

**SELECTIVE DISSEMINATION OF INFORMATION (SDI)
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GENERAL

POSTHARVEST

Gollnow, B., J. Fargher and D. Joyce. 2014. **Postharvest** manual answers many questions. Acta Hort. 1031: 119 – 124.

Abstract

Many authors have noted that consumer confidence in buying fresh flowers is strongly related to their perceived value in that quality and vase life must be high and consistent over time for consumers to repeat buy. Growers, wholesalers, exporters and retailers seek practical information about recommended handling and treatments at the harvest and postharvest stages, including that relating to flowers native to Australia and South Africa ("wildflowers"). This information is essential for products to be of high quality with an acceptable vase life for the end consumer, especially if exported. Published postharvest manuals generally focus on traditional flower crops and so rarely include many, or any, wildflowers. A manual entitled *Postharvest Handling of Australian flowers from Native Plants and Related Species* was published in 2002 and addressed this gap, but required updating. This situation presented an opportunity to provide in-depth information to compliment the Australian wildflower quality specifications (see accompanying paper in the same volume), and to assemble the latest knowledge on wildflower quality and postharvest issues. The resultant manual contains extensive information about harvesting, quality issues and recommended postharvest care focussed on wildflowers. Much of the information is documented for the first time, being based on the most up to date research and development (R&D) as well as practical experience of the floral supply chain, researchers and other technical experts. The manual provides practical and detailed information on postharvest treatment of fresh wildflowers for growers, florists, wholesalers and exporters to use on a daily basis. It discusses the many unique features of wildflowers that must be understood and managed in order to maximise their quality and vase life after marketing and export. The manual also includes postharvest advice for 16 flower- and foliage lines for which quality specifications were not produced. This advice is presented according to the same template as the specifications.

Keywords: /Postharvest/ /Vase Life/ /Quality/ /Ethylene/ /Supply Chain/

FRUIT

APRICOT

Yan, Ruixing, et.al. 2014. UV-C inactivation of *Escherichia coli* and dose uniformity on **apricot** fruit in a commercial setting. *Postharvest Biol. & Technol.* 95: 46–49 .

Abstract

UV-C treatment system (two treatment chambers connected by an inclined belt to rotate apricots between chambers) was tested in a commercial setting. *Escherichia coli* ATCC 25922, used as a

surrogate for *E. coli* O157:H7 to determine the system's antimicrobial efficacy, was inoculated onto fruit surfaces at a population of 6.8 log CFU/fruit. UV-C dosage was evaluated by attaching film dosimeters to six fixed locations on each apricot. Results suggested that reduction of inoculated *E. coli* ATCC 25922 populations on the apricot fruit by UV-C treatment was small (only 0.5–0.7 logs). There were large variations in UV-C doses among varying apricot surface locations. Approximately 1/3 of apricots had individual surfaces receiving less than 0.2 kJ m⁻² UV-C exposure, even though fruit received, on average, more than 1 kJ m⁻². Low reductions of *E. coli* may be attributed, in part, to non-uniform UV-C exposure. This study demonstrates the need to use a fruit rotation device more capable of delivering uniform UV-C dosage to the surface of apricots for inactivating bacteria in a commercial setting.

Keywords: /Apricot/ /*E. coli*/

AVOCADO

Donetti, Manuela, Leon A. Terry. 2014. Biochemical markers defining growing area and ripening stage of imported **avocado** fruit cv. Hass. *J. Food Comp. & Anal.* 34: 90 – 98.

Abstract

Intra-varietal differences in avocado fruit composition were investigated with regard to fruit growing area, maturity, ripening stage and storage conditioning. In particular, mesocarp nutrients such as fatty acids and C7 sugars were investigated as they relate to fruit origin and ripening stage, respectively. The effect of storage temperature on nutrient level was also assessed. Fruit from Chile, Peru and Spain and harvested in the respective early, middle and late season were ripened for seven days at 18 or 23 °C. At specific intervals, mesocarp fatty acids and sugar profiles were identified. The oil composition differed according to origin and harvest-time, suggesting oleic acid as a potential marker in distinguishing fruit origin. Chilean fruit had higher oleic content (57–61%) followed by Spanish (54–60%) and Peruvian (40–47%) fruit. In early season fruit D-mannoheptulose content decreased during shelf life from 128 to 23.5 mg g⁻¹ (Chile), from 115 to 33.6 mg g⁻¹ (Peru), from 65.2 to 23.5 mg g⁻¹ (Spain). A similar trend was noted in middle and late season fruit and from the three origins. For the first time a relationship between C7 sugar content and mesocarp softening, fruit maturity and origin was identified.

Keywords: /Avocado/ /Storage/ /Postharvest Factors/

BANANA

Nutchachai, Ponpraserta, Varit Srilaong. 2014. A novel technique using 1-MCP microbubbles for delaying postharvest ripening of **banana** fruit. *Postharvest Biol. & Technol.* 95: 42 – 45.

Abstract

This study aimed to investigate the application of microbubble technology for delaying banana ripening. A preparation of 1-MCP designed for use as a form of aqueous micro bubble (MBs) solutions was formulated. Banana fruit were immersed in 500 nL L⁻¹ of aqueous 1-MCP microbubbles (1-MCP-MBs) or fumigated with 500 nL L⁻¹ 1-MCP, then stored at 25 °C for 8 days. 1-MCP-MBs were more effective in delaying postharvest ripening than conventional 1-MCP fumigation. 1-MCP-MBs reduced the respiration rate and ethylene production compared to the control and 1-MCP fumigated fruit. Moreover, 1-MCP-MBs delayed yellowing and maintained firmness of banana fruit during storage. These

results indicate that 1-MCP-MBs can be used as an alternative method for delaying the postharvest ripening of banana fruit, and its application for other commodities needs to be further elucidated.

Keywords: /Banana/ /Delayed Ripening/ /Postharvest/ /1-MCP/

Wang, Juan, et.al. 2014. Changes in resistant starch from two **banana** cultivars during postharvest storage. Food Chem. 156: 319 – 325.

Abstract

Banana resistant starch samples were extracted and isolated from two banana cultivars (Musa AAA group, Cavendish subgroup and Musa ABB group, Pisang Awak subgroup) at seven ripening stages during postharvest storage. The structures of the resistant starch samples were analysed by light microscopy, polarising microscopy, scanning electron microscopy, X-ray diffraction, and infrared spectroscopy. Physicochemical properties (e.g., water-holding capacity, solubility, swelling power, transparency, starch-iodine absorption spectrum, and Brabender microviscoamylograph profile) were determined. The results revealed significant differences in microstructure and physicochemical characteristics among the banana resistant starch samples during different ripening stages. The results of this study provide valuable information for the potential applications of banana resistant starches.

Keywords: /Banana/ /Ripening/ /Physicochemical Properties/

BLUEBERRY

Kong, Qiulian, et. al. 2014. Effects of electron-beam irradiation on **blueberries** inoculated with *Escherichia coli* and their nutritional quality and shelf life. Postharvest Biol. & Technol. 95: 28 – 35.

