

**SELECTIVE DISSEMINATION OF INFORMATION (SDI)
PDF REPRINTS as of September 2014**

GENERAL

1-MCP

Serek, M., H. Mibus, E.C. Sisler. 2014. Improvement of postharvest performance of ornamental plants By chemical compounds and molecular biology techniques. Acta Hort. 1047: 191 – 198.

Abstract

Ethylene has been proved to create adverse effects in ethylene sensitive floriculture crops. A powerful strategy in preventing ethylene responses in ornamentals and subsequently increasing their display life and longevity of flowers is blocking ethylene binding sites. Use of chemical compounds is one of the most efficient and low-cost methods to execute such interference. The most powerful ethylene antagonist, which has been used in ornamental industry for more than 40 years, is silver thiosulfate (STS). However, because of the toxic nature of the silver ion alternative chemicals have been tested in the last two decades for their ability in blocking ethylene synthesis and perception. Several gaseous compounds have been evaluated, which lead to the discovery of 1-substituted cyclopropenes (1-CPs), which effectively prevent ethylene action at the receptor level. The most simple of 1-CPs is 1-Methylcyclopropene (1-MCP), which has been commercialized and presently is successfully used worldwide for ethylene sensitive horticulture crops, including edible and ornamental crops. The volatile character of the 1-CPs limited their use to enclosed systems. Nonvolatile formulations for e.g., outdoor applications were therefore needed. Recently, several newly synthesized non-volatile cyclopropenes with a methyl group in the 1-position, on which a substituted amine was attached, have been tested. A non-volatile salt, N,N-dipropyl (1-cyclopropenyl-methyl) amine (DPCA), which can be applied to plant material as a gas, dip or spray has been reported as an effective ethylene blocker in edible and ornamental plant species. The tested plant material was effectively protected against undesirable effects of ethylene. One of the effective ways to control ethylene synthesis and ethylene responses in plants is genetic modification. The introduction of the mutant ethylene receptor gene, *etr1-1*, from *Arabidopsis* has been proved as the most promising for such purpose, especially when its expression is controlled by a flower specific promoter. Several ornamental species, which were genetically modified with *etr1-1* mutant gene showed a strong ethylene tolerance.

Keywords: /1-MCP/ /Flower Longevity/ /Postharvest Quality/ /Silver Thiosulfate/

EDIBLE COATINGS

Dhall, R. K., et.al. 2013. Advances in edible coatings to fresh fruits and vegetables: a review. Critical Rev. In Food Sci. & Nutr. 53: 435 – 450.

Abstract

Edible coatings are an environmentally friendly technology that is applied on many products to control moisture transfer, gas exchange or oxidation processes. Edible coatings can provide an

additional protective coating to produce and can also give the same effect as modified atmosphere storage in modifying internal gas composition. One major advantage of using edible films and coatings is that several active ingredients can be incorporated into the polymer matrix and consumed with the food, thus enhancing safety or even nutritional and sensory attributes. But, in some cases, edible coatings were not successful. The success of edible coatings for fresh products totally depends on the control of internal gas composition. Quality criteria for fruits and vegetables coated with edible films must be determined carefully and the quality parameters must be monitored throughout the storage period. Color change, firmness loss, ethanol fermentation, decay ratio and weight loss of edible film coated fruits need to be monitored. This review discusses the use of different edible coatings (polysaccharides, proteins, lipids and composite) as carriers of functional ingredients on fresh fruits and vegetables to maximize their quality and shelf life. This also includes the recent advances in the incorporation of antimicrobials, texture enhancers and nutraceuticals to improve quality and functionality of fresh-cut fruits. Sensory implications, regulatory status and future trends are also reviewed.

Keywords: /Edible Coatings/ /Food Safety/ /Quality/ /Fruits/ /Vegetables/

FRESH-CUT

Fajardo, Violeta, et.al. 2015. Folate content in **fresh-cut** vegetable packed products by 96-well microtiter plate microbiological assay. Food Chem. 169: 283 – 288.

Abstract

Ready-to-eat foods have nowadays become a significant portion of the diet. Accordingly, nutritional composition of these food categories should be well-known, in particular its folate content. However, there is a broad lack of folate data in food composition tables and databases. A total of 21 fresh-cut vegetable and fruit packed products were analysed for total folate (TF) content using a validated method that relies on the folate-dependent growth of chloramphenicol-resistant *Lactobacillus casei* subspecies *rhamnosus* (NCIMB 10463). Mean TF content ranged from 10.0 to 140.9 lg/100 g for the different matrices on a fresh weight basis. Higher TF quantity, 140.9–70.1 lg/100 g, was found in spinach, rocket, watercress, chard and broccoli. Significant differences were observed between available data for fresh vegetables and fruits from food composition tables or databases and the analysed results for fresh-cut packed products. Supplied data support the potential of folate-rich fresh-cut ready-to-eat vegetables to increase folate intake significantly.

Keywords: /Fresh cut/ /Ready-to eat/ /Vegetables/

HANDLING PRACTICES

Zu, K.S.A., et.al. 2014. Vegetable **handling**, distribution, and wholesale profitability in “Abinchi” night market, Kumasi-Ghana. J. Postharvest Technol. 02(01): 096 – 106.

