grain yield. Furthermore, the efficacy of strain E681 for biological control and plant growth promotion was improved by sesame seed pelleting compared to the treatment with strain E681 alone. Hence, the application of strain E681 via seed pelleting offers potential to overcome some of the problems associated with successive years of sesame cultivation.

Keywords: Plant growth-promoting rhizobacteria; *Paenibacillus polymyxa*; Biological control

David L. Smith, John R. Stommel, Raymond W.M. Fung, Chien Y. Wang, Bruce D. Whitaker, Influence of cultivar and harvest method on postharvest storage quality of pepper (*Capsicum annuum* L.) fruit, *Postharvest Biology and Technology*, Volume 42, Issue 3, December 2006, Pages 243-247, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.06.013.

(<http://www.sciencedirect.com/science/article/B6TBJ-4KPP46T-3/2/1df7428c3f8e8e511f08375e4c73a25b>)

Abstract:

The principal physiological factors that negatively impact pepper fruit during shipment and storage and subsequent marketing are water loss and chilling injury. The current study evaluated the effect of harvest methodology on postharvest water loss from sweet bell pepper fruit and the potential relationship between water loss and chilling injury in cold-stored fruit. The influence of cultivar, epicuticular wax, and AOX gene expression on water loss and chilling injury were examined. Our results demonstrated that the degree of water loss in pepper fruit is subject to effects of genotype and pre- and postharvest environments as evidenced by year to year variation in fruit storage attributes. A comparison of pepper fruit harvest methods, wherein peduncles were either torn or cut, showed that harvest method had little effect on percent water loss. Observations on fruit water loss in relation to fruit size suggested that fruit cuticles are the primary barrier to water loss. A clear relationship between epicuticular wax content and fruit water loss was not evident. Cultivars varied in their susceptibility to chilling injury and fruit water loss was positively correlated with the severity of chilling injury. No correlation was found between endogenous AOX transcript levels and cultivar-specific susceptibility to chilling injury. The results illustrate the difficulty of identifying indices correlated with water loss that could be used to develop or identify cultivars with improved storability. We did, however, find that there are significant differences in storage attributes of pepper cultivars and that routine screening for water loss and chilling injury are advantageous for selection of cultivars most suitable for cold-storage.

Keywords: *Capsicum annuum*; Water loss; Chilling injury; Harvest method; Postharvest storage

Kissinger Maalekuu, Yonatan Elkind, Alicia Leikin-Frenkel, Susan Lurie, Elazar Fallik, The relationship between water loss, lipid content, membrane integrity and LOX activity in ripe pepper fruit after storage, *Postharvest Biology and Technology*, Volume 42, Issue 3, December 2006, Pages 248-255, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2006.06.012.

(<http://www.sciencedirect.com/science/article/B6TBJ-4M0J4GS-1/2/2d97961feabc855f03e3879a09c2070e>)

Abstract:

Ten pepper genotypes with wide variation in rate of water loss after storage were examined in relationship to their membrane lipid content, loss of membrane integrity (electrolyte leakage) and lipoxygenase activity. Pepper genotypes susceptible to high rates of water loss, membrane ion leakage and lipoxygenase activity were found to have correspondingly low amounts of total lipids, total phospholipids and phospholipids classes. The fatty acids determined were also low in amounts except linoleic acid which was high in genotypes susceptible to high rates of water loss. Genotypes with low water loss rates had high amounts of all lipids with the exception of linoleic acid. The high amount of linoleic acid in high water loss genotypes suggests either a rapid biosynthesis of this fatty acid or a slower rate of its catabolism. Correlations between total membrane lipids and rate of water loss (-0.79), electrolyte leakage (-0.89), lipoxygenase (-0.87) were negative and significant. The total phospholipids, phospholipids classes and the fatty acids followed similar trends to total lipids in relation to the other parameters. The high negative correlation between membrane lipids and lipoxygenase activity strengthened the suggestion of the involvement of lipoxygenase activity in lipid peroxidation. Lipoxygenase-catalyzed oxidation of membrane lipids can cause membrane damage, loss of membrane integrity, and interaction of membrane components with highly reactive oxidation products resulting in membrane ion leakage and accelerated water loss in stored peppers.

Keywords: Capsicum annum; Water loss rate; Membrane ion leakage; Lipoxygenase activity; Membrane lipids

Sanjay Kumar, Sanjeet Kumar, Major Singh, Ashok Kumar Singh, Mathura Rai, Identification of host plant resistance to pepper leaf curl virus in chilli (*Capsicum* species), *Scientia Horticulturae*, Volume 110, Issue 4, 27 November 2006, Pages 359-361, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.07.030.

(<http://www.sciencedirect.com/science/article/B6TC3-4KV3Y4J-4/2/540fe5d09dd39585528d85cd7df996fa>)

Abstract:

Three hundred and seven genotypes belonging to four cultivated and one wild species of *Capsicum* were screened against pepper leaf curl virus (PepLCV) causing devastating leaf curl disease of chilli (*Capsicum annum*). Initial screening was done under field conditions based on coefficient of infection (CI), disease reaction to each genotype was assigned. Subsequently, selfed progenies of eight symptom-less and highly resistant lines were challenged by viruliferous white fly under glasshouse conditions, out of which only three genotypes, viz. GKC-29, BS-35 and EC-497636 showed no symptom. Using scion and root stalk of susceptible genotype (Pusa Jwala), these three putative symptom-less genotypes were further challenged by grafting and alternate grafting. The resistant reactions of GKC-29, BS-35, EC-497636 were confirmed because even after 50 days of successful grafting/alternate grafting, no viral symptom appeared on all the grafted plants of these genotypes. When subjected to PCR amplification with degenerate primers deigned to detect geminivirus like PepLCV, the three symptom-less genotypes did not show any amplification, suggesting that the resistant reaction in three identified symptom-less resistant sources was because of the absence of viral genome and they are not symptom-less carrier.

Keywords: Capsicum; Degenerate pimer; Host resistance; Leaf curl virus; Pepper

Hakan Aktas, Kazim Abak, Ismail Cakmak, Genotypic variation in the response of pepper to salinity, *Scientia Horticulturae*, Volume 110, Issue 3, 8 November 2006, Pages 260-266, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.07.017.

(<http://www.sciencedirect.com/science/article/B6TC3-4KWK18H-1/2/594de3a2d03f2af92ffc4c58ca50a4bb>)

Abstract:

Using 102 pepper (*Capsicum annuum*) genotypes, a greenhouse experiment has been conducted to study genotypic variation in tolerance to 100 mM sodium chloride (NaCl) in nutrient solution. Based on the severity of leaf symptoms caused by the NaCl treatment there was a substantial genotypic variation in salt tolerance. From this screening experiment, six sensitive and six tolerant genotypes were chosen to study dry matter production and root and shoot concentrations of sodium (Na), potassium (K) and calcium (Ca) in a growth chamber experiment in a nutrient solution with and without 150 mM NaCl. The genotypes selected as sensitive were highly damaged and developed severe chlorosis and necrosis under NaCl treatment, while the genotypes selected as tolerant were slightly affected. On average, decreases in shoot dry matter production caused by NaCl were greater in the sensitive than the tolerant genotypes. Application of salt increased shoot Na concentration at greater amount in the sensitive than the tolerant genotypes. Of the tolerant genotypes, the genotype Cac (*Capsicum annuum* var. *cerasiforme*) and 1245 F1 had around 2.45% Na in shoot while the sensitive genotypes Kandil and Pazarcik contained, on average, 5.4% Na. All sensitive and tolerant genotypes exhibited more or less similar shoot concentrations of K and Ca. There was very significant and positive correlation between severity of leaf symptoms and shoot Na concentration, but no correlation could be found in the case of K or Ca concentrations with the severity of leaf symptoms. The results indicate existence of substantial genotypic variation in tolerance to NaCl stress in pepper. It seems very likely that exclusion of Na from roots into growth medium plays a critical role in expression of high Na tolerance in pepper.

Keywords: *Capsicum annuum*; Genotypic variation; Pepper; Salt tolerance; Sodium chloride

Norman Q. Arancon, Clive. A. Edwards, Stephen Lee, Robert Byrne, Effects of humic acids from vermicomposts on plant growth, *European Journal of Soil Biology*, Volume 42, Supplement 1, ICSZ - Soil Animals and Ecosystems Services, Proceedings of the XIVth International Colloquium on Soil Biology, November 2006, Pages S65-S69, ISSN 1164-5563, DOI: 10.1016/j.ejsobi.2006.06.004.

(<http://www.sciencedirect.com/science/article/B6VR7-4KDBJ28-3/2/2b029b65e6092b1872d7e4a0723316bb>)

Abstract:

The interactions between earthworms and microorganisms can produce significant quantities of plant growth hormones and humic acids which act as plant regulators. Experiments were designed to evaluate the effects of humic acids extracted from vermicompost and compare them with the action of commercial humic acid in combination with a commercial plant growth hormone, indole acetic acid (IAA) which is a commonly found in vermicomposts. In the first experiments, humic acids were extracted from cattle, food and paper waste vermicomposts. They were applied to a plant growth medium, Metro-Mix360 (MM360), at rates of 0, 250 or 500 mg humates kg⁻¹ dry wt. of MM360, to marigold, pepper, and strawberry plants in the greenhouse. Substitution of humates ranging from 250 to 1000 mg kg⁻¹ MM360 increased the growth of marigold and pepper roots, and increased the growth of roots and numbers of fruits of strawberries significantly. In other experiments, humic acids extracted from food waste vermicomposts were applied at a rate of 500 mg kg⁻¹ dry wt. of MM360, singly or in combination with IAA at a rate of 10⁻⁵ [μ]M, to pepper seedlings. This experiment was designed to compare the differences in effects between the most effective dosage rate of humic acid from food waste, a phytohormone (IAA), and a commercial source of humic acid. The numbers of pepper flowers and fruits increased significantly in response to treatment with humic acid, IAA and a combination of humic acid and IAA. Peppers treated with humic acids extracted from food waste vermicomposts produced significantly more fruits and flowers than those treated with commercially-produced humic acids.

Keywords: Humic acids; Vermicomposts; Plant growth regulators; Earthworms; Marigolds; Peppers; Strawberries

A. Zinedine, C. Brera, S. Elakhdari, C. Catano, F. Debegnach, S. Angelini, B. De Santis, M. Faid, M. Benlemlih, V. Minardi, M. Miraglia, Natural occurrence of mycotoxins in cereals and spices commercialized in Morocco, *Food Control*, Volume 17, Issue 11, November 2006, Pages 868-874, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2005.06.001.

(<http://www.sciencedirect.com/science/article/B6T6S-4GSJR29-1/2/002ee3fadface32d067df0982c7440bd>)

Abstract:

Sixty samples of cereals (20 of corn, 20 of barley, and 20 of wheat) and 55 samples of spices (14 of paprika, 12 of ginger, 14 of cumin, and 15 of pepper) purchased from popular markets of Rabat and Sale in Morocco were analyzed for mycotoxins.

Cereals samples were all analyzed for ochratoxin A (OTA). The average levels of contamination were 1.08, 0.42, and 0.17 [μ g/kg] for corn, wheat, and barley, respectively. Samples of corn were also analyzed for zearalenone (ZEA) and fumonisin B1 (FB1) the average contaminations were 14 and 1930 [μ g/kg], respectively. Co-occurrence of OTA, FB1, and ZEA was also checked. Spices samples were analyzed only for aflatoxins (AFs) and the average contaminations found for aflatoxin B1 (AFB1) were 0.09, 0.63, 2.88 and 0.03 [μ g/kg] for black pepper, ginger, red paprika and cumin, respectively. The higher level of contamination was found in red paprika (9.68 [μ g/kg]).

The present report is the first one ever drafted on the natural co-occurrence of OTA, FB1 and ZEA in cereals and on the occurrence of AFs in spices from Morocco.

Keywords: Mycotoxins; Occurrence; Morocco

I. del Campo, I. Alegria, M. Zazpe, M. Echeverria, I. Echeverria, Diluted acid hydrolysis pretreatment of agri-food wastes for bioethanol production, *Industrial Crops and Products*, Volume 24, Issue 3, 2005 Annual Meeting of the Association for the Advancement of Industrial Crops: The International Conference on Industrial Crops and Rural Development, November 2006, Pages 214-221, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2006.06.014.

(<http://www.sciencedirect.com/science/article/B6T77-4KKNJ2P-1/2/2a3e3f5b89702c2133f9638ff1966ed9>)

Abstract:

Because of its environmental benefits, bioethanol is regarded as a promising biofuel substitute for gasoline in the transportation sector. To make it competitive with fossil fuels, it is necessary to reduce production costs by using new, alternative biomass feedstocks. As a result of its strong agricultural growth, Spain has seen increased development of its vegetable canning industry which produces approximately 450,000 tonnes of waste a year. Solutions must be developed in order to diminish the environmental impact from this increasing amount of waste.

For this study, wastes from fresh and processed vegetables were used as feedstocks for a diluted acid hydrolysis process using sulphuric acid as a catalytic agent.

The maximum ratios of single sugar recovery in the liquid fraction from dilute acid hydrolysis assays were 40.29 and 50.20% (w/w) for tomato and red pepper residues, respectively (Table 3). More intensive pretreatment was necessary to maximise sugar recovery in the case of pulse food (legumes such as beans, lentils and chickpeas) and artichoke residues because of their high starch and inulin content. Finally, for cardoon residues a maximum single sugar recovery of 78.18% (w/w) was obtained in the liquid fraction (Table 4). The suitability of these pretreatments has also been evaluated by corroborating the low levels of sugar degradation compounds detected in the samples, which are significantly lower than the concentrations reported in previous studies.

In conclusion, because the sugars in fresh and processed vegetable wastes are widely available and easily obtainable, they can be considered as potential feedstocks for bioethanol production.

Keywords: Agri-food wastes; Bioethanol; Diluted acid hydrolysis; Pretreatment; Residues

Simone Bernhardt, Elmar Schlich, Impact of different cooking methods on food quality: Retention of lipophilic vitamins in fresh and frozen vegetables, *Journal of Food Engineering*, Volume 77, Issue 2, Progress on Bioproducts Processing and Food Safety - Selected Papers from the 1st International Conference of CIGR Section VI on Bioproducts Processing and Food Safety, November 2006, Pages 327-333, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.06.040.

(<http://www.sciencedirect.com/science/article/B6T8J-4GTVYBH-8/2/c5507fbe16bad68d72dbcb715d692858>)

Abstract:

The bioavailability of all-trans-[beta]-carotene from vegetables depends among other things on the molecular linkage and the food matrix in which it is incorporated. It is assumed that cooking can increase the bioavailability by disruption of the plant cell wall and releasing from protein complexes. But it can also lead to isomerization and degradation of all-trans-[beta]-carotene. In this investigation the influence of different domestic cooking methods on the all-trans- and cis-[beta]-carotene as well as the [alpha]-tocopherol content in fresh and frozen broccoli and red sweet pepper is examined. While in fresh broccoli all cooking methods lead to a significant release of all-trans-[beta]-carotene and [alpha]-tocopherol in the frozen broccoli no change or a decrement occurs. In the fresh and frozen peppers no change or a significant loss of [alpha]-tocopherol and all-trans-[beta]-carotene is observed. A slight increase in the cis-isomers of [beta]-carotene can only be found by cooking fresh broccoli.

Keywords: Cooking; Vitamins; [beta]-carotene; [alpha]-tocopherol

Ana Roldan Serrano, Jose M. Guerra-Sanz, Quality fruit improvement in sweet pepper culture by bumblebee pollination, *Scientia Horticulturae*, Volume 110, Issue 2, 9 October 2006, Pages 160-166, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.06.024.

(<http://www.sciencedirect.com/science/article/B6TC3-4KMYG61-1/2/8e214202e2e128c1147e876fd10a8d86>)

Abstract:

The percentage of ovules that set seeds per fruit has been used to evaluate the bumblebee activity of a two campaigns greenhouse trial. The experiment was carried out with two commercial cultivars of sweet pepper, 'bell' type, called Bardenas and Vergasa. The averages of the percentages of seed set per fruit of the two campaigns were 49.8% (Bardenas) and 40.7% (Vergasa) on the pollination treatment, whereas the averages of the control (self-pollination) treatment were 27.5% and 25.7%, respectively. Percentages of seed set per fruit was strongly related with the number of bee visits, but weakly with duration of visits.

The number of pollen grains deposited on stigmas by pollinators or by self-pollination was assessed by staining and microscopy, resulting in a higher number of pollen grains on the bumblebees-pollinated flowers than on the control (self-pollination) ones. As a consequence of this, the number of seeds set on the bumblebees-pollinated fruits, was always higher than in the control.

Flowers visited by bumblebees produced larger and heavier fruits than non-visited flowers. Because fruit external maximum diameter, length and weight were highly dependent on seed set, the use of pollinators seems to be required to obtain sweet pepper fruits with improved quality characteristics. Percentage of seed set per fruit was correlated with the number of bumblebee visits to the flowers, seeds per fruit, number of pollen grains on stigma, and the quality fruit traits. The number of pollen grains per stigma was correlated with the number of seeds per fruit.

Keywords: *Capsicum annuum* (L.); *Bombus terrestris* (L.); Sweet pepper; Pollination; Percentage of seed set per fruit; Quality yield; Correlations

D.O. Chellemi, Effect of urban plant debris and soil management practices on plant parasitic nematodes, Phytophthora blight and Pythium root rot of bell pepper, *Crop Protection*, Volume 25, Issue 10, October 2006, Pages 1109-1116, ISSN 0261-2194, DOI: 10.1016/j.cropro.2006.02.012.

(<http://www.sciencedirect.com/science/article/B6T5T-4JX370J-1/2/e660f8cf18986a61fbd4463827257c7e>)

Abstract:

Soil management practices were examined for their effects on plant parasitic nematodes and soilborne diseases of field grown bell pepper (*Capsicum annuum*). Field plots were established on a diversified organic vegetable farm that had been under certification for 5 years and on a conventional pepper farm that had been fumigated with methyl bromide/chloropicrin and cropped annually to bell pepper for 25 years. The plot design was a split plot where the main treatment was the application of 67 t ha⁻¹ of urban plant debris (UPD), and sub plots were; (1) no-till production into residue remaining from a cover crop of Sunn Hemp (*Crotalaria juncea*), (2) or Iron-clay Pea (*Vigna unguiculata*), (3) creation of raised polyethylene-mulched beds and, (4) soil solarization for a 6-8 week period. Soil fumigation with methyl bromide/chloropicrin (67/33) was evaluated only at the conventional farm site. Experiments were conducted in 1999 and repeated in 2000. At the organic farm only *Pythium* root rot was identified whereas, at the conventional farm *Phytophthora* blight was the predominant soilborne disease. UPD application significantly reduced the incidence of *Pythium* root rot from 24.7% to 12.1% in 2000 at the organic site and the incidence of *Phytophthora* blight from 49.8% to 31.1% in 1999 at the conventional site. At the conventional site, *Phytophthora* blight was significantly lower in solarized (21.9%) and fumigated (22.1%) plots when compared to plots with untreated soil covered by polyethylene mulch (46.1%) in 1999. In 2000, *Phytophthora* blight was significantly higher in the no-till treatments (91.1-91.8%) when compared to the other soil management treatments (50.2-63.5%). UPD application significantly reduced the populations of plant parasitic nematodes from 64.5 to 37.5 per 100 cm³ soil in 2000 at the organic site and from 94.3 to 12.9 in 1999 at the conventional site, when compared to treatments not receiving UPD. At the organic site the populations of plant parasitic nematodes were significantly higher in the no-till Sunn Hemp plots than solarized plots. At the conventional site, significantly higher populations of *Meloidogyne* spp. were found in solarized and no-till Sunn Hemp treatments than in untreated soil covered with plastic mulch, while significant reductions in *Meloidogyne* spp. only occurred with soil fumigation. The results demonstrate that several nonchemical management practices can reduce the impact of soilborne pests for fresh market bell pepper production in a humid, subtropical climate.

Keywords: Conservation tillage; Cover crops; Low-input agriculture; Methyl bromide; Organic agriculture; *Phytophthora capsici*; Soil solarization

Samuel Agele, S. Shabtai Cohen, Shmuel Assouline, Hydraulic characteristics and water relations of net house-grown bell pepper as affected by irrigation regimes in a Mediterranean climate, *Environmental and Experimental Botany*, Volume 57, Issue 3, October 2006, Pages 226-235, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2005.05.013.

(<http://www.sciencedirect.com/science/article/B6T66-4H6XM1B-1/2/6af8f8369c348bc56b1cc894621ac1>)

Abstract:

Trends in hydraulic architecture and water relation parameters of bell pepper (*Capsicum annuum*, L.) as affected by fertigated drip irrigation regimes (well-watered and water-stressed conditions) in a Mediterranean climate were investigated. The aim were to evaluate the coupling of xylem conductance and stomatal conductance, the regulation of water use of bell pepper by xylem hydraulics and whether the functionality of xylem hydraulic conductance changes under different fertigation regimes. Fertigation (simultaneous application of irrigation water and fertilizers) consisted of daily fertigation rates of 1.2, 1.0 and 0.7 PET delivered using 8, 2 and 0.4 l/h drippers. Emitter discharge rates determine amount of time required to deliver a known quantity of water and hence soil water availability per unit time. Hydraulic conductance was monitored by the evaporative flux (EF) method from the slope of the water potential difference ($[\Delta\psi]$) versus transpiration flux (Q) using the Ohm's law analogy. Water potential gradient was estimated as the

difference between pre-dawn and midday leaf water potential. Day time courses of leaf (lwp) and stem (swp) water potentials and stomatal conductance (gs) were monitored at pre-dawn, 1000, 1200 and 1400 h. Values of midday stomatal conductance and leaf water potentials, water uptake rates (sap flow) and hydraulic conductance through the plant to the canopy (soil-plant-atmosphere (SPAC)) were affected by irrigation regimes. Plant water potential (pre-dawn and midday) ranged from 0.95 to -0.41 MPa for well-watered and water-stressed pepper. Plant hydraulic conductance ranged from 6.57×10^{-01} to 2.27×10^{-03} ($\text{g s}^{-1} \text{MPa}^{-1}$) for well-watered and water-stressed plants. The estimated value of whole plant hydraulic conductance (KT) confirmed increased hydraulic and stomatal resistance under deficit irrigation condition while well-watered pepper plants had greater water uptake rate and remarkably higher within plant (hydraulic) and stomatal conductance. The components of the resistance elements in the SPAC changed as a function of irrigation regimes (root zone water status). Hydraulic characteristics optimize water uptake from the soil, the stomatal respond to changes in leaf water status and the leaf system and sapwood area adjust as necessary to maximize water uptake and avoid loss of hydraulic contact with the soil. The hydraulic non-isolation of the shoot processes to root zone conditions are important attributes of bell pepper grown under variable irrigation regimes.

Keywords: Bell pepper; Irrigation; Hydraulics; Stomata conductance; Sap flow; Water potential

Gazanfer Ergunes, Sefa Tarhan, Color retention of red peppers by chemical pretreatments during greenhouse and open sun drying, *Journal of Food Engineering*, Volume 76, Issue 3, October 2006, Pages 446-452, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.05.046.

(<http://www.sciencedirect.com/science/article/B6T8J-4GP1V5W-5/2/02a41dafdf1691614ca4a9582d533b0a>)

Abstract:

The color of Paprika, which is one of the most important quality measured, is drastically affected by the drying process of red peppers. This study aimed to measure ability of three different chemical solutions ((I) 2% ethyl oleate, (II) 2% ethyl oleate + 2% NaOH, (III) 2% ethyl oleate + 2% NaOH + 4% potassium carbonate in w/v) on the color retention of dehydrated red peppers in associated with dipping temperature (23 [degree sign]C and 60 [degree sign]C) and drying method (greenhouse drying and open sun drying). The surface color was measured by a reflection colorimeter.

All pretreatments significantly accelerated drying process. But their effects diminished towards the end of drying since the length of drying time is considerably long. However, their effects on the final color of dried red peppers are more remarkable. Red peppers dipped in ethyl oleate solution and non-pretreated red peppers (the controls) experienced severe color change to blackish color. Dipping red peppers in the solution of 2% ethyl oleate + 2% NaOH + 4% K_2CO_3 at 60 [degree sign]C dipping temperature resulted in the best color retention.

Keywords: Paprika; Red pepper; Color; Greenhouse dryer; Open sun drying; Reflection colorimeter

Hasan Yetim, Osman Sagdic, Mahmut Dogan, Herbert W. Ockerman, Sensitivity of three pathogenic bacteria to Turkish cemen paste and its ingredients, *Meat Science*, Volume 74, Issue 2, October 2006, Pages 354-358, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2006.04.001.

(<http://www.sciencedirect.com/science/article/B6T9G-4JSMV8C-7/2/00377daf6b4e8f6ec1b9c780fc0b869d>)

Abstract:

Pastirma is a dry cured meat product which is pasted with cemen. This paste is prepared from ground fenugreek, garlic and red hot pepper (RHPP). In this study, the cemen mix/paste and all its ingredients were tested for their inhibitory effects on *Escherichia coli*, *Staphylococcus aureus* and *Yersinia enterocolitica*. All samples had a varying inhibitory effect against all the bacteria tested during 4 days of storage. Complete cemen paste showed the strongest inhibitory effect on the

three pathogens compared to ingredients alone. Fenugreek and RHPP had a bacteriostatic effect while the cemen paste and garlic had a bactericidal effect. *S. aureus* was the most sensitive bacterium while *Y. enterocolitica* was the most resistant. The results of this study confirmed the protective effect of cemen paste and garlic in food preservation especially against *E. coli*, *S. aureus* and *Y. enterocolitica* proving safety for public health. Hence it might be concluded that cemen paste is the first hurdle to prevent bacterial contamination, and a low pH (~4.83) value would also add an additional barrier to secure safety of the product. Finally, it can be suggested that similar studies should be conducted on actual meat systems to confirm these findings.

Keywords: Fenugreek; Garlic; Red pepper; Pastirma; Cemen; Antibacterial effect

Xue-Jian YE, Zheng-Yin Wang, Shi-Hua Tu, G. SULEWSKI, Nutrient Limiting Factors in Acidic Vegetable Soils, *Pedosphere*, Volume 16, Issue 5, October 2006, Pages 624-633, ISSN 1002-0160, DOI: 10.1016/S1002-0160(06)60096-9.

(<http://www.sciencedirect.com/science/article/B82XV-4KYR9DF->

[B/2/7a4a4a0f95400278057c10d0845e3914](http://www.sciencedirect.com/science/article/B82XV-4KYR9DF-B/2/7a4a4a0f95400278057c10d0845e3914))

Abstract: ABSTRACT

Nutrient limiting factors in acidic soils from vegetable fields of the Chongqing suburbs of China were assessed by employing the systematic approach developed by Agro Services International (ASI) including soil testing, nutrient adsorption study, and pot and field experiments to verify the results of soil testing, with a conventional soil test (CST) used for comparison. The ASI method found the moderately acidic soil (W01) to be N and P deficient; the strongly acidic soil (W04) to be N, K and S deficient; and the slightly acidic soil (W09) to be N, K, S, Cu, Mn, and Zn deficient. The CST method showed that W01 had P, B and Cu deficiencies; W04 had N, P and S deficiencies; and W09 had N, P, S, B, Cu, and Zn deficiencies. There were differences between the two methods. Among the two indicator plants selected, the response of sorghum on the three representative acidic soils was more closely related to the ASI results than that of sweet pepper.

Keywords: acidic vegetable soil; nutrient limiting factor; sorghum; sweet pepper; systematic approach

Nurgul Ercan, Funda A. Sensoy, A. Sirri Sensoy, Influence of growing season and donor plant age on anther culture response of some pepper cultivars (*Capsicum annuum* L.), *Scientia Horticulturae*, Volume 110, Issue 1, 11 September 2006, Pages 16-20, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.06.007.

(<http://www.sciencedirect.com/science/article/B6TC3-4KHC3G6->

[1/2/af4d70bb8bb4e87f93198ef27767be3c](http://www.sciencedirect.com/science/article/B6TC3-4KHC3G6-1/2/af4d70bb8bb4e87f93198ef27767be3c))

Abstract:

The effects of growing season and donor plant age on anther culture in *Capsicum* were investigated. Pepper cultivars Kekova and Sera Demre 8 were grown under unheated greenhouse conditions in winter season and field conditions in summer season. Flower buds were collected and cultured in weekly intervals from November to May in winter and from April to December in summer. The results of this study indicated that anthers from these two pepper genotypes gave different embryogenic response to seasonal effects. Kekova cultivar gave the highest embryogenic yield in summer season while this was occurred in winter season for Sera Demre 8 cultivar. The results of the study revealed that the effect of donor plant age was also an important factor in anther culture of pepper. Since 4-month-old plants gave the highest embryo yield in both cultivars in each seasons, it is possible to say that anthers collected from old plants have sufficient embryogenic response when the optimum developmental stage is selected.

Keywords: Pepper; Anther culture; Haploidy; Donor plant age; Season effect

D.R. Seal, M. Ciomperlik, M.L. Richards, W. Klassen, Comparative effectiveness of chemical insecticides against the chilli thrips, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae), on

pepper and their compatibility with natural enemies, *Crop Protection*, Volume 25, Issue 9, September 2006, Pages 949-955, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.12.008.

(<http://www.sciencedirect.com/science/article/B6T5T-4J6162H-1/2/ccf6d85214269c7a2181107f8f0d8a88>)

Abstract:

The chilli thrips, *Scirtothrips dorsalis* Hood, is a significant pest of various vegetable tropical fruit and ornamental crops. Originally from south Asia, this pest is becoming widely distributed in tropical, subtropical and temperate areas, and in 2003 was found for the first time in the Western Hemisphere established on St. Lucia and St. Vincent in the insular Caribbean. Since there is a paucity of information on the effectiveness of modern insecticides in managing *S. dorsalis* populations, we evaluated the efficacy of the following insecticides for their control of this pest on 'Scotch Bonnet' pepper on St. Vincent: spinosad, imidacloprid, chlorfenapyr, novaluron, abamectin, spiromesifen, cyfluthrin, methiocarb, and azadirachtin. Irrespective of the number of applications and use of surfactant, chlorfenapyr was the most effective in reducing the densities of *S. dorsalis* adults and larvae followed by spinosad and imidacloprid. The performance of other insecticides in controlling *S. dorsalis* populations was inconsistent. Nevertheless, all of the above insecticides if applied repeatedly were effective in suppressing of *S. dorsalis* populations. Addition of the surfactant-sticker, Nu-Film 17(TM), improved the performance of all insecticides somewhat. Spinosad was slightly harmful and chlorfenapyr was moderately harmful to *Cryptolaemus* sp. predators.

Keywords: *Scirtothrips dorsalis*; Pepper; Insecticides; Chlorfenapyr; Spinosad; Nufilm; Natural enemies

H. Mujica-Paz, L.D. Arguelles-Pina, L.C. Perez-Velazquez, A. Valdez-Fragoso, J. Welti-Chanes, Vacuum pulse and brine composition effect on pickling kinetics of whole jalapeno pepper, *Innovative Food Science & Emerging Technologies*, Volume 7, Issue 3, September 2006, Pages 195-202, ISSN 1466-8564, DOI: 10.1016/j.ifset.2006.02.001.