Abstract

Fresh blueberries have become a popular new functional food because of their remarkably high levels of antioxidant phytonutrients and health benefits. However, the potential prevalence of human pathogens on blueberries has become an increased concern because they are consumed fresh. Procedures effective in decontamination and extending shelf life without affecting fruit quality are needed. Electron-beam irradiation was applied to fresh blueberries at the doses ranging from 0.5 to 3.0 kGy and its effectiveness for inactivating *Escherichia coli* (E. coli) K-12 and extending shelf life were investigated. The decimal reduction dose, D10 values, of E. coli in cultural medium and blueberries were 0.43 ± 0.01 kGy and 0.37 ± 0.015 kGy, respectively. Irradiation reduced bacteria inoculated on blueberries from 7.7×10^8 CFU/g to 6 CFU/g at 3.13 kGy and decreased the decaying of blueberries stored at 4°C up to 72% and at room temperature up to 70% at this dose. No significant effect on the total monomeric anthocyanins, antioxidant activity, and l-ascorbic acid content of blueberries was observed from irradiation at doses ≤ 3 kGy. However, significant decreases in the antioxidant activity and l-ascorbic acid content were found in both control and irradiated blueberries after storage at 4°C for 7 and 15 d. Information obtained in this study indicates that low dose electron-beam irradiation is effective in reducing E. coli and extending shelf life while maintaining the antioxidant properties of blueberries.

Keywords: /Blueberries/ /Shelf Life/ /Quality/ /Irradiation/

Paniagua, A.C., A.R. East, J.A. Heyes. 2014. Interaction of temperature control deficiencies and atmosphere conditions during **blueberry** storage on quality outcomes. *Postharvest Biol. & Technol.* 95: 50 – 59.

Southern hemisphere blueberry producers often export their products through extended supply chains to Northern hemisphere consumers. During extended storage, small variations in temperature or atmosphere concentrations may generate significant differences in final product quality. In addition, relatively short delays in establishing cool storage temperatures may contribute to quality loss. In these experiments a full factorial analysis was done of the effects of three cooling delays (0, 12 or 24 h at 10°C), three atmosphere concentrations (air, 10% CO₂+ 2.5% O₂ and 10% CO₂+ 20% O₂) and two storage temperatures (0°C and 4°C) which were assessed for their impact on final quality, measured as weight loss, firm-ness and rot incidence. Two blueberry cultivars were studied: 'Brigitta', a highbush cultivar, and 'Maru', a rabbiteye. Delays in cooling had a small effect on final product weight, whereas variation in storage temperature and atmosphere during simulated transport influenced both firmness and rot incidence. Atmospheres with 10% CO₂ reduced decay incidence, particularly at low oxygen concentration (2.5% O₂), although the latter conditions tended to soften fruit. In order to achieve optimal postharvest storage for blueberries, minimising temperature variability in the supply chain is important, as is finding the potentially cultivar-specific optimal combination of high CO₂ and low O₂ concentration that results in simultaneously minimising rot incidence and induced softening.

Keywords: /Blueberry/ /Storage/ /Quality/

CACTUS PEAR

Vergara, Cristina, et.al. 2014. Microencapsulation of pulp and ultrafiltered **cactus pear** (*Opuntia ficus-indica*) extracts and betanin stability during storage. *Food Chem.* 157: 246 – 251.

Abstract

Pulp (CP) and ultrafiltered (UF) cactus pear extracts were encapsulated with Capsul (C) by applying a central composite design (CP-C and UF-C systems) by spray-drying. To evaluate the effect of the extract, microparticles obtained under optimal conditions were characterised and stored at 60 °C. Betacyanin and betaxanthin encapsulation efficiency reached values above 98% for both systems studied. This efficiency was attributed to strong interactions between betalains and the polymer. Betalain degradation in CP-C and UF-C microparticles followed pseudo-first order kinetics. The betacyanin degradation rate constant was significantly higher for CP-C than for UF-C. These results suggested that the mucilage or higher sugar content of CP increased the hygroscopicity of the CP-C microparticles, leading to the degradation of betalain. The hydrolysis pathway was the main mechanism of betanin degradation during micro particle storage. These results demonstrate the potential utility of both CP-C and UF-C micro particles as natural colourants for healthy foods.

Keywords: /Cactus Pear/ /Storage/

CARAMBOLA

Zainudina, Mohd Asrtaf Mohd, et.al. 2014. Variation of bioactive compounds and antioxidant activity of carambola (*Averrhoa carambola* L.) fruit at different ripening. *Scientia Hort.* 172: 325 – 331.

Abstract

The variations in bioactive compounds and antioxidant activity of carambola (cv. B17) fruit at different ripening stages were investigated. The carambola fruit was harvested from week 9 until week 13. Ascorbic acid (AA), total phenolic content (TPC), total flavonoids content (TFC), total carotenoids content (TCC), β -carotene, tocopherol homologues (α , β , γ and δ) and sugar composition (sucrose, glucose and fructose) were analyzed for each sampling week. Antioxidant activity was measured with 2,2-diphenyl-1-picrylhydrazil (DPPH) and β -carotene/linoleic acid model (BCLAM) assays. The results showed that AA, TCC and sugar composition were significantly ($P < 0.05$) increased while TPC, TFC and β -carotene showed reversed trends as ripening process was in progressed. Interestingly, the tocopherol compounds varied differently with contribution of α - and β -tocopherols highest on week 12 and then decreased on week 13 but γ - and δ -tocopherols were constantly decreased during ripening. Meanwhile, antioxidant activities for both assays were significantly ($P < 0.05$) decreased. Multivariate analysis revealed a notable variation of tested attributes among the ripening stages. Bioactive compounds such as TPC, TFC, α -carotene, α - and δ -tocopherol were found to be dominant in unripe fruit while those of sugar (sucrose, glucose and fructose), TCC, α - and β -tocopherol were prominent in the ripe fruit. The findings of this study advocate harvesting of carambola fruit at an appropriate stage to get maximum nutritional benefits.

CITRUS

Parra, Javier, Gabriela Ripoll, Benito Orihuel-Iranzo. 2014. Potassium sorbate effects on citrus weight loss and decay control. *Postharvest Biol. & Technol.* 96: 7 – 13.

Abstract

Potassium sorbate (PS) is a well-known and widely used food preservative. Among other applications, it is used as a GRAS fungistatic postharvest treatment for citrus, although its use is not free of significant adverse effects. In this paper, we study in detail the efficacy of wax containing increasing concentrations of PS to control *Penicillium digitatum* decay in citrus fruit, and its effect on fruit weight loss. Decay control and weight loss increased with the concentration of PS in the wax. Wax with typical amounts of 2–5% PS showed poor decay reduction indices (DRI), between 26% and 32%, whereas fruit weight loss increased compared with non-waxed controls. Waxing of fruit reduced weight loss by up to 40%, depending on wax formulation, but the addition of just 2% PS to the wax caused an increase in fruit weight loss of up to 65% compared with the waxed fruit. Similar results were observed for all the types of wax formulations tested. The hygroscopic effects of PS are even more damaging for citrus fruit with leaves. The leaves lose weight very rapidly when PS is added to the wax and they become desiccated in 24 h. We also present the results of a similar study where PS was applied to citrus as an aqueous treatment. When applied in water, PS was far more effective for decay control than when applied in wax, but there was also a considerable increase in fruit weight loss. A treatment combining aqueous PS with Fortisol®Ca Plus biostimulant completely solved the problem of weight loss, these mixtures being commercially feasible treatments.