Abstract

The study was conducted on vegetable handling practices, distribution and wholesale haulage profitability in Abinchi night market Kumasi, Ghana. Focus group discussions were held for middlemen,

market queens and men, and 150 market queens and men were randomly selected and interviewed to elicit prevailing handling practices. SPSS was used to analyze data obtained and financial analytical tools; profit margin, return on investment and benefit cost ratio were used to assess the profitability of the vegetable wholesale haulage. Open and closed trucks, mini vans and taxis were identified to be regular modes of transport of vegetables. Vegetables are packed and stored in jute sacks with shelf life ranging from 3 to 7 days with visible deterioration over days. The wholesale haulage of vegetable was viable in the months of July, August and September. In mid September 2013, a 150 Kg sack full of cabbage in Tapa, a major hub of vegetable production in the Ashanti region was selling for an average of GH¢15 on farm. This constitutes 39% of the total cost of a sack full of cabbage with about 61% constituting the cost of overheads and transportation at the wholesale centre. The sales price of an average sack of cabbage to middlemen was GH¢40, with a net revenue of GH¢ 1.20 on each sack of cabbage sold. A 40Kg jute sack full of carrot sold at GH¢20 on farm, representing 77% of the total cost per sack.

Keywords: /Handling Practices/ /Shelf Life/ /Vegetables/

POSTHARVEST

Benkeblia, N. 2014. Metabolomics and **postharvest** sciences: challenges and perspectives. Acta Hort. 1047: 303 – 308.

Abstract

With more than 400,000 plant and 1,000,000 estimated metabolites, metabolomics is an emerging technology that profiles the complete set of small naturally or induced metabolites. The recent progress of metabolomics led to a comprehensive and global analysis of metabolites and metabolic pathways. Metabolomics approach could be used to study the development and ripening stages of fruits and identifying novel information on the metabolic transition from immature to ripe fruit. Metabolomics profiling could also be used to reveal changes induced by cooling, irradiation and other postharvest treatments. Changes in primary and secondary, pathways associated with sugars, organic acids, and, phenolic compounds metabolisms, ethylene synthesis, and fruit texture could also be tracked by their metabolites. Broader use of metabolomics will speed the discovery of novel gene functions in primary and secondary metabolism and will provide comprehensive data sets necessary to model metabolic networks related to postharvest physiology and biochemistry of fruits and vegetables, and human health-promoting metabolites as well. The broad data collected will help to determine the appropriate conditions of storage and/or the physical treatments, such as modified atmosphere/controlled atmosphere, to divert the metabolism towards the desired pathway, or at least slow down the production of the undesirable metabolites by reducing the speed of the respective reactions. The issues of these results would also lead to make commodities acquire a self-defence, and extending the shelf-life of these commodities with less stress effects and better quality attributes preservation.

Keywords: /Postharvest/ /Postharvest Science/

Ganpat, W.G. 2014. Model for **postharvest** extension in the Caribbean. Acta Hort. 1047: 181 – 188.

Abstract

Most farmers sell at farm gate, choosing not to engage in any significant way activities after harvesting. Since tropical crops are highly perishable, losses in the region have been consistently high. Farmers can significantly improve their incomes if they seek to reduce such losses. To achieve this, farmers as well as others involved in postharvest activities must be empowered with the latest technical knowledge and modern skills. The special characteristics of those involved in further activities along the value chain as well as the nature of postharvest technologies demand an extension approach that is different from the traditional methods used to transfer production technologies. A model that seeks to promote extension for categories of clients based on the technical expertise available is proposed. When combined with the concept of clustering i.e., groups of farmers, processors, marketers, or exporters working with the same or similar commodities, this approach can be more effective. A system of mentoring and training to build extension staff capabilities is incorporated in the model for sustainability. Teaching activities based on the principles of experiential learning must have a stronger focus; discovery based activities in which learners are involved in action and reflection can bring about higher quality and more sustained learning. Such an approach, along with some of the traditional lecture/demonstrations is proposed. For this model of extension to be successful, it must be supported with increased training at all levels; tertiary level training for the development of postharvest Subject Matter Specialists and diploma level training to provide skilled technicians. Recommendations include curricula revision at all levels and both national and regional coordinated approaches for postharvest development in the Caribbean.

Keywords: /Postharvest/ /Extension/

STORAGE

Ahmad, Md.Shamsher, et.al.2014.Quality prerequisites of fruits for storage and marketing. J.Postharvest Technol. 02(01): 107 – 123.

Abstract

Quality is a major component that attracts consumers of all ages. If the consumers like it, they are ready to pay a premium price. India is the second largest producer of fruits in the world. However, quality of the produce is not up to the world standard level. There may be many reasons for this, but one of the main reasons is lack of knowledge. Most producers are small and marginal farmers and they are not much aware about quality. Country's current distribution system of fresh produce is also inefficient in maintaining quality in the long supply chain between producers and consumers. With the amendment in the policy of Agricultural Produce Market Committee, recently a few reputed companies entered into fruit business on small, medium, and large-scale. These firms increased quality bars of Indian fruits as only quality fruits are purchased and sold by these firms.