(<http://www.sciencedirect.com/science/article/B6W6D-4JDN6FB-9/2/5ded12791529b39f0ef57a599467fe4f>)

Abstract:

The combined effect of pickling time and pickling solutes concentration was studied on pickling whole jalapeno pepper by applying a vacuum pulse (VP) of 666 mbar for 5 min. Sodium chloride and acetic acid concentrations ranged from 10-15.1% to 2.3-3.2% (w/w), respectively, and the pickling or processing time varied from 0.3 to 30 days. The response surface methodology was used to evaluate the influence of the process variables on water loss (WL), solutes gain (SG) and weight reduction (WR) of jalapeno pepper. Processing time showed a linear effect on most of the pickling rate parameters ($p < 0.01$). Sodium chloride concentration affected WL, SG and WR of pepper pickled with VP, but the interaction between acetic acid and processing time affected WL ($p < 0.10$) and WR ($p < 0.05$). In general, the use of VP enhanced solutes and weight gain and it also reduced pickling time by around 50%, in comparison to pickling conducted without VP. Industrial relevance

Vacuum pulse application in conjunction with increasing pickling solutes concentration resulted in a significant reduction of pickling time of whole jalapeno pepper, compared to industrial pickling. Thus, mass transfer rates of cold packing can be accelerated by vacuum pulse without heat treatment application, which can lead to significant time and energy savings in the pickling industry.

Keywords: Vacuum impregnation; Pickles; Jalapeno pepper; Mass transfer

Ute Schweiggert, Andreas Schieber, Reinhold Carle, Effects of blanching and storage on capsaicinoid stability and peroxidase activity of hot chili peppers (*Capsicum frutescens* L.),

Innovative Food Science & Emerging Technologies, Volume 7, Issue 3, September 2006, Pages 217-224, ISSN 1466-8564, DOI: 10.1016/j.ifset.2006.03.003.

(<http://www.sciencedirect.com/science/article/B6W6D-4JXPS9D-1/2/1794b50ee4a15f5ee9a4783776da6877>)

Abstract:

Comprising the major pungent principles capsaicin, dihydrocapsaicin and nordihydrocapsaicin, changes in capsaicinoid contents of chili powders after thermal treatment and during storage experiments were monitored. For this purpose, freshly harvested chili pods and chili pastes were immediately pasteurized at 80 [degree sign]C, 90 [degree sign]C and 100 [degree sign]C for 5 and 10 min, respectively, and finally lyophilized. Heating and drying resulted in a 21.7% to 28.3% degradation of the initial capsaicinoid content, the three major capsaicinoids showing similar heat susceptibility. During storage at ambient temperature over 6 months with and without illumination, further degradation of the pungent principles by 6.8-11.9% was observed. Since residual enzyme activities were assumed to cause capsaicinoid losses, soluble peroxidase (POD) activity was investigated. It was shown that immediate thermal treatment of the plant material did not result in a complete POD inactivation even under rigorous temperature-time regimes. In contrast, a regeneration of about 30% of initial POD activity was found in those samples which were first blanched at 80 [degree sign]C for 5 and 10 min and then minced. However, no correlation between POD activity and capsaicinoid losses could be established. Industrial relevance

Besides microbial contamination and color properties, the pungent principles called capsaicinoids are the major quality parameters of hot chili peppers and might be influenced by peroxidase activity. The present contribution demonstrated that heating of fresh chili pods slightly diminishes capsaicinoids, which were further reduced during storage at ambient temperature irrespective of soluble peroxidase activity. The production of high quality spices characterized by low microbial load and bright color requires thermal treatment of the raw material; however, a slight decrease in capsaicinoid concentration cannot be excluded.

Keywords: Capsaicinoids; Processing; Storage; Stability; Peroxidase activity

U. Kidmose, R.-Y. Yang, S.H. Thilsted, L.P. Christensen, K. Brandt, Content of carotenoids in commonly consumed Asian vegetables and stability and extractability during frying, *Journal of Food Composition and Analysis*, Volume 19, Issues 6-7, Biodiversity and nutrition: a common path, September-November 2006, Pages 562-571, ISSN 0889-1575, DOI: 10.1016/j.jfca.2006.01.011.

(<http://www.sciencedirect.com/science/article/B6WJH-4JMV289-1/2/870a831c3e167b2b6f8f14e32e462b2c>)

Abstract:

In order to investigate the variation in [beta]-carotene and vitamin A in commonly consumed vegetables in Asia, different leafy vegetables were analyzed. The mean [beta]-carotene content varied between 16 and 6630 [mu]g/100 g fresh weight (FW) with the highest content in drumstick leaves and the lowest content in common cabbage and Garland chrysanthemum leaves. In six tuber and fruit vegetables, the mean [beta]-carotene content varied between 311 and 15,400 [mu]g/100 g FW with the highest content in a chili pepper variety. Vitamin A activity varied significantly between the investigated vegetables (1-1280 [mu]g retinol activity equivalents (RAE)/100 g FW). The retention of [beta]-carotene and formation of cis-isomers were investigated in selected vegetables during stir-frying. Retentions of all-trans-[beta]-carotene varied between 73% and 98% in sweet bell pepper, sweet potato and tomato that were fried for . In sweet potato, 13-cis-[beta]-carotene was the major cis-isomer of [beta]-carotene, while only minor amounts of 15-cis- and 9-cis-[beta]-carotene were formed. The total amount of cis-isomers of [beta]-carotene formed during frying depended on the frying time and the size with the highest amount in cubes, that were fried for 3 min (1070 [mu]g 13-cis-[beta]-carotene/100 g FW). In leafy vegetables, only

13-cis-[beta]-carotene was detected during frying. Extraction of [beta]-carotene into the frying oil was only observed in low amounts after 3 min frying of sweet potato shreds.

Keywords: [beta]-Carotene; Vitamin A activity; Frying; Retention; Vegetables

N. Deepa, Charanjit Kaur, Balraj Singh, H.C. Kapoor, Antioxidant activity in some red sweet pepper cultivars, *Journal of Food Composition and Analysis*, Volume 19, Issues 6-7, Biodiversity and nutrition: a common path, September-November 2006, Pages 572-578, ISSN 0889-1575, DOI: 10.1016/j.jfca.2005.03.005.

(<http://www.sciencedirect.com/science/article/B6WJH-4J7B0XN-1/2/52b3bea8782d6c711a826355253e65a9>)

Abstract:

Cultivars and growing conditions seem to play an important role in affecting the metabolism of antioxidant components and antioxidant capacity. Ten cultivars of red sweet peppers grown over two consecutive years were compared with regard to ascorbic acid, total reducing content, [beta]-carotene, total antioxidant activity and free radical scavenging activity. Cultivar Flamingo had the highest ascorbic acid content followed by cultivars Bomby and Parker. All cultivars fulfilled 100% RDA requirement for vitamin C. Torkel and Mazurka excelled in terms of [beta]-carotene. Flamingo had the highest total reducing content and antioxidant activity. There was no effect of harvest year on antioxidant activity; however, ascorbic acid, total reducing content (mainly phenolics) and [beta]-carotene differed significantly. A weak correlation was observed between total reducing content and antioxidant activity as measured by ferric reducing antioxidant power (FRAP) and free radical (1,1-diphenyl-2-picrylhydrazyl, or DPPH) scavenging assays.

Keywords: Red sweet peppers; Genotypes; Antioxidants; FRAP; Total reducing content; Ascorbic acid

Laurence Ketteringham, Raphaele Gausseres, Stephen J. James, Christian James, Application of aqueous ozone for treating pre-cut green peppers (*Capsicum annum* L.), *Journal of Food Engineering*, Volume 76, Issue 1, Bugdeath, September 2006, Pages 104-111, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.05.019.

(<http://www.sciencedirect.com/science/article/B6T8J-4GJKTKR-1/2/d094c3ef43757dae4e264ab9c2de238d>)

Abstract:

The effect of immersing pre-cut green peppers (*Capsicum annum* L.) in ozonated water at a range of ozone concentrations and for a range of contact times on the numbers of naturally occurring microorganisms was investigated. To achieve different levels of natural contamination on the peppers they were stored, either pre-cut or as whole peppers, for 5 days at 5 [degree sign]C, before the treatments were carried out. All samples were cut into 28 mm diameter discs either before storage or immediately before treatment in the case of being stored whole. Three separate trials were carried out; each trial using improved equipment to achieve higher concentrations of aqueous ozone (0.30-0.36, 0.38-0.45, and 3.85-3.95 mg ozone l⁻¹ of water, respectively). In each trial, samples were either washed in agitated, non-ozonated water for 15 min, or in agitated, ozonated water for times ranging from 20 s to 30 min. Washing with ozonated water was not found to be significantly more effective than washing with non-ozonated water. Maximum reductions in mean Aerobic Plate Counts (APCs) of 0.66 log₁₀ cfu g⁻¹ were achieved by washing with non-ozonated water, while maximum reductions of 0.72 log₁₀ cfu g⁻¹ were achieved using aqueous ozone, in comparison with untreated controls. Such reductions were considered too small to be commercially viable.

Keywords: Decontamination; Disinfection; Produce; Vegetables; Cleaning; Washing

Milan Suhaj, Jana Racova, Martin Polovka, Vlasta Brezova, Effect of [gamma]-irradiation on antioxidant activity of black pepper (*Piper nigrum* L.), *Food Chemistry*, Volume 97, Issue 4, August 2006, Pages 696-704, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.05.048.

(<http://www.sciencedirect.com/science/article/B6T6R-4GNTG0B-3/2/042291f7f6b46ec5afe780685444dfe1>)

Abstract:

Antioxidant activity and EPR investigations of irradiated ground black pepper (*Piper nigrum* L.) were evaluated. The black pepper was exposed to [gamma]-irradiation at doses from 5 to 30 kGy. The effect of irradiation on antioxidant properties of black pepper extracts was investigated by radical-scavenging effect on 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals, by determination of reducing power and content of thiobarbituric acid-reactive substances. Some significant changes were observed in creation of thiobarbituric acid-reactive substances (TBARS). Difference between non-irradiated and irradiated samples at the legal European limit dose of 10 kGy reached, on average, 23% and, at the Food and Drug Administration (FDA) 30 kGy limit, 33%. Irradiation affected significantly the DPPH radical-scavenging activity and reducing power of ground black pepper extracts. The [gamma]-radiation treatment of ground black pepper samples observed by EPR, resulted in the production of three paramagnetic species (GI-GIII) characterized by different origin, thermal behaviour and stability. The axially symmetric EPR resonances, GI and GII, were assigned to the carbohydrate radical structures. The spin Hamiltonian parameters of GIII possessed the characteristic features of 'cellulosic' radical species. The EPR measurements, performed 20 weeks after the radiation process, confirmed that temperature increase from 298 to 353 K, caused significant decrease of integral EPR signal intensity for [gamma]-irradiated samples (~40%), compared to the reference (non-irradiated) ground black pepper, where only 13% drop was found. Significant correlation between EPR and thiobarbituric acid methods was assessed by study of antioxidant activity changes in relation to irradiation doses and also in the case of spice storage, between EPR and reducing power methods.

Keywords: Black pepper; [gamma]-Irradiation; EPR spectroscopy; DPPH radical-scavenging activity; Reducing power; Thiobarbituric acid reactive substances

Keiko Kuroiwa, Makoto Shibutani, Kaoru Inoue, Kyoung-Youl Lee, Gye-Hyeong Woo, Masao Hirose, Subchronic toxicity study of water pepper extract in F344 rats, *Food and Chemical Toxicology*, Volume 44, Issue 8, August 2006, Pages 1236-1244, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.01.020.

(<http://www.sciencedirect.com/science/article/B6T6P-4JHMS6B-2/2/8bf35168bfad058f74f21e3b39ead95d>)

Abstract:

A subchronic toxicity study of water pepper extract (WPE) from *Polygonum hydropiper* L. was conducted in groups of 10 male and 10 female F344 rats fed powdered diets containing 0, 62.5, 250, 1000 or 4000 ppm concentrations for 13 weeks. Suppression of body weight gain due to decreased food consumption was observed in both sexes at 4000 ppm, and at autopsy, increase of relative weights was observed for the brain, liver, spleen, kidneys, and testes in these animals, suggestive of the reflection of the reduced body weights. At this dose, slight increases of blood urea nitrogen in both sexes and serum alanine aminotransferase, Na and Cl in females, were observed, suggestive of weak hepatic and renal toxicity, at least in females. The same females also exhibited slight decrease of red blood cells and haematocrit, slight increase of mean corpuscular volume and mean corpuscular haemoglobin, and minimal increase of splenic haemosiderin deposition, providing evidence of slight haemolytic anemia. On the other hand, enhanced accumulation of mast cells was observed in the mesenteric lymph nodes at 4000 ppm in males and 1000 and 4000 ppm in females. Considering the anti-anaphylactic properties of polygodial, a major constituent of WPE, the mast cell accumulation was concluded to be an adaptive change in response to the subchronic oral administration of WPE. Based on the present

toxicity data, 1000 ppm was determined to be the no-observed-adverse-effect level, translating into 57.4 and 62.9 mg/kg/day for male and female rats, respectively.

Keywords: Subchronic toxicity; Water pepper extract; *Polygonum hydropiper* L.; Polygodial; F344 rats

P. Laohavechvanich, K. Kangsadalampai, N. Tirawanchai, A.J. Ketterman, Effect of different Thai traditional processing of various hot chili peppers on urethane-induced somatic mutation and recombination in *Drosophila melanogaster*: Assessment of the role of glutathione transferase activity, *Food and Chemical Toxicology*, Volume 44, Issue 8, August 2006, Pages 1348-1354, ISSN 0278-6915, DOI: 10.1016/j.fct.2006.02.013.

(<http://www.sciencedirect.com/science/article/B6T6P-4JF3T8D-1/2/f8dce29658aff42b12ff808f8f17dc63>)

Abstract:

Four different Thai traditional chili peppers, namely bird pepper (*Capsicum frutescens*), red chili spur peppers (*Capsicum annum*), green bell peppers and sweet pepper (*C. annum*) were investigated for their antimutagenic properties. Each chili was prepared in three formulations commonly used for chili food processing; raw paste (chili ground in water), pickled in vinegar or stir-fried in palm oil. Each sample was tested for its antimutagenic effect against urethane by using the somatic mutation and recombination of wing hair of *Drosophila melanogaster* as an indicator. Three-day-old larvae, trans-heterozygous for two genetic markers, multiple wing hairs *mwh* and *orrigan* (*ORR*; *flr3*), were exposed to urethane alone or in combination with each chili formulation. The various processing methods for chilies differentially extracted the antimutagenic chili components. The specific chili as well as the method of processing influenced the observed antimutagenic properties against urethane. This suggested each chili contains a unique complex mixture of many antimutagens. Co-treatment and pre-treatment experiments showed that both direct and indirect protective mechanisms are involved in an 'activation' process to give antimutagenesis effects. An association between antigenotoxicity and glutathione transferase activity could not be established.

Keywords: Chili; Urethane; SMART; Glutathione transferase; Antimutagens

Bulent Kozanoglu, Adan Cabrera Vazquez, Jorge Welti Chanes, Jose Luis Patino, Drying of seeds in a superheated steam vacuum fluidized bed, *Journal of Food Engineering*, Volume 75, Issue 3, August 2006, Pages 383-387, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.03.063.

(<http://www.sciencedirect.com/science/article/B6T8J-4GHBP1D-1/2/fb9252b4bf662a42953ed8fca4eea9d3>)

Abstract:

Drying experiments were carried out in a superheated steam vacuum fluidized bed, using coriander seed and pepper seed particles. The moisture gain in initial period of the process, reported in several studies, was avoided in most of the experiments by supplying some additional heat to the column. Both particles showed higher drying rates and lower final moisture contents by increasing operating temperature. The principle influence of the reduced operating pressure was found to be accomplishing higher degrees of superheating at relatively lower temperatures. The degree of superheating was identified as the most important parameter over the process.

Keywords: Fluidization; Drying process; Superheated steam; Vacuum

Xin-guo LI, Jin-ping ZHAO, Ping-li XU, Jing-jing MENG, Qi-wei HE, Effects of Cyclic Electron Flow Inhibitor (Antimycin A) on Photosystem Photoinhibition of Sweet Pepper Leaves upon Exposure to Chilling Stress Under Low Irradiance, *Agricultural Sciences in China*, Volume 5, Issue 7, July 2006, Pages 506-511, ISSN 1671-2927, DOI: 10.1016/S1671-2927(06)60084-9.

(<http://www.sciencedirect.com/science/article/B82XG-4KHCTP6-4/2/69dcead9dbfc54b79976895a4c2f8858>)

Abstract:

In chloroplast, there were two pathways involved in the cyclic electron flow around photosystem 1 (PS1). One was the NADH dehydrogenase (NDH)-dependent flow and the other was the ferredoxin quinone reductase-dependent flow. It was proposed that the NDH-dependent cyclic electron flow around PS1 was related to the xanthophyll cycle-dependent non-photochemical quenching (NPQ) at chilling temperature under low irradiance (CL). The function of the chloroplastic cyclic electron flow around PS1 was examined by comparing sweet pepper (*Capsicum annuum* L.) control with its antimycin A (AA)-fed leaves upon exposure to CL stress. During CL stress, the maximum photochemical efficiency of PS2 (Fv/Fm) decreased markedly in both controls and AA-fed leaves, and P700+ was also lower in AA-fed leaves than in controls. These results implied that cyclic electron flow around PS1 functioned to protect the photosynthetic apparatus from CL stress. Under such stress, NPQ and PS2-driven electron transport rate were different between AA-fed leaves and controls. The lower NPQ in AA-fed leaves might be related to an inefficient proton gradient across thylakoid membranes ($[\Delta]pH$) because of inhibiting cyclic electron flow around PS1 under CL stress.

Keywords: sweet pepper; chilling stress; cyclic electron flow; non-photochemical quenching; the xanthophyll cycle

Thomas C. Pullaro, Paul C. Marino, D. Michael Jackson, Howard F. Harrison, Anthony P. Keinath, Effects of killed cover crop mulch on weeds, weed seeds, and herbivores, *Agriculture, Ecosystems & Environment*, Volume 115, Issues 1-4, July 2006, Pages 97-104, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.12.021.

(<http://www.sciencedirect.com/science/article/B6T3Y-4JCBKF6-1/2/5be3c8245dcf38aefbcc824ee39ac139>)

Abstract:

The feasibility of killed cover crop mulches as an alternative to methyl bromide fumigation was investigated in spring bell pepper and fall collard production by examining post-dispersal predation on weed seed, predation on beet armyworm larvae and pupae, percent weed cover, invertebrate activity, activity of red imported fire ant, and crop yield. In three experiments, 5047 weed seeds were removed from cover crop mulch plots compared to 1860 seeds from standard production plots, and within treatments, predation increased significantly with decreasing seed size. Predation of beet armyworm pupae was 33% greater in cover crop mulch compared to conventional production plots. Fire ants were the main predator of weed seed and pest insects. In the two bell pepper experiments, weed cover per square meter was 31.8% less in standard production than in cover crop mulch plots. The mean number of invertebrates (other than fire ants) captured in pitfall traps was 5.8 +/- 0.1 plot⁻¹ versus 3.8 +/- 0.8 plot⁻¹ for cover crop and conventional treatments, respectively. There were 5734 fire ants captured in mulched cover crop plots compared to 1278 in conventional production plots. There was no significant difference in crop yield among treatments. The results suggest fire ants were more abundant where there was mulched cover and were important predators of weed seed and pest insects in killed cover crop plots and that cover crop mulches in summer pepper and fall collard production are potentially viable alternatives to black plastic mulch and soil fumigation.

Keywords: Brassica oleracea; Capsicum annuum; Killed cover crop mulch; No-tillage; Solenopsis invicta; Vicia sativa; Weed control

Sonia Marilia Castro, Ann Van Loey, Jorge Alexandre Saraiva, Chantal Smout, Marc Hendrickx, Inactivation of pepper (*Capsicum annuum*) pectin methylesterase by combined high-pressure and temperature treatments, *Journal of Food Engineering*, Volume 75, Issue 1, July 2006, Pages 50-58, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2005.03.050.

(<http://www.sciencedirect.com/science/article/B6T8J-4G54HCJ-5/2/aff15f55d874477fb894bae164ea5354>)

Abstract:

Pressure and/or temperature inactivation (at mild temperature, 10-64 [degree sign]C, in combination with high-pressure, 0.1-800 MPa) of the labile fraction of purified pepper pectin methylesterase (PME) was studied in a model system at pH 5.6. Inactivation of the labile fraction under mild-heat and high-pressure conditions could be accurately described by a fractional conversion model, while a biphasic model was used to estimate the inactivation rate constant of both fractions at more drastic conditions of temperature/pressure. At lower pressures (P [less-than-or-equals, slant] 300 MPa) and high temperatures (>54 [degree sign]C), an antagonistic effect of pressure and temperature was observed. Pressure and temperature dependence of the inactivation rate constants of the labile fraction was quantified using the Eyring and Arrhenius relations, respectively. A third-degree polynomial model (derived from the thermodynamic model) was successfully applied to describe the temperature/pressure dependence of the inactivation rate constants of the labile pepper PME fraction.

Keywords: Capsicum annum; Pectin methylesterase; High-pressure; Inactivation; Thermodynamic model

N. Akbudak, H. Tezcan, B. Akbudak, V. Seniz, The effect of harpin protein on plant growth parameters, leaf chlorophyll, leaf colour and percentage rotten fruit of pepper plants inoculated with *Botrytis cinerea*, *Scientia Horticulturae*, Volume 109, Issue 2, 29 June 2006, Pages 107-112, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.03.008.

(<http://www.sciencedirect.com/science/article/B6TC3-4JRVD9T-8/2/ca87bfac0deae1421712d1a01c9a0017>)

Abstract:

In this study, harpin protein was applied to the peppers (*Capsicum annum* L. var. cvs. 'Demre', 'Yalova Charleston' and 'Sari Sivri') grown under natural conditions. These plants were subjected to artificial inoculation with *Botrytis cinerea*, which causes fruit spoilage in peppers. Changes in vegetative growth, total chlorophyll content in leaves, leaf colour and percentage of rotten fruits were determined after treatments. The number of leaves per plant value was quite low in all cultivars and the plant height value was low only in cv. 'Sari Sivri' treated with *B. cinerea*. Values obtained from vegetative growth parameters in the plants subjected to harpin protein + *B. cinerea* treatment were only higher than *B. cinerea* treatment. Leaf chlorophyll values exhibited significant decline in the plants subjected to *B. cinerea* treatment in all cultivars. However, the chlorophyll content in the plants subjected to harpin protein + *B. cinerea* treatment was low. The colour values obtained from leaves supported the chlorophyll findings. Fruit spoilage percentages were lower in the fruits picked from the plants of harpin protein + *B. cinerea* treatment compared with those picked from the plants only subjected to *B. cinerea* treatment.

Keywords: *Botrytis cinerea*; *Capsicum annum*; Growth parameters; Leaf chlorophyll; Messenger; Percentage of rotten fruit

Seok Keun Cho, Jee Eun Kim, Jong-A Park, Tae Jin Eom, Woo Taek Kim, Constitutive expression of abiotic stress-inducible hot pepper CaXTH3, which encodes a xyloglucan endotransglucosylase/hydrolase homolog, improves drought and salt tolerance in transgenic *Arabidopsis* plants, *FEBS Letters*, Volume 580, Issue 13, 29 May 2006, Pages 3136-3144, ISSN 0014-5793, DOI: 10.1016/j.febslet.2006.04.062.

(<http://www.sciencedirect.com/science/article/B6T36-4JVSSM4-6/2/9fe22a0648b2d3340b26fedb64787112>)

Abstract:

Xyloglucan endotransglucosylase/hydrolase (XTH) has been recognized as a cell wall-modifying enzyme, participating in the diverse physiological roles. From water-stressed hot pepper plants, we isolated three different cDNA clones (pCaXTH1, pCaXTH2, and pCaXTH3) that encode XTH homologs. RT-PCR analysis showed that three CaXTH mRNAs were concomitantly induced by a

broad spectrum of abiotic stresses, including drought, high salinity and cold temperature, and in response to stress hormone ethylene, suggesting their role in the early events in the abiotic-related defense response. Transgenic *Arabidopsis* plants that constitutively expressed the CaXTH3 gene under the control of the CaMV 35S promoter exhibited abnormal leaf morphology; the transgenic leaves showed variable degrees of twisting and bending along the edges, resulting in a severely wrinkled leaf shape. Microscopic analysis showed that 35S-CaXTH3 leaves had increased numbers of small-sized cells, resulting in disordered, highly populated mesophyll cells in each dorsoventral layer, and appeared to contain a limited amount of starch. In addition, the 35S-CaXTH3 transgenic plants displayed markedly improved tolerance to severe water deficit, and to lesser extent to high salinity in comparison with the wild-type plants. These results indicate that CaXTH3 is functional in heterologous *Arabidopsis* cells, thereby effectively altering cell growth and also the response to abiotic stresses. Although the physiological function of CaXTHs is not yet clear, there are several possibilities for their involvement in a subset of physiological responses to counteract dehydration and high salinity stresses in transgenic *Arabidopsis* plants.

Keywords: Abiotic stress; Cell wall; Coordinated gene expression; Hot pepper; Transgenic *Arabidopsis*; Xyloglucan endotransglucosylase/hydrolase

Sei Kang, Kyoungwhan Back, Enriched production of N-hydroxycinnamic acid amides and biogenic amines in pepper (*Capsicum annuum*) flowers, *Scientia Horticulturae*, Volume 108, Issue 3, 8 May 2006, Pages 337-341, ISSN 0304-4238, DOI: 10.1016/j.scienta.2006.01.037.

(<http://www.sciencedirect.com/science/article/B6TC3-4JFGFKT-1/2/33457329ec2d64d8d0dbe543779ade50>)

Abstract:

The biosynthesis of N-hydroxycinnamic acid amides (HCAAs), such as feruloyltyramine, p-coumaroyltyramine, feruloylserotonin, and p-coumaroylserotonin, in pepper plants was investigated in view of the activity of their corresponding enzymes and substrate levels. Almost all HCAAs were found in flowers, whereas the enzyme activity essential for HCAA biosynthesis seemed to be expressed constitutively in all tissues tested. The highest levels of the biogenic amines tyramine and serotonin, the key amine substrates, were also found in flowers, indirectly suggesting that the amine substrates play an important regulatory role in the synthesis of HCAAs.

Keywords: p-Coumaroyltyramine; p-Coumaroylserotonin; Feruloyltyramine; Tryptophan decarboxylase; Serotonin; Tyramine

Lee Robertson, Jose A. Lopez-Perez, Antonio Bello, Miguel A. Diez-Rojo, Miguel Escuer, Ana Piedra-Buena, Caridad Ros, Casimiro Martinez, Characterization of *Meloidogyne incognita*, *M. arenaria* and *M. hapla* populations from Spain and Uruguay parasitizing pepper (*Capsicum annuum* L.), *Crop Protection*, Volume 25, Issue 5, May 2006, Pages 440-445, ISSN 0261-2194, DOI: 10.1016/j.cpro.2005.07.008.

(<http://www.sciencedirect.com/science/article/B6T5T-4H3JJ3K-1/2/05c5ad75ac247fec43688e30ddad7e7d>)

Abstract:

A total of 136 populations of *Meloidogyne arenaria*, *M. hapla*, *M. incognita* and *M. javanica* were collected from infected soil from representative horticultural regions of Spain and Uruguay, and evaluated in a bioassay designed to characterize the virulence on cultivars of pepper, tomato, cotton, tobacco and watermelon. None of the of *M. arenaria* race 2 or *M. javanica* populations parasitized any of the resistant pepper cultivars used, but all of the *M. hapla* populations reproduced on resistant peppers. Forty-three populations were found to parasitize both susceptible and resistant pepper cultivars, of those, 37 populations belonged to *M. incognita* (all races), one to *M. arenaria* (new race 3), and five to *M. hapla* races A and B. Seventeen of the *M. incognita* populations that were virulent on resistant pepper did not parasitize the resistant tomato cv. Nikita

containing the Mi gene. The results obtained have important implications for the design of alternative nematode management strategies using resistant cultivars.

Josefa M. Navarro, Pilar Flores, Consuelo Garrido, Vicente Martinez, Changes in the contents of antioxidant compounds in pepper fruits at different ripening stages, as affected by salinity, *Food Chemistry*, Volume 96, Issue 1, May 2006, Pages 66-73, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.01.057.

(<http://www.sciencedirect.com/science/article/B6T6R-4G7GFXT-1/2/da85cdf2375656918314e627e5579415>)

Abstract:

The interest in the consumption of pepper fruits (*Capsicum annum* L.) is, to a large extent, due to its content of bioactive nutrients and their importance as dietary antioxidants. A greenhouse experiment was carried out to determine the effects of salinity and different ripening states of pepper fruits on several compounds with antioxidant properties. Fruits from plants grown under three saline treatments (0, 15, and 30 mM NaCl) were collected at three maturity states (green, turning, and red). Antioxidant activity in the hydrophilic (HAA) and lipophilic (LAA) fractions, lycopene, [beta]-carotene, ascorbic acid, total phenolic compounds and reducing sugars were determined. From the nutritional point of view, the red state was the most appropriate state of maturation, since red peppers had the highest levels of lycopene, [beta]-carotene, and sugars and the highest antioxidant activity for both hydrophilic and lipophilic fractions. The effect of salinity depended on the maturity state of the peppers: it had no effect on HAA, [beta]-carotene or sugars, but decreased ascorbic acid and total phenolic compounds, and increased LAA and lycopene. The use of a moderately-saline water was beneficial when peppers were harvested in the red state, by increasing HAA and LAA in fruits, with no significant effects on other parameters.

Keywords: *Capsicum annum* L.; Lycopene; [beta]-carotene; Antioxidant activity; Ascorbic acid; Phenolic content; Ripening state; Salinity

F.R. Miranda, R.S. Gondim, C.A.G. Costa, Evapotranspiration and crop coefficients for tabasco pepper (*Capsicum frutescens* L.), *Agricultural Water Management*, Volume 82, Issues 1-2, 10 April 2006, Pages 237-246, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.07.024.

(<http://www.sciencedirect.com/science/article/B6T3X-4GY873T-2/2/e16ca532b944e17dea3b94bf5aa34739>)

Abstract:

Precise estimation of crop evapotranspiration (ET_c) on a daily basis is critical for drip irrigation management in soils with limited water storage capacity. The objective of this study was to determine the evapotranspiration and crop coefficients for tabasco pepper (*Capsicum frutescens* L.), in the Northeast region of Brazil. Crop ET was measured daily using a precision weighing lysimeter with a surface area of 2.25 m². Reference ET was estimated using the FAO Penman-Monteith equation. The total ET_c observed throughout the 300-day crop season was 888 mm, with maximum daily values of 5.6 mm d⁻¹. Under the climatic conditions of the Brazilian northeast region the crop presented two harvest cycles. Maximum values of crop coefficient were observed during the two periods of intense flowering and fruit development preceding fruit harvest. Average crop coefficients observed during the first harvest cycle were 0.3, 1.22 and 0.65 for the initial, mid-season and end of the late-season stages, respectively. During the second harvest cycle average crop coefficients were 1.08 and 0.60 for the mid-season and the late-season stages, respectively.

Keywords: Microirrigation; Pepper; Crop evapotranspiration; Weighing lysimeter

Mohammad S. Al-mazra'awi, Les Shipp, Bruce Broadbent, Peter Kevan, Biological control of *Lygus lineolaris* (Hemiptera: Miridae) and *Frankliniella occidentalis* (Thysanoptera: Thripidae) by *Bombus impatiens* (Hymenoptera: Apidae) vectored *Beauveria bassiana* in greenhouse sweet

pepper, *Biological Control*, Volume 37, Issue 1, April 2006, Pages 89-97, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.11.014.