Keywords: /Citrus/ /Weight Loss/ /Decay Control/

LITCHI

Mandal, D., S.K. Mitra. 2014. Relationship of fruit calcium content, fruit pressure at maturity and tubercle density with cracking and sun-burning in fifteen **litchi** cultivars of West Bengal, India. Acta Hort. 1029: 209 – 214.

Abstract

Litchi is one of the important subtropical fruits of the *Sapindaceae* family grown in India in States like Bihar, West Bengal, Uttarakhand, Tripura, Punjab, etc. In West Bengal, litchi cultivars suffer from sun-burning and fruit cracking disorders which cause 10-15% fruit loss to the growers. The present study was taken up to identify the relationship of fruit (aril and peel) calcium content, fruit pressure and tubercle density with fruit cracking and sun-burning in 15 litchi cultivars. Results revealed that among the fifteen cultivars in the study 'Bedana', 'Bombai', 'Elaichi', 'Kasba', 'Nafarpal', 'Piazi' and 'Seedless Late' showed less amount of fruit cracking and sun-burning (<5%); while cultivars like 'China', 'Deshi', 'McLean', 'Early Muzaffarpur', 'Muzaffarpur', 'Purbi' and 'Rose Scented' showed higher percentages of cracking and sun-burning in fruits (>10%). In general, calcium content in the pericarp was found higher than in the aril of the fruit. Besides, normal fruit contained more calcium in the aril and pericarp than in cracked and burnt fruits. Cultivars like 'Bedana', 'Bombai' and 'Kasba' showed higher aril and pericarp calcium and less fruit cracking and burning. The cultivars 'McLean', 'China' and 'Deshi' showed higher percentages of fruit cracking and burning even though the aril and pericarp calcium contents were higher. Correlation study revealed no significant relationship between fruit cracking and sun-burning and calcium content in fruit aril and pericarp. In general, fruit pressure at maturity and tubercle density was higher in cracked and burnt fruits. Among the cultivars, 'Bedana' and 'Seedless Late' showed lower tubercle density (4.66 and 6.25 cm⁻²) and less cracking (4.70 and 5.66%).

Keywords: /Litchi/ /Fruit Cracking/ /Maturity/

Stone, W., S.E. Terblanche. 2014. Agricultural extension in the **litchi** Industry of South Africa. Acta Hort. 47 – 54.

Abstract

The philosophy of extension is to "help farmers to help themselves". Extension approaches have evolved from linear to advisory models, which focused mainly on transfer of technology with limited interaction between role players. Modern extension approaches include facilitation and participatory models that encourage interaction amongst all role players. Previously the South African Litchi Growers Association (SALGA) had no extension advisors serving the industry. Currently the Subtropical Growers Association of South Africa (Subtrop) manages the affairs of SALGA. Agricultural extension is one of the services Subtrop provides to SALGA. Farm visits, newsletters and study groups are the main extension communication channels. A customer satisfaction survey was conducted with Subtrop members. Suggestions to improve extension services to litchi farmers are suggested, with programmed extension as a working method.

Keywords: /Litchi/

LONGAN

Lin, Yifen, et.al. 2014. The role of active oxygen metabolism in hydrogen peroxide-induced pericarp browning of harvested **longan**. *Postharvest Biol. & Technol.* 96: 42 – 48.

Abstract

Effects of hydrogen peroxide (H₂O₂), as exogenous reactive oxygen, on browning and active oxygen metabolism in pericarp of harvested 'Fuyan' longan fruit were investigated. The results showed that as compared with the control fruit, there was a higher browning index in pericarp of H₂O₂-treated fruit. The fruit treated with H₂O₂ resulted in increased rate of superoxide anion (O₂^{•-}) production, reduced activities of superoxide dismutase (SOD), catalase (CAT) and ascorbate peroxidase (APX), decreased amounts of ascorbic acid (AsA), glutathione (GSH) and carotenoid, and increased malondialdehyde (MDA) content. These results indicated that H₂O₂-induced browning in pericarp of harvested longan fruit might be due to a reducing capacity of active oxygen scavenging and an increase of accumulation of O₂^{•-}, which might stimulate membrane lipid peroxidation, disrupt cellular membrane structure, and cause the loss of cellular compartmentalization, in turn, resulting in the contact of polyphenol oxidase (PPO) and peroxidase (POD) with phenolic substrates and subsequently oxidation phenolics to form brown polymers.

Keywords: /Longan/ /Browning/

You, C.H. , et. al. 2014. Effects of precooling on storage and ROS metabolism of **longan** fruit. *Acta Hort.* 2019: 37 – 344.

Abstract

Effects of cold room precooling and ice water precooling on storage and reactive oxygen species (ROS) metabolism of longan (*Dimocarpus longan* Lour.) fruit were studied. Changes of pericarp browning index, pericarp moisture content, activities of relative enzymes of ROS metabolism and contents of pulp total soluble solids (TSS), titratable acid (TA) and vitamin C (Vc) during storage were measured. The results indicated that cold room precooling and ice water precooling can maintain pericarp moisture content and decrease pericarp browning index, but have little effect on contents of TSS, TA and Vc. After cold room precooling and ice water precooling, activities of peroxidase (POD) in the pericarp and pulp of longan were inhibited. Activities of superoxide dismutase (SOD) increased in the pericarp but were inhibited in the pulp of precooled fruit. Precooling treatments also inhibited the content of hydrogen peroxide (H₂O₂) in longan pulp. Anti-superoxide anion activities in longan pulp were increased in cold room precooling but decreased in ice water precooling. Postharvest ice water precooling of longan fruit can maintain high scavenging activities of the superoxide anion and less ROS content, delay fruit aging, maintain quality and improve storage life.

Keywords: /Longan/ /Precooling/ /Storage/

MANDARIN

Nengguo, Tao, et.al. 2014. Octanal incorporated in postharvest wax of Satsuma mandarin fruit as a botanical fungicide against *Penicillium digitatum*. *Food Control*. 45: 56 – 61.

Abstract

The antifungal activity of octanal against *Penicillium digitatum*, the causal agent of citrus green mold, was assessed by in vitro and in vivo experiments. In vitro assays results showed that the minimum inhibitory concentration and minimum fungicidal concentration (MFC) of octanal were 500 and 1000 $\mu\text{L/L}$, respectively. In vivo test results demonstrated that wax β octanal (WO; 2 x MFC) treatment but not WO (1 x MFC) treatment effectively inhibited the growth of *P. digitatum* after 6 d of storage at 25 ± 2 °C. The WO treatment remarkably increased the activities of antioxidant enzymes, such as catalase and superoxide dismutase, in Satsuma mandarin fruit. However, this treatment evidently decreased phenylalanine ammonia lyase activity and malondialdehyde content. The WO treatment also inhibited peroxidase activity and prevented hydrogen peroxide accumulation. Furthermore, the WO treatment did not impair the fruit quality parameters (vitamin C content, pH, coloration index, and total soluble solid content) of the tested fruit. This study provided theoretical data for the practical application of octanal to improve citrus fruit quality during postharvest storage.