Keywords: /Storage/ /Commercial Quality/ /Marketing/ /Postharvest/ /Marketing/

FRUITS

BANANA

Rahman, M.A., et.al. 2014. Rahman, M. valuating the effects of 1-methylcyclopropene concentration and immersion duration on ripening quality of **banana** fruit. J. Postharvest Technol. 02(01): 054 – 067.

Abstract

The influence of different concentrations of aqueous 1- methylcyclopropene (1-MCP) in delaying the ripening process of harvested banana fruit (*Musa* sp., AAA group, cv. BARI Kola-1) was investigated. Banana fruits at mature green stage were immersed in aqueous 1-MCP at 100, 300 and 500 µg L⁻¹ for 5, 10 and 15 min, fan-forced air-dried and kept into 1% perforated low density polyethylene bag. The fruits were then stored at 20±2 °C and 75-80% RH for ripening over 35 days. Banana ripening was delayed when immersed in 100-500 µg L⁻¹ 1-MCP solution however; higher concentrations were more effective. The efficacy of 1-MCP was not significantly influenced by immersion durations of 5, 10 and 15 min. The changes in respiration rate, fruit firmness, TSS, ascorbic acid contents and surface colour of bananas subjected to all three concentrations of 1-MCP remained strongly suppressed and consequently extended the storage life by 15 days compared to untreated fruit. Increased storage life of banana occurred without affecting the peel appearance, pulp texture, soluble solids concentration and aroma profiles. Nevertheless, crown rot disease initiated at the later stage of ripening although individual finger was not affected until end of the storage. Thus, postharvest immersion of banana fruit in aqueous 1-MCP at 100 µg L⁻¹ solution for 5 min could extend the storage life up to 35 days without compromising fruit quality and could be a feasible alternative technology for long distance transportation and marketing.

Keywords: /Banana/Ripening/ /1-MCP/ /Respiration/ /Firmness/ /Storage Life/

Wasala, W.M.C.B., et.al. 2014. Postharvest losses, current issues and demand for postharvest technologies for loss management in the main **banana** supply chains in Sri Lanka. J. Postharvest Technol. 02(1): 080 – 087.

Abstract

Banana is the main fruit crop cultivated in Sri Lanka. It's a commercial crop giving high income to the cultivators. It is distributed from farm gate to consumers through the supply chain which involves farmer, collector, whole seller, retailer and transporter and with a high post harvest loss. Therefore, this study was conducted to assess the present status of the banana supply chain. A total sample of 100 including farmers, collectors, whole sellers, transporters and retailers were randomly selected from two growing areas and a high banana retailing municipal council areas. Data were gathered through a survey using a questionnaire, key informant interviews, direct observations and secondary sources. The study revealed that the banana supply chain follows the conventional chain with some deviations. All whole sellers were acting as bulk transporters. Majority of stakeholders preferred and transported bananas as whole bunches bulk packed in vehicles. Preference in selling in retail outlets were also as intact bunches.

The commonly used transportation vehicles were two wheel tractors, open trucks, and lorries. The total postharvest loss of banana was 20 % from farm gate to retailer. A suitable bulk packing method should be introduced to reduce the post harvest loss of banana.

Keywords: /Banana/ /Packaging Methods/ /Postharvest Losses/ /Supply Chain

BLACKBERRY

Dalany Menezes Oliveira, et. al. 2014. Biodegradable coatings on the postharvest of **blackberry** stored under refrigeration. *Revista Ciencia Agronomica*. 44(2): 302 – 309.

Abstract

Blackberry is a notable fruit due to bioactive compounds. However it has a fragile structure, which reduces the consumption *in natura*. The aim of this study was to evaluate the physical and chemical quality of the cv. Tupy blackberry fruits, produced in an organic system, and coated with emulsions based on cassava starch and water kefir grains stored under refrigeration. The fruits were divided into three groups: a control (T1) and two treatments with coatings. The coatings used were: cassava starch solution 2.5% (T2); water kefir grains at 20% (T3). The fruits of the three treatments were stored at 10 ± 2 °C and RH $85 \pm 3\%$, and were evaluated every three days for 12 days period. It was determined: weight loss, firmness, pH, titratable acid, soluble solids, ratio, anthocyanins and decay incidence. The results for the chemical features showed statistical differences ($p > 0.05$) except for the pH value at the end of the storage. There were differences between crop for all parameters. During the storage period, the anthocyanin content increased on the 2008 crop and reduced on the fruits of 2009. To reduce the decay incidence it is recommended to use the coating with kefir grains. These fruits can be consumed until the third day of storage at 10 °C.

Key words: /Blackberry/ /Postharvest/ /Biodegradable Coating/

Oliveira, Dalany Menezes, et.al. 2014. Refrigeration and edible coatings in **blackberry** (*Rubus* spp.) conservation. *J. Food Sci. Technol*. 51(9): 2120 – 2126.