(<http://www.sciencedirect.com/science/article/B6WBP-4J2M4FT-1/2/52fb40b4613208a226e93c394be20b47>)

Abstract:

The ability of bumble bees to disseminate conidia of *Beauveria bassiana* (Balsamo) Vuillemin from hive-mounted dispensers to greenhouse sweet peppers for the control of tarnished plant bug (TPB) and western flower thrips (WFT) was investigated in greenhouse trials using large screened enclosures. Samples collected from the enclosures (four treatments) on two sampling dates showed that 97, 90, 91, and 42% of the collected bees, flowers, leaves, and TPB, respectively, showed detectable densities of *B. bassiana* on the first sampling date. On the second sampling date, 99, 96, 87, and 30% of collected bees, flowers, leaves, and TPB, respectively, showed detectable densities of the fungus. Mean mortalities of TPB collected from cages treated with *B. bassiana* were 34 and 45% compared to 9 and 15% in the controls on the first and second sampling dates, respectively. Mean infection rates of WFT were 40 and 34% compared to 3% in the controls on the first and second sampling dates, respectively. These results indicate that bumble bees are an effective means of vectoring the fungal conidia to the crop. The pollinator vector technology is a novel example of integrating agro-ecosystem processes of pollination and pest management, that reduces the reliance on insecticides and increases crop yields and quality.

Keywords: *Beauveria bassiana*; Bee vectoring; *Bombus impatiens*; Dispensers; *Frankliniella occidentalis*; *Lygus lineolaris*; Pollination

F.D. Molina-Aiz, D.L. Valera, A.J. Alvarez, A. Madueno, A Wind Tunnel Study of Airflow through Horticultural Crops: Determination of the Drag Coefficient, *Biosystems Engineering*, Volume 93, Issue 4, April 2006, Pages 447-457, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2006.01.016.

(<http://www.sciencedirect.com/science/article/B6WXV-4JHMFKP-4/2/a69b7aa55b6beac56383a78b36cd1dae>)

Abstract:

Greenhouse crops exert a drag force causing a net loss of momentum in the airflow and a negative effect on ventilation. The drag effect produced by the airflow through crops can be modelled as a function of leaf area density (LAD) and the square of air velocity. A wind tunnel was used to determine the drag coefficient C_D of four horticultural crops. Three samples with differing values of LAD were tested for each crop. The values of C_D obtained for tomato, sweet pepper, aubergine and bean were 0.26, 0.23, 0.23 and 0.22, respectively. Coefficients obtained for the four crops were similar, which suggests that the effect of leaf shape and size is not significant.

The drag coefficients found decreased with velocity and remained nearly constant for Reynolds number greater than 6×10^4 . The drag coefficient allows the aerodynamic behaviour of crops to be characterised, although the use of a constant value involves a significant error (15-30%) for velocities usually registered inside greenhouses (1-5 m s⁻¹). Maximum values of C_D were obtained for velocities between 0.5 and 1.5 m s⁻¹ due to the effects of change in leaf position and variation in airflow regime.

S. Metin Sezen, Attila Yazar, Salim Eker, Effect of drip irrigation regimes on yield and quality of field grown bell pepper, *Agricultural Water Management*, Volume 81, Issues 1-2, 10 March 2006, Pages 115-131, ISSN 0378-3774, DOI: 10.1016/j.agwat.2005.04.002.

(<http://www.sciencedirect.com/science/article/B6T3X-4GCX0CG-1/2/af1c6e308fe32edb1f4fc8e43118918c>)

Abstract:

This study examined the effects of different irrigation regimes on yield and water use of bell pepper (*Capsicum annuum* sp. 11-B-14) irrigated with a drip irrigation system under field conditions in

2002 and 2003 growing seasons in the Mediterranean region of Turkey. Irrigation regimes consisted of three irrigation intervals based on three levels of cumulative pan evaporation (Epan) values (I1, 18-22 mm; I2, 38-42 mm; and I3, 58-62 mm); irrigations occurred on the respective treatments when Epan reached target values. Three plant-pan coefficients were evaluated as irrigation levels (Kcp1 = 0.50, Kcp2 = 0.75 and Kcp3 = 1.00). Irrigation intervals varied from 3 to 6 days in I1, 6 to 11 days in I2 and 9 to 15 days in I3 treatments. Combined variance analysis indicated that experimental years were not significantly different, but both Kcp and irrigation intervals (I) significantly influenced total pepper yields. Maximum and minimum yields were obtained from the I1Kcp3 and I3Kcp1 treatments: 33,140 kg ha⁻¹ and 21,620 kg ha⁻¹ in the first experimental year and 35,298 kg ha⁻¹ and 21,010 kg ha⁻¹ in the second experimental year, respectively. As the Kcp value decreased the total yields within each irrigation interval also decreased. However, with the lower irrigation frequency (I3), lower yields were obtained with all Kcp coefficients. Crop evapotranspiration (ET) values in the treatments varied from 365 mm in I2Kcp1 to 528 mm in I1Kcp3 in the first experimental year and 309 mm in I3Kcp1 to 511 mm in I1Kcp3 in the second experimental year. Significant second degree polynomial relations were found between pepper yield and total water use for each irrigation interval in 2002 and 2003 growing seasons. Different irrigation intervals resulted in similar water use in the treatments with the same Kcp value. Water use efficiency (WUE) and irrigation water use efficiency (IWUE) values were significantly influenced by the irrigation intervals, plant-pan coefficients and experimental years (Y1: 2002 and Y2: 2003) at 1% level of significance. WUE ranged from 4.7 kg m⁻³ in I3Kcp2 to 7.6 kg m⁻³ of ET in the I1Kcp1 in the 2002 growing season and ranged from 6.4 kg m⁻³ in I3Kcp3 to 7.9 kg m⁻³ of ET in the I2Kcp2 in the 2003 growing season. Maximum IWUE was observed in Y1I1Kcp1 (7.7 kg m⁻³), and minimum IWUE was in Y1I3Kcp3 treatment (4.8 kg m⁻³) in the experimental years. Kcp coefficients (irrigation amounts) and irrigation frequencies (I) and years had significantly different effects on quality parameters such as the first and second quality yield, and number of fruit. Both Kcp and I significantly influenced the mean fruit weight, pepper length and width, as well as stem diameter and plant height at harvest. In conclusion, I1Kcp3 irrigation regime is recommended for field grown bell pepper in order to attain higher yields with improved quality.

Keywords: Deficit irrigation; Bell pepper; Water use efficiency; Quality; Drip irrigation; Free surface evaporation

Ramon A. Arancibia, Carl E. Motsenbocker, Pectin methylesterase activity in vivo differs from activity in vitro and enhances polygalacturonase-mediated pectin degradation in tabasco pepper, *Journal of Plant Physiology*, Volume 163, Issue 5, 3 March 2006, Pages 488-496, ISSN 0176-1617, DOI: 10.1016/j.jplph.2005.06.022.

(<http://www.sciencedirect.com/science/article/B7GJ7-4HDP6TH-2/2/7f20f391f34cfa3f1b6d35263ab107c3>)

Abstract: Summary

Polygalacturonase (PG) and pectin methylesterase (PME) activities were analyzed in ripening fruits of two tabasco pepper (*Capsicum frutescens*) lines that differ in the extent of pectin degradation (depolymerization and dissolution). Ripe 'Easy Pick' fruit is characterized by pectin ultra-degradation and easy fruit detachment from the calyx (deciduous trait), while pectin depolymerization and dissolution in ripe 'Hard Pick' fruit is limited. PG activity in protein extracts increased similarly in both lines during fruit ripening. PME activity in vivo assessed by methanol production, however, was detected only in fruit of the 'Easy Pick' line and was associated with decreased pectin methyl-esterification. In contrast, methanol production in vivo was not detected in fruits of the 'Hard Pick' line and the degree of pectin esterification remained the same throughout ripening. Consequently, a ripening specific PME that is active in vivo appears to enhance PG-mediated pectin ultra-degradation resulting in cell wall dissolution and the deciduous fruit trait. PME activity in vitro, however, was detected in protein extracts from both lines at all ripening

stages. This indicates that some PME isozymes are apparently inactive in vivo, particularly in green fruit and throughout ripening in the 'Hard Pick' line, limiting PG-mediated pectin depolymerization which results in moderately difficult fruit separation from the calyx.

Keywords: *Capsicum frutescens*; Depolymerization; Detachment force; Methanol; Ripening

Li-hao WANG, Bao-xi ZHANG, AM Daubeze, San-wen HUANG, Jia-zhen GUO, Sheng-li MAO, A Palloix, Yong-chen DU, Genetics of Fertility Restoration in Cytoplasmic Male Sterile Pepper, Agricultural Sciences in China, Volume 5, Issue 3, March 2006, Pages 188-195, ISSN 1671-2927, DOI: 10.1016/S1671-2927(06)60037-0.

(<http://www.sciencedirect.com/science/article/B82XG-4JMM39D-4/2/1c675b2aa6ed2c178051f5a4a5c81628>)

Abstract: Abstract

Pepper hybrid seeds production using male sterility could lower cost by reducing time and labour, and increase the genetic purity of the F1 seeds. To investigate the genetics of fertility restoration of the Peterson cytoplasmic sterility in pepper, a doubled haploid population of 115 pepper lines obtained from anther culture of the F1 hybrid between Yolo Wonder (sterility maintainer line) and Perennial (fertility restorer line) and the parental lines were test-crossed by 77013A (a strict cytoplasmic-genic male sterile line). The fertility of the test-crossed lines was assessed in greenhouse and open field with the following three criteria: pollen index (PI, visual estimation of pollen amount per flower), pollen number (PN, pollen counting under microscope), and seed number (SN, the number of seeds per fruit in open pollination). Correlations between the each couple of criteria within, as well as between the cultivation methods ranged from 0.55 to 0.84. Analysis of variance showed that the genotype (DH line) and environment were the significant sources of variation of the fertility. Narrow sense of heritance of fertility restoration ranged from 0.38 to 0.92, depending on the criteria and environment. The distribution of the progeny was continuous between the parental genotypes indicating the quantitative inheritance of fertility restoration. Inferred from segregation according to Snape et al.(1984), the number of segregating genes was estimated to be that three to four genetic factors were involved in pollen traits (PI and PN) and five to eight genetic factors in seed production (SN). The heredity analysis of the CMS will be helpful for understanding of the genetic mechanism of the fertility restoration and the exploitation of the CMS in hybrid seed production.

Keywords: *Capsicum annum* L; doubled haploids population; cytoplasmic male sterility (CMS); fertility restoration; genetic analysis

A.I. Olives Barba, M. Camara Hurtado, M.C. Sanchez Mata, V. Fernandez Ruiz, M. Lopez Saenz de Tejada, Application of a UV-vis detection-HPLC method for a rapid determination of lycopene and [beta]-carotene in vegetables, Food Chemistry, Volume 95, Issue 2, March 2006, Pages 328-336, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2005.02.028.

(<http://www.sciencedirect.com/science/article/B6T6R-4FWFVXK-1/2/729ef1b360b66e9e9cc84b1c2bb7fc46>)

Abstract:

The purpose of this paper is to optimize an HPLC method for the determination of lycopene and [beta]-carotene in vegetables and compare it with a spectrophotometric standard method. Among the different conditions studied the most suitable ones for our samples were: extraction with hexane/acetone/ethanol (50:25:25 v/v/v), evaporation of the hexane layer, dissolution of the dry extract in THF/ACN/methanol (15:30:55 v/v/v) and injection on a C18 column with methanol/ACN (90:10 v/v) + TEA 9 [mu]M as mobile phase ([Phi] = 0.9 ml/min) and [lambda]detection = 475 nm. Samples considered for analysis were: tomato, carrot, pepper, watermelon, persimmon and medlar. The HPLC method proposed showed adequate reproducibility (RSD < 10.5%), accuracy (100-109% recovery) and sensitive detection limits (0.6 [mu]M for lycopene; 0.3 [mu]M for [beta]-

carotene), with a simple preparation of the samples (one step direct extraction) and short run times (10 min) for the quantification of lycopene and [beta]-carotene.

Keywords: Lycopene; [beta]-carotene; HPLC; Vegetables

S. Bougoul, T. Boulard, Water dynamics in two rockwool slab growing substrates of contrasting densities, *Scientia Horticulturae*, Volume 107, Issue 4, 27 February 2006, Pages 399-404, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.11.007.

(<http://www.sciencedirect.com/science/article/B6TC3-4J2M5M3-1/2/3cd8c9a486a8e46d8a80816a76a8ef93>)

Abstract:

It is important to determine the dynamics of water and nutrients in the growing substrate used for soil-less cultivation because this allows better time and space management of the water and nutrient supply according to plant needs during each step of the crop cycle. In this study, we focus on the motion of water in rockwool slabs used as growing substrate for a sweet pepper crop. The transport equation is first quoted and root absorption described by a sink term for which the absorption law was experimentally determined. Control volume methods by means of commercial computer fluid dynamics (CFD) software were used to solve the water movement equations numerically in three dimensions. However, as Richards' equation describing water movements in the substrate is quite different from the Navier-Stokes equations used by the CFD, considerable modifications of the standard transport equations were required. The numerical results were then compared with experimental results and, once validated, the model was reused for a sensitivity analysis with respect to various physical parameters of the substrate. Based on this study, we propose an alternative substrate design more suitable for closed systems.

Keywords: Simulation; Rockwool slabs; Water movement; CFD; Sweet pepper; Irrigation

E.D.J. Supena, W. Muswita, S. Suharsono, J.B.M. Custers, Evaluation of crucial factors for implementing shed-microspore culture of Indonesian hot pepper (*Capsicum annum* L.) cultivars, *Scientia Horticulturae*, Volume 107, Issue 3, 6 February 2006, Pages 226-232, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.08.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4HNSBC5-1/2/83f8b5f9c50f7d079b8b366946de909d>)

Abstract:

A shed-microspore culture protocol was developed in Wageningen for producing doubled haploid plants in several genotypes of Indonesian hot pepper (*Capsicum annum* L.). For transfer of technology to Indonesia, three factors were studied that appeared crucial for successful implementation in practice. First, application in the culture medium of a combination of the antibiotics timentin and rifampicin at the concentrations of 200 and 10 mg/l, respectively, prevented bacterial contamination from the donor explants. Second, in vitro application of colchicine (100 [μ]M) during the first week of culture was highly effective in increasing the percentage of doubled haploid plants. Third, a comparative analysis of the ploidy level of plants regenerated from shed-microspore-derived embryos using chloroplast counts in guard cells of leaf stomata and flow cytometric measurement of leaf nuclear DNA content, revealed that the first procedure is a reliable and an easy to use method for ploidy determination with hot pepper.

Keywords: *Capsicum*; Contamination; Chloroplast; Colchicine; Haploid; Ploidy; Rifampicin; Timentin

Zhi-Qiang Jiang, Ya-Hui Guo, Shi-Mo Li, Hong-Ying Qi, Jian-Hua Guo, Evaluation of biocontrol efficiency of different *Bacillus* preparations and field application methods against *Phytophthora* blight of bell pepper, *Biological Control*, Volume 36, Issue 2, February 2006, Pages 216-223, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.10.012.

(<http://www.sciencedirect.com/science/article/B6WBP-4HRMV2M-1/2/23706bfbbeeb31e1ed509da75546e726>)

Abstract:

Biocontrol efficiency of various *Bacillus* preparations (BB11 and FH17 strains, and a mixture of both strains (BF) at a 1:1 ratio by concentration) and different application methods against *Phytophthora* blight of bell pepper were studied. The application methods included (A) mixing (mixing BF with rapeseed residue and then immediately applying in the field), (B) composting (mixing BF with rapeseed residue and made compost before application), (C) spraying (spraying diluted BF into field or rhizosphere of plants), and (D) watering (watering diluted BF into field or rhizosphere of plants). In greenhouse experiments, the addition of BF increased biocontrol efficiency (60.3%), and yield increase (200%) was better than with BB11 (55.8 and 80.6%, respectively) or FH17 (37.1 and 50.0%, respectively). In field trials at Huai'an in 2001, the best dosages of BF mixture (1010 cfu/ml) with the four above-mentioned application methods were 15, 7.5, 15, and 22.5 L/ha, respectively. When preparations were applied at the best dosage in the same field, the BF mixture provided superior biocontrol efficiency and greater yield increase with treatment B than those with treatment A or C. Combining the field trial results from 2002 to 2003 at Huai'an and Wu'han, the total average control efficiencies and yield increases for treatments A, B, and C reached 81.0, 88.0, and 79.1% and 33.1, 44.3, and 29.1%, respectively, with their best dosages. However, method B, composting, provided better disease control and greater yield increases than all other methods, and did so at a lower application rate.

Keywords: *Bacillus*; *Phytophthora capsici*; Biocontrol; Application method

Jorge Pino, Enrique Sauri-Duch, Rolando Marbot, Changes in volatile compounds of Habanero chile pepper (*Capsicum chinense* Jack. cv. Habanero) at two ripening stages, *Food Chemistry*, Volume 94, Issue 3, February 2006, Pages 394-398, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.11.040.

(<http://www.sciencedirect.com/science/article/B6T6R-4FCRFHH-6/2/098c0ee063d69171fdae4671f678cbaa>)

Abstract:

The steam volatile components of Yucatan Habanero chile pepper (*Capsicum chinense* Jack. cv. Habanero) at two ripening stages (green and orange) were analyzed using GC and GC/MS. Both samples had several compounds in common. One hundred and two compounds were identified, from which (E)-2-hexenal, hexyl 3-methylbutanoate, (Z)-3-hexenyl 3-methylbutanoate, hexyl pentanoate, 3,3-dimethylcyclohexanol, and hexadecanoic acid were found to be the major constituents. During Habanero chile pepper maturation, the majority of volatile compounds decreased or even disappeared, some of them with green odour notes while esters, which have fruity odour notes, increased at the same time.

Keywords: Habanero chile pepper; *Capsicum chinense*; Volatile compounds; Ripening

F. Tateo, M. Bononi, Determination of ethylene chlorohydrin as marker of spices fumigation with ethylene oxide, *Journal of Food Composition and Analysis*, Volume 19, Issue 1, February 2006, Pages 83-87, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.12.003.

(<http://www.sciencedirect.com/science/article/B6WJH-4H0BSW8-1/2/3a5483574f4560b8a1085ff0cea8e2bb>)

Abstract:

Ethylene oxide (EO) is a gas used to sterilize spices, drugs, packaging materials, medical devices, polyester fibers, plastics and synthetic rubber. When the aeration step foreseen for spices is not properly carried out, residues of EO and its derivative ethylene chlorohydrin (ECH), produced by reaction with chlorine ions always present in the matrix, can be found in these products.

In this way, the reactivity of EO with chlorides in spices provides a suitable marker to confirm the use of EO for fumigation. The ECH derived from spontaneous transformation during the storage

and forcibly obtained during the first step of the extraction can be evaluated in spices by a simple GC/MS analytical method, without derivatization.

It has been proven that the EO molecule is carcinogenic for humans; it has been classified as a category 1 carcinogen by the International Agency for Research on Cancer (IARC): ECH, as EO, is a mutagenic substance.

This paper shows the results concerning 25 pepper samples purchased on the Italian market.

The limit of detection for ECH was assumed to be 20 [mu]g/kg (LOD) and was calculated by spiking a matrix pepper that had not been treated with EO. The limit of quantitation was assumed to be 100 [mu]g/kg (LOQ), i.e. 5 times LOD. The reliability of the method was verified by recovery and repeatability tests. Recovery average values are 60-70% (CV%=9.6-5.5) for the concentration range 100-500 [mu]g/kg.

Only 56% of pepper samples analyzed did not contain ECH at detectable levels, and only 24% of pepper samples contained ECH at levels lower than LOQ. Three samples had a content ranging between 0.2 and 3.3 mg/kg and two samples showed a content of ECH higher than 5 mg/kg.

Keywords: Ethylene Oxide; Ethylene Chlorohydrin; Spices; Fumigation

Ho Won Jung, Chae Woo Lim, Byung Kook Hwang, Isolation and functional analysis of a pepper lipid transfer protein III (CALTPIII) gene promoter during signaling to pathogen, abiotic and environmental stresses, *Plant Science*, Volume 170, Issue 2, February 2006, Pages 258-266, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.08.010.

(<http://www.sciencedirect.com/science/article/B6TBH-4H279XW-1/2/af00cc54b4e7473efdf981dcfe4b8e6c>)

Abstract:

The promoter fragment of 1065 bp upstream from the translation initiation site of the CALTPIII gene encoding a basic lipid transfer protein was isolated from the genomic DNA of *Capsicum annuum*. Some putative cis-acting elements, including an ERE-box, a W-box, and MYB-core elements were found in the promoter region of the CALTPIII gene. In *Agrobacterium*-mediated transient expression assay, strong activation of the CALTPIII full promoter region (1065 bp long) occurred in tobacco leaves after infection with *Pseudomonas syringae* pv. *tabaci*, and treatments with ethylene, salicylic acid, methyl jasmonate and H₂O₂. However, the full promoter did not respond to abscisic acid while previous studies have shown that the CALTPIII mRNA is indeed induced by ABA. Pathogen and ethylene responses were mostly affected by the deletion between -830 and -422 bp. Salicylic acid response was lost in any deleted construct. A fine analysis showed that the crucial elements for pathogen response are located between -626 and -552 bp.

Keywords: *Capsicum annuum*; GUS activity; Cis-acting element; Lipid transfer protein; Promoter

Jeffrey B. Jones, George H. Lacy, Hacene Bouzar, Robert E. Stall, Norman W. Schaad, Erratum to 'Reclassification of the Xanthomonads Associated with Bacterial Spot Disease of Tomato and Pepper': [*System. Appl. Microbiol.* 27 (2004) 755-762], *Systematic and Applied Microbiology*, Volume 29, Issue 1, 24 January 2006, Pages 85-86, ISSN 0723-2020, DOI: 10.1016/j.syapm.2005.05.002.

(<http://www.sciencedirect.com/science/article/B7GVX-4GHSGJK-1/2/cd23fca1546b22900b09adfafa861bc2>)

Venkataiah Peddaboina, Christopher Thamidala, Subhash Karampuri, In vitro shoot multiplication and plant regeneration in four *Capsicum* species using thidiazuron, *Scientia Horticulturae*, Volume 107, Issue 2, 10 January 2006, Pages 117-122, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.06.010.

(<http://www.sciencedirect.com/science/article/B6TC3-4GWC28X-2/2/9ac8c3a56513e60540d9ef29a26ab86d>)

Abstract:

A procedure of in vitro plant propagation using shoot meristem explants (~0.5 cm) has been developed for *Capsicum annum* cv CA960, *C. baccatum*, *C. frutescens* and *C. praetermissum* on Murashige and Skoog [Murashige, T., Skoog, F., 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Plant Physiol.* 15, 473-497] medium containing various cytokinins. Among various concentrations of cytokinins tested; adenine (Ad), N6-benzyladenine (BA), kinetin (Kn), zeatin and thidiazuron (TDZ) individually. TDZ regenerated maximum number (4.2-22.4) of shoots in all the *Capsicum* species tested. Multiple shoot elongation occurred upon transfer to BA (0.22 [μ]M l⁻¹) + IAA (0.48 [μ]M l⁻¹). Rooting of regenerated shoots was achieved on medium supplemented with 5.71 [μ]M l⁻¹ indole-acetic acid (IAA). Rooting was observed in 72-94% of shoots obtained from TDZ-containing regeneration medium followed by elongation treatment in contrast to 8-22% of shoots without elongation treatment. Plantlets obtained from TDZ-containing media were normal diploid (2n = 24) and could readily be established in the soil under green house conditions with a survival frequency of 68-84%. Regenerated plants were developed into morphologically normal, fertile plants and able to set viable seeds.

Keywords: Cytokinins; Multiple shoots; Pepper; Plant regeneration; Rooting

A.I. Bhat, R. Madhubala, P.S. Hareesh, M. Anandaraj, Detection and characterization of the phytoplasma associated with a phyllody disease of black pepper (*Piper nigrum* L.) in India, *Scientia Horticulturae*, Volume 107, Issue 2, 10 January 2006, Pages 200-204, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.06.013.

(<http://www.sciencedirect.com/science/article/B6TC3-4GTW92C-3/2/7748e926c47e890825e2ae066e1218b0>)

Abstract:

Using polymerase chain reaction (PCR), the phytoplasma was detected in black pepper (*Piper nigrum*) with phyllody symptoms in India. A 1.20 kb DNA fragment encoding the portion of phytoplasma 16S rDNA consistently amplified by nested PCR was cloned and sequenced. The sequenced region contained 1230 nucleotides. Sequence analyses showed that the gene was most closely related to members of aster yellows group (16Sr I) of phytoplasma. The sequence identity with members of aster yellows group (16Sr I) was >98% while that with members of other groups (16Sr II to 16Sr XV and other undesignated groups) ranged from 87 to 96%. On the basis of sequence identity and phylogenetic relationship studies, it is concluded that phytoplasma infecting black pepper in India belongs to aster yellows group. This is the first report of identification of phytoplasma in black pepper.

Keywords: Black pepper; Phyllody disease; 16S rDNA sequence; Sequence analyses; Aster yellows phytoplasma

M. Muchuweti, J.W. Birkett, E. Chinyanga, R. Zvauya, M.D. Scrimshaw, J.N. Lester, Heavy metal content of vegetables irrigated with mixtures of wastewater and sewage sludge in Zimbabwe: Implications for human health, *Agriculture, Ecosystems & Environment*, Volume 112, Issue 1, January 2006, Pages 41-48, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.04.028.

(<http://www.sciencedirect.com/science/article/B6T3Y-4HBTDBR-1/2/26b81f8f46a0899fee62ffc4823fb2dd>)

Abstract:

There is growing public concern in Zimbabwe over the illegal cultivation of vegetables on soils amended with sewage sludge or irrigated with admixtures of sewage and sewage sludge. Excessive accumulation of heavy metals in agricultural soils may not only result in environmental contamination, but lead to elevated heavy metal uptake by crops, which may affect food quality and safety. The work reported here studied heavy metal concentrations in crops irrigated with sewage sludge and sewage/sewage sludge admixtures at Firlie Municipal Farm in Harare. The crops analysed in this study are heavily contaminated with the four regulated elements: Cd, Cu, Pb

and Zn. This contamination is at its highest in two of the staple dietary crops maize and tsunga. Tsunga leaves contained 3.68 mg kg⁻¹ Cd, over 18 times the permissible level by the EU standards (0.2 mg kg⁻¹); Cu concentrations were 111 mg kg⁻¹, 5 times the EU Standard (20 mg kg⁻¹); concentrations of Pb were 6.77 mg kg⁻¹, over 22 times the permissible levels allowed by both EU standards and UK guidelines (0.3 mg kg⁻¹); Zn concentrations were 221 mg kg⁻¹, over 4 times the guideline value (50 mg kg⁻¹). The other plants (beans, maize, peppers and sugarcane) also contained concentrations of heavy metals above the permissible levels. Furthermore, the concentrations observed in this study were higher than those reported by other workers who have examined vegetation from other contaminated sites. This study highlights the potential risks involved in the cultivation and consumption of vegetables on plots irrigated with sewage sludge, a practice which may place at risk the health of the urban population who consume these vegetables.

Keywords: Soils; Sewage sludge; Wastewater; Heavy metals; Green vegetables; Zimbabwe

N. Kokalis-Burelle, J.W. Kloepper, M.S. Reddy, Plant growth-promoting rhizobacteria as transplant amendments and their effects on indigenous rhizosphere microorganisms, *Applied Soil Ecology*, Volume 31, Issues 1-2, January 2006, Pages 91-100, ISSN 0929-1393, DOI: 10.1016/j.apsoil.2005.03.007.

(<http://www.sciencedirect.com/science/article/B6T4B-4GBWJB5-1/2/1dd09f0272df143a719c937d561a04c9>)

Abstract:

Field trials were conducted in Florida on bell pepper (*Capsicum annuum*) to monitor the population dynamics of two plant growth-promoting rhizobacteria (PGPR) strains (*Bacillus subtilis* strain GBO3 and *Bacillus amyloliquefaciens* strain IN937a) applied in the potting media at seeding and at various times after transplanting to the field during the growing season. In-field drenches of an aqueous bacterial formulation were used for the mid-season applications. The effects of the applied PGPR and application methods on bacterial survival, rhizosphere colonization, plant growth and yield, and selected indigenous rhizosphere microorganisms were assessed. The Gram-positive PGPR applied to the potting media established stable populations in the rhizosphere that persisted throughout the growing season. Additional aqueous applications of PGPR during the growing season did not increase the population size of applied strains compared to treatments only receiving bacteria in the potting media; however, they did increase plant growth compared to the untreated control to varying degrees in both trials. Most treatments also reduced disease incidence in a detached leaf assay, indicating that systemic resistance was induced by the PGPR treatments. However, treatments did not result in increased yield, which was highly variable. Application of the PGPR strains did not adversely affect populations of beneficial indigenous rhizosphere bacteria including fluorescent pseudomonads and siderophore-producing bacterial strains. Treatment with PGPR increased populations of fungi in the rhizosphere but did not result in increased root disease incidence. This fungal response to the PGPR product was likely due to an increase in nonpathogenic chitinolytic fungal strains resulting from the application of chitosan, which is a component of the PGPR formulation applied to the potting media.

Keywords: Bell pepper; Biological control; BioYield(TM); *Capsicum annuum*; Plant growth-promoting rhizobacteria (PGPR); Soil ecology; Transplants

Javed Shaikh, Rajesh Bhosale, Rekha Singhal, Microencapsulation of black pepper oleoresin, *Food Chemistry*, Volume 94, Issue 1, January 2006, Pages 105-110, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.10.056.

(<http://www.sciencedirect.com/science/article/B6T6R-4F9247M-2/2/bc9aa22dec8994b60f568a90744a94>)

Abstract:

Despite of solvent extracted spice oleoresin having many advantages over ground spices, its sensitivity to light, heat and oxygen is a disadvantage. One approach to overcome this is microencapsulation. The present work reports on microencapsulation of black pepper oleoresin by spray-drying, using gum arabic and modified starch as wall materials. The microcapsules were evaluated for the content and stability of volatiles, non-volatiles, total piperine and entrapped piperine for six weeks. Gum arabic offered greater protection to the pepper oleoresin than modified starch, as seen from the $t_{1/2}$, time required for a constituent to be reduced to 50% of its initial value.

Keywords: Black pepper oleoresin; Gum arabic; Modified starch; Encapsulation

J.H. Zhu, X.L. Li, P. Christie, J.L. Li, Environmental implications of low nitrogen use efficiency in excessively fertilized hot pepper (*Capsicum frutescens* L.) cropping systems, *Agriculture, Ecosystems & Environment*, Volume 111, Issues 1-4, 1 December 2005, Pages 70-80, ISSN 0167-8809, DOI: 10.1016/j.agee.2005.04.025.

(<http://www.sciencedirect.com/science/article/B6T3Y-4GG8VDH-3/2/7076ea48745beb214e45ccef25f0b13>)

Abstract:

A randomized-block greenhouse plot experiment was conducted on N utilization efficiency and N losses in intensive hot pepper (*Capsicum frutescens* L.) production systems typical of commercial practice in Shouguang, an important vegetable production area in Shandong province, northeast China. Crop yield and N utilization, soil mineral N dynamics and potential nitrate leaching losses were studied in control plots receiving no N fertilizer or organic manure and in experimental plots receiving 0, 600, 1200 or 1800 kg urea-N ha⁻¹ plus a basal dressing of 15 t ha⁻¹ air-dried poultry manure supplying 178 kg N ha⁻¹. Ammonia volatilization from the soil surface was monitored. A microplot was established in each of the plots receiving 1200 kg urea-N ha⁻¹ (the local average commercial fertilizer N application rate), the urea applied to the microplot was labelled with 10 atom % ¹⁵N tracer and residual soil ¹⁵N and ¹⁵N in harvested plant parts were determined. Previous intensive cropping led to a very high residual soil mineral N content (1117 kg N ha⁻¹) before the experiment began and control plots gave a satisfactory mean fruit yield of 5.7 t DM ha⁻¹ with no significant yield response to applied fertilizer and poultry manure. Only 10% of applied fertilizer N was recovered in the aboveground parts of the crop and about 52% was lost from the soil-plant system. Substantial nitrate leaching losses occurred using the two highest fertilizer N application rates but there was little NH₃ volatilization from the soil surface. In a survey of 94 wells in Shouguang, the NO₃⁻-N concentrations in water used for drinking and irrigation were determined. Almost half of 94 local wells surveyed had NO₃⁻-N concentrations above the USEPA public drinking water maximum contaminant level of 10 mg L⁻¹. The data indicate that N inputs for intensively managed vegetable crops in northeast China should be reduced urgently to maintain crop yields while avoiding serious long-term environmental damage.