Keywords: /Mandarin/ /Fruit Quality/

MANGO

Liu, Kun, Xueling Wang, Matthew Young. 2014. Effect of bentonite/potassium sorbate coatings on the quality of mangos in storage at ambient temperature. *J. Food Eng.* 137: 16 – 22.

Abstract

The use of bentonite coatings for mango preservation was investigated. Mangos were coated with bentonite and bentonite loaded with potassium sorbate at ambient temperature. The major properties of quality and physiology assessed including color change, decay index, weight loss, respiration intensity, soluble sugar content, titratable acidity, vitamin C content, soluble solids content, protopectin content, and soluble pectin content. Results indicated that mangos treated by either bentonite or bentonite loaded with potassium sorbate exhibited reduced decay, delayed postharvest ripening, decreased water loss, maintained high vitamin C levels, preserved titratable acidity, and no changes in flavor. These effects were greater for bentonite loaded with potassium sorbate than for pure bentonite. Overall results suggest that bentonite and bentonite loaded with potassium sorbate coatings could extend the shelf-life of mangos with optimum quality.

Keywords: /Mango/ /Postharvest Storage/ /Coating

MELON

Sanchez, Maria-Teresa, et.al. 2014. First steps to predicting pulp colour in whole melons using near-infrared reflectance spectroscopy. *Biosystems Eng.* 123: 12 – 18.

Near-infrared reflectance spectroscopy (NIRS) technology was used for the non-destructive measurement of melon-pulp colour (a^* , b^* , C^* and h^*), one of the main indicators of ripeness and quality. A total of 432 Cantaloupe and Galia melons were used in the construction of calibration models, testing various spectral signal pre treatments and both linear and nonlinear regression algorithms. The coefficient of determination (r^2) and the standard error of cross-validation (SECV) obtained for parameters a^* (0.96, 2.16), b^* (0.85, 3.25), C^* (0.82, 3.76) and h^* (0.96, 3.64) in intact fruit confirmed the a priori viability of NIRS technology with modified partial least squares (MPLS) regression for measuring melon ripeness and quality. Moreover, the application of a local algorithm improved the ability of models to predict all the internal-colour quality parameters studied. These results suggest that NIRS technology is a promising tool for monitoring ripening in melons and thus for establishing the optimal harvesting time.

Keywords: /Melon/ /Pulp Color/

PEACH

Jin, Peng, et.al. 2014. Oxalic acid alleviates chilling injury in **peach** fruit by regulating energy metabolism and fatty acid contents. Food Chem. 161: 87 – 93.

Abstract

The effects of postharvest oxalic acid (OA) treatment on chilling injury, energy metabolism and membrane fatty acid content in 'Baifeng' peach fruit stored at 0 °C were investigated. Internal browning was significantly reduced by OA treatment in peaches. OA treatment markedly inhibited the increase of ion leakage and the accumulation of malondialdehyde. Meanwhile, OA significantly increased the contents of adenosine triphosphate and energy charge in peach fruit. Enzyme activities of energy metabolism including H⁺-adenosine triphosphatase, Ca²⁺-adenosine triphosphatase, succinic dehydrogenase and cytochrome C oxidase were markedly enhanced by OA treatment. The ratio of unsaturated/saturated fatty acid in OA-treated fruit was significantly higher than that in control fruit. These results suggest that the alleviation in chilling injury by OA may be due to enhanced enzyme activities related to energy metabolism and higher levels of energy status and unsaturated/saturated fatty acid ratio.

Keywords: /Peach/ /Chilling Injury/ /Oxalic Acid/

Yang, Zhenfeng, et.al. 2014. Respiratory activity and mitochondrial membrane associated with fruit senescence in postharvest **peaches** in response to UV-C treatment. Food Chem. 161: 16 – 21.

Abstract

The effect of 3.0 kJ/m² ultraviolet-C (UV-C) treatment on respiratory activity and mitochondrial membrane associated with fruit senescence in peach fruit stored at 20 °C for 8 days was investigated. UV-C treatment could reduce senescence development, as evidenced by higher fruit firmness due to inhibition of respiration rate via reducing succinic dehydrogenase and cytochrome C oxidase activity. Meanwhile, the activities of superoxide dismutase, catalase and ascorbate peroxidase in the UV-C-treated fruit were much higher than those in control fruit, resulting in lower levels of superoxide radicals

(O_2^-) and hydrogen peroxide (H_2O_2). In addition, this treatment maintained a higher level of mitochondrial membrane fluidity and inhibited opening of mitochondrial permeability transition pore. Our results suggest that the induction of antioxidant enzymes to scavenge O_2^- and H_2O_2 by UV-C treatment was associated with the maintenance of mitochondrial membrane integrity, which also played an important role in senescence retardation in peach fruit.

Keywords: / Peach/ /Senescence/

PEAR

Zhang, Di Cui, Yibin Ying. 2014. Nondestructive measurement of **pear** texture by acoustic vibration vibration method. *Postharvest Biol. & Technol.* 96: 99 – 105.

Abstract

Texture is a key attribute for the assessment of pear quality, and a nondestructive texture detection method was investigated. Each pear fruit was excited by a swept sine wave signal (x_{in}), and the response signal from the top of the pear (x_{out}) was detected by a laser Doppler vibrometer (LDV). The vibration spectrum was acquired after a fast Fourier transform was applied to the x_{in} and x_{out} data. Six vibration parameters, including the second resonance (f_2), the amplitude at f_2 (A_2), and the phase shifts at (P_{400} , P_{800} , P_{1200} and P_{1600}) were extracted from the vibration spectrum, and the elasticity index (EI) was determined by the formula $EI = f_2^2 m^2 / 3$. The fruit texture was then measured by a puncture test. Three texture indices were extracted from the force–deformation curve, in which the stiffness (Stif) was found to be more suitable for representing fruit quality. The multiple linear regression (MLR) method was applied to evaluate the importance of each vibration parameter for predicting Stif, and the following order of importance was found: EI, f_2 , P_{400} , P_{1600} , P_{800} , P_{1200} and A_2 . A texture prediction model was built by the stepwise multiple linear regression (SMLR) method and modified through the introduction of the pear shape index (SI). The performance of the prediction model was improved after modification; the value of the correlation coefficient for the calibration and validation sample sets (r_c and r_p) increased by 0.4% and 2.1%, respectively, while the root mean square errors of calibration and prediction (RMSEC and RMSEP) decreased by 0.6% and 3.3%, respectively. Highly significant results ($P < 0.01$) for both the initial and modified prediction models proved that the evaluation of pear texture by a combination of the LDV method and the proposed approach was feasible.