Abstract

An experiment was conducted to evaluate the conservation of blackberry, cv. Tupy, stored under refrigeration and coated with different edible coatings. Four treatments were carried out: control T1 (uncoated), T2 (chitosan 1.5 %), T3 (cassava starch 2.5 %) and T4 (kefir grains in water 20 %), stored at temperatures of 0 and 10 °C; 1.0 % (m/v) sorbitol/glycerol was added as plasticizers. Chemical and physical-chemical evaluations (weight loss, firmness, pH, titratable acidity, soluble solids, SS/TA ratio and anthocyanins) were made, besides rot incidence. The results showed that cooling to 0 °C combined with T2 showed an effect in reducing the physiological loss of weight (4.41 %), in retaining fruit firmness (19.1 N) and presenting lower incidence of rot (6.19 %). Likewise, in physical and chemical parameters: SS did not alter significantly during the whole period of 18 days of storage.

Keywords: /Blackberry/ /Edible coatings/

BLUEBERRIES

Blaker, Kendra M., et.al. 2014. Correlation between sensory and instrumental measurements of standard and crisp-texture southern highbush **blueberries** (*Vaccinium corymbosum* L. interspecific-interspecific hybrids). J Sci Food Agric. 94: 2785 – 2793.

Abstract

BACKGROUND: Fruit texture is a primary selection trait in southern highbush blueberry (SHB) breeding to increase fresh fruit postharvest quality and consumer acceptance. A novel crisp fruit texture has recently been identified among SHB germplasm. In this study, we developed a common set of descriptors that align sensory evaluation of blueberry fruit texture with instrumental measures that could be used for quantitative measurements during pre- and postharvest evaluation. **RESULTS:** Sensory and instrumental characteristics were measured in 36 and 49 genotypes in 2010 and 2011, respectively. A trained sensory panel evaluated fresh fruit based on five common textural attributes in 2010 and 2011: bursting energy, flesh firmness, skin toughness, juiciness and mealiness. Instrumental measures of compression and bio yield forces were significantly different among cultivars and correlated with sensory scores for bursting energy, flesh firmness and skin toughness ($R > 0.7$, except skin toughness in 2011), but correlations with sensory scores for juiciness and mealiness were low ($R < 0.4$). **CONCLUSION:** The results of sensory and instrumental measures supported the use of both compression and bio yield force measures in distinguishing crisp from standard-texture genotypes, and suggest that crisp texture in SHB is related to the sensory perception of bursting energy, flesh firmness and skin toughness.

Keywords: /Blueberries/ /Firmness/

CITRUS

Pedro A. Moscoso-Ramírez, Pedro A. & Clara Montesinos-Herrero & Lluís Palou. 2014. Antifungal activity of sodium propylparaben alone or in combination with low doses of imazalil against *Penicillium* decay on **citrus** fruit. Eur. J Plant Pathol. 140: 145–157.

Abstract

The performance of postharvest treatments with sodium propylparaben (SPP), alone or combined with low doses of the fungicide imazalil (IMZ), against citrus green (GM) and blue (BM) molds was evaluated on several citrus species and cultivars artificially inoculated with *Penicillium digitatum* and *P. italicum*, respectively, and incubated at 20 °C or cold-stored at 5 °C. Effectiveness of 100 mM SPP dips at 20 °C for 60 s was higher on oranges than on mandarins, with GM and BM incidence reductions of up to 60–90 % after 7 days at 20 °C. Irrespective of citrus cultivar and storage condition, SPP generally improved the curative action of 25 µl l⁻¹ IMZ to control *Penicillium* molds. In additional tests, 100 mM SPP dips at 20 °C for 60 s only prevented GM on 'Valencia' oranges inoculated 24 h after treatment when combined with IMZ. It can be concluded that postharvest SPP treatments show promise as an effective alternative to be considered in citrus postharvest disease control programs.

Keywords: /Citrus/ /Greenmold/ /Bluemold/ /Postharvest Disease Control/

Shaoa, Xingfeng, et.al. 2014. Effect of postharvest application of chitosan combined with clove oil against citrus green mold. *Postharvest Biol. & Technol.* 99: 37 – 43.

Abstract

The antifungal activity of chitosan combined with clove oil against *Penicillium digitatum*, the causal agent of citrus green mold, was tested in vitro and in vivo. Chitosan combined with clove oil inhibited mycelia growth more than individual treatments, which was related to the greater release of cellular material and the largest alterations in hyphal morphology of *P. digitatum*. However, compared to chitosan alone, 1% chitosan coatings combined with various amounts of clove oil (0.5, 1 or 2 mL/L) showed no greater ability in controlling decay development on artificially inoculated citrus fruit. 1% chitosan combined with 0.5 mL/L clove oil appeared to slightly reduce lesion diameter and enhanced the activities of defense enzymes, including chitinase and phenylalanine ammonia-lyase at the later stages of incubation. This study indicated that the synergistic antifungal activity of chitosan-clove oil observed in in vitro studies was not found in in vivo tests. Therefore, the data suggest that a coating of 1% chitosan alone, not combined with clove oil, can effectively contribute to the control of green mold on citrus fruit.

Keywords: Citrus/ /Chitosan/ /Green Mold/

Vázquez, D. et.al. 2014. Characterization of sensitivity of grove and packing house isolates of *Penicillium digitatum* to pyrimethanil. *Postharvest Biol. & Technol.* 98: 1 -6.