Keywords: Fertilizer N use efficiency; Nitrogen inputs; ¹⁵N; Intensive cultivation; Nitrate leaching; Environmental protection

Nihal Turkmen, Ferda Sari, Y. Sedat Velioglu, The effect of cooking methods on total phenolics and antioxidant activity of selected green vegetables, *Food Chemistry*, Volume 93, Issue 4, December 2005, Pages 713-718, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.12.038.

(<http://www.sciencedirect.com/science/article/B6T6R-4FHKCWM-2/2/efd903079d1c6e854eba0e52f947c290>)

Abstract:

Effects of microwave and conventional cooking methods were studied on total phenolics and antioxidant activity of pepper, squash, green beans, peas, leek, broccoli and spinach. Total phenolics content of fresh vegetables ranged from 183.2 to 1344.7 mg/100 g (as gallic acid equivalent) on dry weight basis. Total antioxidant activity ranged from 12.2% to 78.2%. With the

exception of spinach, cooking affected total phenolics content significantly ($p < 0.05$). The effect of various cooking methods on total phenolics was significant ($p < 0.05$) only for pepper, peas and broccoli. After cooking, total antioxidant activity increased or remained unchanged depending on the type of vegetable but not type of cooking.

Keywords: Green vegetables; Phenolics; Antioxidant activity; DPPH

Patricia Y. Niizu, Delia B. Rodriguez-Amaya, New data on the carotenoid composition of raw salad vegetables, *Journal of Food Composition and Analysis*, Volume 18, Issue 8, December 2005, Pages 739-749, ISSN 0889-1575, DOI: 10.1016/j.jfca.2004.09.001.

(<http://www.sciencedirect.com/science/article/B6WJH-4FFX96B-5/2/0776bccae6cf8ae6f97debc5339d5163>)

Abstract:

This study was carried out to determine the concentrations of the principal carotenoids of eight vegetables (Nantes carrot, chicory, Boston and curly lettuce, green bell pepper, rucula, Carmen tomato and cress), which are the most consumed in raw salad by the Brazilian population. The samples were purchased from three major supermarkets in the city of Sao Paulo. For each vegetable, six composite samples collected at different times during the year were analyzed individually. The green vegetables had lutein (7.7-56.1 [$\mu\text{g/g}$]), [β]-carotene (2.7-35.3 [$\mu\text{g/g}$]), violaxanthin (4.6-31.7 [$\mu\text{g/g}$]) and neoxanthin (3.1-20.5 [$\mu\text{g/g}$]) as principal carotenoids. Boston and curly lettuce also contained lactucaxanthin (7.5 and 6.7 [$\mu\text{g/g}$], respectively). Carrot had [α]-carotene (35.0 [$\mu\text{g/g}$]) and [β]-carotene (61.5 [$\mu\text{g/g}$]) as principal carotenoids and lutein (5.1 [$\mu\text{g/g}$]) as minor component. Tomato, a rich source of lycopene (35.4 [$\mu\text{g/g}$]), also contained lutein (1.0 [$\mu\text{g/g}$]) and [β]-carotene (3.2 [$\mu\text{g/g}$]) in much smaller amounts.

Keywords: Carotenoids; Leafy vegetables; Bell pepper; Carrot; Tomato

A. Perez-Galvez, M. Jaren-Galan, M.I. Minguez-Mosquera, Impact of the increased thermal processing on retinol equivalent values of paprika oleoresins, *Journal of Food Engineering*, Volume 71, Issue 4, December 2005, Pages 379-385, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.10.042.

(<http://www.sciencedirect.com/science/article/B6T8J-4F02M1Y-C/2/fdb0d2d0495985ca4274d6aa6fc43d2c>)

Abstract:

Processing of pepper fruits (*Capsicum annum* L.) to produce their oleoresins includes an extraction stage with organic solvent that extract the lipophilic content of raw material, and a desolventizing step that removes the organic solvent employed initially. This process subjects components of the product to a heating stress, what may generates degradation of the carotenoid fraction that provides this product its colouring capacity, and nutritional content. Food legislation tends to limit the use of organic solvents and diminish the residue limit levels allowed in the end product. Different paprika oleoresins were subjected to thermal degradation and evolution of the provitamin A carotenoids, [β]-carotene and [β]-cryptoxanthin was followed. Two reaction pathways were detected during thermal process: isomerization and degradation with different contributions to the provitamin A value of the sample. Increasing values of temperature applied to oleoresins (conditions that may be necessary to obtain an end-product with lower residue solvent levels) show that stability of carotenoids in paprika oleoresins, is good enough to suffer a prolonged heating process avoiding changes in the RE values.

Keywords: Carotenoids; Processing of paprika oleoresins; Provitamin A; Retinol equivalent; Temperature-time regime; Isomerization reactions

C. Perakis, V. Louli, K. Magoulas, Supercritical fluid extraction of black pepper oil, *Journal of Food Engineering*, Volume 71, Issue 4, December 2005, Pages 386-393, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.10.049.

(<http://www.sciencedirect.com/science/article/B6T8J-4F37M3D-1/2/e53a3e57eb452e3855cdd941cfcfb1fa>)

Abstract:

The supercritical fluid extraction (SFE) of oil from ground black pepper, using supercritical carbon dioxide (SC CO₂) as a solvent, is presented in this study. The effect of process parameters, namely pressure (90, 100, 150 bar) and temperature (40, 50 [degree sign]C) of extraction, and solvent flow rate (1.1, 2, 3 kg/h), on the extraction rate was examined in a series of experiments conducted in a bench scale apparatus. The results indicated a significant increase of extraction rate with increase of pressure or decrease of temperature. A similar effect was observed with the increase of solvent flow rate. The experimental data were satisfactorily correlated by two mass balance models. The first one is based on the Lack's plug flow model, which accounts for both the solubility and diffusion controlled regimes of the extraction, and the second one on the adsorption-desorption equilibrium of solute from solid tissue, the diffusion of the solute dissolved in the supercritical solvent to the surface and the mass transfer through the external film into the bulk.

Keywords: Supercritical fluid; Extraction; Black pepper oil; Process parameters; Mass transfer; Modelling

M.P. Ruiz Perez-Cacho, H. Galan-Soldevilla, F. Leon Crespo, G. Molina Recio, Determination of the sensory attributes of a Spanish dry-cured sausage, *Meat Science*, Volume 71, Issue 4, December 2005, Pages 620-633, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2005.05.005.

(<http://www.sciencedirect.com/science/article/B6T9G-4GKWJ7C-1/2/dcf9f909786250aaf74083df30ee6b6f>)

Abstract:

A lexicon for describing the sensory attributes of a Spanish dry-cured sausage (salchichon) was developed in order to characterise this product. A highly trained, descriptive sensory panel generated, defined, selected and referenced the main sensory characteristic of commercial salchichon elaborated from meat of white pig. This language was not only descriptive but also discriminative. Panellists initially produced a vocabulary of 108 terms that were later modified to 15 attributes: four for appearance (luminance, presence of crust, fat/lean connection and exudate); four for odour (black pepper, lactic acid, mould and other spices); two for texture (hardness and initial juiciness) and five for flavour (black pepper aroma, mould aroma, other spices aroma, acid taste and salty taste). The Kruskal-Wallis test showed that all attributes were significantly different between samples ($p < 0.001$). Three different groups of Salchichones were separated by principal component analyses: group I was characterised by strong other spices smell and aroma and higher juiciness than the other groups. Salchichones from group II had a high mould smell and aroma, a notable fat/lean connection and exhibited a great amount of exudate. Salchichones from group III were characterised by an acid and salty taste.

Keywords: Meat product; Sensory analysis; Sensory profile; Language; Vocabulary; PCA

Philip A. Stansly, Javier Calvo, Alberto Urbaneja, Release rates for control of *Bemisia tabaci* (Homoptera: Aleyrodidae) biotype 'Q' with *Eretmocerus mundus* (Hymenoptera: Aphelinidae) in greenhouse tomato and pepper, *Biological Control*, Volume 35, Issue 2, November 2005, Pages 124-133, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2005.07.004.

(<http://www.sciencedirect.com/science/article/B6WBP-4GY874G-4/2/86d7a187036136c9c7111c00e19d64ab>)

Abstract:

Tomato and sweet pepper are the principal crops grown in protected culture on the southern coast of Spain. Augmentative biological control based on the parasitoid *Eretmocerus mundus* Mercet

promises to be a useful component to manage *Bemisia tabaci*, the key pest of these and other horticultural crops. The present studies were undertaken with the objective of evaluating control obtained with different release rates under simulated commercial conditions. Experiments were conducted in an air-conditioned plastic greenhouse located on the southern Spanish coast during the two main horticultural cropping seasons of the region (fall-winter and spring). Host plant (tomato and sweet pepper) constituted the main plots and release rate of *E. mundus* (0, 1.5 and 6 m⁻²) the subplots in split plot design with four replicates. No other management practices were used against whitefly. Whitefly populations in fall reached over 80 nymphs/100 cm² leaf surface in pepper and twice this in tomato. Nevertheless, control using the high release rate in fall exceeded 90% in both crops, with no differences between rates in pepper, although the high rate was significantly better in tomato. Whitefly populations on pepper in spring reached densities five times greater than in fall, and yet control equalled or exceeded 95% with the high rate. Adult whiteflies on tomato were reduced by 92% in response to the high rate in spring, but nymphs were only reduced 69%. These experiments suggested that, although higher rates may be required in tomato to achieve the same level of control as in pepper, good suppression of *B. tabaci* could be achieved in both crops under most conditions using *E. mundus* without recourse to insecticides.

Keywords: Whitefly; Augmentative release; Biological control; Protected agriculture

Francesco Puoci, Carmelo Garreffa, Francesca Iemma, Rita Muzzalupo, Umile Gianfranco Spizzirri, Nevio Picci, Molecularly imprinted solid phase extraction for detection of sudan I in food matrices, *Food Chemistry*, Volume 93, Issue 2, November 2005, Pages 349-353, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.11.014.

(<http://www.sciencedirect.com/science/article/B6T6R-4F3NXWW-N/2/51afa65af28c7222256fecb2d436a584>)

Abstract:

Sudan I is a synthetic azoic dye employed as an additive in foods, and in particularly in those containing chilli powders, because of his intense red-orange colour. Now European Community does not allow 'Sudan I' as an additive in foods because of its demonstrated cancerogenity.

Several methods were developed to detect the presence of this compound (HPLC, GC/MS). However when 'Sudan I' is mixed just in traces in foods, very expensive instruments are necessary (LC/MS/MS) to reveal it.

This study describes the synthesis of a molecularly imprinted polymers (MIPs) for solid phase extraction (MISPE) using Sudan I as template. This procedure allows to concentrate this compound in order to make it detectable by HPLC. Furthermore we investigated the ability of these MISPE cartridges to absorb selectively Sudan I from food matrices. Considerable differences in the interaction with 'Sudan I' were observed when MIPs were used as stationary phase in SPE compared with the non imprinted polymers (NIPs).

Keywords: Molecularly imprinted polymer; Solid phase extraction; Sudan I; Red chilli peppers

Miguel Urrestarazu, Pilar Carolina Mazuela, Effect of slow-release oxygen supply by fertigation on horticultural crops under soilless culture, *Scientia Horticulturae*, Volume 106, Issue 4, 1 November 2005, Pages 484-490, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.05.010.

(<http://www.sciencedirect.com/science/article/B6TC3-4GKWJ6W-1/2/3cc4ec29c87d1f819b83b2a457b7ff6d>)

Abstract:

Oxygen deficiency has an immediate effect on both water and nutrient uptake, the yield of the whole plant under different soilless culture is affected. The oxygen level required for the respiration of the root system then becomes a limiting factor as much in soil culture as in soilless culture. The total area of soilless crops in SE Spain today is estimated to be about 5000 ha. The objective of this experiment was to study the effect of potassium peroxide as an oxygen generator on vegetable crops growing in commercial substrates and to determinate the supply fraction for its

use. Bioassay was used to determinate the fraction of potassium peroxide needed. Three greenhouse experiments were conducted in soilless culture with perlite and rockwool. Sweet pepper, melon and cucumber crop were supplied with potassium peroxide through fertigation to increase the oxygen content for one day per week. There were treatments: one with (T1) and the other without potassium peroxide (T0) in the nutrient solution. Fertigation parameters, yield and its quality were measured. Bioassay suggested that one gram per litre is the best fraction to use in soilless culture. Yield of sweet pepper was about 20% higher for T1 than T0 and 15% for melon; there was no significant difference in cucumber plants.

Keywords: Soilless culture; Hydroponics; Root oxygen deficiency; Oxygen; Melon; Cucumber; Sweet pepper

Jinsuk J. Lee, Kevin M. Crosby, Leonard M. Pike, Kil Sun Yoo, Daniel I. Leskovar, Impact of genetic and environmental variation on development of flavonoids and carotenoids in pepper (*Capsicum* spp.), *Scientia Horticulturae*, Volume 106, Issue 3, 3 October 2005, Pages 341-352, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.04.008.

(<http://www.sciencedirect.com/science/article/B6TC3-4GCWYPC-1/2/7049453f64fcdd962ba7aab1aa5cc5a0>)

Abstract:

Peppers (*Capsicum* spp.) were grown for phytochemical analyses at three different locations including a greenhouse at College Station and field plots at Uvalde and Weslaco, Texas. Cultivar effects were significant at each location for all compounds. The best sources of [beta]-carotene were mature greenhouse-grown fruit of Fidel (23.7 [mu]g/g) and C 127 (22.3 [mu]g/g). Mature greenhouse fruit of Tropic Bell (10.1 [mu]g/g) and PI 357509 (9.2 [mu]g/g) had high lutein, but Uvalde field-grown mature fruit of these lines were low in this compound, (1.4 and 0.5 [mu]g/g, respectively). MJ 201 fruit had the highest zeaxanthin levels (10 [mu]g/g) at both College Station and Uvalde. The best sources of quercetin over all locations were the yellow wax types, Banana Supreme (186 [mu]g/g), PI 357509 (86 [mu]g/g) and Rio Grande Gold (26 [mu]g/g). Fidel (37 [mu]g/g) and Banana Supreme (21.5 [mu]g/g) were the best sources of luteolin. Immature fruit generally contained lower levels of lutein and zeaxanthin than mature, colored fruit. These differences were not always statistically significant. Greenhouse-grown peppers at College Station contained more carotenoids than the field-grown peppers in Uvalde and Weslaco, but there were no significant differences among locations for flavonoid concentrations. Several good candidate parents were identified for the breeding program to develop novel pepper varieties with increased health benefits. Families of these varieties are currently being examined to assess the impact of specific environmental factors and identify genes involved in regulating synthesis of these beneficial phytochemicals.

Keywords: [beta]-Carotene; *Capsicum*; Lutein; Luteolin; Quercetin; Zeaxanthin

James P. Gilreath, Bielinski M. Santos, Timothy N. Motis, Joseph W. Noling, John M. Mirusso, Methyl bromide alternatives for nematode and *Cyperus* control in bell pepper (*Capsicum annuum*), *Crop Protection*, Volume 24, Issue 10, October 2005, Pages 903-908, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.01.016.

(<http://www.sciencedirect.com/science/article/B6T5T-4FNW4CY-3/2/cde1691d4793feef46c79b4651183af5>)

Abstract:

Three field trials were conducted to determine the efficacy of fumigant and herbicide combinations on nematode and *Cyperus* control in bell pepper (*Capsicum annuum* L.). Various in-bed, broadcast and drip-applied fumigants were combined with napropamide, trifluralin, and a non-herbicide treated control. Results indicated that during all the three bell pepper seasons, metham sodium plus chloropicrin (MNa+Pic), and both the gas and emulsifiable formulations of 1,3-dichloropropene (1,3-D) plus Pic provided equal or better *Meloidogyne* control than methyl

bromide (MBr) plus Pic. For *Heterodera* and *Belonolaimus* control, MNa+Pic and both formulations of 1,3-D+Pic were equally effective as MBr+Pic during the three bell pepper trials. For *Cyperus* control, the herbicides failed to improve weed control. For the fumigants, MBr+Pic consistently controlled the weed better than the others. However, most of the MBr alternatives reduced *Cyperus* populations with respect to the non-fumigant control. For bell pepper yield, the application of MNa and MNa+Pic provided similar fruit weight as for MBr+Pic in two of the three seasons.

Keywords: 1,3-dichloropropene; Chloropicrin; Metham sodium; Napropamide; Trifluralin

Li Ni, Daniel Lin, Diane M. Barrett, Pectin methylesterase catalyzed firming effects on low temperature blanched vegetables, *Journal of Food Engineering*, Volume 70, Issue 4, October 2005, Pages 546-556, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.10.009.

(<http://www.sciencedirect.com/science/article/B6T8J-4F29HSR-1/2/095e5be07cbf764d4d10495f38c70281>)

Abstract:

The effect of low temperature blanching on firmness of eight vegetables was studied. Preheating vegetables at low temperatures prior to a conventional blanch resulted in firmer products. Temperature and time had significant effects on texture, with temperature the most influential. Under optimal conditions, firmness improvements in preheated vegetables as compared to blanched controls were: Bok choy--3.0 x (65 [degree sign]C, 45 min); Chinese cabbage--1.8 x (55 [degree sign]C, 45 min); cabbage--1.6 x (65 [degree sign]C, 15 min); green bell peppers--1.36 x (70 [degree sign]C, 15 min); sugar snap peas--1.7 x (65 [degree sign]C, 30 min); carrots--2.1 x (60 [degree sign]C, 15 min) and broccoli--2.9 x (60 [degree sign]C, 15 min). Thermal stability and optimal temperature for pectin methylesterase in homogenates from these vegetables were also analyzed. The relationship between optimum preheating conditions for textural integrity and pectin methylesterase activity is discussed.

Keywords: Blanching, Texture; Pectin methylesterase; Bok choy; Cabbage; Bell peppers; Sugar snap peas; Broccoli; Carrot

Yoav Bashan, Luz E. de-Bashan, Fresh-weight measurements of roots provide inaccurate estimates of the effects of plant growth-promoting bacteria on root growth: a critical examination, *Soil Biology and Biochemistry*, Volume 37, Issue 10, October 2005, Pages 1795-1804, ISSN 0038-0717, DOI: 10.1016/j.soilbio.2005.02.013.

(<http://www.sciencedirect.com/science/article/B6TC7-4FR3HSB-3/2/f9b8fffd659507c56d714ea3c0c843e5>)

Abstract:

Four strains of plant growth-promoting bacteria (PGPB), including three strains of *Azospirillum* and *Pseudomonas fluorescens* 313 were used to inoculate seeds of wheat, tomato, pepper, and cotton. Inoculated seedlings were grown to the two or three-leaf stage. After harvest, seven different environmental and technical conditions were evaluated to determine the effect of these conditions on the reproducibility of fresh and dry root weight measurements. Dry root weight of each sample showed no significant variations (smaller than 1%), despite the variations in measurement conditions. Root fresh weights varied greatly (usually in the range of 4-10%, but up to 18%), and were significantly affected ($P \leq 0.05$) by air temperature and relative humidity, air currents, different light intensities during extraction of plants from the substrate, duration of the extraction from soil (depending on the size of the experiment and type of plant growth substrate), and the type of absorbing paper used to blot excess water from harvested roots. Measurements by different technicians did not influence fresh or dry weight values. We conclude that fresh weight determinations are altered by factors independent of the intended experimental variables and should not be used to evaluate the effect of PGPB on plants.

Keywords: Erroneous methodology; Plant dry weight; Plant growth-promoting bacteria; PGPR; Rhizobacteria

Reed L. Wadley, Ole Mertz, Pepper in a time of crisis: Smallholder buffering strategies in Sarawak, Malaysia and West Kalimantan, Indonesia, *Agricultural Systems*, Volume 85, Issue 3, Local Land Use Strategies in a Globalizing World: Subsistence Farming, Cash Crops and Income Diversification, September 2005, Pages 289-305, ISSN 0308-521X, DOI: 10.1016/j.agsy.2005.06.012.

(<http://www.sciencedirect.com/science/article/B6T3W-4GP1VS3-1/2/8d3f0fa9bb324d1eac0119c795dade4f>)

Abstract:

A past study in Sarawak, Malaysia (Cramb, R.A., 1993. Shifting cultivation and sustainable agriculture in East Malaysia: a longitudinal case study. *Agricultural Systems* 42, 209-226) found among smallholder farmers a mutual buffer effect between price fluctuations in cash crops (black pepper, *Piper nigrum* L. and pararubber, *Hevea brasiliensis* M.-Arg.) and swidden or shifting cultivation of hill rice. The recent rise in international prices for black pepper provides an opportunity to test the generality of Cramb's original findings. For about three years beginning in 1997 and concomitant with the Asian economic crisis, smallholders throughout Southeast Asia responded to the price rises by investing more labour into existing pepper gardens, as well as planting new gardens. Here, we compare the response of Iban pepper smallholders to this situation on either side of the international border separating Sarawak, Malaysia and West Kalimantan, Indonesia, with special attention to Cramb's findings. The mutual buffering capacity of hill rice cultivation and pepper/rubber farming described by Cramb is less evident in the study communities. The primary reasons that may account for the lack of fit revolve around the extent of pepper cultivation, availability of credit or subsidy, competition with labour in hill swiddens, and presence of nearby alternatives to earn cash.

Keywords: Pepper cultivation; Swidden cultivation; Smallholder strategies; Malaysia; Indonesia

P.A. Stansly, F.J. Calvo, A. Urbaneja, Augmentative biological control of *Bemisia tabaci* biotype 'Q' in Spanish greenhouse pepper production using *Eretmocerus* spp., *Crop Protection*, Volume 24, Issue 9, September 2005, Pages 829-835, ISSN 0261-2194, DOI: 10.1016/j.cropro.2005.01.010.

(<http://www.sciencedirect.com/science/article/B6T5T-4FPJ9M5-1/2/3605a22a59039e51211ffd0e6bc4c5be>)

Abstract:

Eretmocerus mundus Mercet is indigenous to the Mediterranean basin and the most abundant parasitoid attacking *Bemisia tabaci* Gennadius on the southern coast of Spain. However, *E. mundus* was not available commercially until 2002 and the North American *Eretmocerus eremicus* Rose and Zolnerowich had been used instead to control whiteflies in greenhouse vegetables, including sweet pepper in Campo de Cartagena (Murcia). The ability of these two *Eretmocerus* species to control *B. tabaci* on pepper by augmentation was compared with weekly releases of *E. mundus* and *E. eremicus*, alone, and in 1:1 combination (three treatments) initiated early in the winter crop cycle in 12 commercial greenhouses. *E. mundus* rapidly displaced *E. eremicus* in greenhouses where both were released, and eventually, even where only *E. eremicus* was released, indicating that a significant portion of the *E. mundus* population entered the greenhouses from outside. Nevertheless, parasitism rates were greater in greenhouses where *E. mundus* was released, especially early in the trial. Whitefly populations were lower compared to where *E. eremicus* was released alone, presumably in response to parasitism. Thus, higher incidence of parasitism and superior control of *B. tabaci* with *E. mundus* confirmed the value of early season augmentation with this parasitoid as opposed to *E. eremicus* under conditions of this test.

Keywords: *Bemisia*; *Eretmocerus*; Biological control; Protected horticulture; Spain

Motoko Ueeda, Masaharu Kubota, Kazufumi Nishi, Contribution of jasmonic acid to resistance against *Phytophthora* blight in *Capsicum annuum* cv. SCM334, *Physiological and Molecular Plant*

Pathology, Volume 67, Issues 3-5, September 2005-October 2006, Pages 149-154, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2005.12.002.

(<http://www.sciencedirect.com/science/article/B6WPC-4J8CY2H-1/2/f34c55630bedfa2206c37af932cb8b62>)

Abstract:

Defense responses were investigated in the leaves of a cultivar of pepper, *Capsicum annuum* (cv. SCM334) resistant to *Phytophthora* blight. Jasmonic acid (JA) increased in the resistant cultivar immediately after inoculation with the pathogen, *Phytophthora capsici*, but as the levels of JA later decreased, levels of salicylic acid (SA) increased and were subsequently accompanied by hypersensitive response (HR)-mediated cell death in SCM334. Simultaneously, expression patterns of JA- and HR-related genes were analyzed. The mRNA of catalase and peroxidase (suppressing HR generation) disappeared, while the mRNA of OPR3 (encoding JA synthesis reductase) was detected in SCM334 specifically. JA-mediated defense appears to be crucial in the resistance of pepper plants against *P. capsici*.

Keywords: *Capsicum annuum* cv. SCM334; *Phytophthora capsici*; Disease resistance; Hypersensitive response; Jasmonic acid; Salicylic acid

I.H. Lycoskoufis, D. Savvas, G. Mavrogianopoulos, Growth, gas exchange, and nutrient status in pepper (*Capsicum annuum* L.) grown in recirculating nutrient solution as affected by salinity imposed to half of the root system, *Scientia Horticulturae*, Volume 106, Issue 2, 1 September 2005, Pages 147-161, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.02.022.

(<http://www.sciencedirect.com/science/article/B6TC3-4FWV2PN-1/2/bef188fa2287358494b926729303aff9>)

Abstract:

Pepper plants grown in recirculating nutrient solution were exposed to NaCl-salinity (60 mM NaCl, 8 dS m⁻¹) imposed either to the entire or to half of the root system and compared to plants supplied with a standard nutrient solution (1.9 dS m⁻¹). The saline solution was obtained by adding NaCl to the standard nutrient solution. In the split-root treatment, the root compartment not exposed to salinity was supplied with raw water (0.38 dS m⁻¹). Both the stem and the root dry weights were markedly restricted by salinity, irrespective of salinizing half or the entire root system. In the split-root treatment, the dry weight of the root compartment receiving raw water did not differ significantly from that exposed to salinity. The net photosynthesis and the leaf chlorophyll content were restricted by both salinity treatments, but the decrease was more marked when the entire root system was exposed to salinity. In contrast, the stomatal conductance and the transpiration rate were equally reduced, regardless of salinizing the entire or part of the root system. The leaf Na and Cl concentrations were raised by the NaCl-salinity, but only in one sampling date the increase was significantly higher when the entire root zone was exposed to salinity, as compared with salinization of half of the root system. Salinity reduced significantly the leaf K, Ca, and Mg uptake but not to levels that could cause nutrient deficiencies. These results indicate that pepper is susceptible to high salinity, predominantly due to reduced stomatal conductance. However, after long-term exposure to salinity the growth may be suppressed due also to inhibition of photosynthesis at chloroplast level. The adverse effects of high NaCl-salinity are hardly mitigated when only a part of the root system is salinized, which indicates that the response is governed by root exposure to high NaCl concentrations and not by inefficiency of the roots to take up water.

Keywords: Salinity; Photosynthetic response; Stomatal conductance; Hydroponics; Soilless culture; Split-root; Pepper

Momoko Asano, Rena Satoh, Atsuko Mochizuki, Shinya Tsuda, Takuya Yamanaka, Masamichi Nishiguchi, Katsuyuki Hirai, Tetsuo Meshi, Satoshi Naito, Masayuki Ishikawa, Tobamovirus-resistant tobacco generated by RNA interference directed against host genes, *FEBS Letters*,

Volume 579, Issue 20, 15 August 2005, Pages 4479-4484, ISSN 0014-5793, DOI: 10.1016/j.febslet.2005.07.021.

(<http://www.sciencedirect.com/science/article/B6T36-4GR32V0-D/2/dec9c2fe87012a576f213dc7b1f98fcf>)

Abstract:

Two homologous *Nicotiana tabacum* genes NtTOM1 and NtTOM3 have been identified. These genes encode polypeptides with amino acid sequence similarity to *Arabidopsis thaliana* TOM1 and TOM3, which function in parallel to support tobamovirus multiplication. Simultaneous RNA interference against NtTOM1 and NtTOM3 in *N. tabacum* resulted in nearly complete inhibition of the multiplication of Tomato mosaic virus and other tobamoviruses, but did not affect plant growth or the ability of Cucumber mosaic virus to multiply. As TOM1 and TOM3 homologues are present in a variety of plant species, their inhibition via RNA interference should constitute a useful method for generating tobamovirus-resistant plants.

Keywords: Tobamovirus; Resistance; TOM1; RNA interference; *Nicotiana tabacum*; *Arabidopsis thaliana*

Sara San-Francisco, Fabrice Houdusse, Angel M Zamarreno, Maria Garnica, Esther Casanova, Jose M Garcia-Mina, Effects of IAA and IAA precursors on the development, mineral nutrition, IAA content and free polyamine content of pepper plants cultivated in hydroponic conditions, *Scientia Horticulturae*, Volume 106, Issue 1, 3 August 2005, Pages 38-52, ISSN 0304-4238, DOI: 10.1016/j.scienta.2005.03.006.

(<http://www.sciencedirect.com/science/article/B6TC3-4FV3625-1/2/62e13d2c10dafb6c49eafc1dbacd250e>)

Abstract:

The effect of IAA and two IAA precursors, l-tryptophan (Trp) and indole (Ind), on the growth, mineral nutrition and potential development under stress conditions of intact pepper plants cultivated in hydroponic conditions, has been studied.

To this end, the growth of both shoots and roots, the plant content of both IAA and free polyamines and the content in leaves and roots of macronutrients and micronutrients have been evaluated.

Both Trp and Ind presented a similar pattern of action to that of IAA regarding both plant development and mineral uptake. The application of Ind and Trp at the highest dose (10⁻³ M) was associated with significant increases of IAA content in roots. The application of IAA and IAA precursors was associated with an increase in Spermine and a decrease in Putrescine in leaves, thus suggesting the conversion of Putrescine into Spermidine and Spermine, which in turn could be associated with better plant development under stress.

Both Trp and Ind showed auxin-like effects likely due to their conversion into IAA within the plant. However, further studies carried out under axenic conditions are needed in order to clarify this question.

Keywords: IAA; Tryptophan; Indole; Free polyamines; Plant growth; Mineral nutrition; Pepper; Hydroponics

Ken Pernezny, Richard N. Raid, Nikol Havranek, Jairo Sanchez, Toxicity of mixed-oxidant electrolyzed oxidizing water to in vitro and leaf surface populations of vegetable bacterial pathogens and control of bacterial diseases in the greenhouse, *Crop Protection*, Volume 24, Issue 8, August 2005, Pages 748-755, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.12.011.

(<http://www.sciencedirect.com/science/article/B6T5T-4FM5CSM-1/2/ee3304899af6038b4254dd14cb00ed22>)

Abstract:

Mixed-oxidant (MO) electrolyzed oxidizing (EO) water was generated by electrolysis of a 1.7% KCl (aq. w/v) brine solution. The MO EO water was a powerful bactericide in vitro at a dosage of mixed oxidants equivalent to 50 mg L⁻¹ free available chlorine. Populations of *Xanthomonas campestris*

pv. vitians, *Pseudomonas syringae* pv. coriandricola, and *Erwinia carotovora* subsp. *carotovora* were reduced from log 9 to log 10 CFU mL⁻¹ to undetectable levels after 1 min exposure. Only *E. carotovora* subsp. *carotovora* was sensitive to a 5 mg L⁻¹ dose of MO EO water. In greenhouse disease control experiments, 50 or 100 mg L⁻¹ MO EO water failed to control bacterial leaf spot of lettuce, bacterial spot of tomato and pepper, or bacterial leaf spot of radish. A spray application of a copper hydroxide/mancozeb suspension was effective for control of bacterial leaf spot of lettuce and bacterial spot of tomato and pepper, reducing foliar disease levels up to 45%. Some phytotoxicity was observed at the 100 mg L⁻¹ MO EO water dose. The lack of disease control on greenhouse plants with MO EO water may in large part be due to low mortality of the pathogen on leaf surfaces. In five of six experiments, no significant reductions in leaf surface populations were found for 50 mg L⁻¹ MO EO water. In contrast, copper/mancozeb treatments reduced pathogen leaf surface populations by up to 5 log units when copper-sensitive strains were involved.