Keywords: /Pear/ /Non Destructive Measurement/

PLUM

Wisuthiphaet, Nicharee, et.al. 2014. Non-destructive detection of the wax bloom on European **plum** during post-harvest handling. *J. Food Eng.* 140: 46 – 51.

Abstract

Post-harvest handling may disturb the wax bloom of plum, blueberry or grape berry, which constitutes both an external visual (speckled fruit) as well as physiological fruit quality parameter (disturbing the water loss barrier) with the following results: (a) Destructive ESEM analysis showed the wax bloom of European plum to be caused by wax platelets, where the wax is largely re-distributed on handling rather than removed. (b) CIE L^* values significantly ($p < 0.05$) decreased from 37.3 to 28.1,

indicating a darker plum surface after polishing. The a-value of the plum surfaces increased significantly from 2.35 to 2.86, whereas b-values decreased ca. 2.5-fold from -13.9 to -5.0 after polishing viz the plum surface became more red and less blue. (c) Luster levels (glossiness) detected non-destructively increased by almost 3-fold from 111 (SD + 20) to 284 (SD + 32) relative units. (d) Analysis of RGB images visualised the relative wax distribution over the fruit surface after polishing, as uneven with a more dense wax coverage at the fruit apex and less at the fruit equator, where the contacts by hand are most frequent. The changes in L and b values, and to a lesser extent in the a-value, luster levels and RGB image analysis may be used as a technical fruit quality parameter as determined non-destructively.

Keywords: /Plum/ /Postharvest Handling/

RASPBERRIES

Morales, M.L., et. al. 2014. Effect of storage time at low temperature on the volatile compound composition of Sevillana and Maravilla **raspberries**. *Postharvest Biol. & Technol.* 96: 128 – 134.

Abstract

In this study, the effect of storage time at low temperature on volatile compounds in two cultivars of raspberry, *Rubus idaeus* L. cv. Sevillana and Maravilla, was determined. A total of 28 compounds were identified in both cultivars and showed quantitative differences between the cultivars. The Sevillana cultivar was richer in volatile compounds than the Maravilla cultivar. -linalool had the highest concentration in both cultivars. We observed opposing trends in the volatile compound composition for the cultivars during storage at low temperature, in which 'Sevillana' lost compounds and 'Maravilla' was enriched. Therefore, storage at low temperature causes important changes in the volatile compound profile of raspberry, particularly the Sevillana cultivar, with significant decreases in C13-norisoprenoids and increases in terpenes. These changes are most likely responsible for the aromatic differences between the cultivars because of the presence of terpenes in 'Sevillana' and C13-norisoprenoids in 'Maravilla'.

Keywords: /Raspberries/ /Storage/ /Low Temperature Storage/

Mazur, Sebastian Piotr. 2014. Quality and chemical composition of ten red **raspberry** (*Rubus idaeus* L.) genotypes during three harvest seasons. *Food Chem.* 160: 233 – 240.

Abstract

Colour and chemical composition of fruits of 10 red raspberry genotypes grown in Nordic climate during three harvest seasons were studied. The main phenolic compounds in the fruits were ellagitannins and anthocyanins, contributing 57% and 42% to the quantified phenolic compounds, respectively. Cyanidin-3-sophoroside was the most abundant anthocyanin (61%). All quality parameters were significantly affected by genotype. The genotypes could be categorised into three groups. 'Veten' and 'RU984 06038' were characterised by high concentrations of flavonoids, i.e., anthocyanins and quercetin glycosides, and dark red colour. 'Octavia', 'Glen Magna', 'RU004 03067', 'Glen Ample' and 'RU974 07002' were characterised by light colour, high titratable acids and low flavonoid concentrations. 'Malling Hestia', 'RU024 01003' and 'RU004 04095' had high content of dry matter, soluble solids, ascorbic acid and ellagic acid containing compounds, in addition to high hue and chroma values. All quality parameters, except ascorbic acid and lambertianin C, varied significantly between

harvest seasons. The lowest seasonal variation in fruit quality was observed in 'RU024 01003' and 'Glen Ample' and the highest 'RU004 03067' and 'Glen Magna'.

Keywords: /Raspberry/ /Quality/ /Anthocyanins/

STRAWBERRY

Filho, Tarcisio L. et.al. 2014. Consumer rejection threshold for **strawberry** radiation doses. *Innov. Food Sci. Emerg. Technol.* 23: 194 – 198.

Abstract

Strawberries have a short shelf life. The use of irradiation has been suggested as a possible solution to increase the shelf life of foods and decrease the outbreaks of food-borne diseases. However, undesirable sensory attributes are observed at certain doses. Therefore, this study aimed at ascertaining the consumer rejection threshold (CRT) and the detection threshold (DT) for radiation doses in strawberries. Consumers participated in paired preference tests and in triangular tests to determine the CRT and DT, respectively. The CRT and DT were 3.6 kGy and 0.405 kGy, respectively. The DT was below the lower limit (1.5 kGy) and the CRT was greater than that of the upper limit (3.0 kGy) of radiation doses generally recommended for strawberries. The main sensory change observed was a decrease in firmness of the fruit as the dosage increased. The calculated CRT serves as a guideline for producers and industries that market or intend to market irradiated strawberries. Industrial relevance: We present the calculation of the consumer rejection threshold (CRT) for strawberry radiation doses. The CRT serves as a guideline for producers and industries that market or intend to market irradiated strawberries. Furthermore, the CRT may encourage the use of higher doses of radiation than those of generally recommended for strawberries, thus resulting in the increased elimination of pathogenic and spoilage microorganisms and consequently, a greater availability of microbiologically safe strawberries with a longer shelf life, thus reducing losses.

Keywords: /Strawberry/ /Radiation/

SWEET CHERRY

Jimenez, Maria Jose, et.al. 2014. Quality and antioxidant properties on **sweet cherries** as affected by preharvest salicylic and acetylsalicylic acids treatments. *Food Chem.* 160: 226 – 232.

Abstract

The effects of salicylic acid (SA) or acetylsalicylic acid (ASA) treatments during on-tree cherry growth and ripening on fruit quality attributes, especially those related with the content on bioactive compounds and antioxidant activity were analysed in this research. For this purpose, two sweet cherry cultivars, 'Sweet Heart' and 'Sweet Late', were used and SA or ASA treatments, at 0.5, 1.0 and 2.0 mM concentrations, were applied at three key points of fruit development (pit hardening, initial colour changes and onset of ripening). These treatments increased fruit weight and ameliorated quality attributes at commercial harvest, and led to cherries with higher concentration in total phenolics and in total anthocyanins, as well as higher antioxidant activity, in both hydrophilic and lipophilic fractions. Thus, preharvest treatments with SA or ASA could be promising tools to improve sweet cherry quality and health beneficial effects for consumers.

Keywords: /Sweet Cherries/ /Quality/ /Anthocyanins/

VEGETABLES

BROCCOLI

Navarro-Rico, Javier, et.al. 2014. Neutral and acidic electrolysed water kept microbial quality and health promoting compounds of fresh-cut **broccoli** throughout shelf life. *Innov. Food Sci. Technol.* 21: 74-81.