In most northeast Argentinean citrus packing houses, postharvest fungicide treatments are based on the use of thiabendazole and imazalil. However, these fungicides have been used in a manner highly conducive to the selection and proliferation of resistant biotypes of *Penicillium digitatum*, the main fruit decay fungus in the area. Recently, a new fungicide, pyrimethanil (PYR), was introduced to control molds. Aims of this study were to determine the baseline sensitivities for PYR against isolates of *P. digitatum* considering its use in the region is not yet widespread and to evaluate the control of the fungus in vivo. One hundred and nine (109) *P. digitatum* isolates were collected from diseased fruit within citrus groves (43 isolates) and packing houses (66 isolates). EC₅₀ was determined for each isolate by measuring colony diameters on different agar dilutions of the fungicide. The mean EC₅₀ value of the green mold isolates collected from the groves was 0.14 ± 0.03 mg L⁻¹ while the mean EC₅₀ of those collected from packing houses was 0.13 ± 0.05 mg L⁻¹. No resistant isolates were found in the field where the fungicide is not used, while one isolate originated from a packing house showed an EC₅₀ of 3.40 mg L⁻¹, 26-fold higher than the mean level. This isolate was collected from lemons stored in cool rooms of a packing house where PYR had not been used. Fruit decay by sensitive isolates was reduced approximately 80% by PYR applied at 500–600 mg L⁻¹ by immersion for 60 s at room temperature to inoculated oranges and mandarins. In contrast, the resistant isolate was not controlled by PYR applied at 1000 mg L⁻¹. Thus, the introduction of PYR applied into packing houses should be done carefully and control strategies should be implemented in order to minimize the development of resistant isolates.

Keywords: /Citrus/ /Postharvest/ /Green Mold/

JACKFRUIT

Adiani, Vanshika, et.al. 2014. SPME-GCMS integrated with chemometrics as a rapid non-destructive method for predicting microbial quality of minimally processed **jackfruit** (*Artocarpus heterophyllus*) bulbs. *Postharvest Biol. & Technol.* 98: 34 – 40.

Abstract

SPME-GCMS in combination with chemometrics was employed to correlate volatile headspace composition with microbial quality of minimally processed jackfruit (*Artocarpus heterophyllus*) bulbs stored at 4°C and 10°C. Predictive models of the total viable count (TVC) and yeast and mold count (Y&M) were prepared by Partial Least Square Regression (PLS-R) using total ion current (TIC) and total mass spectral data as independent variables. All PLS-R models correlating microbial quality with GC spectral data and total mass spectral data demonstrated high regression coefficient ($R > 0.93$). Models generated using TIC performed better in comparison with models prepared with total mass spectral data against test data. Ethanol, ethyl acetate and 3-methyl-1-butanol were identified as major compounds responsible for the observed correlations. The possibility of using GCMS as a non destructive method for rapid assessment of microbial quality of minimally processed fruits is demonstrated here for the first time.

Keywords: /Jackfruit/ /Minimally Processed/ /Microbial Quality/

KINNOW FRUIT

Mahajan, B.V.C. and Rupinder Singh. 2014. Influence of coatings on postharvest physiology and shelf life of **kinnow** fruits under super market conditions. *J. Postharvest Technol.* 02(01): 037 – 044.

Abstract

The Kinnow mandarin (*Citrus nobilis x Citrus deliciosa*) fruits after harvesting were coated with different coating emulsions viz. cellulose, citrashine, terpenoidal oligomer and sta-fresh. The control fruits were kept uncoated. The fruits were stored under supermarket conditions (18-20°C and 80-85% RH). The observations on various physico-chemical attributes of fruits were recorded at different storage intervals. The data revealed that fruits coated with citrashine or terpenoidal oligomer coatings can be stored for 15 days under supermarket conditions (18-20°C and 80-85% RH) with highly acceptable quality as compared to control which maintained storage life of one week only.

Keywords: /Kinnow/ /Coating/ /Physiological Changes/ /Storage/

KIWIFRUIT

Huang, Zihui, et.al. 2014. Energy status of **kiwifruit** stored under different temperatures or exposed to long-term anaerobic conditions or pure oxygen. *Postharvest Biol. & Technol.* 98: 56 – 64.

Energy status is a key factor switching on ripening and senescence of fruit. In this study, kiwifruit was stored at 15°C or 25°C or exposed to long-term N₂ and O₂. Energy characteristics and transcript abundance of energy-related genes cloned from kiwifruit in relation to fruit quality, respiration rate