Keywords: Electrolyzed oxidizing water; *Xanthomonas*; *Pseudomonas*; *Erwinia*; Lettuce; Tomato; Pepper

Huseyin Bozkurt, Osman Erkmen, Effects of salt, starter culture and production techniques on the quality of hot pepper paste, *Journal of Food Engineering*, Volume 69, Issue 4, August 2005, Pages 473-479, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.08.041.

(<http://www.sciencedirect.com/science/article/B6T8J-4DTM08J-1/2/5914aa18fb5147d8c24b9fd2151b3b4a>)

Abstract:

Hot pepper pastes were produced by various starter cultures (*Saccharomyces* spp., *Streptomyces griseus*), production techniques (traditional and vacuum), and with or without salt addition. They were stored at 37 [degree sign]C for 46 days. The pH values, acidity, brown pigment formation, aerobic plate count (APC), and mould and yeast counts were determined during the storage periods. The acidity and pH values of hot pepper pastes produced by the traditional technique did not change ($P > 0.05$) during the storage periods. The pH values of hot pepper pastes produced by the vacuum technique decreased ($P < 0.05$) during the first days of the storage period after which increasing pH values ($P < 0.05$) were observed. The pH values of hot pepper pastes produced by the traditional technique were lower ($P < 0.05$) than the paste produced by the vacuum technique. Brown pigment formation in pastes produced by vacuum and traditional techniques were found to be in the range of 0.78-1.58 optical density (OD) and 7.51-9.52 OD, respectively. Addition of salt into pastes produced by the vacuum technique decreased ($P < 0.05$) the brown pigment formation. The starter culture had no any effect ($P > 0.05$) on the brown pigment formation in pastes produced by both traditional and vacuum techniques. Traditionally produced hot pepper had a higher ($P < 0.05$) number of APC than the other two production techniques. Mold and yeast counts of hot pepper pastes decreased ($P < 0.05$) sharply during the storage periods. Addition of both 5% salt and starter culture had no significant effect ($P > 0.05$) on the mold and yeast counts of hot pepper pastes. Also, the production technique did not change ($P > 0.05$) the mold and yeast counts of hot pepper pastes.

Keywords: Hot pepper paste; Browning reaction; Aerobic plate count

Norman Q. Arancon, Clive A. Edwards, Peter Bierman, James D. Metzger, Chad Lucht, Effects of vermicomposts produced from cattle manure, food waste and paper waste on the growth and yield of peppers in the field, *Pedobiologia*, Volume 49, Issue 4, 1 August 2005, Pages 297-306, ISSN 0031-4056, DOI: 10.1016/j.pedobi.2005.02.001.

(<http://www.sciencedirect.com/science/article/B7CW5-4G7DYB1-1/2/9046e91ccd89bd86ba43bf6c73e4ac3a>)

Abstract: Summary

Commercially processed vermicomposts, produced from food wastes, paper wastes and cattle manure, were applied to 8.25 m² field plots, at rates of 10 or 20 t/ha in 1999 and 5 or 10 t/ha in

2000, to evaluate their effects on the growth and yields of peppers (*Capsicum annuum*) var. King Arthur. The vermicomposts were incorporated into the upper 10 cm of soil and supplemented, based on chemical analyses, with amounts of inorganic NPK fertilizers calculated to equalize initially with the rates of 95-95 NK kg/ha applied to the inorganic fertilizer control plots. Phosphorus was determined to be adequate in soils at the experiment site so was not added. All treatments were replicated four times in a randomized complete block design. The vermicompost applications increased the growth and yields of peppers significantly; including increased leaf areas, plant shoot biomass, marketable fruit weights and decreased yields of non-marketable fruit. Application of vermicomposts to soils increased their microbial biomass and dehydrogenase activity. Humic materials and other plant growth-influencing substances, such as plant growth hormones, produced by microorganisms during vermicomposting, and produced after increased microbial biomass and activity in soils, may have been responsible for the increased pepper growth and yields, independent of nutrient availability.

Keywords: Peppers; Vermicomposts; Dehydrogenase activity; Microbial biomass; Humic acids; Plant growth regulators

Michael Bock, Panteleimon Xofis, Jonathan Mitchley, Godela Rossner, Michael Wissen, Object-oriented methods for habitat mapping at multiple scales - Case studies from Northern Germany and Wye Downs, UK, *Journal for Nature Conservation*, Volume 13, Issues 2-3, 15 July 2005, Pages 75-89, ISSN 1617-1381, DOI: 10.1016/j.jnc.2004.12.002. (<http://www.sciencedirect.com/science/article/B7GJ6-4G82Y3G-4/2/fdd85984bd5464032f74569ef53ef475>)

Abstract: Summary

This paper presents an application of object-oriented techniques for habitat classification based on remotely sensed images and ancillary data. The study reports the results of habitat mapping at multiple scales using Earth Observation (EO) data at various spatial resolutions and multi temporal acquisition dates. We investigate the role of object texture and context in classification as well as the value of integrating knowledge from ancillary data sources. Habitat maps were produced at regional and local scales in two case studies; Schleswig-Holstein, Germany and Wye Downs, United Kingdom. At the regional scale, the main task was the development of a consistent object-oriented classification scheme that is transferable to satellite images for other years. This is demonstrated for a time series of Landsat TM/ETM+ scenes. At the local scale, investigations focus on the development of appropriate object-oriented rule networks for the detailed mapping of habitats, e.g. dry grasslands and wetlands using very high resolution satellite and airborne scanner images. The results are evaluated using statistical accuracy assessment and visual comparison with traditional field-based habitat maps. Whereas the application of traditional pixel-based classification result in a pixelised (salt and pepper) representation of land cover, the object-based classification technique result in solid habitat objects allowing easy integration into a vector-GIS for further analysis. The level of detail obtained at the local scale is comparable to that achieved by visual interpretation of aerial photographs or field-based mapping and also retains spatially explicit, fine scale information such as scrub encroachment or ecotone patterns within habitats.

Keywords: Object based; HRSC; Quickbird; Landsat; Natura 2000; FFH; Land cover; Remote sensing

Norman Q. Arancon, Paola A. Galvis, Clive A. Edwards, Suppression of insect pest populations and damage to plants by vermicomposts, *Bioresource Technology*, Volume 96, Issue 10, July 2005, Pages 1137-1142, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.10.004.

(<http://www.sciencedirect.com/science/article/B6V24-4F05RCV-1/2/aa06f6aec2e9f715a4f8c1ceb0506b43>)

Abstract:

The effects of commercial vermicomposts, produced from food waste, on infestations and damage by aphids, mealy bugs and cabbage white caterpillars were studied in the greenhouse. Vermicomposts were used at substitution rates into a soil-less plant growth medium, MetroMix 360 (MM360), at rates of 100% MM360 and 0% vermicompost, 80% MM360 and 20% vermicompost, and 60% MM360 and 40% vermicompost to grow peppers (*Capsicum annuum* L.), tomatoes (*Lycopersicon esculentum* Mill.) and cabbages (*Brassica oleracea* L.), in pots. Groups of 10 pots containing young plants were distributed randomly in nylon mesh cages (40 cm x 40 cm x 40 cm). Groups of 10 pepper seedlings in a single cage were infested with either 100 aphids (*Myzus persicae* Sulz.) or 50 mealy bugs (*Pseudococcus* spp.) per cage. Similar groups of tomato seedlings were infested with 50 mealy bugs per cage. Groups of four cabbage seedlings in pots in cages were infested with 16 cabbage white caterpillars (*Pieris brassicae* L.). Populations of aphids and mealy bugs were counted after 20 days and the shoot dry weights of peppers, tomatoes and cabbages were measured at harvest. Numbers of cabbage white caterpillars and loss in shoot weights were measured after 15 days. The substitution rates of 20% and 40% vermicomposts suppressed populations of both aphids and mealy bugs on peppers, and mealy bugs on tomatoes, significantly. Substitutions with vermicomposts into MM360 decreased losses of dry weights of peppers, in response to both aphid and mealy bug infestations, decreased losses in shoot dry weights of tomatoes after mealy bug infestations significantly. There were significantly decreased losses in leaf areas of cabbage seedlings in response to the cabbage white caterpillar infestations. Keywords: Vermicompost; Aphids; Mealy bugs; Cabbage white; Caterpillars; Tomatoes; Peppers; Cabbage; Pest suppression

R. Troncoso, C. Espinoza, A. Sanchez-Estrada, M.E. Tiznado, Hugo S. Garcia, Analysis of the isothiocyanates present in cabbage leaves extract and their potential application to control *Alternaria* rot in bell peppers, *Food Research International*, Volume 38, Issue 6, July 2005, Pages 701-708, ISSN 0963-9969, DOI: 10.1016/j.foodres.2005.02.004.
(<http://www.sciencedirect.com/science/article/B6T6V-4FSNXMW-1/2/dc0085db949e72da691739a485919eac>)

Abstract:

The potential use of cabbage isothiocyanates to control *Alternaria* rot in bell pepper was tested. Solid phase microextraction and gas chromatography-mass spectrometry found allyl, benzyl, 2-phenylethyl and phenyl isothiocyanates in a ratio of 1:3.5:5.3:9.6, respectively, in cabbage leaves. The same proportion was used to prepare an isothiocyanate mixture from reagent grade isothiocyanates (MCIT) to test the effect on *Alternaria alternata* growth in vitro. Application of 0.28 and 0.56 mg/ml of MITC, with or without packing in low density polyethylene bags (LDPE), were also tested on bell pepper fruit inoculated with *A. alternata*, using a commercial fungicide as positive control. A concentration of 0.03 mg/ml of MITC inhibited 100% *Alternaria* growth in vitro. A treatment with 0.56 mg/ml of MCIT with LDPE bags performed better than the commercial fungicide to control fungi rot on bell pepper with no adverse effects on fruit quality. MCIT combined with LDPE bag showed potential to control *Alternaria* rot on bell pepper.

Keywords: Isothiocyanates; Natural fungicide; Fungal disease; Postharvest quality; Bell pepper

Sujon Sarowar, Eui Nam Kim, Young Jin Kim, Sung Han Ok, Ki Deok Kim, Byung Kook Hwang, Jeong Sheop Shin, Overexpression of a pepper ascorbate peroxidase-like 1 gene in tobacco plants enhances tolerance to oxidative stress and pathogens, *Plant Science*, Volume 169, Issue 1, July 2005, Pages 55-63, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.02.025.
(<http://www.sciencedirect.com/science/article/B6TBH-4FS8936-2/2/e9087fd9015ef4afbe33ba62da8b040b>)

Abstract:

In order to determine the role of ascorbate peroxidase, an antioxidant enzyme, in the cellular responses to oxidative stress and pathogens, transgenic tobacco plants were generated, using the

Capsicum annuum ascorbate peroxidase-like 1 gene (CAPOA1), under the control of the CaMV 35S promoter. High levels of CAPOA1 gene expression were observed in the transgenic plants, with a 2-fold increase in total peroxidase activity. The constitutive expression of CAPOA1 in the tobacco exhibited no morphological abnormalities, while significantly increased growth was observed in transgenic plants, as compared to control plants. The CAPOA1-overexpressed plants exhibited increased tolerance to methyl viologen-mediated oxidative stress, and also enhanced resistance to the oomycete pathogen, *Phytophthora nicotianae*. However, the transgenic plants were not found to be resistant to the bacterial pathogen, *Pseudomonas syringae* pv. *tabaci*, but were weakly resistant to *Ralstonia solanacearum*. Our results suggested that the overproduction of ascorbate peroxidase increased peroxidase activity that enhances active oxygen scavenging system, leading to oxidative stress tolerance and oomycete pathogen resistance.

Keywords: Ascorbate peroxidase; Reactive oxygen species; Oxidative stress tolerance; Disease resistance; Transgenic tobacco plants

Marie-Luce Schantz, Elisabeth Jamet, Anne-Elisabeth Guitton, Rudy Schantz, Guy Houlne, Functional analysis of the bell pepper KNOLLE gene (*cakn*) promoter region in tobacco plants and in synchronized BY2 cells, *Plant Science*, Volume 169, Issue 1, July 2005, Pages 155-163, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.03.018.

(<http://www.sciencedirect.com/science/article/B6TBH-4FSX49W-2/2/ede0959ba671e17bb14a5f5c8e318fbf>)

Abstract:

Cytokinesis in higher plants, the final stage of cell division, is accomplished by the formation of the cell plate, a unique cytokinetic membranous organelle that is assembled across the inside of the dividing cell. There is evidence for a major role played by secretory vesicle trafficking and fusion in this process and the KNOLLE protein, specifically involved in vesicle fusion during the building of the cell plate, is one of the best-characterized component. Previously we had determined the expression of the bell pepper KNOLLE gene (*cakn*) in dividing tissues. In the present study, we demonstrate that 1372 bp of its promoter region are able to drive the expression of the GUS (beta-glucuronidase) reporter gene in tobacco tissues containing highly dividing cells. In synchronized tobacco BY2 cells, a 261 bp fragment of the promoter confers a G2 and M-phase-specific expression on the GUS reporter gene. This DNA fragment contains two Myb-like cis-elements identical to the MSA elements characterized in B-type cyclin promoters. Our results suggest the existence of equivalent regulation mechanisms for a gene encoding a protein involved in the building of the cell plate, KNOLLE, and genes coding for proteins associated with the regulation of the cell cycle such as cyclins.

Keywords: Cell cycle; G2/M; GUS; MSA-like element; Transcription; KNOLLE

Robert D. Hagenmaier, A comparison of ethane, ethylene and CO₂ peel permeance for fruit with different coatings, *Postharvest Biology and Technology*, Volume 37, Issue 1, July 2005, Pages 56-64, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2005.02.012.

(<http://www.sciencedirect.com/science/article/B6TBJ-4GDSDWD-1/2/2ad4f99637f4ad1f853ad677288468dd>)

Abstract:

Oranges, bell peppers and apples were treated with different coatings, and measurements were made of gas permeance through the peel. Shellac and wood resin coatings reduced ethane permeance of orange and apple peels by approximately 95% from the values for non-coated peel, and carnauba wax coatings gave about 85% reduction. The experimental procedure enabled us to make multiple measurements on the individual fruit CO₂ and ethylene production, internal gas concentrations and permeance. These measurements showed that some individual fruit were atypical in terms of CO₂ and ethylene production or permeance. Application of coatings resulted in some fruit having markedly high values of internal CO₂ and low O₂. High-barrier coatings not only

caused large decreases in internal O₂ and increases in CO₂; but these also resulted in much larger variation in internal gas concentrations in different individual fruit with the same coating, much larger than the variation between different individual non-coated fruit. Because fruit quality is much dependent on internal gas concentrations, this means that high-barrier coatings result in fruit with higher variation in product quality.

Keywords: Candelilla wax; Respiration rate; Polyethylene wax

Ute Schweiggert, Klaus Mix, Andreas Schieber, Reinhold Carle, An innovative process for the production of spices through immediate thermal treatment of the plant material, *Innovative Food Science & Emerging Technologies*, Volume 6, Issue 2, June 2005, Pages 143-153, ISSN 1466-8564, DOI: 10.1016/j.ifset.2004.11.006.

([http://www.sciencedirect.com/science/article/B6W6D-4FR8PPD-](http://www.sciencedirect.com/science/article/B6W6D-4FR8PPD-1/2/8f5157f32bd46dbd3116e70dc62baaff)

[1/2/8f5157f32bd46dbd3116e70dc62baaff](http://www.sciencedirect.com/science/article/B6W6D-4FR8PPD-1/2/8f5157f32bd46dbd3116e70dc62baaff))

Abstract:

An innovative process for the production of spices was developed on pilot-plant scale. Immediately after harvest, fresh chili and green pepper (fruits), ginger (rhizomes), and coriander (whole plant) were blanched and subjected to coarse and fine grinding prior to lyophilization. Alternatively, thermal treatment was applied after processing the fresh plant material into a paste. Microbiological assays revealed low counts of aerobic germs, aerobic spore forming bacteria, *Escherichia coli*, coliforms, *Staphylococcus aureus*, *Bacillus cereus*, yeasts and moulds, and sulfite reducing clostridia. Salmonella as well as aflatoxins were not detected in any of the products. Because the spice powders obtained were generally characterized by improved color, in contrast to conventional spice processing, early inactivation of endogenous enzymes may have prevented degradation of plant pigments and browning. Industrial relevance

Spices are common sources for microbial contaminations with special concern in minimally processed products. Sterilization of spices has been shown to adversely affect product quality criteria and ionizing or UV radiation have been met with consumer resistance. Pasteurization/sterilization or blanching as thermal processes effective in reducing microbial loads and inactivating enzymes. However, loss of volatiles could not be prevented in the process presented and needs to be tackled prior to industrial scale use.

Keywords: Spices; Green pepper; Chili; Ginger; Coriander; Color; Volatile oils; Pungency; Microbial load

T.Y. Tunde-Akintunde, T.J. Afolabi, B.O. Akintunde, Influence of drying methods on drying of bell-pepper (*Capsicum annum*), *Journal of Food Engineering*, Volume 68, Issue 4, June 2005, Pages 439-442, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2004.06.021.

([http://www.sciencedirect.com/science/article/B6T8J-4DFBVJP-](http://www.sciencedirect.com/science/article/B6T8J-4DFBVJP-1/2/c675420a7989fd0117a2e045863acd49)

[1/2/c675420a7989fd0117a2e045863acd49](http://www.sciencedirect.com/science/article/B6T8J-4DFBVJP-1/2/c675420a7989fd0117a2e045863acd49))

Abstract:

Drying of bell-pepper was carried out using sun solar and artificial air drying methods. The drying curves and rates obtained indicated that drying of bell-pepper was done in two drying rate periods, the constant drying rate period (mainly) and the falling drying rate period. The existence of the constant drying rate period was more pronounced in the artificial air-drying method than in the other two drying methods and the drying process was also faster. This was attributed to the effect of temperature of drying air on the diffusion of water from internal regions to the surface of the product.

Keywords: Bell-pepper; Drying method; Drying rate

Takeshi Shinogi, Yo Hamanishi, Yasunari Otsu, Yanqing Q. Wang, Teruo Nonomura, Yoshinori Matsuda, Hideyoshi Toyoda, Yoshihiro Narusaka, Yukio Tosa, Shigeyuki Mayama, Role of induced resistance in interactions of *Epilachna vigintioctopunctata* with host and non-host plant

species, *Plant Science*, Volume 168, Issue 6, June 2005, Pages 1477-1485, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2005.01.022.

(<http://www.sciencedirect.com/science/article/B6TBH-4FNDP49-1/2/804e15dbc6bc4d29fae963419a6b6a7e>)

Abstract:

The process of host/non-host determination was dissected in interactions of *Epilachna vigintioctopunctata*, a specialist herbivore of solanaceous plants, with various plant species. On host plants (tomato and egg plant) the ladybird beetle started feeding within 5 min. On red pepper, another solanaceous plant, it also started feeding within 5 min, but did not continue the feeding as vigorously as on tomato or eggplant. This result suggests that the ladybird beetle recognizes red pepper as a host plant but does not overcome its constitutive resistance. On Chinese cabbage, the ladybird beetle did not start feeding as quickly as on the host plants, but once started, it continued feeding as vigorously as on the host plants. This result suggests that the ladybird beetle does not recognize Chinese cabbage as a host plant but overcomes its constitutive resistance. Subsequently, the effect of induced resistance in a host (tomato) and non-hosts (Chinese cabbage and *Arabidopsis*) was evaluated. The treatment with methyl jasmonate (MeJA) showed no effects in tomato but decreased the damaged area in Chinese cabbage and *Arabidopsis*. A feeding test with *Arabidopsis* mutants supported the idea that induced resistance via the jasmonic acid (JA) pathway is effective against the ladybird beetle on the cruciferous plants. We suggest that a specialist herbivore has to overcome not only constitutive resistance but also induced resistance to utilize the non-host plant as a host, and that induced resistance is one of the factors that determine host specificity of the specialist.

Keywords: *Epilachna vigintioctopunctata*; Solanaceous plant; Host-specificity; Induced resistance

M.C. Vargas-Garcia, M.J. Lopez, F. Suarez, J. Moreno, Laboratory study of inocula production for composting processes, *Bioresource Technology*, Volume 96, Issue 7, May 2005, Pages 797-803, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.07.012.

(<http://www.sciencedirect.com/science/article/B6V24-4DF486D-4/2/df51c3c9a043b79fb917d8724366de4a>)

Abstract:

Six ligno-cellulolytic fungi were tested regarding to examine their capability to grow on agricultural wastes and produce inocula for composting. Two residues were used: pepper plant wastes and almond shell residues. Results showed the latter as the most adequate substrate for growth of fungi tested. On the contrary, *Trichoderma koningii*, as well as HLC1 and HLC3, both fungi isolated from almond shell wastes, were able to persist in pepper plant wastes. Modifications of aeration and pH significantly influenced growth of *Coriolus versicolor*, HLC1 and *Phanerochaete flavidobrunnea* and *P. flavidobrunnea* and *Phlebia radiata*, respectively, while *P. flavidobrunnea* was the only microorganism whose growth was not significantly altered by temperature. In competitive assays, where fungi were grown together with other species, growth of both microorganisms isolated from almond shell residues, HLC1 and HLC3, were stimulated while *T. koningii* showed the better results in sterile conditions.

Keywords: Ligno-cellulolytic fungi; Agricultural wastes; Composting

Pavel Kalac, Martin Krizek, Tamara Pelikanova, Marketa Langova, Ondrej Veskrna, Contents of polyamines in selected foods, *Food Chemistry*, Volume 90, Issue 4, May 2005, Pages 561-564, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.05.019.

(<http://www.sciencedirect.com/science/article/B6T6R-4CPVMKP-2/2/0cc3edd136e326af1e13815e04a21b0f>)

Abstract:

Dietary polyamines, putrescine, spermidine and spermine, participate in many biochemical processes, mainly in cell proliferation and differentiation. Polyamines were determined as N-

benzamides by micellar electrokinetic capillary chromatography in 153 samples of 21 foods, mostly culinary processed. Very low putrescine contents were observed in processed meats, pork liver and kidney, while the highest mean contents exceeded 55 mg kg⁻¹ in stewed green pea, grapefruit and fresh green pepper. Higher spermine than spermidine contents were typical for foods of animal origin, while the opposite was observed in plant products. Mean spermidine contents, exceeding 20 mg kg⁻¹, were found in dry soybean, stewed green pea, yellow pea puree and roasted chicken breast. Roasted chicken breast, stewed pork kidney, roasted pork liver and roasted pork neck had mean spermine contents above the same level. Polyamine content varies widely within individual food items, what makes application of the results by dietitians rather difficult.

Keywords: Polyamines; Putrescine; Spermidine; Spermine; Food

Julien Mercier, Denise C. Manker, Biocontrol of soil-borne diseases and plant growth enhancement in greenhouse soilless mix by the volatile-producing fungus *Muscodora albus*, *Crop Protection*, Volume 24, Issue 4, April 2005, Pages 355-362, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.09.004.

(<http://www.sciencedirect.com/science/article/B6T5T-4DS6V2V-1/2/0af0540d413f82f02a86685dec482bfa>)

Abstract:

The use of the volatile-producing fungus *Muscodora albus* for the biological control of soil-borne diseases in greenhouse soilless growing mix was investigated. Fresh rye grain culture of *M. albus* incorporated into *Rhizoctonia solani*-infested growing mix at a rate of 15 g/L or greater provided complete control of damping-off of broccoli seedlings; restoring seedling emergence to levels similar to the non-infested control without deleterious effect to plant growth. The effect of the treatment was essentially local, suggesting that the volatile compounds associated with disease control moved little in the growing mix. Treatment with *M. albus* was effective at a range of temperatures, from 4 to 22 [degree sign]C. The ability of *M. albus* to control damping-off declined rapidly after its incorporation to the growing mix, suggesting that its activity takes place in the initial hours of treatment. In treated mix, damping-off remained under control regardless of planting time after treatment, suggesting that a biological fumigation had killed *R. solani*. *M. albus* also completely controlled root rot of bell pepper caused by *Phytophthora capsici*. Bell pepper and cosmos showed increased growth when planted in non-infested mix treated with *M. albus*. Since the sterilization of the growing mix by autoclaving had a similar effect on plant growth, it is hypothesized that *M. albus* enhances growth by controlling deleterious microorganisms that often contaminate commercial growing mixes.

Keywords: *Muscodora albus*; Fumigation; Volatile; *Rhizoctonia solani*; *Phytophthora capsici*; Damping-off

M.A. Radwan, M.M. Abu-Elamayem, M.H. Shiboob, A. Abdel-Aal, Residual behaviour of profenofos on some field-grown vegetables and its removal using various washing solutions and household processing, *Food and Chemical Toxicology*, Volume 43, Issue 4, April 2005, Pages 553-557, ISSN 0278-6915, DOI: 10.1016/j.fct.2004.12.009.

(<http://www.sciencedirect.com/science/article/B6T6P-4FFNBW9-2/2/b7df68c7065acc2c0cef2e4daa2f3883>)

Abstract:

Profenofos (Selecron 72% EC), was sprayed on field-grown pepper and eggplant at the recommended rate of 1.28 kg a.i./ha. Fruit samples were collected at 1 h to 14 days after application and analysed to determine the content and dissipation rate of profenofos. The effect of different washing solutions and some household processing on the removal of such residues from treated vegetables were also investigated. Profenofos residues were quantified by using gas chromatography. The results showed that the consumable safety time were found to be 10 days

on sweet pepper and 14 days on hot pepper and eggplant fruits. The initial disappearance of profenofos appeared to follow first order kinetics with different rates of reaction of 0.38, 0.40 and 0.35 day⁻¹ for hot pepper, sweet pepper and eggplant, respectively. The corresponding half-lives (t_{1/2}) were 1.84, 1.74 and 1.96 days. Also, the results indicated that tap water, potassium permanganate and acetic acid solution gave high percent removal of profenofos residues from hot and sweet pepper fruits, while no detectable residues was found in eggplant fruit after washing with soap and acetic acid solutions. In general, all tested washing solutions gave higher percent removal of profenofos residues from eggplant fruit than the two other pepper fruits. Blanching and frying of pepper and eggplant fruits resulted in great reduction to almost completely removed (~100%) of the deposited profenofos. In addition, pickling process removed 92.58 and 95.61% from hot pepper fruit after one week and after two weeks, respectively.

Keywords: Residues; Profenofos; Eggplant; Green pepper; Washing solutions; Household processing

K. Dorji, M.H. Behboudian, J.A. Zegbe-Dominguez, Water relations, growth, yield, and fruit quality of hot pepper under deficit irrigation and partial rootzone drying, *Scientia Horticulturae*, Volume 104, Issue 2, 30 March 2005, Pages 137-149, ISSN 0304-4238, DOI: 10.1016/j.scienta.2004.08.015.

(<http://www.sciencedirect.com/science/article/B6TC3-4DHXH13-1/2/c7c3d959e9a9ff7eb99254a09a3564a8>)

Abstract:

We compared two water-saving irrigation practices, deficit irrigation (DI) and partial rootzone drying (PRD), for their effects on growth and quality of 'Ancho St. Luis' hot pepper (*Capsicum annum* L.). The treatments were: commercial irrigation (CI) considered as the control, irrigating both sides of the rootzone with half of the volume of CI considered as DI, and alternating irrigation between two sides of the rootzone with half the volume of CI at each irrigation time considered as PRD. Midday leaf water potentials of PRD and DI plants were lower by 0.15 and 0.30 MPa, respectively, than of CI plants from 130 days after sowing. Total fresh mass of fruit was reduced by 19 and 34.7% in PRD and DI, respectively, compared to CI. Fruit number per plant was reduced by more than 20% in PRD and DI compared to CI. Total dry mass of fruit was similar among the treatments. At harvest, DI fruit had 21% higher total soluble solids concentration and better colour development than other treatments. Although incidence of blossom-end rot was high in PRD and DI fruit, more than 80% of fruit from PRD was not affected. DI and PRD saved 170 and 164 l of water, respectively, compared to CI and they could be feasible irrigation strategies for hot pepper production where the benefit from saving water outweighs the decrease in total fresh mass of fruit.

Keywords: Plant water relations; Water conservation; Blossom-end rot; Dry mass distribution

F. Orgaz, M.D. Fernandez, S. Bonachela, M. Gallardo, E. Fereres, Evapotranspiration of horticultural crops in an unheated plastic greenhouse, *Agricultural Water Management*, Volume 72, Issue 2, 18 March 2005, Pages 81-96, ISSN 0378-3774, DOI: 10.1016/j.agwat.2004.09.010.

(<http://www.sciencedirect.com/science/article/B6T3X-4DM2CJ0-1/2/5ea18b14336186cc21e4d2619b6d7554>)

Abstract:

Large unheated greenhouse areas are located in the coastal lands of the Mediterranean Basin, based on low-cost structures covered with plastic. Water is a scarce resource in these areas and therefore it is necessary to optimise irrigation practice by applying the crop water needs, thus avoiding waste. This work was undertaken to determine the water requirements of four major horticultural crops grown in an unheated plastic greenhouse located in Almeria, Spain.

Drainage lysimeters were used to determine the seasonal evapotranspiration (ET) of four crops (melon, green beans, watermelon and pepper), which ranged from 170 to 371 mm and it was

associated with the reference ET (ET₀). Compared to irrigated crops outdoors, the seasonal ET of the greenhouse horticultural crops is relatively low due to the lower evaporative demand inside the greenhouse and to a further reduction in solar radiation transmission by whitening in late spring and summer. Additionally, off-season greenhouse crops are grown during low evaporative demand periods, thus the low water requirements.

Crop coefficient (K_c) curves were obtained for the four crops under different conditions. The K_c values varied with the crop, stage of development, and with management practices. Measured peak K_c values for crops, which were not vertically supported (melon and watermelon) were between 1 and 1.1, similar to the measured values for the same crops under field conditions. By contrast, peak K_c values for vertically supported (VS) crops (melon, green bean and sweet pepper) varied between 1.3 and 1.4, which are higher than those reported for outdoors. The tall and open canopy structures of the VS greenhouse crops, their high leaf area indices, along with the high proportion of diffuse radiation inside the greenhouse, allowed for more uniform light penetration within the canopies and ET rates in those crops higher than those of the short, non-supported crops.

Management and climatic conditions combined to define an unusual K_c curve for sweet pepper. The crop is transplanted in late summer and reaches the peak K_c in early winter. Because of the low temperatures, K_c decreased thereafter down to about 1.0, until climatic conditions inside the greenhouse improved. From late winter to the end of the season, K_c was either stable or increased steadily. A simple K_c model based on thermal time for greenhouse crops with and without pruning, was proposed and validated. The model gave accurate estimates of measured K_c values for melon and pepper.

Keywords: Crop coefficient; Crop evapotranspiration; Horticultural crops; Plastic greenhouse; Models

James P. Gilreath, Timothy N. Motis, Bielinski M. Santos, *Cyperus* spp. control with reduced methyl bromide plus chloropicrin doses under virtually impermeable films in pepper, *Crop Protection*, Volume 24, Issue 3, March 2005, Pages 285-287, ISSN 0261-2194, DOI: 10.1016/j.cropro.2004.08.008.