Abstract

The effect of neutral (NEW) and acidic (AEW) electrolysed water (EW) sanitising treatments (both with 70 and 100 mg L⁻¹ free chlorine) on the bioactive profile and microbial quality of fresh-cut 'Parthenon' and kailanhybrid broccoli throughout 19 days at 5 °C was studied. Disinfection with 100 mg L⁻¹ NaClO was used as control. EW treatments, particularly NEW100, achieved the best microbial reductions after shelf life, being a promising alternative to chlorine in both broccoli cvs. In addition, all EW-treated samples, regardless of pH or free chlorine levels, showed up to 30% higher total phenolic (TP) contents than chlorine-disinfected ones, which reported values of 556.5 (kailan-hybrid) and 444.0 mg gallic acid kg⁻¹ fw ('Parthenon'). The best correlation between total antioxidant capacity (TAC) and TP was attained by the FRAP method with an R² = 0.65–0.68. Throughout shelf life, TP and FRAP-analysed TAC kept stable values, or even slightly increased. On the processing day, the APX, GPX, CAT and SOD activities of chlorine-treated samples were 105.6/115.4, 3783.2/6791.0, 359.0/433.0 and 798.0/1489.0 U g⁻¹ protein for kailan-hybrid/'Parthenon', respectively. SOD and CAT activities of EW-treated samples were 13–46% lower than those of the NaOCl-disinfected samples. Myrosinase activity in kailan-hybrid was 1.5-fold higher than in 'Parthenon'. Generally, the myrosinase activity in EW-disinfected samples was kept during shelf life, while in NaOCl-sanitised samples decreased. In general, both EW treatments seem to be promising techniques for keeping good microbial quality in both fresh-cut broccoli cvs. Furthermore, this alternative water sanitising technique showed better bioactive compounds retention in broccoli. Industrial relevance: The present study shows for the first time the effects of neutral and acidic electrolyzed water treatments (with two different free Cl concentrations) on the bioactive content (antioxidant capacity, phenolics, and antioxidant enzymes) and microbial quality of two different broccoli cvs. (kailan-hybrid and 'Parthenon') throughout 19 days at 5 °C. These results will be useful for the fresh-cut (FC) vegetable industry since the optimum parameters for the EW treatments of two FC broccoli cvs. are hereby provided in order to accomplish the safety and microbial quality aspects. Furthermore, data regarding to enhancing of health-promoting properties of these FC broccoli cvs. after EW treatments are shown. In that way, the FC industries may supply to the consumers a FC vegetable that meet the safety aspects and with improved health-promoting properties.

Keywords: /Broccoli/ /Quality/ /Minimally Processed/

CABBAGE

Thammawonga, Mansihkan, et.al. 2014. Modeling of the respiration rate and gene expression patterns of **cabbage** in response to mechanical impact stress using a modified Weibull distribution Manasikan. *Postharvest Biol. & Technol.* 96: 118 – 127.

Abstract

We previously found that respiration rate changes of postharvest cabbage heads are influenced by the mechanical (impact) stress level and the time since the stress application. In this study, the effect of impact stress (dropping treatment) on the expression of genes related to respiratory by products and ethylene synthesis of the cabbage was investigated. Quantitative reverse transcription PCR (qRT-PCR) analysis revealed that cabbage leaf wounds caused by dropping treatment significantly increased the expression of genes (BoAPX2, BoPAL, BoSAMS, and BoACS2) in the wounded area and the surrounding leaf area within 1 h after the treatment. Additionally, we proposed a novel mathematical model based on a modified Weibull distribution (MWD) to describe the stress response characteristics of the cabbage. Using a non-linear least square method, the proposed prediction model fitted the respiration rate and relative gene expression experimental data very well. The model parameters are also clearly defined and discussed. The results, therefore, suggest possible uses of the model for predicting the stress-responsive cellular metabolisms and quality changes of postharvest fresh produce. Furthermore, this model has potential to become valuable tool for developing the postharvest techniques to minimize quality loss and to extend the shelf-life of fresh produce.

Keywords: /Cabbage/ /Chilling Injury/ /Quality/

LETTUCE

Kim, Do-Hee, et. al. 2014. Browning control of fresh-cut **lettuce** by phytoncide treatment. Food Chem. 159: 188 – 192.

Abstract

Phytoncide essential oil derived from pine leaves was applied for the control of enzymatic browning of fresh-cut lettuce. Changes in the browning characteristics of cut lettuce treated with phytoncide in an water or ethanol solution (1%, v/v) at 10 °C were investigated for 12 days at 4 °C. Other samples dipped in distilled water or 95% ethanol were used as the controls. The samples treated with phytoncide in an ethanol solution showed significantly higher L^* values and lower a^* values, DE values, browning index, phenolic compounds, and enzyme activities (PPO, POD, PAL) related to browning. The samples dipped in distilled water showed the opposite tendency. On the basis of changes in the browning characteristics, anti-browning effects of each treatment, phytoncide in an ethanol solution was the most effective treatment applied. These results suggest that phytoncide treatment could be used as an effective method for controlling enzymatic browning in fresh-cut lettuce.

Keywords: /Lettuce/ /Browning/ /Fresh-Cut/

Palma-Salgado, Sindy, et.al. 201. Whole-head washing, prior to cutting, provides sanitization advantages for fresh-cut Iceberg **lettuce** (*Latuca sativa* L.). Int'l. J. Food Microbiol. 179: 18 – 23.

Abstract

The efficacy of two leafy produce wash methods, the traditional cutting-before-washing process and a new washing-before-cutting method, on reduction of *Escherichia coli* O157:H7 inoculated on

Iceberg lettuce was compared. The washing tests were conducted in a pilot-scale washer using combinations of water, chlorine, peroxyacetic acid, and ultrasound. The washing-before-cutting process recorded an *E. coli* O157:H7 count reduction 0.79–0.80 log₁₀ CFU/g higher than that achieved with the cutting-before-washing process in treatments involving only a sanitizer. When ultrasound was applied to the washing-before-cutting process, a further improvement of 0.37–0.68 log₁₀ CFU/g in microbial count reduction was obtained, reaching total reductions of 2.43 and 2.24 log₁₀ CFU/g for chlorine and peroxyacetic acid washes, respectively.

Keywords: /Lettuce/ /Fresh Cut/

RED BELL PEPPER

Poverenova, Elena, et.al. 2014. Effects of a composite chitosan–gelatin edible coating on postharvest quality and storability of **red bell peppers**. *Postharvest Biol. & Technol.* 96: 106 – 109.

Abstract

For the first time, a composite chitosan–gelatin (CH–GL) coating was applied to peppers and its effects on fruit quality and storability were examined. Pure chitosan (CH) and gelatin (GL) coatings were studied for comparison. The CH coating inhibited microbial spoilage and prolonged the possible storage period. The GL coating contributed to fruit firmness, but did not allow for prolonged storage. The composite CH–GL coating was associated with a two-fold decrease in microbial decay, significantly ($p \leq 0.05$) enhanced fruit texture and prolonged the possible period of cold storage up to 21 days and fruit shelf-life up to 14 days, without affecting the respiration or nutritional content of the fruit.