and ethylene production rate were investigated. The concentrations of adenylylate triphosphate (ATP), adenylylate diphosphate (ADP) and adenylylate monophosphate (AMP) peaked during storage in the following order: AMP, ADP and ATP. The transcript abundances of ADP/ATP carrier 1 (AdAAC1), ATP synthase β subunit (AdAtpB) and sucrose non-fermenting-1-related kinase 1 (AdSnRK1) fluctuated during storage. Transcript abundance peaks of alternative oxidase 2 (AdAOX2) and uncoupling protein (AdUCP) appeared after 2 days of storage, consistent with the peak in respiratory rate. Low temperature (15°C) and long-term N₂ treatment maintained higher firmness, blocked respiration and energy production, and lowered the total soluble solids (TSS) content, ATP level, and ATP/AMP ratio, whilst these treatments increased the transcript abundance of AdAAC1 and AdSnRK1. Furthermore, low temperature storage increased the transcript abundance of AdAtpB, AdAOX2 and AdAUCP. Long-term O₂ application dramatically elevated the transcript abundance of AdAOX2 and AdUCP, especially at the beginning of storage. It was suggested that ripening and senescence of kiwifruit was closely related to the energy level, which in turn was positively correlated with respiration activity and regulated in coordination with AdAAC1, AdAtpB, AdAOX2, AdAUCP and AdSnRK1.

Keywords: /Kiwifruit/ /Storage/

LEMON

El-Shiekh, A. F. 2014. Effect of some biological fertilizers on productivity and postharvest fruit quality of 'Adalia' **lemons** grown in the United Arab Emirates. *Acta Hort.* 1047: 45 – 50.

Abstract

This study was done at Dibba Experiment Station, Eastern Region, Ministry of Environment & Water, UAE. Two types of biological fertilizers (alnowaya and super alnowaya) at two different doses, in addition to the regular mineral fertilizer, were added to 10-year-old 'Adalia' lemon trees. The study was performed during two consecutive seasons (2009/2010 and 2010/2011). At fully mature stage, fruits were harvested and yield was weighed. Fruit qualitative (fruit weight and dimensions; juice percentage) and quantitative (soluble solids contents, pH, nitrogen, phosphorus and potassium juice contents) measurements were done. In both seasons, trees supplemented with super alnowaya biological fertilizer at both doses (25 and 50 kg/tree) had the highest yield in comparison with the rest of the treatments. Super alnowaya fertilizer (25 kg/tree) increased tree yield by about 83% over that of the control in the first season while the yield increment was over 100% in the second season. Although alnowaya fertilizer (50 kg/tree) increased tree yield over that of the control, the differences were not significant. No significant differences were noticed between the treatments for average fruit weight, juice percentage, soluble solids contents and pH of juice in both seasons. Fruit height increased significantly as affected by super alnowaya fertilizer (25 kg/tree) in comparison with the control, alnowaya (50 kg/tree) and super alnowaya (50 kg/tree) fertilizers in the first season. However, in the second season, no significant differences were observed between treatments for either fruit height or fruit width. In addition, no significant differences were noticed in nitrogen and potassium contents of fruit juice in the first season. In the contrary, in the second season, nitrogen contents of the fruit juice were increased as affected by all treatments over that of the control. For phosphorus fruit juice contents, the data were not consistent in both seasons. In the first season, alnowaya (25 kg/tree) and super alnowaya (50 kg/tree) fertilizers resulted in a reduction in fruit phosphorus content in comparison with the other treatments. However, in the second season, super alnowaya (50 kg/tree) fertilizer resulted in a reduction in phosphorus fruit content when compared with the other treatments. As a result of the treatments (in the first season),

nitrogen, potassium and magnesium leaves content increased over that of the control while nitrogen only was increased in the leaves in the second season. Also, magnesium leaves content was increased by the treatments but the differences were not significant. Super alnawaya (25 kg/tree) fertilizer is recommended to be used on 10-year old 'Adalia' lemon trees under the UAE environment rather than alnawaya, super alnawaya (50 kg/tree) or mineral fertilizers.

Keywords: /Lemon/ /Postharvest/ /Fruit Quality/

MANDARIN

Godenberg, Livnat, et.al. 2014. Genetic diversity among mandarins in fruit-quality traits. J. Agric. & Food Chem. 62: 4938 – 4946.

Abstract

A detailed phenotypic analysis of fruit-quality traits was conducted among 46 mandarin varieties within the Israeli Citrus breeding collection, belonging to genetically different natural subgroups, including common mandarin (*C. reticulata* Blanco), clementine (*C. clementina* Hort. ex. Tan), satsuma (*C. unshiu* Marcovitch), Mediterranean mandarin (*C. deliciosa* Tenore), King mandarin (*C. nobilis* Loureiro), and mandarin hybrids, such as tangor (*C. reticulata* × *C. sinensis*) and tangelo (*C. reticulata* × *C. paradisi*). Evaluated qualities included physical attributes (size, shape, color, peel thickness, and seed number); physiological properties (ripening period, peel ability, and segmentation); nutritional and biochemical composition (vitamin C, phenol, flavonoid, and carotenoid contents and total antioxidant activity); and sensory attributes (total soluble solids and acid levels, flavor preference, sweetness, sourness, and fruitiness). The results indicated wide genetic variability in fruit-quality traits among mandarin varieties and natural subgroups, and statistical and hierarchical clustering analysis revealed multiple correlations among attributes. Such phenomic analysis is an obligatory requirement for identification of molecular markers for distinct fruit quality traits and for selection of appropriate parents for future breeding programs.