(<http://www.sciencedirect.com/science/article/B6T5T-4DR1PJS-1/2/7d91a59a81c198562d84863fc83011fa>)

Abstract:

Two field trials were conducted to determine if reduced doses of methyl bromide plus chloropicrin (MBr+Pic) applied under two types of virtually impermeable films (VIF) could provide the same extent of *Cyperus* spp. control and pepper (*Capsicum annuum* L.) crop yield as the commercially used MBr+Pic dose with low-density mulch. Various treatments compared 98 and 196 kg MBr+Pic/ha under VIF versus 392 kg/ha of the fumigant with conventional polyethylene mulch. Results showed that there were no differences in *Cyperus* control and pepper yield with both reduced MBr+Pic and the commercially applied dose with low-density mulch. It appeared that the increased fumigant retention by the VIF gave the same weed control as the high MBr+Pic dose.

Keywords: Nutsedge; Low-density mulch; Fumigant retention

Ofelia Collera-Zuniga, Federico Garcia Jimenez, Ricardo Melendez Gordillo, Comparative study of carotenoid composition in three mexican varieties of *Capsicum annuum* L, *Food Chemistry*, Volume 90, Issues 1-2, March-April 2005, Pages 109-114, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2004.03.032.

(<http://www.sciencedirect.com/science/article/B6T6R-4CBV31M-6/2/bdc0346ecd6159c16462601c991998af>)

Abstract:

Normal and reverse phase high-performance liquid chromatography have been used in order to identify and separate the carotenoid pigments present in the commercial varieties ancho, guajillo

and mulato of *Capsicum annuum*, since there is considerable variation in carotenoid composition. In the reverse phase 13 common carotenoids out of 24 were found. In normal phase there were 14 common carotenoids out of 22. These varieties are highly appreciated and used because of their distinctive flavour and colour in Mexican cuisine. Among the major identified carotenoids, were [beta]-carotene and [beta]-cryptoxanthin which have provitamin A activity.

Keywords: *Capsicum annuum*; Mexican chile peppers; Carotenoid pigments; Pepper constituents; Provitamin A

Esmâ Kozan, Bahadır Gonenc, Oguz Sarimehmetoglu, Hasan Aycicek, Prevalence of helminth eggs on raw vegetables used for salads, *Food Control*, Volume 16, Issue 3, March 2005, Pages 239-242, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2004.02.005.

(<http://www.sciencedirect.com/science/article/B6T6S-4CYGS6G-1/2/94eb6efc4e0608ba23935249d15bf44b>)

Abstract:

The presence of helminth eggs on raw vegetables, including lettuce, parsley, green onions, cucumbers, carrots, red cabbage, tomatoes, rockets (*Eruca sativa*), and green-peppers from wholesalers in Ankara, Turkey was determined. A total of 203 unwashed and 406 washed samples were assayed by light microscopy. Helminth eggs were detected in 12 (5.9%) of 203 unwashed samples and not in any washed samples ($p < 0.05$).

Helminth eggs detected in unwashed samples included *Taenia* spp. (3.5%), *Toxocara* spp. (1.5%), and *Ascaris lumbricoides* (1.0%) eggs. *Taenia* spp. eggs were recovered to be highest number ($n=130$), followed by *Toxocara* spp. eggs ($n=21$). Approximately 11% of unwashed lettuce and parsley was contaminated compared with only 2.5% of carrot samples. No helminth eggs were detected in red cabbage, rockets, tomatoes or green-peppers.

These results highlight the potential for transmission of helminth eggs by unwashed salad vegetables in Turkey and the importance of properly washing/disinfecting raw vegetables before consumption.

Keywords: Vegetables; Human pathogens; Helminth eggs; Washing; Disinfecting

A. Tsakonas, V. Stergiou, M. Polissiou, K. Akoumianakis, H. C. Passam, Kenaf (*Hibiscus cannabinus* L.) based substrates for the production of compact plants, *Industrial Crops and Products*, Volume 21, Issue 2, March 2005, Pages 223-227, ISSN 0926-6690, DOI: 10.1016/j.indcrop.2004.04.008.

(<http://www.sciencedirect.com/science/article/B6T77-4CFV8DF-1/2/a037226f99d1018be0643d548f232bb4>)

Abstract:

Growth media based on whole-stem kenaf (*Hibiscus cannabinus* L.) and sand have been used to produce compact lettuce (*Lactuca sativa* L.) and pepper (*Capsicum annuum* L.) plants. Seeds were sown directly in kenaf-containing substrates and growth was recorded for up to 100 days after sowing. The presence of whole-stem kenaf (core and bark), even at a ratio of 10:90 (kenaf:sand), inhibited plant growth expressed as plant height, leaf number, and plant fresh and dry weight. When plants were subsequently transplanted to a kenaf-free substrate, growth continued at a similar rate to that of the control (sown and grown in peat and sand). The inhibitory effect of kenaf is located both in the core and bark, but is decreased by soaking the kenaf in NH_4NO_3 prior to use. A possible role for whole-stem kenaf (core and bark) in the production of compact plants is proposed.

Keywords: Kenaf; Substrate; Germination; Growth; Pepper; Lettuce

Kiyoong Kang, Sun-Mi Jang, Sei Kang, Kyoungwhan Back, Enhanced nutraceutical serotonin derivatives of rice seed by hydroxycinnamoyl-CoA:serotonin N-(hydroxycinnamoyl)transferase,

Plant Science, Volume 168, Issue 3, March 2005, Pages 783-788, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2004.10.007.

(<http://www.sciencedirect.com/science/article/B6TBH-4DS40BM-1/2/2a290f5a2ae8b479f79e09a3e2feb04a>)

Abstract:

Serotonin derivatives such as p-coumaroylserotonin and feruloylserotonin, a family of plant polyphenol compounds, have been implicated in an array of biological activities including antioxidative activity, but neither their production nor identification has been reported in crop plants. Here, we report the detection and enhanced synthesis of serotonin derivatives in rice seeds. We identified that wild-type rice seeds synthesized a basal levels of serotonin derivatives with around 30 ng g⁻¹ seed weight. However, transgenic rice expressing the pepper hydroxycinnamoyl-CoA:serotonin N-(hydroxycinnamoyl)transferase (SHT) produced on average 274 ng g⁻¹ seed weight which was nine-fold higher than wild-type. In addition, production of serotonin derivatives increased upon chemical treatments such as trans-cinnamic acid and tyramine in both wild-type and transgenic rice by two- to three-fold. The DPPH radical scavenging activities of transgenic rice were higher than that of wild-type and showed concentration dependent of serotonin derivatives. These results demonstrate that overexpression of SHT provides the feasibility of engineering increased nutraceutical serotonin derivative levels in plants using this gene.

Keywords: Feruloylserotonin; Coumaroylserotonin; Transgenic rice; Serotonin N-(hydroxycinnamoyl)transferase; Antioxidant

Jun Qiao, Akira Sasao, Sakae Shibusawa, Naoshi Kondo, Eiji Morimoto, Mapping Yield and Quality using the Mobile Fruit Grading Robot, Biosystems Engineering, Volume 90, Issue 2, February 2005, Pages 135-142, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2004.10.002.

(<http://www.sciencedirect.com/science/article/B6WXV-4F8TK4C-1/2/3a3b198e0bb85bc7e929eb5e4a9d91dd>)

Abstract:

Localised crop output measurement is the principal requirement in determining profit on a spatially variable basis. Quality of agricultural products immediately affects the market value. Therefore, quality maps should be obtained as well as yield map. In this research, a database of spatial yield and quality information was created for sweet pepper by using the mobile fruit grading robot. Then a real-time mapping method was developed from the database. Three hundred and seventy-two sweet pepper fruits harvested from 300 plants were utilised for the experiment in laboratory. Information such as plant location, harvesting time, fruit index (number of fruits from a plant), fruit size, colour, shape, defects and grade also mass was obtained. Based on these information sources, a database was established to create both a yield map and a quality map. Results indicated that the database is adequate to represent the spatial variability of yield and quality in a field as yield and quality maps, the developed mapping program is effective and practical, and that the system can be applied in real time.

Krishnapura Srinivasan, Spices as influencers of body metabolism: an overview of three decades of research, Food Research International, Volume 38, Issue 1, January 2005, Pages 77-86, ISSN 0963-9969, DOI: 10.1016/j.foodres.2004.09.001.

(<http://www.sciencedirect.com/science/article/B6T6V-4DHXGRY-1/2/a2bfc694c9daa7c98dd7b7e5558ef1ba>)

Abstract:

The safety of the consumption of spices - turmeric, red pepper and black pepper and their respective active principles was established in animal studies by observing the influence on growth, organ weights, nitrogen balance and blood constituents upon feeding at levels close to human intake as well as upto 100-times the normal human intake. Exhaustive animal studies

documented the beneficial influence of turmeric/curcumin, red pepper/capsaicin, and garlic on lipid metabolism, especially anti-hypercholesterolemic effect of the three spices and anti-lithogenic effect of curcumin and capsaicin. The anti-diabetic effects of turmeric/curcumin, onion and cumin seeds were also evidenced with particular ameliorative influence of curcumin and onion on diabetic nephropathy. The antioxidant effects of curcumin (of turmeric), capsaicin (of red pepper) and eugenol (of clove) were evidenced both in in vitro and in vivo systems and the consequential health beneficial anti-inflammatory influence in experimentally induced arthritis was documented. The mechanism of digestive stimulant action of common spices examined in experimental animals revealed to be mediated through phenomenal stimulation of bile secretion with an enhanced bile acid concentration (ingredients essential for fat digestion and absorption) and an appropriate stimulation of the activities of digestive enzymes of pancreas and small intestine. The protective influence of hypolipidemic spices - curcumin, capsaicin and garlic on the altered fluidity of erythrocytes under hypercholesterolemic situation was evidenced in experimental animal models. Antioxidant spices were also shown to greatly reduce LDL-oxidation and also modulate the synthesis of prostaglandins and leukotrienes. Several spices or their extracts were also found to beneficially inhibit platelet aggregation. All these observations strongly indicate that many spices and their active principles are excellent nutraceuticals.

Keywords: Spices; Safety of consumption; Physiological effects; Hypolipidemic; Antioxidant; Digestive stimulant; Anti-diabetic

Ariel R. Vicente, Carlos Pineda, Laura Lemoine, Pedro M. Civello, Gustavo A. Martinez, Alicia R. Chaves, UV-C treatments reduce decay, retain quality and alleviate chilling injury in pepper, *Postharvest Biology and Technology*, Volume 35, Issue 1, January 2005, Pages 69-78, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2004.06.001.

(<http://www.sciencedirect.com/science/article/B6TBJ-4DCMJDJ-7/2/c4337526e1efebea4fc76655f4c98925>)

Abstract:

Peppers (*Capsicum annum* L. cv. Zafiro), having 90% red color, were treated with UV-C light (7 kJ m⁻²) and stored at 10 [degree sign]C for 18 days. The UV-C treatment reduced decay. UV-C-treated peppers also kept firmer and presented lower carotenoid content and superficial color than control fruit. The treatments did not produce changes in fruit sugar content. After 18 days of storage at 10 [degree sign]C non-treated fruit showed a reduction in pH, suggesting higher damage and tissue disruption. To evaluate the effect of UV-C on chilling injury, fruit were UV-C-treated and stored for 15 and 22 days at 0 [degree sign]C plus 4 days at 20 [degree sign]C. UV-C treatments reduced chilling injury incidence and severity. UV-C-treated fruit also presented lower electrolyte leakage, respiration rate, and phenolic compound content suggesting lower damage in response to low temperature storage.

Results suggest that the UV-C treatments could be a useful way of reducing decay and maintaining bell pepper fruit quality. Furthermore, chilling injury incidence and severity could be reduced by short UV-C treatments.

Keywords: UV-C light; Physical methods; Chilling injury; Fruit quality; Pepper

Jeffrey B. Jones, George H. Lacy, Hacene Bouzar, Robert E. Stall, Norman W. Schaad, Reclassification of the Xanthomonads Associated with Bacterial Spot Disease of Tomato and Pepper, *Systematic and Applied Microbiology*, Volume 27, Issue 6, 15 December 2004, Pages 755-762, ISSN 0723-2020, DOI: 10.1078/0723202042369884.

(<http://www.sciencedirect.com/science/article/B7GVX-4GHB1NN-K/2/fca2e5a2fd0612be73d2fe82bea8a11b>)

Abstract: Summary

Four phenotypic xanthomonad groups have been identified that are pathogenic to pepper, tomato, or both hosts. These include groups A and C which are found in *Xanthomonas axonopodis* pv.

vesicatoria, group B found in *X. vesicatoria*, and group D found in '*X. gardneri*'. We present DNA:DNA hybridization data in which *X. axonopodis* pv. *vesicatoria* group A and C strains have less than 70% DNA relatedness with each other, with the type strain of *X. axonopodis*, and with the currently classified species within *Xanthomonas* and, therefore, should be removed from this species and given species status. We present information that the A strains most closely resemble the strains originally isolated by Doidge in 1921. In an attempt to avoid confusion in nomenclature as stated in Principle 1 of the Bacteriological Code, we propose that the A strains of *X. axonopodis* pv. *vesicatoria* be renamed as *X. euvesicatoria* (ATCC11633T = NCPPB2968T = ICMP 109T = ICMP 98T). Use of the *euvesicatoria* epithet should be reserved for strains originally identified by Doidge, which she designated *Bacterium vesicatorium* (Ann. Appl. Biol. 7: 407-430, 1921) in the original description when she referred to those strains as being feebly amylolytic. The name *X. perforans* sp. nov. is proposed for the C group of strains previously designated as *X. axonopodis* pv. *vesicatoria* (ATCC BAA-983T = NCPPB 4321T). We also propose that '*X. gardneri*', which has less than 70% DNA relatedness with any of the *Xanthomonas* species and which has never had taxonomic status, be named *X. gardneri* (ATCC 19865T = NCPPB 881T) to reflect the specific epithet proposed by Sutic [17] in 1957.

Keywords: *Xanthomonas campostris* pv. *vesicatoria*

Markus Moller, Josef Tanny, Yan Li, Shabtai Cohen, Measuring and predicting evapotranspiration in an insect-proof screenhouse, *Agricultural and Forest Meteorology*, Volume 127, Issues 1-2, 5 December 2004, Pages 35-51, ISSN 0168-1923, DOI: 10.1016/j.agrformet.2004.08.002.

(<http://www.sciencedirect.com/science/article/B6V8W-4DJ4CD5-1/2/6535e2c3616eab2f1d0cd2461d18d6c5>)

Abstract:

This study addresses the current lack of accurate measurements and predictions of evapotranspiration below modern screening materials. Energy balance components, microclimatic and physiological parameters were measured in a 50-mesh insect-proof screenhouse cultivated with sweet pepper. A lysimeter-calibrated sap flow system and an eddy covariance system installed inside the screenhouse measured canopy transpiration and evapotranspiration, respectively. Sap flow (SF) and eddy covariance (EC) data showed good agreement ($R^2 = 0.95$) and although EC exceeded SF by 9%, this was less than the standard error of inter-specific sap flow, supporting previous findings that mid-day soil evaporation was negligible. Screenhouse bulk resistance was inversely correlated with external wind speed and simple mass balance estimations gave reasonable values of evapotranspiration on a daily basis. A one-dimensional screenhouse model was derived, based on a modified Penman-Monteith equation incorporating an additional boundary layer resistance. The model, along with a greenhouse model, was used to calculate evapotranspiration of the screenhouse crop. Half hourly predictions of both models yielded good agreement with measured SF ($R^2 = 0.94-0.95$). Daily crop water use, predicted with the greenhouse model was in better agreement with measurements than that predicted by the screenhouse model. Measured and predicted transpiration rates inside the screenhouse were approximately 1.8-2.1 mm day⁻¹ during the most active stage of growth, while those simulated for a similar crop grown outside would be 4.5-5.3 mm day⁻¹ on average. Model sensitivity analysis showed that reduced radiation and wind speed and modified vapour pressure deficit were the main factors influencing transpiration. Calculations of the decoupling factor [Ω] suggest that the screenhouse evaporative climate is predominantly 'decoupled'.

Keywords: Insect-proof screens; Sap flow; Eddy covariance; Evapotranspiration; Model; Sweet pepper

D. Nuyttens, S. Windey, B. Sonck, Optimisation of a Vertical Spray Boom for Greenhouse Spray Applications, *Biosystems Engineering*, Volume 89, Issue 4, December 2004, Pages 417-423, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2004.08.016.

(<http://www.sciencedirect.com/science/article/B6WXV-4DTP20K-1/2/bb290ae3380003faa7eafa587a1ef199>)

Abstract:

Proper delivery of pesticides into desired positions within crop canopies could result in a safe use of pesticides and reduce environmental pollution. A quantitative method with mineral chelates was used to evaluate spray deposits and distributions within tomato and pepper canopies. Tests were conducted in greenhouses with two different spray systems both equipped with vertical spray booms: a Fumimatic motor-driven sprayer and a manual-driven trolley sprayer. Deposition tests with water-sensitive paper and mainly with the manganese and molybdenum chelates as tracer elements were performed. Filter papers were placed at several heights within canopies to determine the spray distribution for changes in the vertical nozzle distance (0[middle dot]35 versus 0[middle dot]50 m) and the spray distance to the crop. The tests demonstrated that the spray with 0[middle dot]35 m nozzle spacing provided a much better spray distribution than that with 0[middle dot]50 m nozzle spacing. The optimal spray distance for 80[degree sign] flat fan nozzles with the 0[middle dot]35 m nozzle spacing was about 0[middle dot]30 m.

Mekonnen Tsegaye, Eden Ephraim, Mogessie Ashenafi, Behaviour of *Escherichia coli* O157:H7 during the fermentation of Datta and Awaze, traditional Ethiopian fermented condiments, and during product storage at ambient and refrigeration temperatures, *Food Microbiology*, Volume 21, Issue 6, December 2004, Pages 743-751, ISSN 0740-0020, DOI: 10.1016/j.fm.2004.02.003.

(<http://www.sciencedirect.com/science/article/B6WFP-4D3W9F4-G/2/d7d34870c6076cc7d03fa8351abed6e8>)

Abstract:

The survival of *E. coli* O157:H7 in fermenting foods and its prolonged survival in refrigerated fermented foods is documented. This prompted the study to evaluate survival of *E. coli* O157:H7 during the fermentation of Datta and Awaze, traditional Ethiopian condiments. Datta was prepared by wet milling a variety of spices along with green or red chilli and fermenting it by lactic acid bacteria. Awaze is a slurry made of red pepper, garlic and ginger to which various other spices were added and fermented by lactic acid bacteria (LAB) and yeasts. The Datta or Awaze slurry was separately inoculated with three strains of *E. coli* O157:H7 and the fermentation was allowed to proceed at ambient (20-25[degree sign]C) temperatures for 7 days. When fermenting Datta or Awaze was initially inoculated at low inoculum level (3 log cfu/g), the test strains were not recovered after 24 h of fermentation. At higher initial inoculum level (6 log cfu/g), however, counts of the test strains in Datta at day 7 were less by about 1.5 log unit than the initial inoculum level. In fermenting Awaze, all test strains were completely eliminated in 7 days. The pH of the fermenting green and red Datta was reduced from 5.2 to 4.4 and that of Awaze dropped from 4.9 to 3.8 during this time. In another experiment, the fermented products were separately inoculated with the *E. coli* O157:H7 test strains at levels of 6 log cfu/g and incubated at ambient and refrigeration (4[degree sign]C) temperatures for 7 days. In fermented Datta, two of the three strains were not recovered by enrichment after 6 days of storage at ambient temperatures. In fermented Awaze, all strains were below countable levels at day 5, but could still be recovered by enrichment at day 7. At refrigeration storage, counts of the test strains in Datta and Awaze products were <3 log cfu/g at day 7. The inhibition of our *E. coli* O157:H7 test strains in Datta and Awaze may be due to the antimicrobial activity of spices and other metabolites produced by LAB which may be effective at low pH.

Keywords: *E. coli* O157:H7; Condiments; Fermentation

G. A. Gonzalez-Aguilar, J. F. Ayala-Zavala, S. Ruiz-Cruz, E. Acedo-Felix, M. E. Diaz-Cinco, Effect of temperature and modified atmosphere packaging on overall quality of fresh-cut bell peppers, *Lebensmittel-Wissenschaft und-Technologie*, Volume 37, Issue 8, December 2004, Pages 817-826, ISSN 0023-6438, DOI: 10.1016/j.lwt.2004.03.007.

(<http://www.sciencedirect.com/science/article/B6WMV-4CC2YBD-1/2/e5501f83407dfc1722c5c93b9bc79081>)

Abstract:

The effect of vacuum packaging (VP) and modified atmosphere packaging without vacuum (MAP) on shelf-life of fresh-cut green bell pepper stored at 5[degree sign]C and 10[degree sign]C were evaluated. In-package atmosphere, overall quality, percentage of leaked juice, texture, ascorbic acid content, ethanol and acetaldehyde, and microbial growth, were evaluated at different intervals of storage. MAP-fresh-cut peppers presented better visual quality, less leaked juice and higher firmness than those stored under VP. Microbiological and quality analysis revealed a limit of shelf-life of 14 and 21 days, when fresh-cut peppers were stored at 10[degree sign]C and 5[degree sign]C, respectively. We conclude that MAP could be used to maintain quality attributes of fresh-cut peppers for up 21 days at 5[degree sign]C.

Keywords: Capsicum annum; Overall quality; Ascorbic acid; Microbial growth

Idoia Garmendia, Nieves Goicoechea, Jone Aguirreolea, Effectiveness of three Glomus species in protecting pepper (*Capsicum annum* L.) against verticillium wilt, *Biological Control*, Volume 31, Issue 3, November 2004, Pages 296-305, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.04.015.

(<http://www.sciencedirect.com/science/article/B6WBP-4CHRDR5-5/2/2f518ddbc094333116377e40ba325395>)

Abstract:

The objective of this work was to study the influence of three *Glomus* species--*Glomus mosseae* (Nicol. and Gerd.) Gerd. and Trappe, *Glomus intraradices* (Schenck and Smith) and *Glomus deserticola* (Trappe, Bloss, and Menge)--on the development of *Verticillium*-induced wilt in *Capsicum annum* cv. Piquillo. Results showed that the effectiveness of arbuscular mycorrhizal fungi (AMF) as biocontrol agents varied among different *Glomus* species. In pepper colonized by *G. intraradices* the severity of the disease was even higher than that observed in non-mycorrhizal plants in terms of plant growth and pepper yield. On the other hand, the high effectiveness exhibited by *G. mosseae* in improving plant growth and the early beginning of the reproductive stage in these plants was not associated with great plant protection and high pepper yield in diseased plants. Only plants associated with *G. deserticola* had greater yield than non-mycorrhizal ones despite the lower P fertilization applied to the mycorrhizal treatment and this fact was observed in both healthy and diseased plants. It is suggested that the higher specific phosphorus uptake in *Verticillium*-inoculated plants associated with *G. deserticola* could contribute to diminish the deleterious effect of pathogen on yield. On the other hand, the possible influence of endogenous phenolics in roots on the tolerance or resistance of pepper against wilt induced by *Verticillium dahliae* remains unclear.

Keywords: Biocontrol; *Capsicum annum*; *Glomus* spp.; *Verticillium dahliae*

C. Garcia, J. A. Pascual, E. Mena, T. Hernandez, Influence of the stabilisation of organic materials on their biopesticide effect in soils, *Bioresource Technology*, Volume 95, Issue 2, November 2004, Pages 215-221, ISSN 0960-8524, DOI: 10.1016/j.biortech.2004.02.006.

(<http://www.sciencedirect.com/science/article/B6V24-4C0V65Y-1/2/a733d22976cdbc8086531665fc7954a1>)

Abstract:

Some organic materials have shown a suppressive effect on several diseases induced by soilborne plant pathogens. We have carried out a laboratory experiment (microcosm) to ascertain the influence of the stabilisation process of sewage sludge on its biopesticide effect when *Pythium ultimum* or *Phytophthora* sp. were introduced to soil as pathogens for pea or pepper. When *P. ultimum* was introduced there was a 63.8% reduction in the weight of the stems grown in the control, 47.6% in the presence of sewage sludge, but only 24.7% with compost. The same

biopesticide effect was evident from the weight of the roots. The biopesticide effect was also strong when compost was used as organic amendment in the presence of *Phytophthora*, as could be seen from stem and shoot weight and length. The data showed that the degree of stabilisation of the organic material (compost) had a positive influence on its biopesticide effect. The changes undergone by a soil after the addition of organic materials helped to explain the biopesticide effect of the amendment. The organic treatments reduced *P. ultimum* and *Phytophthora* sp. populations.
Keywords: Biopesticide effect; Stabilisation of organic matter; Phytopathogens; *Pythium ultimum*; *Phytophthora* sp.; Sewage sludge; Compost

Edgar Uquiche, Jose M. del Valle, Jaime Ortiz, Supercritical carbon dioxide extraction of red pepper (*Capsicum annum* L.) oleoresin, *Journal of Food Engineering*, Volume 65, Issue 1, November 2004, Pages 55-66, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2003.12.003.

(<http://www.sciencedirect.com/science/article/B6T8J-4BHVFMM-3/2/41837d57786d9db1081d48f5ac654811>)

Abstract:

The extraction kinetics of red pepper oleoresin with supercritical carbon dioxide (SC-CO₂) at 40 [degree sign]C from a pelletized substrate was evaluated as a function of crushed-pellet particle size ($D_p=0.273-3.90$ mm), superficial solvent velocity ($U_s=0.57-1.25$ mm/s), and extraction pressure (320-540 bar). Batch productivity increased with substrate pelletization, which caused a 4-time increase in apparent density. Microscopy was utilized to characterize the microstructure of the pelletized substrate. Fractal analysis of binary images and mercury porosimetry allowed an estimation of pellet porosity and tortuosity, which in turn allowed an independent estimation of effective diffusivity. Solute partition between the solid matrix and SC-CO₂ (K) was estimated from the initial slope of cumulative plots of oleoresin yield versus specific solvent mass, and did not depend on D_p and U_s . Yield of oleoresins and carotenoid pigments increased, and K decreased as the extraction pressure increased. A linear driving force approximation was used to model experimental data, and discrepancies between model predictions and experimental data points with large particles were explained.

Keywords: Effective diffusivity; Extraction; Fractal analysis; Microstructure; Oleoresin; Pelletization; Red pepper; Supercritical CO₂

R. Shaked, K. Rosenfeld, E. Pressman, The effect of low night temperatures on carbohydrates metabolism in developing pollen grains of pepper in relation to their number and functioning, *Scientia Horticulturae*, Volume 102, Issue 1, 15 October 2004, Pages 29-36, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.12.007.

(<http://www.sciencedirect.com/science/article/B6TC3-4CC7W6R-1/2/fafae626a8f497c9ae57e22d656938f8>)

Abstract:

Four pepper cultivars were grown under winter low night temperature (LNT) conditions (night temperature of 10 ± 2 [degree sign]C and day temperature which did not exceed 24 [degree sign]C) in a greenhouse in Bet Dagan, Israel. In all four cultivars, LNT conditions caused a decrease in the number of pollen grains and a reduction in their germinability, in comparison with pollen of control plants grown in another greenhouse under higher temperature conditions (night temperature of 20 ± 2 [degree sign]C and similar day temperatures). Analysis of carbohydrates content in the later stages of pollen development revealed that LNT caused a reduction in starch concentration 4 days before anthesis (A-4), and in the concentrations of sucrose and reducing sugars (glucose and fructose) at anthesis (A). It is suggested that low temperatures hinder pollen functioning in pepper, by interfering with starch accumulation at A-4, thereby decreasing the concentrations of soluble sugars in the mature pollen grains. The fruits of the LNT-grown plants, except for cv. Devilla, were smaller, seedless and misshapen. The reason for the ability of cv. Devilla to set seeds and normal fruits under LNT conditions need further investigation.

Keywords: Capsicum annuum; Cultivars; Low night temperatures; Pepper; Pollen viability; Reducing sugars; Starch; Sucrose

M. C. Martinez-Ballesta, V. Martinez, M. Carvajal, Osmotic adjustment, water relations and gas exchange in pepper plants grown under NaCl or KCl, *Environmental and Experimental Botany*, Volume 52, Issue 2, October 2004, Pages 161-174, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2004.01.012.

(<http://www.sciencedirect.com/science/article/B6T66-4C04V4Y-3/2/bc1c65461d34f5ec790638b66c123777>)

Abstract:

Pepper plants (*Capsicum annuum* L. cv. Orlando) were used to compare the effects of NaCl and KCl on osmotic adjustment, water relations, and gas exchange. Thus, two different saline treatments, 60 mM NaCl and 60 mM KCl, were applied and different measurement times (1, 2, 3 and 10 days) were assayed in order to determine the effect of the treatment duration on the parameters studied. Reductions in root hydraulic conductance, stomatal conductance and net assimilation of CO₂ were observed after NaCl and KCl addition. Mineral composition of leaf sap was also determined and it was observed that Cl⁻ and NO₃⁻ were the main anions used by pepper plants to achieve the osmotic adjustment. Also, salinity induced a decrease in the concentrations of Ca²⁺ and Mg²⁺ in leaves. Osmotic regulation by organic solutes was also determined, by analysis of the contents of sugars and amino acids. It appeared that sucrose was the main carbohydrate accumulated by the plants in order to maintain turgor. However, the degree of osmotic adjustment observed indicated that changes in leaf turgor occurred after either saline treatment, for all application times, suggesting that pepper plants could not adjust their water relations sufficiently. Thus, Na⁺ and K⁺ exerted a toxic effect on pepper plants mainly by affecting the plant water relations, although the effect of Na⁺ on water relations parameters was more significant than that of K⁺.

Keywords: *Capsicum annuum*; Net assimilation of CO₂; Osmotic adjustment; Root hydraulic conductance; Stomatal conductance; Water relations

Takashi Kuda, Akiko Iwai, Toshihiro Yano, Effect of red pepper *Capsicum annuum* var. conoides and garlic *Allium sativum* on plasma lipid levels and cecal microflora in mice fed beef tallow, *Food and Chemical Toxicology*, Volume 42, Issue 10, October 2004, Pages 1695-1700, ISSN 0278-6915, DOI: 10.1016/j.fct.2004.06.007.

(<http://www.sciencedirect.com/science/article/B6T6P-4D0Y29H-3/2/ee775d2a6a6acbc4a6ce9d957d78eb1a>)

Abstract:

Antihyperlipidemia or hypocholesterolaemic and antibacterial activities of red hot pepper and garlic are well known. To determine the effect of the dietary spices ingested to suppress blood lipids on the intestinal condition, we examined plasma lipid levels and cecal microflora in mice that were fed diets containing 19% (w/w) beef tallow and 2% red pepper *Capsicum annuum* var. conoides 'Takanotume' (RP) or garlic *Allium sativum* 'White' (GP) for 4-weeks. Plasma triacylglyceride level was suppressed by the spices. RP lowered cecal bacteroidaceae, a predominant bacterial group (from 9.4 to 9.0 log CFU/g), bifidobacteria (from 8.7 to 7.6 log CFU/g), and staphylococci. Although GP increased the cecal weight including their contents, significant differences were not shown in the cecal microflora. These results suggest that RP can affect the intestinal condition and host health through the disturbance of intestinal microflora.

Keywords: Red pepper; Garlic; Cecal microflora; Mice; Plasma lipids

Pedro J. Zapata, Maria Serrano, M. Teresa Pretel, Asuncion Amoros, M. Angeles Botella, Polyamines and ethylene changes during germination of different plant species under salinity,

Plant Science, Volume 167, Issue 4, October 2004, Pages 781-788, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2004.05.014.