Keywords: /Pepper/ /Quality/ /Storability/

TOMATO

Maharaj, Rohanie, Joseph Arul, Pul Nadeu. 2014. UV-C irradiation effects on levels of enzymic and non-enzymic phytochemicals in tomato. *Innov. Food Sci. & Emerg. Technol.* 21: 99 – 106.

The study examined enzymic and non-enzymic phytochemicals in irradiated and control tomato exocarp. Mature green tomato fruit were exposed to doses of 0, 3.7 and 24.4kJm⁻² UV-C radiation (254nm) before storage at 16°C for 28 days. Identification and quantitation of water soluble antioxidants (ascorbic acid, glutathione and cysteine) and lipid-soluble α -tocopherol were analyzed by HPLC. Spectrophotometric analysis was used to quantify total phenols and superoxide dismutase (SOD) activity. Levels of total phenols were stimulated one week earlier with both UV-C treatments compared to the control fruits. Alpha-tocopherol, ascorbic acid, glutathione and its precursor cysteine were significantly reduced with the UV-C treatment compared to controls. Maximum SOD activity in exocarp of UV-C treated fruit was delayed by one week compared to the control group. UV-C irradiation of tomato did not stimulate the accumulation of any specific phytochemicals but did stimulate the accumulation of non-specific phenols. Industrial relevance: Developing environmentally safe non-thermal processing technologies which are not capital intensive, in order to improve postharvest losses of tropical crops in developing countries, have always been a challenge to researchers. One such technology is the application of low dose germicidal UV-C radiation to elicit beneficial responses in tropical crops. Understanding the activation of defense mechanisms such as the production of

phytochemicals as a result of UV-C irradiation can retard senescence and postharvest losses as well as provide health benefits to consumers through the consumption of fresh produce.

Keywords: /Tomato/ /Phytochemicals/

Marvasi, Massimiliano. 2014. Effects of nitrogen and potassium fertilization on the susceptibility of tomatoes to post-harvest proliferation of Salmonella enteric. Food Microbiol. 43: 20 – 27.

Abstract

Fresh fruits and vegetables are increasingly recognized as vehicles of salmonellosis. Pre- and post-harvest environmental conditions, and physiological, and genetic factors are thought to contribute to the ability of human pathogens to persist in the production environment, attach to, colonize and proliferate in and on raw produce. How field production conditions affect the post-harvest food safety outcomes is not entirely understood. This study tested how varying nitrogen and potassium fertilization levels affected the “susceptibility” of tomatoes to Salmonella infections following the harvest of fruits. Two tomato varieties grown over three seasons under high, medium, and low levels of nitrogen and potassium fertilization in two locations were inoculated with seven strains of Salmonella. Even though the main effects of nitrogen and potassium fertilization on the susceptibility of tomatoes to infections with Salmonella enterica were not statistically significant overall, differences in nitrogen concentrations in plant tissues correlated with the susceptibility of partially ripe tomatoes (cv. Solar Fire) to Salmonella. Tomato maturity and the season in which tomatoes were produced had the strongest effect on the ability of Salmonella to multiply in tomatoes. Tomato phenolics, accumulation of which is known to correlate with rates of the N fertilization, did not inhibit growth of Salmonella in vitro.

Keywords: /Tomato/ /Postharvest/

Mukhopadhyay, S. et.al. 2014. Effects of UV-C treatment on inactivation of Salmonella enterica and Escherichia coli O157:H7 on grape tomato surface and stem scars, microbial loads, and quality. Food Control. 44 : 110 – 117.

The purpose of this study was to investigate the effectiveness of ultraviolet-C (UV-C) light inactivation as affected by the location of pathogens on the surface and at stem scars of whole grape tomatoes. A mixed bacterial cocktail containing a three strain mixture of Escherichia coli O157:H7 (C9490, E02128 and F00475) and a three serotype mixture of Salmonella enterica (S. Montevideo G4639, S. Newport H1275, and S. Stanley H0558) were used. Tomatoes were spot inoculated using approximately 100 mL of inocula to achieve a population of about 10^7 CFU/tomato. Additionally, the effects of treatment on color, texture, lycopene content, and background microbial loads during post UV-C storage at 4 °C for 21 days were determined. Results showed that UV-C doses of 0.60e6.0 kJ/m² resulted in 2.3e3.5 log CFU per fruit reduction of E. coli O157:H7 compared to 2.15e3.1 log CFU per fruit reduction for Salmonella on the surfaces. Under the same conditions, log reductions achieved at stem scar were 1.7e3.2 logs CFU for E. coli O157:H7 and 1.9e2.8 logs CFU for Salmonella. The treatment was effective in controlling native microbial loads during storage at 4 °C as the total aerobic mesophilic organisms (PCA) and anaerobic lactic acid bacteria (LAB) counts of treated tomatoes were significantly ($p < 0.05$) lower during storage compared to the control group and the yeast and mold populations were reduced significantly below the detection limit. Furthermore, the firmness of tomato and its color was not affected by the UV-C doses during storage. UV-C radiation could potentially be used for sanitizing fresh tomatoes and extending shelf-life. The results of this study indicate that the specific location of

pathogens on the produce influences the effectiveness of UV-C treatment, which should be taken into consideration for the design of UV-C systems for produce sanitization.

Keywords: /Tomato/ /Color/ /Ultraviolet Treatment/

Schouten, Rob E. et.al. 2014. Quantifying lycopene synthesis and chlorophyll breakdown in **tomato** fruit using remittance VIS spectroscopy. *Postharvest Biol. & Technol.* 6: 53 – 63.

The aim of this study was to increase the understanding of chlorophyll breakdown and lycopene synthesis at a quantitative level in *Solanum lycopersicum* fruit. To accomplish this, a kinetic model is proposed describing the transition from chloro- to chromoplast. Remittance VIS spectroscopy was used to assess chlorophyll and lycopene levels non-destructively in cocktail and round type tomatoes. Tomatoes were stored at constant temperatures between 4 and 24°C, or at a stepwise changing temperature between 4 and 16°C. Chlorophyll and lycopene levels were measured repeatedly over time and used to calibrate a kinetic model that describes how an autocatalytic enzyme system links chlorophyll breakdown to lycopene synthesis, including breakdown of lycopene precursor and lycopene itself. Increasing storage temperatures increased the reaction constant for lycopene synthesis more than that of chlorophyll breakdown for both tomato types. The reaction constants describing chlorophyll breakdown and lycopene synthesis were considerably larger, and the estimated enzyme levels lower for the round type. This allows round tomatoes to quickly resume lycopene synthesis after a cold storage period when enzyme levels are low. Lycopene breakdown was established for the round type while the cocktail type showed lycopene precursor breakdown. Chlorophyll breakdown and lycopene synthesis, as affected by storage temperature and tomato type, is covered well by the model for both tomato types. We hypothesise that the postulated enzyme system, responsible for the direct link between chlorophyll breakdown and lycopene synthesis, is due to STAY-GREEN proteins. Remittance VIS spectroscopy is, in combination with a parameter estimation tool, suited to screen tomato genotypes for intended colour transformation performance, or as tool in chloroplast to chromoplast transition studies.