Keywords: /Mandarin/ /Citrus/ /Fruit Quality/

MANGO

Diop, B. and N. Benkeblia. 2014 Correlation between colour, firmness, dry matter, sugars and maturity in 'East Indian' mangoes (*Mangifera indica*). Acta Hort. 1047: 121 – 126.

Abstract

There are about twenty-five (25) different types of mangoes in Jamaica, but most consumers are unable to identify the cultivars. The 'East Indian' mango is one of the most popular cultivars because of its fruit quality. Although much is known on mango physiology, little is known on these cultivars. This study aimed to determine the correlation in the skin colour, firmness, dry matter, sugar contents and maturity indices of the 'East Indian' mango cultivar. Results showed that the L^* , a^* , b^* , c^* values of the fruit increased significantly during the ripening of the fruit. The L^* values ranged from 48.72 ± 1.92 to 62.44 ± 2.11 . The b^* , c^* and a^* measurements showed similar trends; ranging from 32.13 ± 2.36 to 47.57 ± 6.91 , 36.52 ± 2.49 to 49.02 ± 7.48 and -17.36 ± 0.99 to 10.75 ± 5.91 respectively. The hue angle (H^*)

showed a significant decrease during maturity; ranging from 118.42 ± 0.92 to 77.97 ± 6.62 . Sugar contents increased significantly during maturation. Reducing sugars in skin increased steadily from 17.57 ± 0.32 mg/g in stage 1 to 35.34 ± 5.35 mg/g in stage 4. However, reducing sugars in pulp increased significantly from 21.99 ± 3.42 mg/g in stage 1 to 58.07 ± 2.14 mg/g in stage 4. The total sugars in skin increased significantly between each stage; ranging from 27.88 ± 1.55 mg/g in stage 1 to 80.89 ± 12.77 mg/g in stage 4. However, total sugars increased significantly from 26.85 ± 3.43 mg/g in stage 1 to 68.43 ± 10.76 mg/g in stage 2. The concentration increased steadily to 74.31 ± 5.38 mg/g in stage 4. Firmness decreased significantly by 60% during maturation. Dry matter did not vary significantly with final % dry matters of 34 and 24% for peel and pulp respectively. A strong correlation was found between the skin colour, dry matter, firmness and sugar content of the fruit during maturation and ripening. Therefore, these are good indicators for determining the optimal maturity stage of the 'East Indian' mango fruit.

Keywords: /Mango/ /Mangifera indica/ /Firmness/

Wijewardane, R.M.N.A. 2014. Effect of pre-cooling combined with exogenous oxalic acid application on storage quality of **mango** (*Mangifera indica*). J. Postharvest Technol. 02(01): 045 – 053.

Abstract

This study was undertaken to determine low cost treatments that may be readily adoptable by local producers and exporters to extend the storage life of mango. The experiment was conducted for the var. 'Karuthacolomban'. The fruits were harvested 13 weeks after flowering. Just after harvesting, the half of the lots of selected fruits were subjected to pre-cooling by using hydro pre-cooling (water temperature 15°C) till the fruit temperature reaches to $13 - 15^{\circ}\text{C}$ and remaining was kept without pre-cooling. The pre-cooled and non pre-cooled fruits were dipped in 5% sodium bicarbonate solution for 10 min followed by 6 and 8 ppm oxalic acid solution for 10 min, air-dried and the treated fruits were stored at ambient ($28-30^{\circ}\text{C}$, 65-70% RH) and low temperature ($13 \pm 2^{\circ}\text{C}$, 55-60% RH) conditions. The fruits from each treatment were observed to evaluate the physiological weight loss, fruit firmness, total soluble solids, titratable acidity, pH and rate of respiration. The results revealed that fruits dipped in 5% sodium bicarbonate solution followed by 8 ppm oxalic acid application along with pre-cooling was the most effective for extension of storage life of fresh mango up to 12 and 24 days under ambient ($28-30^{\circ}\text{C}$, 65-70% RH) and low temperature storage ($13 \pm 2^{\circ}\text{C}$, 55-60% RH), respectively. Fruits stored under low temperature exhibited better retention of all physiological and biochemical characteristics than the same treatments during ambient storage.

Keywords: /Mango/ /Pre-Cooling/ /Storage/ /Quality/

MEDLAR FRUIT

Selcuk, Nurten, Mustafa Erkan. 2014. The effects of modified and palliflex controlled atmosphere storage on postharvest quality and composition of 'Istanbul' **medlar fruit**. Postharvest Biol. & Technol. 99: 9 – 19.