(<http://www.sciencedirect.com/science/article/B6TBH-4CJV7SY-5/2/acd0b8c365716f32de20b2ba2f4884f6>)

Abstract:

The effect of salinity on germination percentage, seedling growth, ethylene production, respiration rate and polyamine levels was studied in different plant species: spinach (*Spinacia oleracea* L.), lettuce (*Lactuca sativa* L.), melon (*Cucumis melo* L.), pepper (*Capsicum annum* L.), broccoli (*Brassica oleracea* L. var. *Italica* Plenk.), beetroot (*Beta vulgaris* L. var. *crassa* (Alef.) J. Helm.) and tomato (*Lycopersicon esculentum* Mill.). Seeds were germinated under control (NaCl 1 mM) and saline (100 or 150 mM NaCl) conditions. Generally, salinity decreased seedling fresh weight and germination percentage, spinach being the exception. The lowest effect of salinity on germination percentage was found with lettuce. Respiration rate increased with salinity in all species except spinach, while ethylene production increased in some species and decreased in others, as did free and total 1-aminocyclopropane-1-carboxylic acid (ACC). Polyamine levels changed with salinity, in most cases putrescine (Put) decreased while spermidine (Spd) and/or spermine (Spm) increased. That the ratio (Spd + Spm)/Put increased with salinity in all studied species would infer increased tolerance to salinity. Results obtained showed a general response by different plant species to salinity in relation to polyamine production, but not with regard to ethylene production.

Keywords: Salinity tolerance; Germination; Ethylene; ACC; Putrescine; Spermine; Spermidine

Erol Ayranci, Sibel Tunc, The effect of edible coatings on water and vitamin C loss of apricots (*Armeniaca vulgaris* Lam.) and green peppers (*Capsicum annum* L.), Food Chemistry, Volume 87, Issue 3, September 2004, Pages 339-342, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2003.12.003.

(<http://www.sciencedirect.com/science/article/B6T6R-4BHJX20-6/2/852bd4ac04b8694e2aebf518392db941>)

Abstract:

Edible coatings of varying composition were applied on fresh apricots and green peppers. The water and vitamin C losses of these coated fresh foods were followed and compared with those of uncoated ones. The main components of the coating were methyl cellulose (MC) and polyethylene glycol (PEG). Stearic acid (SA) and ascorbic acid (AA) or citric acid (CA) were added to the coating formulation to control the barrier properties toward water and oxygen. It was found that coatings of any composition studied lower the water loss rate of fresh apricots and green peppers. Coating formulation of MC-PEG-SA was the most effective in reducing the water loss. Inclusion of AA or CA in the coating formulation as antioxidants lowered the vitamin C loss.

Keywords: Edible coatings; Oxygen permeability; Vitamin C; Water loss

Mousumi Banerjee, Prabir K. Sarkar, Growth and enterotoxin production by sporeforming bacterial pathogens from spices, Food Control, Volume 15, Issue 6, September 2004, Pages 491-496, ISSN 0956-7135, DOI: 10.1016/j.foodcont.2003.07.004.

(<http://www.sciencedirect.com/science/article/B6T6S-49G5RHH-1/2/2b29b6a723577e3598da7b2455dea8a1>)

Abstract:

Spices often act as important vectors for various micro-organisms, specially sporeformers implicating possible health problems for consumers. *Bacillus cereus* enterotoxin (BCET) and *Clostridium perfringens* enterotoxin (PET) were estimated using the latex agglutination method. Seventy-four percent of the tested 23 strains of *B. cereus* were able to produce 8 to >256 ng BCET ml⁻¹ brain heart infusion broth supplemented with glucose. Of the selected 16 strains of *Cl. perfringens*, 19% produced 2-32 ng PET ml⁻¹ modified Duncan Strong medium. Some market

spices, like cumin powder contained a high BCET titre (64 ng g⁻¹). After intentional inoculation of black pepper powder with a toxigenic strain (120-B1) of *B. cereus* and 14 d-storage at room temperature, there was no significant ($P < 0.05$) change in the cell count and BCET production. To assess safety of spicy foods, aloo dam (a potato-based food) and goat meat gravy were taken as subjects for the respective growths of *B. cereus* and *Cl. perfringens*. Freshly prepared aloo dam did not contain *B. cereus*, however immediately to seasoning with small cardamom the count of *B. cereus* cells was 533 g⁻¹ and the BCET content was 8 ng g⁻¹. After keeping the food at 30 [degree sign]C for 21 h, the cell count increased to 106 g⁻¹ and the BCET content increased to 128 ng g⁻¹. A similar situation happened when aloo dam was intentionally inoculated with *B. cereus* 120-B1. A toxigenic strain of *Cl. perfringens* multiplied rapidly in the gravy; after 19 h at 37 [degree sign]C the cell count increased from 103 to 107 g⁻¹, however the PET content (2 ng g⁻¹) remained unchanged. After boiling the 19 h-long incubated gravy for 15 min in a water bath, the cell count fell to 103 g⁻¹ and the PET content went below the limit of detection. The results confirmed that these foods are capable of supporting outgrowth of bacterial pathogens introduced in contaminated spices and the production of enterotoxins.

Keywords: *Bacillus cereus*; *Clostridium perfringens*; Enterotoxins; Spices; Challenge study

Huseyin Bozkurt, Osman Erkmén, Effects of production techniques on the quality of hot pepper paste, *Journal of Food Engineering*, Volume 64, Issue 2, September 2004, Pages 173-178, ISSN 0260-8774, DOI: 10.1016/j.jfoodeng.2003.09.028.

(<http://www.sciencedirect.com/science/article/B6T8J-49Y3H78-1/2/abdc4bc94b9fbc7b2493a82954cf197f>)

Abstract:

The hot pepper pastes were produced by various production techniques (traditional, open pan and vacuum). They were stored at 37 [degree sign]C for 46 days. The pH values, acidity, brown pigment formation, aerobic plate count (APC), and mold and yeast counts were determined during the storage periods. pH value of fresh hot pepper was about 5.20, and pH values were ranged between 4.08 and 4.56 after processing. Generally, pH values decreased ($P < 0.05$) during the first 14 days of the storage in pastes produced by open pan and vacuum techniques and then increased ($P < 0.05$). pH values of paste produced by traditional technique were lower ($P < 0.05$) than the pastes produced by open pan and vacuum techniques, however, acidities of hot pepper pastes produced by traditional technique were higher ($P < 0.05$) than the other techniques. Addition of 5% salt into pastes decreased ($P < 0.05$) the pH values and prevented pH values increasing during the storage periods, but did not change ($P > 0.05$) the acidity. Brown pigment formation in pastes increased ($P < 0.05$) during the storage period. APC and mold and yeast counts of hot pepper pastes decreased gradually ($P < 0.05$) during the storage periods. Traditionally produced hot pepper had a higher ($P < 0.05$) APC number than the other two production techniques. Traditionally produced hot pepper paste was found to be best with respect to flavor scores. Color scores of paste produced by vacuum techniques were found to be more acceptable than the other techniques.

Keywords: Hot pepper paste; Quality; Stability

Jun-Young Park, Teruo Kawada, In-Seob Han, Byung-Sam Kim, Tsuyoshi Goto, Nobuyuki Takahashi, Tohru Fushiki, Tadao Kurata, Rina Yu, Capsaicin inhibits the production of tumor necrosis factor [alpha] by LPS-stimulated murine macrophages, RAW 264.7: a PPAR[gamma] ligand-like action as a novel mechanism, *FEBS Letters*, Volume 572, Issues 1-3, 13 August 2004, Pages 266-270, ISSN 0014-5793, DOI: 10.1016/j.febslet.2004.06.084.

(<http://www.sciencedirect.com/science/article/B6T36-4CVV3B4-4/2/ac396d0bf0df37f55aa41f33146ce60a>)

Abstract:

Capsaicin, a major ingredient of hot pepper, is considered to exhibit anti-inflammatory properties. Our previous study demonstrated that capsaicin inhibited the production of pro-inflammatory mediators through NF- κ B inactivation in LPS-stimulated macrophages. In order to further clarify the mechanism underlying the anti-inflammatory action of capsaicin, we investigated whether capsaicin alters PPAR γ activity, which regulates the production of the pro-inflammatory cytokine TNF α . Capsaicin significantly inhibited the production of TNF α by macrophages in a dose-dependent manner. Simultaneous exposure of the cells to capsaicin and PPAR γ agonist troglitazone or RXR agonist LG100268 resulted in stronger inhibition of TNF α production compared to the cells treated with either capsaicin, troglitazone, or LG100268 alone. Luciferase reporter assay revealed that capsaicin induced GAL4/PPAR γ chimera and full length PPAR γ (PPRE) transactivations in a dose-dependent manner. Furthermore, a specific PPAR γ antagonist T0070907 abrogated the inhibitory action of capsaicin on LPS-induced TNF α production by RAW 264.7 cells, indicating that capsaicin acts like a ligand for PPAR γ . Our data demonstrate for the first time that the anti-inflammatory action of capsaicin may be mediated by PPAR γ activation in LPS-stimulated RAW 264.7 cells.

Keywords: Capsaicin; Inflammation; Macrophage; RAW 264.7; PPAR γ ; Pro-inflammatory cytokine; TNF α

Amra Perva-Uzunalic, Mojca Skerget, Bernd Weinreich, Zeljko Knez, Extraction of chilli pepper (var. Byedige) with supercritical CO₂: Effect of pressure and temperature on capsaicinoid and colour extraction efficiency, Food Chemistry, Volume 87, Issue 1, August 2004, Pages 51-58, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2003.10.016.

(<http://www.sciencedirect.com/science/article/B6T6R-4B5BCD5-6/2/0c197c6202c1fae4470c1424ccaed925>)

Abstract:

The influence of operating parameters (pressure from 100 to 400 bar and temperature of 40, 60 and 80 [degree sign]C) on the extraction efficiency of capsaicinoids and colour components from chilli pepper (variety Byedige) was studied. Capsaicinoid content and colour value were determined in raw material and residue material after extraction. The colour intensities of residue material and obtained extracts were given by ASTA (American Spice Trade Association) and CU (Colour Unit) value, respectively. Total extraction yield and extraction efficiency of capsaicinoids increased with increasing pressure at constant temperature as well as with increasing temperature at constant pressure. The highest extraction yield for total solids of 12.8% was obtained at 400 bar and 40 [degree sign]C, where almost 96% of capsaicinoids and 80% of colour components were removed from the raw material. The highest CU value of chilli pepper extract, obtained by a single step extraction at 40 [degree sign]C and 400 bar, was approximately 15,000 CU. Calculated mass transfer coefficients of chilli pepper extract from solid material varied from 2×10^{-7} to 11×10^{-7} m s⁻¹ in the pressure range of 100-400 bar and temperature range 40-80 [degree sign]C. It was observed that the mass transfer coefficient is a linear function of the density of carbon dioxide in the range of applied operating conditions.

Keywords: Chilli pepper; Supercritical fluid extraction; Capsaicinoids; Colour intensity; Mass transfer coefficient

Ayhan Topuz, Feramuz Ozdemir, Influences of gamma irradiation and storage on the capsaicinoids of sun-dried and dehydrated paprika, Food Chemistry, Volume 86, Issue 4, August 2004, Pages 509-515, ISSN 0308-8146, DOI: 10.1016/j.foodchem.2003.09.003.

(<http://www.sciencedirect.com/science/article/B6T6R-4B0X60C-7/2/ae736468e8d9f2fb943f7ce17aa452f0>)

Abstract:

A study was conducted to investigate the changes in the pungent components (capsaicin, dihydrocapsaicin, homodihydrocapsaicin, isodihydrocapsaicin and nordihydrocapsaicin) of paprika as a function of drying method, gamma irradiation and storage period. Sun-dried and dehydrated paprika samples were irradiated by using a ^{60}Co gamma irradiator at five doses (0, 2.5, 5.0, 7.5 and 10 kGy) in polyethylene bags and stored at ambient temperature for 10 months. The capsaicinoid contents of the samples were analyzed by HPLC every 2 months within the 10 months. The major pungent components, capsaicin and dihydrocapsaicin, significantly ($P < 0.01$) increased with increasing irradiation doses. The increases of capsaicin, dihydrocapsaicin and homodihydrocapsaicin contents were about 10% with the dose of 10 kGy. In contrast, a significant ($P < 0.01$) decrease was observed in these components with storage. The levels of all capsaicinoids were significantly ($P < 0.01$) higher in dehydrated paprika than in sun-dried paprika. Nordihydrocapsaicin was found only in fresh red pepper. Although isodihydrocapsaicin was not detected in paprika during the first five months of the storage period, it was detected from the 6th month of the storage period. Hence, isodihydrocapsaicin might be used to identify paprika which has been stored for longer than six months.

Keywords: Capsicum annuum; Capsaicinoids; Drying method; Gamma irradiation; Storage

T. Komprda, D. Smela, P. Pechova, L. Kalhotka, J. Stencl, B. Klejdus, Effect of starter culture, spice mix and storage time and temperature on biogenic amine content of dry fermented sausages, *Meat Science*, Volume 67, Issue 4, August 2004, Pages 607-616, ISSN 0309-1740, DOI: 10.1016/j.meatsci.2004.01.003.

(<http://www.sciencedirect.com/science/article/B6T9G-4BT8GNF-3/2/5aa20e1580ac1255b0466d8053d66709>)

Abstract:

Two types of dry fermented sausage differing in spicing mixture and the diameter (low content of red pepper + diameter 80 mm, H-sausage; high content of red pepper + diameter 55 mm, P-sausage, respectively) were produced in parallel with two different starter cultures (*Pedococcus pentosaceus* + *Staphylococcus carnosus*, B-samples and *S. carnosus* + *Staphylococcus xylosus* + *Lactobacillus farciminis*, F-samples, respectively). The sausages were ripened 21 days and subsequently stored 91 days at the room temperature. Concentration of both most abundant amines, putrescine and tyramine (y ; mg/kg DM) increased significantly ($P < 0.01$) in HB-sausage during ripening (x ; days): $y = 2.5 + 18.13x - 0.3144x^2$ ($R^2 = 0.99$) and $y = 0.7 + 8.17x - 0.1130x^2$ ($R^2 = 0.99$), and also during storage: $y = 127.3 + 5.123x$ ($R^2 = 0.79$) and $y = 26.0 + 3.211x$ ($R^2 = 0.74$), respectively. At the end of ripening, putrescine (247 mg/kg DM) and tyramine (123 mg/kg DM) content in the HB-sausage was higher ($P < 0.05$) than in the PB-sausage (12 and 9 mg/kg DM, respectively), concentration of either of these amines was negligible (1 mg/kg DM) in either type of F-inoculated sausage. Both starter culture and sausage type influenced significantly ($P < 0.001$) both putrescine and tyramine content in the sausage; starter accounted for 57% and 55% of total variability in putrescine and tyramine content, respectively. Due to the significant ($P < 0.05$) increase of total aerobic counts in the HB-sausage between the end of ripening and the 7th day of storage, followed by the significant ($P < 0.01$) increase of the sum of total biogenic amines between the end of ripening (425 mg/kg DM) and the end of storage (1029 mg/kg DM), the storage of the dry fermented sausages at the room temperature should not be recommended.

Keywords: Biogenic amines; Tyramine; Putrescine; Food safety; Lactic acid bacteria; Storage; Fermented products

Hugo A. Caldironi, Diego J. Bentivegna, Miles R. Rhea, Irrigation of pepper plant (*Capsicum* sp.) with water containing acrolein, *Agricultural Water Management*, Volume 67, Issue 3, 1 July 2004, Pages 235-240, ISSN 0378-3774, DOI: 10.1016/j.agwat.2004.02.006.

(<http://www.sciencedirect.com/science/article/B6T3X-4C59TR2-2/2/02c3b6a9841f16d200bc5b5a0c9a78fc>)

Abstract:

MAGNACIDE(R) H herbicide (a.i. acrolein (2-propenal)) is an aquatic herbicide applied through underwater injection into agricultural irrigation canals for the control of submerged aquatic weeds. In support of the products national registration in Argentina, additional information was required pertaining to the potential persistence of acrolein residuals in plants irrigated with water treated with this herbicide. Pepper plants (*Capsicum* sp.) were treated through irrigation with the maximum application rate permitted (15 [mu]l l⁻¹) on the label and at double the maximum application rate (30 [mu]l l⁻¹), under controlled environmental conditions in a greenhouse. Reverse phase high-performance liquid chromatography (RP-HPLC) with fluorescence detection was the method used to determine acrolein. Parts of the plant (leaves, stems, roots and fruit) as well as soil were collected in order to determine potential residual levels of acrolein. The low values of acrolein measured in all samples were reduced to undetectable levels within a few hours, resulting a half-life of acrolein in pepper plants of 10.3 h. The plants did not exhibit any visible damage attributable to the aquatic herbicide. The most remarkable observation was that acrolein never persisted in any of the sampled plants. Therefore, it is safe to use water acrolein treated under controlled conditions through field application.

Keywords: 2-Propenal; Acrolein; Aquatic herbicides

Woo-Jin Jung, Yu-Lan Jin, Young-Cheol Kim, Kil-Yong Kim, Ro-Dong Park, Tae-Hwan Kim, Inoculation of *Paenibacillus illinoisensis* alleviates root mortality, activates of lignification-related enzymes, and induction of the isozymes in pepper plants infected by *Phytophthora capsici*, *Biological Control*, Volume 30, Issue 3, July 2004, Pages 645-652, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2004.03.006.

(<http://www.sciencedirect.com/science/article/B6WBP-4C4684V-1/2/dab5c6e9237d727abf309fa9d5635f8f>)

Abstract:

To investigate the variations of the enzymes responsible for lignification, after inoculation with *Phytophthora capsici* and/or *Paenibacillus illinoisensis* KJA-424, in relation to biocontrol of *Phytophthora* blight in pepper, roots of two-month-old plants were inoculated with *P. capsici* inoculation (P), and co-inoculation of *P. capsici* and *P. illinoisensis* cell cultures (P + A). Root mortality of pepper plants induced by inoculation of *P. capsici* was completely recovered by co-inoculation with antagonistic KJA-424. At day 7, peroxidase (POD) activity increased by 36.7% in P-treated roots but by 7.1% only in P + A-treated, compared with control. Polyphenol oxidase (PPO) activity increased for 3 days and then drastically decreased in P-treated roots but maintained a constant level in control and P + A-treated. At day 7, PPO activity in P-treated leaves decreased but recovered to the level of control in the P + A-treated. Three major POD isozymes (45, 53, and 114 kDa) were shown in P-treated roots, while two major (53 and 114 kDa) in control and P + A-treated, suggesting that the 45 kDa of POD was actively induced in P-treated roots but not induced in P + A-treated roots. A PPO isozyme of 80 kDa was induced in P-treated roots but not induced by co-treated with KJA-424. In leaves, the POD isozyme of 45 kDa appears to be systemically induced in P-treated only. The PPO isozyme of 80 kDa in leaves was not induced by pathogen challenge but recovered by co-inoculated with *P. illinoisensis*. All these results suggest that the inoculation of an antagonist, *P. illinoisensis* alleviates root mortality, activates of lignification-related enzymes and induction of the isozymes in pepper plants infected by *P. capsici*.

Keywords: *Paenibacillus illinoisensis*; *Phytophthora capsici*; *Phytophthora* blight; Peroxidase; Polyphenol oxidase; Phenylalanine ammonia-lyase

J. E. Gonzalez-Zamora, D. Leira, M. J. Bellido, C. Avilla, Evaluation of the effect of different insecticides on the survival and capacity of *Eretmocerus mundus* Mercet to control *Bemisia tabaci* (Gennadius) populations, *Crop Protection*, Volume 23, Issue 7, July 2004, Pages 611-618, ISSN 0261-2194, DOI: 10.1016/j.cropro.2003.11.011.

(<http://www.sciencedirect.com/science/article/B6T5T-4BJ20M7-1/2/15fb398284a6efa31dbe112a9cf0ce14>)

Abstract:

Two different experiments were carried out to evaluate three insecticides. In the first one, the effect of two insecticides, methomyl and indoxacarb, on pupae and adults of the whitefly *Bemisia tabaci* (Gennadius) parasitoid *Eretmocerus mundus* Mercet was evaluated under laboratory and greenhouse conditions, using sweet pepper (*Capsicum annuum* L.) plants. In the second experiment, oxamyl was tested to study its effect on the ability of *E. mundus* to parasitize and control *B. tabaci* in sweet pepper plants, using a greenhouse cage evaluation. Methomyl and indoxacarb caused low mortality of *E. mundus* pupae (17.6% and 7.8% respectively), although methomyl mortality was significantly higher. Methomyl produced 100% mortality on *E. mundus* adults with fresh and 24 h old residues on leaves, significantly higher than the mortality produced by indoxacarb (values ranged from 43.9% to 34.4%). The harmful effect of methomyl persisted for a long time (up to 60 days). The results of the experiment with oxamyl showed that *E. mundus* controlled whitefly population, without significant interaction between the presence of the parasitoid and insecticide on whitefly mortality. Whitefly mortality in the presence of the parasitoid was 87.8%, significantly higher than the mortality in the absence of *E. mundus* (59.3%). Oxamyl did not produce a significant effect on the emergence of *E. mundus* adults. Application of the products in IPM programs is discussed.

Keywords: *Eretmocerus mundus*; *Bemisia tabaci*; Indoxacarb; Oxamyl; Methomyl; Sweet pepper; Parasitism

I. Celik, I. Ortas, S. Kilic, Effects of compost, mycorrhiza, manure and fertilizer on some physical properties of a Chromoxerert soil, *Soil and Tillage Research*, Volume 78, Issue 1, July 2004, Pages 59-67, ISSN 0167-1987, DOI: 10.1016/j.still.2004.02.012.

(<http://www.sciencedirect.com/science/article/B6TC6-4C40V7N-1/2/fbc5f5671b3dfc4fb7488ecc7acf004e>)

Abstract:

Addition of organic materials of various origins to soil has been one of the most common rehabilitation practices to improve soil physical properties. Mycorrhiza has been known to play a significant role in forming stable soil aggregates. In this study, a 5-year field experiment was conducted to explore the role of mycorrhizal inoculation and organic fertilizers on the alteration of physical properties of a semi-arid Mediterranean soil (Entic Chromoxerert, Arik clay-loam soil). From 1995 to 1999, wheat (*Triticum aestivum* L.), pepper (*Capsicum annuum* L.), maize (*Zea mays* L.) and wheat were sequentially planted with one of five fertilizers: (1) control, (2) inorganic (160-26-83 kg N-P-K ha⁻¹), (3) compost at 25 t ha⁻¹, (4) farm manure at 25 t ha⁻¹ and (5) mycorrhiza-inoculated compost at 10 t ha⁻¹. Soil physical properties were significantly affected by organic fertilizers. For soil depths of 0-15 and 15-30 cm, mean weight diameter (MWD) was highest under the manure treatment while total porosity and saturated hydraulic conductivity were highest under the compost treatment. For a soil depth of 0-15 cm, the compost and manure-treated plots significantly decreased soil bulk density and increased soil organic matter concentration compared with other treatments. Compost and manure treatments increased available water content (AWC) of soils by 86 and 56%, respectively. The effect of inorganic fertilizer treatment on most soil physical properties was insignificant ($P>0.05$) compared with the control. Mycorrhizal inoculation+compost was more effective in improving soil physical properties than the inorganic treatment. Organic fertilizer sources were shown to have major positive effects on soil physical properties.

Keywords: Soil aggregation; Soil physical properties; Soil organic matter; Compost; Manure; Mineral fertilization; Mycorrhiza

S. Chatterton, J. C. Sutton, G. J. Boland, Timing *Pseudomonas chlororaphis* applications to control *Pythium aphanidermatum*, *Pythium dissotocum*, and root rot in hydroponic peppers, *Biological Control*, Volume 30, Issue 2, June 2004, Pages 360-373, ISSN 1049-9644, DOI: 10.1016/j.biocontrol.2003.11.001.

(<http://www.sciencedirect.com/science/article/B6WBP-4B6KF6F-1/2/4ecae75566e2b3572b3627cc72ad8e1f>)

Abstract:

The ability of the microbial agent *Pseudomonas* (Ps.) *chlororaphis* Tx-1 to suppress *Pythium aphanidermatum* and *Pythium dissotocum*, and control root rot, was investigated as a function of time of agent application and pathogen inoculation in vegetative-stage sweet peppers grown in single-plant hydroponic units. The agent was applied to the nutrient solution at 1×10^7 CFU/mL and roots were inoculated by immersion in suspensions of 5×10^3 or 1×10^4 zoospores/mL. When Ps. *chlororaphis* was applied at 14, 7, 3, or 0 days before roots were inoculated with P. *aphanidermatum*, treatments timed as follows were significantly, and often markedly, effective: 3 and 0 days against root colonization by the pathogen; 14, 7, and 3 days against brown root tips; and 7, 3, and 0 days against percent discolored roots. In a parallel study of P. *dissotocum*, each treatment suppressed symptoms, though inconsistently, but not colonization. When Ps. *chlororaphis* was applied once (day 0) or twice (days 0 and 14) and roots were inoculated with P. *aphanidermatum* on day 3 or day 17, the single treatment strongly suppressed colonization, brown root tips and percent colonization regardless of inoculation time, but the second treatment did not improve control. Density of Ps. *chlororaphis* associated with the roots after one or two applications, respectively, ranged up to $1.3\text{--}1.5 \times 10^5$ and $8.0 \times 10^6\text{--}1.6 \times 10^7$ CFU/g fresh roots. The density rapidly declined in noninoculated roots but generally remained high in roots inoculated with either pathogen. Collectively, the observations suggest that Ps. *chlororaphis* treatments should be timed to maintain about 105 CFU of the agent/g fresh roots, that more frequent application is needed to maintain the agent in healthy compared to infected roots, and that an ideal time for initial application is 3 days before an attack by P. *aphanidermatum* or P. *dissotocum*.

Keywords: *Capsicum annuum*; Hydroponic; *Pythium aphanidermatum*; *Pythium dissotocum*; *Pseudomonas chlororaphis*; Biological control

Norman Q. Arancon, Clive A. Edwards, Rola Atiyeh, James D. Metzger, Effects of vermicomposts produced from food waste on the growth and yields of greenhouse peppers, *Bioresource Technology*, Volume 93, Issue 2, June 2004, Pages 139-144, ISSN 0960-8524, DOI: 10.1016/j.biortech.2003.10.015.

(<http://www.sciencedirect.com/science/article/B6V24-4BGHHKX-4/2/6ef3251bd937e0fc98db5c845c7cb46b>)

Abstract:

Vermicomposts, produced commercially from food wastes, were substituted at a range of different concentrations into a soil-less commercial bedding plant container medium, Metro-Mix 360 (MM360), to evaluate their effects on the growth and yields of peppers in the greenhouse. Six-week-old peppers (*Capsicum annuum* L. var. California) were transplanted into 100%, 80%, 60%, 40%, 20% or 10% MM360 substituted with 0%, 10%, 20%, 40%, 60%, 80% and 100% vermicompost. All plants were watered three times weekly with 200 ppm Peter's Nutrient Solution from the time of transplanting up to 107 days. Peppers grown in potting mixtures containing 40% food waste vermicomposts and 60% MM360 yielded 45% more fruit weights and had 17% greater mean number of fruits than those grown in MM360 only. The mean heights, numbers of buds and numbers of flowers of peppers grown in potting mixtures containing 10-80% vermicompost although greater did not differ significantly from those of peppers grown in MM360. There were no positive correlations between the increases in pepper yields, and the amounts of mineral-N and microbial biomass-N in the potting mixtures, or the concentrations of nitrogen in the shoot tissues of peppers. Factors such as: an improvement of the physical structure of the potting medium,

increases in populations of beneficial microorganisms and the potential availability of plant growth-influencing-substances produced by microorganisms in vermicomposts, could have contributed to the increased pepper yields obtained.

Keywords: Food waste; Vermicomposts; Pepper; Plant growth; Yield

Young-Cheol Yang, Il-Kwon Park, Eun-Hee Kim, Hoi-Seon Lee, Young-Joon Ahn, Larvicidal Activity of Medicinal Plant Extracts Against *Aedes aegypti*, *Ochlerotatus togoi*, and *Culex pipiens pallens* (Diptera: Culicidae), *Journal of Asia-Pacific Entomology*, Volume 7, Issue 2, June 2004, Pages 227-232, ISSN 1226-8615, DOI: 10.1016/S1226-8615(08)60220-4.

(<http://www.sciencedirect.com/science/article/B8JJN-4V6K5N5-C/2/5bbd7d45b2bbe1010422853e6f40eb58>)

Abstract:

The toxicities of methanol extracts from 28 medicinal plant species to early 4th instar larvae of *Aedes aegypti*, *Ochlerotatus togoi* (*Aedes togoi*), and *Culex pipiens pallens* were determined in the laboratory. Responses varied according to plant and mosquito species. At a concentration of 100 ppm, >90% mortality of the three species was obtained with the extracts of *Cinnamomum cassia* bark, *Illicium verum* fruit, *Piper nigrum* fruit, *Zanthoxylum piperitum* fruit, and *Kaempferia galanga* rhizome. *P. nigrum* fruit extract gave 100% mortality of larvae of *Ae. aegypti* and *O. togoi* at 5 ppm and 96% mortality of larvae of *C. pipiens pallens* at 2.5 ppm. *Z. piperitum* fruit extract gave 85, 100, and 48% mortality in larvae of *Ae. aegypti*, *O. togoi*, and *Cx. pipiens pallens* at 10 ppm, respectively. The plants described merit further study as potential mosquito larval control agents.

Keywords: *Aedes aegypti*; Biopesticides; *Culex pipiens pallens*; medicinal plants; mosquito larvicides; natural insecticides; *Ochlerotatus togoi*

Jeum Kyu Hong, Ho Won Jung, Byung Kook Lee, Sung Chul Lee, Yeon Kyeong Lee, Byung Kook Hwang, An osmotin-like protein gene, CAOSM1, from pepper: differential expression and in situ localization of its mRNA during pathogen infection and abiotic stress, *Physiological and Molecular Plant Pathology*, Volume 64, Issue 6, June 2004, Pages 301-310, ISSN 0885-5765, DOI: 10.1016/j.pmpp.2004.10.004.

(<http://www.sciencedirect.com/science/article/B6WPC-4FDJN78-2/2/3be29f6d314596083d2c644c1ce1d939>)

Abstract:

An osmotin-like protein (CAOSM1) gene was isolated from pepper leaves infected with the avirulent strain Bv5-4a of *Xanthomonas campestris* pv. *vesicatoria*. The cDNA encoded a polypeptide of 250 amino acids with a molecular mass of 27,361 Da. Its amino acid sequence was highly homologous to various osmotin-like proteins from other plant species. The CAOSM1 gene expression was organ- and tissue-specifically regulated in pepper plants. The CAOSM1 mRNA was intensely localized in the endodermis area of root tissue and in the phloem cells of vascular bundles of red fruit tissue, but not in leaf, stem, and green fruit tissues of the healthy pepper plants. Infection by *X. c.* pv. *vesicatoria*, *Colletotrichum coccodes*, or *Phytophthora capsici* induced CAOSM1 transcription in the leaf and stem tissues. Expression of the CAOSM1 gene was somewhat higher and earlier in the incompatible than the compatible interactions in pepper leaves infected by pathogens. The CAOSM1 mRNA was prevalently localized in the phloem cells of the vascular bundle of leaf tissues infected by *C. coccodes*. The CAOSM1 gene was activated in leaf tissues by treatment with ethylene, methyl jasmonate, high salinity, cold acclimation and mechanical wounding, but not by abscisic acid (ABA) and drought. These results indicate that the pepper CAOSM1 protein might play a role in the response to certain pathogens.

Keywords: *Capsicum annuum*; Osmotin protein; Pathogen infection; Abiotic stress; In situ mRNA localization

Christina Walz, Patrick Giavalisco, Martina Schad, Melanie Juenger, Joachim Klose, Julia Kehr, Proteomics of curcubit phloem exudate reveals a network of defence proteins, *Phytochemistry*, Volume 65, Issue 12, Proteomics 2, June 2004, Pages 1795-1804, ISSN 0031-9422, DOI: 10.1016/j.phytochem.2004.04.006.