Keywords: /Tomato/ /Lycopene/

HERBS AND SPICES

ARTICHOKE

Restuccia, Cristina, et.al. 2014. An innovative combined water ozonisation/O₃-atmosphere storage for preserving the overall quality of two globe **artichoke** cultivars. *Postharvest Biol. & Technol.* 21: 82 – 89.

Abstract

Effects of ozonised water, gaseous ozone exposure, and their combined treatments on microbiological and qualitative parameters of two globe artichoke cultivars (Violet de Provence and Romanesco clone C3) were studied during storage at 4 °C. At the end of this period, microbial counts were significantly lowered. Considering the qualitative parameters, ozone can be successfully applied to cv. Romanesco clone C3 without significantly increasing the respiration rate, while it could determine the acceleration of senescence in Violet de Provence heads. The storage under ozone-enriched atmosphere improved the initial polyphenol content in Violet de Provence, while for Romanesco clone C3 it seemed to be opportune to interrupt the ozonisation within the 4th day of storage for preventing

excessive losses of polyphenol content. The ascorbic acid reduction, for both cultivars, was significantly increased by postharvest treatments with gaseous ozone suggesting to reduce, also in this case, the exposure days to the gas. Industrial relevance: The globe artichoke is a herbaceous crop native to the Mediterranean basin, which gives an important contribution both to agricultural economy and to human health due to the high content of promoting nutrients. Unfortunately, globe artichoke heads are very perishable because of their high respiratory activity, susceptibility to weight loss, and microbial decay. In particular, fungal decay is one of the main factors affecting the postharvest quality of globe artichoke and, so far, it is controlled by the application of chemical fungicides. However, resistance phenomena in microbial populations, growing public health and environmental concerns are urging for the use of alternative treatments. Among them, ozone is one of the most promising technologies from the health and environmental points of view for its spontaneous decomposition to non-toxic product. In addition, it has emerged as a potential antimicrobial agent in the post-harvest treatment of fruits and vegetables and is able to decompose pesticides and chemical residues. On the other side, the effect of ozone treatments on other qualitative parameters, including the level of antioxidant compounds, is highly dependent on the commodity and storage conditions. In this view, the combined water ozonisation/O₃-atmosphere storage represents innovative and applicable postharvest treatments for globe artichoke, whose exposure time and concentrations need to be customized for each cultivar.

Keywords: /Tomato/ /Shelf Life/

ROOTCROPS

CASSAVA

Uarrotta, Virgilio Gavicho. 2014. Metabolomics combined with chemometric tools (PCA, HCA, PLS-DA and SVM) for screening **cassava** (*Manihot esculenta* Crantz) roots during postharvest physiological deterioration. Food Chem. 161: 67 – 78.

Abstract

Cassava roots are an important source of dietary and industrial carbohydrates and suffer markedly from postharvest physiological deterioration (PPD). This paper deals with metabolomics combined with chemometric tools for screening the chemical and enzymatic composition in several genotypes of cassava roots during PPD. Metabolome analyses showed increases in carotenoids, flavonoids, anthocyanins, phenolics, reactive scavenging species, and enzymes (superoxide dismutase family, hydrogen peroxide, and catalase) until 3–5 days postharvest. PPD correlated negatively with phenolics and carotenoids and positively with anthocyanins and flavonoids. Chemometric tools such as principal component analysis, partial least squares discriminant analysis, and support vector machines discriminated well cassava samples and enabled a good prediction of samples. Hierarchical clustering analyses grouped samples according to their levels of PPD and chemical compositions.

Keywords: /Cassava/ /Postharvest/

ORNAMENTALS

LILY

Conijn, C.G.M. 2-014. Developments in the control of **lily** diseases. Acta Hort. 1027: 213 – 210.

Abstract

No crop is free of diseases, and this is true for both commercial lily bulb and flower production and garden/park plantings. Several threats are present that can influence lily growth, yield and ornamental value and the more we grow this crop the more we have to deal with diseases. For a widely-planted crop like the lily, research is done all over the world in regard to disease and disease control. In this paper a literature review is combined with up-to-date grower information. The main diseases are: viruses, for example: *lily symptomless virus* (LSV), *lily mottle virus* (LMoV) and *plantago asiatica mosaic virus* (PIAMV); fungal diseases like *Botrytis*, *Fusarium*, *Phytophthora*, *Pythium*, *Penicillium* and *Rhizoctonia solani*; root rot caused by nematodes (*Pratylenchus penetrans*); insects like aphids and the lily leaf beetles (*Lilioceris lili*) and mites (*Rhizoglyphus robini*). Several other diseases and disorders can occur during propagation, storage and growing of lily bulbs. In this article the main diseases and disorders are discussed along with their control measures. Known and new knowledge or control measures of diseases and disorders are described. There is a trend toward control without the use of chemicals, e.g., optimisation of the hot water treatment, fostering soil life, stimulation of biodiversity in the field, and biological control. But also control strategies have become more practical such as growing virus free stocks and using decision support systems.

Keywords: /Lily/ /Lilium/ /Disease Control/

LILIUM

Miller, W. B. 2014. Postharvest of Lilium: experiment to industry adaptation. Acta Hort. 1027: 87 – 96.

Abstract

While lilies are the fourth cut flower in the world and an important potted plant, much remains to be discovered about their postharvest physiology and characteristics. Lilies have two main postharvest issues: floral longevity and foliar chlorosis. Inclusion of sugar in the vase solution invariably improves flower life (individual flowers and the entire inflorescence), but sometimes increases leaf yellowing. Aside from possibilities in breeding longer lasting cultivars, a number of technologies have emerged for maximizing postharvest quality, among them refrigeration, application of gibberellin-containing hormones and anti-ethylene treatments (for both pot plants and cut flowers) and inclusion of carbohydrates in cut flower vase solutions. We have found that storage temperature differentially influences bud life based on bud age at the time of storage: warmer storage temperatures (e.g., 7°C vs. 1°C) are beneficial in promoting opening of smaller buds, but often detrimental to life of larger (older) buds. During postharvest evaluation, an analysis of the extent of leaf senescence should also be made, as leaf chlorosis, (commonly associated with cold storage), is often more limiting to display life than flower senescence per se. Gibberellin (GA4+7) is routinely used in industry to combat leaf chlorosis in both potted plants (as a foliar spray) and cut flowers (as a postharvest pulse). After petal expansion, lily flowers generally have low sensitivity to ethylene, but as developing buds they are usually highly sensitive to ethylene. By protecting young, sensitive buds, the anti-ethylene action molecule 1-MCP (1-methylcyclopropene) can play an important role in maximizing lily display life, especially in situations of exogenous ethylene contamination. Chilling injury is not widely recognized in lilies. Leaf chlorosis that develops during or rapidly after cold storage (prior to marketing) is an example of chilling injury. Another example is the development of necrotic spots in unopened buds during postharvest cold storage of certain Oriental hybrid cultivars.

Keywords: /Lilium/ /Ethylene/ /Flower Senescence/ /Postharvest Disorders/ /Vase Life/