(<http://www.sciencedirect.com/science/article/B6TH7-4CC7R29-1/2/c62d35053249d5435e27c154bba0a53c>)

Abstract:

Many different proteins can be separated from the sap of mature sieve tubes of different plant species. To date, only a limited number of those have been identified and functionally characterised. Due to sieve tubes inability of transcription and translation, the proteins are most probably synthesised in the intimately connected companion cells and transported into the sieve elements through plasmodesmata. The specific protein composition of phloem sap suggests an important role of these proteins not only for sieve tube maintenance, but also for whole plant physiology and development.

Here we describe a comprehensive analysis of the phloem protein composition employing one- and high-resolution two-dimensional gel electrophoresis and partial sequencing by mass spectrometry. In this study more than 300 partial sequences generated by hybrid mass spectrometry were used to identify a total of 45 different proteins from the phloem exudates of cucumber (*Cucumis sativus* L. cv. Hoffmanns Giganta) and pumpkin (*Cucurbita maxima* Duch. cv. Gelber Zentner) plants. In addition to previously described phloem proteins, it was possible to localise proteins with high similarity to an acyl-CoA binding protein, a glyoxalase, a malate dehydrogenase, a rhodanese-like protein, a drought-induced protein, and a [ss]-glucosidase. The results indicate that the majority of the so far identified proteins are involved in stress and defence reactions.

Keywords: *Cucumis sativus*; *Cucurbita maxima*; Cucurbitaceae; Mass spectrometry; Phloem; Proteins; Stress

Bert H. Dijkink, Monic M. Tomassen, Jeroen H. A. Willemsen, Wouter G. van Doorn, Humidity control during bell pepper storage, using a hollow fiber membrane contactor system, *Postharvest Biology and Technology*, Volume 32, Issue 3, June 2004, Pages 311-320, ISSN 0925-5214, DOI: 10.1016/j.postharvbio.2003.12.002.

(<http://www.sciencedirect.com/science/article/B6TBJ-4CDJJNP-2/2/b106b823c748b21d4993d30028e53326>)

Abstract:

Green bell peppers (*Capsicum annuum* cv. Cardio) were stored in open crates at 5 [degree sign]C, using a novel system for maintenance of relative humidity (RH). A hollow fiber membrane contactor allowed adequate transfer of water vapor between the air in the storage room and a liquid desiccant. The membrane was made of polyetherimide (PEI), coated on the inside with a thin non-porous silicone layer. The desiccant was a dilute aqueous glycerol solution, which was pumped through the hollow fibers at a low flow rate. Produce was placed in ventilated 500 l containers with a closed lid. During the 3 weeks of the experiment, RH could be maintained within a narrow range each day (e.g. 90.5+/-0.1%). RH could be changed by adjusting the glycerol concentration and/or the temperature of the desiccant. The control was a 550 l container connected to the hollow fiber membrane set up which had no glycerol solution (average RH 93%). The contactor thus removed water vapor in this set up.

The quality of the bell peppers (visible peel shrivelling and fungus development), after 3 weeks of storage, was highly dependent on RH. Compared with the control container and with packaging in conventional cardboard boxes for bell peppers (average RH 86%), the contactor system reduced fungus development without increasing shrivelling. The improvement compared with cardboard boxes was presumably due to reduction of local differences in RH. Such differences were avoided

in the containers where the packaging was very open (open crates, with space in between them, and only two layers of fruit) and where the airflow was rather high.

In preliminary experiments with red currants and pears the contactor system also functioned well (a) at subzero temperatures, (b) when it was combined with controlled atmosphere (1.5% oxygen and 20% carbon dioxide), or (c) when it released water vapor. It is concluded that the system is promising for the large-scale storage of several fresh commodities.

Keywords: Capsicum annum; Green bell pepper; Humidity control; Storage; Cooling; Membrane contactor

N. Goicoechea, J. Aguirreolea, J. M. Garcia-Mina, Alleviation of verticillium wilt in pepper (*Capsicum annum* L.) by using the organic amendment COA H of natural origin, *Scientia Horticulturae*, Volume 101, Issues 1-2, 3 May 2004, Pages 23-37, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.09.015.

(<http://www.sciencedirect.com/science/article/B6TC3-4B4PWK7-2/2/90b6bc7225aef70f3a3b1358655eaa8>)

Abstract:

Pepper seedlings cv. 'Piquillo' were grown for 3 months in unamended medium with organic growing medium COA H (containing salicylic acid (SA), soluble ammonium salts and sea weed extract from *Ascophyllum nodosum*) inoculated or not inoculated with *Verticillium dahliae* Kleb. and in amended growing medium with COA H inoculated or not inoculated with *V. dahliae*. Seedling growth parameters, leaf content of relative water and chlorophyll, leaf gas exchange and resistance as well as total phenolics in stems were determined on days 0, 7, 21, 28 and 33 after inoculation with *V. dahliae*. SA in stems was measured on days 0, 21 and 33 and leaf nutrient content was analysed on day 33. Results indicate that the organic amendment COA H delayed senescence in *Verticillium*-inoculated seedlings. In fact, inoculated seedlings that received COA H always exhibited similar leaf resistance to water vapour as well as leaf content of chlorophyll, relative water and nutrients to their relative healthy controls. By contrast, the content of chlorophyll a and relative water in leaves from unamended seedlings significantly decreased on days 21 and 28, respectively, reaching values 30 and 20% lower than those found in the unamended healthy controls. Likewise, the content of chlorophyll b, potassium (K) and magnesium (Mg) in leaves from unamended seedlings inoculated with *V. dahliae* had declined 35, 40 and 50%, respectively, of the control values by day 33 after pathogen inoculation. On the other hand, while *Verticillium*-inoculated seedlings grown in amended medium with COA H maintained control photosynthetic rates for 21 days after inoculation, CO₂ exchange rates decreased from day 21 in unamended ones and the leaf resistance in these seedlings enhanced 50% 1 week after inoculation. In addition, *Verticillium*-inoculated seedlings supplied with COA H delayed the appearance of disease symptoms and their disease index on day 33 was about 40% lower than that measured in unamended pepper. The early accumulation of phenolics (from day 7 after inoculation) in pepper grown in amended medium with COA H could be involved in the greater disease resistance and/or tolerance exhibited by these seedlings.

Keywords: Disease resistance; Pepper; Phenolics; *Verticillium dahliae*

R. Kulcu, O. Yaldiz, Determination of aeration rate and kinetics of composting some agricultural wastes, *Bioresource Technology*, Volume 93, Issue 1, May 2004, Pages 49-57, ISSN 0960-8524, DOI: 10.1016/j.biortech.2003.10.007.

(<http://www.sciencedirect.com/science/article/B6V24-4B7YBK5-9/2/e0f245f1a6618d15bcbb5c8daf347b2>)

Abstract:

This study aimed to determine the aeration rate and its kinetics in aerobic composting of agricultural wastes. For this aim compost materials were prepared by mixing grass trimmings, tomato, pepper, and eggplant wastes.

Four vertical forced aeration type reactors and one vertical natural convection type reactor were manufactured to apply four different aeration rates.

CO₂ rate and temperature changes were recorded in three different places in the reactors. Moisture content, pH and organic material rate were recorded each day. While process-monitoring parameters (CO₂, temperature, pH, moisture content) were used for interpretation of the process, organic material degradation was used for interpretation of the process success.

The seven different kinetic models were applied for modeling decomposition rate to the experimental values. According to the results, four of these models were found applicable to this study. These models were analyzed with some statistical methods as root mean square error (RMSE), chi-square (χ^2), and modeling efficiency (EF). According to the statistical results of these models, the best model was found as: where kT is the rate of decomposition (g VS/g VS day); T the process temperature ($^{\circ}\text{C}$); M_c the daily moisture content (%wb); C the daily CO₂ rate in composting reactor (%) and a , b , c , d are constants.

According to the results, the highest organic matter degradation and temperature value were obtained at the aeration rate of 0.4 l air min⁻¹ kgom⁻¹. Thus, it could be applied to this mixed materials composting process.

Keywords: Composting; Kinetics; Aeration rate; Agricultural wastes

Hyun Mee Do, Sung Chul Lee, Ho Won Jung, Kee Hoon Sohn, Byung Kook Hwang, Differential expression and in situ localization of a pepper defensin (CADEF1) gene in response to pathogen infection, abiotic elicitors and environmental stresses in *Capsicum annuum*, Plant Science, Volume 166, Issue 5, May 2004, Pages 1297-1305, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2004.01.008. (<http://www.sciencedirect.com/science/article/B6TBH-4BMJC10-1/2/f95ce0de7b6113446ea4808422ec2be8>)

Abstract:

Pepper defensin (CADEF1) clone was isolated from cDNA library constructed from pepper leaves infected with avirulent strain Bv5-4a of *Xanthomonas campestris* pv. *vesicatoria*. Putative protein encoded by CADEF1 gene consists of 78 amino acids including eight conserved cysteine residues to form four structure-stabilizing disulfide bridges. Transcription of the CADEF1 gene was earlier and more strongly induced by *X. campestris* pv. *vesicatoria* infection in the incompatible than in the compatible interaction. CADEF1 mRNA was constitutively expressed in stem, root and green fruit of pepper. Transcripts of CADEF1 gene drastically accumulated in pepper leaf tissues treated with salicylic acid (SA), methyl jasmonate (MeJA), abscisic acid (ABA), hydrogen peroxide (H₂O₂), benzothiadiazole (BTH) and β -amino-n-butyric acid (BABA). In situ hybridization results revealed that CADEF1 mRNA was localized in the phloem areas of vascular bundles in leaf tissues treated with exogenous SA, MeJA and ABA. Strong accumulation of CADEF1 mRNA occurred in pepper leaves in response to wounding, high salinity and drought stress. These results suggest that bacterial pathogen infection, abiotic elicitors and some environmental stresses may play a significant role in signal transduction pathway for CADEF1 gene expression.

Keywords: Abiotic elicitor; Defensin; Environmental stresses; Pathogenesis-related protein

James P. Gilreath, Joseph W. Noling, Bielinski M. Santos, Methyl bromide alternatives for bell pepper (*Capsicum annuum*) and cucumber (*Cucumis sativus*) rotations, Crop Protection, Volume 23, Issue 4, April 2004, Pages 347-351, ISSN 0261-2194, DOI: 10.1016/j.cropro.2003.09.006. (<http://www.sciencedirect.com/science/article/B6T5T-49WMWGG-3/2/f4d609a7b7db55a52c6d3fcb7ce26d8>)

Abstract:

Two field trials were conducted to determine the effect of soil fumigant and herbicide combinations as potential alternatives for methyl bromide (MBr) in bell pepper-cucumber rotations. For the first bell pepper-cucumber trial, fumigant levels were a non-treated control, MBr+chloropicrin (Pic) (67/33%, respectively) at a rate of 400 kg/ha, Pic at 400 kg/ha, metam sodium (MNa) at 945 l/ha,

1,3-dichloropropene (1,3-D)+Pic (83/17%, respectively) at 330 l/ha, and anhydrous ammonia (ANH₄) at 300 l/ha. For the second bell pepper-cucumber trial, fumigants levels were the same, except that ANH₄ was substituted by 1,3-D+Pic (65/35%, respectively) at 330 l a.i./ha. Fumigants were only applied during the bell pepper seasons. Herbicides used were napropamide at 4.50 kg/ha, metolachlor at 2.25 kg/ha, pebulate at 4.50 kg/ha, in addition to an untreated check. Applied herbicides did not interact with fumigants and had excellent control of goosegrass (*Eleusine indica* L.), southern crabgrass (*Digitaria ciliaris* L.) and smooth pigweed (*Amaranthus hybridus* L.), but only poor to fair control of purple nutsedge (*Cyperus rotundus* L.). The fumigants 1,3-D+17% Pic, MNa, and Pic had reduced nematode root galling compared with the unchecked control. All fumigants tested for bell pepper, except ANH₄, successfully showed significant residual effects for cucumbers in the same plots. In most cases, 1,3-D+17% Pic, and Pic were comparable to MBr.

Keywords: Soil fumigant; 1,3-dichloropropene; Chloropicrin; Metam sodium; Napropamide; Metolachlor; Pebulate

Natalia V. Ullrich, Riva Touger-Decker, Julie O'Sullivan-Maillet, Beverly J. Tepper, PROP taster status and self-perceived food adventurousness influence food preferences, *Journal of the American Dietetic Association*, Volume 104, Issue 4, April 2004, Pages 543-549, ISSN 0002-8223, DOI: 10.1016/j.jada.2004.01.011.

(<http://www.sciencedirect.com/science/article/B758G-4C1DT7Y-K/2/a49f0ec775ba0365df7583204fa0f764>)

Abstract: Objective

To determine the influence of 6-n-propylthiouracil (PROP) taster status and food adventurousness on liking of bitter, hot, and pungent foods. Design

Self-reported survey of food likes/dislikes for 70 foods. Subjects were classified as tasters or nontasters of PROP using a standard screening procedure. By their response to a query regarding their perceived frequency of trying unfamiliar foods, subjects were characterized as being more or less adventurous. Subjects

A convenience sample of 232 healthy adults, 18 to 55 years of age, was recruited from the local community. Statistical analyses

Individual foods were grouped using Principal Component Analysis. Analysis of variance was used to assess differences in liking of food groups as a function of PROP status and food adventurousness. Results

PROP tasters who were more food adventurous liked chili peppers and hot sauce, other pungent condiments, strong alcohol, and bitter fruits and vegetables more than tasters who were less food adventurous ($P \leq .05-.001$). Nontasters liked most foods, and food adventurousness had little influence on food liking for these individuals. Conclusions

Food adventurous PROP tasters liked a wide variety of strong-tasting foods, whereas tasters who were less food adventurous showed the classic dislike of bitter, hot, and pungent foods. Previous studies might have overestimated the influence of PROP taster status on rejection of strong-tasting foods by not distinguishing individuals by food adventurousness.

Hye-Jung Lee, Da-Eun Lee, Suk-Bong Ha, Soo-Won Jang, In-Jung Lee, Stephen B. Ryu, Kyounghwan Back, The characterization of transgenic rice plants expressing a pepper 5-epi aristolochene synthase, the first committed step enzyme for capsidiol synthesis in isoprenoid pathway, *Plant Science*, Volume 166, Issue 4, April 2004, Pages 881-887, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.11.026.

(<http://www.sciencedirect.com/science/article/B6TBH-4B8K7BV-1/2/96313eb6ba87d795c8b07066285d2cd8>)

Abstract:

5-Epi-aristolochene synthase (EAS) from *Capsicum annuum* was introduced into the rice genome under the control of a maize ubiquitin promoter by *Agrobacterium*-mediated transformation. Fifteen

independent transgenic rice plants were isolated and characterized. The integration and expression of the transgene were verified through the use of Southern, Northern, and Western blot analyses. The heterologous expression of EAS in transgenic rice did not interfere with the activities of endogenous squalene synthase (SS) or farnesyl diphosphatase (FDPase), in which both enzymes used the same substrate-farnesyl diphosphate (FDP), for the production of squalene and farnesol, respectively. Transgenic rice cells exhibited the induction of EAS enzyme activity upon elicitor (N-acetylchitohexaose) and jasmonic acid (JA) treatments. The induction of EAS enzyme activity was accompanied by an increase in EAS mRNA when challenged by the elicitor. Results indicated that the maize ubiquitin promoter was upregulated upon jasmonic acid and elicitor treatments. Results also show that the EAS ectopic expression in transgenic rice plants resulted in the synthesis of 5-epi-aristolochene in vivo upon elicitor treatment, suggesting that the heterologous expression of pepper EAS is coupled with the endogenous biosynthetic pathway channel of isoprenoid in rice cells.

Keywords: 5-Epi-aristolochene synthase; Transgenic rice; Maize ubiquitin promoter; Isoprenoid; Capsidiol; 5-Epi-aristolochene

Norio Katoh, Mamiko Yui, Seiki Sato, Takeshi Shirai, Hiroshi Yuasa, Manabu Hagimori, Production of virus-free plants from virus-infected sweet pepper by in vitro grafting, *Scientia Horticulturae*, Volume 100, Issues 1-4, 19 March 2004, Pages 1-6, ISSN 0304-4238, DOI: 10.1016/j.scienta.2003.08.015.

(<http://www.sciencedirect.com/science/article/B6TC3-49W1WRF-2/2/97536952aac465997fc4a2641187e819>)

Abstract:

A method has been developed to obtain virus-free sweet pepper plants from apical meristems by in vitro grafting. The shoot tips (0.4-0.8 mm) excised from virus-infected plants in a green house were grafted onto decapitated rootstock seedlings. The shoot tip was an apical meristem with two to four leaf primordia. Shoot development was observed in 2-83% of grafted shoot tips. By this method, virus-free plants were produced from the mother plants infected with Tobacco mosaic virus (TMV) or with Tomato spotted wilt virus (TSWV) or with both viruses.

Keywords: Apical meristem; Capsicum; In vitro grafting; Sweet pepper; Virus-free plants

James P. Gilreath, Bielinski M. Santos, Herbicide dose and incorporation depth in combination with 1,3-dichloropropene plus chloropicrin for *Cyperus rotundus* control in tomato and pepper, *Crop Protection*, Volume 23, Issue 3, March 2004, Pages 205-210, ISSN 0261-2194, DOI: 10.1016/j.cropro.2003.08.015.

(<http://www.sciencedirect.com/science/article/B6T5T-49P48GV-3/2/5d095a3d71f7c64936c36b48449acf1b>)

Abstract:

Field trials were conducted to compare the efficacy of various herbicides in combination with 1,3-dichloropropene plus chloropicrin (C-17) on *Cyperus rotundus* (purple nutsedge) control and their effect on tomato and pepper yields, and to determine the appropriate herbicide application depth in the soil for purple nutsedge control in polyethylene-mulched tomato and pepper fields. The various chemical treatments were incorporated into the soil. High doses and deep incorporation of napropamide and metolachlor provided the best weed control. Tomato data revealed that although C-17 reduced purple nutsedge density, the fumigant alone was insufficient to avoid tomato yield losses. Therefore, adding an herbicide to enhance purple nutsedge control is necessary. In pepper, yield improved as purple nutsedge density declined with the application of C-17 alone, indicating that for the purple nutsedge density present, C-17 alone could effectively reduce pepper yield losses.

Keywords: *Cyperus rotundus*; Soil fumigants; Napropamide; Metolachlor; Pebulate

Raymond W. M. Fung, Chien Y. Wang, David L. Smith, Kenneth C. Gross, Meisheng Tian, MeSA and MeJA increase steady-state transcript levels of alternative oxidase and resistance against chilling injury in sweet peppers (*Capsicum annuum* L.), *Plant Science*, Volume 166, Issue 3, March 2004, Pages 711-719, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.11.009.

(<http://www.sciencedirect.com/science/article/B6TBH-4B5366B-4/2/c3406b778894c621b549317152fda1d1>)

Abstract:

Methyl salicylate (MeSA) and methyl jasmonate (MeJA) vapors increased resistance against chilling injury in freshly harvested green bell pepper (*Capsicum annuum* L. cv Century). The period within 2 days of cold storage was considered the most critical because chilling injury symptom (surface pitting) was not apparent. The expression patterns of alternative oxidase (AOX) and seven other genes involved in defense against oxidative stress before and during the early chilling period suggested that pre-treatment of pepper fruit with MeSA or MeJA vapors increased preferentially the transcript levels of AOX. Overnight treatment with MeSA or MeJA vapors increased transcript levels of AOX (1.5 kb) even at room temperature of 25 [degree sign]C, whereas no change was observed with untreated control. In addition to the expected 1.5 kb AOX transcript, RNA gel blot analysis revealed an extra 3.5 kb transcript that was induced only at 0 [degree sign]C. At 0 [degree sign]C, both AOX transcripts (1.5 and 3.5 kb) reached maximal levels firstly in MeSA treated fruit, secondly in MeJA treated fruit and lastly in controls. Compared with freshly harvested peppers, overnight treatment of wholesaler peppers with MeJA does not increase AOX transcript level and no differences in chilling injury symptom were observed between treated and control fruit. AOX transcript level in peppers from farm and wholesaler were maintained at a high level as long as the fruits were kept at 0 [degree sign]C. Transcript levels of AOX (1.5 kb) were increased by storage at low temperature but the steady-state mRNA accumulation rate was faster at 0 than at 5 [degree sign]C. Alternative respiratory pathway was proposed to mediate chilling injury. Here, we show that the increase in AOX transcript levels by MeJA or MeSA before cold treatment was correlated with reduced incidence of chilling injury.

Keywords: *Capsicum*; AOX; Methyl salicylate; Methyl jasmonate; Antioxidative enzyme; Chilling injury

M. Uyttendaele, K. Neyts, H. Vanderswalmen, E. Notebaert, J. Debevere, Control of *Aeromonas* on minimally processed vegetables by decontamination with lactic acid, chlorinated water, or thyme essential oil solution, *International Journal of Food Microbiology*, Volume 90, Issue 3, 1 February 2004, Pages 263-271, ISSN 0168-1605, DOI: 10.1016/S0168-1605(03)00309-X.

(<http://www.sciencedirect.com/science/article/B6T7K-496NMY9-1/2/af4b6709eec95e03f9a6cae06ad6216b>)

Abstract:

Aeromonas is an opportunistic pathogen, which, although in low numbers, may be present on minimally processed vegetables. Although the intrinsic and extrinsic factors of minimally processed prepacked vegetable mixes are not inhibitory to the growth of *Aeromonas* species, multiplication to high numbers during processing and storage of naturally contaminated grated carrots, mixed lettuce, and chopped bell peppers was not observed. *Aeromonas* was shown to be resistant towards chlorination of water, but was susceptible to 1% and 2% lactic acid and 0.5% and 1.0% thyme essential oil treatment, although the latter provoked adverse sensory properties when applied for decontamination of chopped bell peppers. Integration of a decontamination step with 2% lactic acid in the processing line of grated carrots was shown to have the potential to control the overall microbial quality of the grated carrots and was particularly effective towards *Aeromonas*.

Keywords: *Aeromonas*; Minimal processing; Vegetables; Decontamination; Lactic acid; Chlorination; Thyme essential oil

Francisco J. Cabanero, Vicente Martinez, Micaela Carvajal, Does calcium determine water uptake under saline conditions in pepper plants, or is it water flux which determines calcium uptake?, *Plant Science*, Volume 166, Issue 2, February 2004, Pages 443-450, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.10.010.

(<http://www.sciencedirect.com/science/article/B6TBH-4B3JMTJ-1/2/4ebc16093c736abd4828c25ef7414072>)

Abstract:

Under saline conditions, we investigated the effects of root-zone temperature on pepper plants (*Capsicum annum* L.) treated with extra calcium, in order to study the influence of this parameter on water and calcium uptake. The treatments, for plants cultivated hydroponically in a controlled environment chamber, were control, NaCl (50 mM), Ca²⁺ (10 mM) and Ca²⁺ (10 mM) + NaCl (50 mM), all at 25 and 35 [degree sign]C root temperature. After these treatments, it could be seen that salinity reduced the concentration of calcium in roots and leaves, which were restored when calcium was added to saline-stressed plants. This effect of calcium was increased when plants were grown at 35 [degree sign]C root-zone temperature. The effect of both high temperature and extra supply of calcium influenced plant water relations, involving functionality of aquaporins. Therefore, the negative effect of salinity, with respect to tissue calcium concentration and water relations, was mitigated if there was a supply of Ca²⁺, this effect being greater when the root-zone temperature was increased.

Keywords: Aquaporins; Calcium; *Capsicum annum* L.; Salinity; Root-zone temperature; Water relations

Shimon Mayak, Tsipora Tirosh, Bernard R. Glick, Plant growth-promoting bacteria that confer resistance to water stress in tomatoes and peppers, *Plant Science*, Volume 166, Issue 2, February 2004, Pages 525-530, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.10.025.

(<http://www.sciencedirect.com/science/article/B6TBH-4B3NHGJ-3/2/1d2bb4327a62d299684fd7fb78b69901>)

Abstract:

The work reported here evaluates whether bacteria populating arid and salty environments can confer resistance in tomato and pepper plants to water stress. Plant growth-promoting bacteria that have ACC deaminase activity were isolated from soil samples taken from the Arava region of southern Israel. One of these strains, *Achromobacter piechaudii* ARV8 [Mayak et al., Plant growth-promoting bacteria that confer resistance in tomato and pepper plants to salt stress, submitted for publication.] significantly increased the fresh and dry weights of both tomato and pepper seedlings exposed to transient water stress. In addition, the bacterium reduced the production of ethylene by tomato seedlings, following water stress. During water deprivation the bacterium did not influence the reduction in relative water content; however, it significantly improved the recovery of plants when watering was resumed. Inoculation of tomato plants with the bacterium resulted in continued plant growth during both the water stress and after watering was resumed. Based on the results of the experiments reported herein, the use of plant growth-promoting bacteria such as *A. piechaudii* ARV8 may provide a means of facilitating plant growth in arid environments.

Keywords: Tomato; Pepper; PGPB; Water stress; Drought; RWC

Burhan Ozkan, Ahmet Kurklu, Handan Akcaoz, An input-output energy analysis in greenhouse vegetable production: a case study for Antalya region of Turkey, *Biomass and Bioenergy*, Volume 26, Issue 1, January 2004, Pages 89-95, ISSN 0961-9534, DOI: 10.1016/S0961-9534(03)00080-1.

(<http://www.sciencedirect.com/science/article/B6V22-48TM585-2/2/cc5807c051d1824fee69a4a31af6f120>)

Abstract:

The aim of this research was to examine the energy equivalents of inputs and output in greenhouse vegetable production in the Antalya province of Turkey. For this purpose, the data for

the production of four greenhouse crops (tomato, cucumber, eggplant and pepper) were collected in eighty-eight greenhouse farms by questionnaire. The results revealed that cucumber production was the most energy intensive of among the four crops investigated. Cucumber production consumed a total of 134.77 GJha⁻¹ followed by tomato with 127.32 GJha⁻¹. The consumption of energy by eggplants and pepper were 98.68 and 80.25 GJha⁻¹, respectively. The output-input energy ratio for greenhouse tomato, pepper, cucumber and eggplant were estimated to be 1.26, 0.99, 0.76 and 0.61, respectively. This indicated an intensive use of inputs in greenhouse vegetable production not accompanied by increase in the final product. This can lead to problems associated with these inputs such as global warming, nutrient loading and pesticide pollution. Therefore, there is a need to pursue a new policy to force producers to undertake energy efficient practices to increase the yield without diminishing natural resources.

Keywords: Energy equivalent; Energy Use; Input-output; Greenhouses; Vegetables; Antalya

C. Chaya, C. Perez-Hugalde, L. Judez, C. S. Wee, J. -X. Guinard, Use of the STATIS method to analyze time-intensity profiling data, Food Quality and Preference, Volume 15, Issue 1, January 2004, Pages 3-12, ISSN 0950-3293, DOI: 10.1016/S0950-3293(02)00219-7.

(<http://www.sciencedirect.com/science/article/B6T6T-487N0GD-7/2/3264e78e2a64c2e530d6c2fb6d63da2c>)

Abstract:

The sensory properties (sourness, pepper, oily, fatty/creamy and garlic) of nine Ranch salad dressing samples varying in fat and garlic flavor according to a 32 factorial design were evaluated by time-intensity profiling (TIP). The dynamic and complex processes involved in the perception of these attributes were analyzed with the STATIS method (Structuration des Tableaux A Trois Indices de la Statistique). STATIS allows for the simultaneous analysis of several data matrices, where each matrix consists of the data recorded by TIP at a given instant. STATIS analysis revealed the existence of a common sensory structure during the early and central portions of the time-intensity evaluations (from 6 to 50 s), i.e., the respective positions of the salad dressing samples changed very little during that time period. The compromise matrix obtained for all the instants in the evaluation provided a summary of the sensory properties of the dressing during that 6-50 s period. A different distribution of the samples was observed, however, at the beginning (3 s) and towards the end (75 and 120 s) of the evaluations, with lesser contributions of these instants to the compromise plot. The first two principal components of the compromise space, which accounted for 65 and 11% of the variance, respectively, contrasted the attribute fatty/creamy with the other four attributes. This is the first time the STATIS method has been used to analyze time-intensity curves. The main improvement of the method over other approaches is its ability to determine which portions (start, central portion, tail end) of a TI curve are most critical to the understanding of intensity and time course differences among products.

Keywords: STATIS; Time-intensity profiling; Salad dressing

Ezio Portis, Alberto Acquadro, Cinzia Comino, Sergio Lanteri, Analysis of DNA methylation during germination of pepper (*Capsicum annuum* L.) seeds using methylation-sensitive amplification polymorphism (MSAP), Plant Science, Volume 166, Issue 1, January 2004, Pages 169-178, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.09.004.

(<http://www.sciencedirect.com/science/article/B6TBH-49S6S6D-2/2/26c4d39f1adb07129a1942f6142e3056>)

Abstract:

DNA methylation in plants is related to a number of epigenetic (i.e. heritable, but potentially reversible) phenomena. Heavy methylation of cytosine residues plays an important role in gene expression, and significant differences in cytosine methylation levels have been observed among various tissue types, which can be explained as one of the regulatory mechanisms during development and differentiation. Here, we report on the analysis of cytosine methylation during

pepper seed germination using an adaptation of the AFLP technique called methylation-sensitive amplified polymorphism (MSAP). Notable changes in MSAP profiles of genomic DNA obtained from embryo tissues of dry seeds and germinating seeds were detected. The changes were mainly: (i) fragments not detected in dry seeds were present after digestion with both EcoRI/HpaII and EcoRI/MspI at a certain stage during germination; (ii) fragments present after both digestions in dry seeds were no longer detected upon germination. Although changes in MSAP patterns during germination are not easily interpreted, our results can be mainly attributed to demethylation events, which appear to be necessary for transcriptional activation during germination. The potential and limits of MSAP in the analysis of DNA methylation status are discussed.

Keywords: DNA methylation; Isoschizomers; AFLP; Germination; Sweet pepper

Ernesto Garcia-Pineda, Elda Castro-Mercado, Edmundo Lozoya-Gloria, Gene expression and enzyme activity of pepper (*Capsicum annuum* L.) ascorbate oxidase during elicitor and wounding stress, *Plant Science*, Volume 166, Issue 1, January 2004, Pages 237-243, ISSN 0168-9452, DOI: 10.1016/j.plantsci.2003.09.013.

(<http://www.sciencedirect.com/science/article/B6TBH-49WPBRN-2/2/f4b49a74979cc808fb3db8c2e82fe593>)

Abstract:

Ascorbate is one of the best natural anti-oxidant substances, and pepper (*Capsicum annuum* L.) has the highest ascorbate content among plants. Elicitation, wounding and other plant stress conditions are related with the oxidative burst, so we were interested in studying the putative role of pepper ascorbate oxidase (pAO) enzyme activity and its gene expression during some of these stresses. A partial pAO-cDNA was isolated by reverse transcriptase-polymerase chain reaction (RT-PCR) from pepper fruit elicited with araquidonic acid (AA). Southern blot analysis confirmed the existence of a single-copy gene encoding pAO. Northern blot analysis revealed a rapid but transient pAO-mRNA accumulation after treatment with AA, cellulase or wounding, but not with methyl jasmonate (MeJa). The pAO gene was differentially expressed from high transcription rate in roots, then stem, bud flower and almost non-expressed in leaves. AO enzyme activity levels correlated with transcript accumulation in these organs. Finally, the elicitation of pAO in response to various treatments is discussed in relation to plant defense responses.

Keywords: Arachidonic acid; Methyl jasmonate; Pepper ascorbate oxidase; Reactive oxygen species; Reverse transcriptase-polymerase chain reaction