Abstract

Medlar (*Mespilus germanica* L. cv. Istanbul) fruit were stored in palliflex controlled atmosphere storage systems of 21% O_2 + 0.03% CO_2 (PL-1, control), 2% O_2 + 5% CO_2 (PL-2), 3% O_2 + 10% CO_2 (PL-3)

and modified atmosphere packaging (MAP) at 0°C for 60 days to determine the effects of different O₂ and CO₂ concentrations on physiological properties, quality attributes and storability. Every 15 days, three replicates of each treatment were evaluated for weight loss, fruit firmness, decay, external browning index, skin color, pH, titratable acidity, total soluble solids, total phenolics, total flavonoids, total condensed tannins, ascorbic acid, antioxidant activity and organic acid and sugar contents. Taste analysis of the fruit was performed after 30, 45 and 60 days of storage. The CO₂ and O₂ concentrations created by the MAP stabilized at 7% and 14%, respectively. Weight loss of fruit stored in MAP was lower (<0.4% at 60 days) than for other treatments. Off-flavors were not detected in any treatment. Storage of medlar fruit under PL-3 was the least effective treatment in delaying fruit ripening (flesh firmness). The incidence and severity of browning, loss of skin color (Ch^o) and retaining acceptable taste during 60 days were found the most effective in PL-2 and PL-1 compared to other treatments. Fruit pH increased and titratable acidity decreased during the storage period. Total soluble solids and sugar contents first increased then decreased in all treatments by the end of storage. The fruit stored in PL-2 had higher titratable acidity, total soluble solids and sugar contents than fruit stored in PL-1, PL-3 and MAP at all evaluations. Concentrations of total phenolics, total flavonoids, total condensed tannins, ascorbic acid, associated antioxidant activity and organic acids were affected by the storage atmosphere, decreased during storage. The concentrations of total phenolics, total flavonoids, and antioxidant activity were found the highest in PL-2, PL-1 and MAP treatments, respectively. However, in terms of ascorbic acid and total condensed tannins retention, PL-2 was the most effective treatments. The results indicated that 60 days storage of medlar fruit in the palliflex storage system at 0°C maintained physiological and biochemical properties of medlar fruit.

Keywords: /Medlar Fruit/ /Modified Atmosphere/ /Postharvest/ /Fruit Quality/

MELON

Dilmaçunal, Tuba, et al. 2014. Efficacy of some antimicrobial treatments compared to sodium hypochlorite on physical, physiological and microbial quality of fresh-cut **melons** (*Cucumis melo* L. var. *inodorus*). *LWT – Food Sci. & Technol.* 59: 1146 – 1151.

Abstract

Turkish-type 'Kırka_gaç' melons (*Cucumis melo* L. var. *inodorus* cv. 'Kırka_gaç') were hand-harvested at a commercial harvest maturity stage from a greenhouse in Turkey (Antalya). Fruits were divided into four groups for the experiments: 1. Control (C), 2. Hazelnut oil (HO), 3. Gaseous Ozone (GO), and 4. NaClO. After the treatments, slices were placed immediately to lidded plastic boxes (500 g capacity) and stored in a cold room at 5 °C and 90 ± 5% relative humidity for 12 days. Fruits were evaluated at three-day intervals for microbial enumeration, firmness, flesh color, titratable acidity (TA), pH, soluble solid content (SSC), weight loss, sensorial attributes (external appearance, taste-flavor and translucency), respiration rate and ethylene production. The integrity of the slices treated with GO was preserved better than those of the others and no juice leakage was observed during storage. According to the results, especially for microbial and sensorial attributes, control, NaClO and HO treated melon slices were preserved their quality for six days, whereas GO treated samples were stored for nine days with good quality.

Keywords: /Melons/ / Cold Storage/ /Fresh Cut/ /Quality/

ORANGE

Barakat, Mohamed R., Abeer T. Mohsen and Ahmed F. Jasim. 2014. Studies on storage of Valencia orange fruits. J. Hortic. Sci & Ornamentals Plants. 6(1): 27 - 33.

Abstract

The present investigation was carried out for two successive seasons 2012 and 2013 on Valencia orange fruit. The effect of postharvest treatments i.e. chitosan at 2%, citric acid 0.5% and malic acid 150 ppm as well as their combinations on some fruit quality parameters during cold storage at 5°C. 90-95% relative humidity, to assess the effect of treatments on weight loss %, decay, fruit firmness (lb/inch²), juice TSS %, juice acidity % and respiration rate. It was concluded from the results, that Valencia orange fruits treated with chitosan 2% + citric acid 0.5% + malic acid 150 ppm gave the best results during cold storage at 5°C after 90 days.

Keywords: /Orange/ /Valencia Orange/ / Chitosan/ /Storage/ / Fruit Quality/

Buron-Moles, G., et.al. 2015. Characterisation of H₂O₂ production to study compatible and non-host pathogen interactions in orange and apple fruit at different maturity stages. Postharvest Biol. & Technol. 99: 27 – 36.

Abstract

Penicillium digitatum and *Penicillium expansum* are the main postharvest pathogens of orange and apple fruit, respectively. These wound pathogens can infect through injuries caused during harvest and postharvest handling, which lead to large economic losses. Susceptibility of fruit to mechanical damage or infection increases during ripening. However, few studies have been focussed on the fruit wound-induced defence responses, such as H₂O₂ production. In this study, the characterisation of H₂O₂ production in orange (*C. sinensis* cv Valencia) and apple (*M. domestica* L. cv Golden Smoothie) fruit in response to abiotic (wounding) and biotic (pathogen and non-host pathogen) stresses at different maturity stages was investigated. The effect of H₂O₂ on the eco physiology of *P. digitatum* and *P. expansum* at different temperatures was also studied. The potential antifungal effect of H₂O₂ in both pathogens depends on the temperature. *P. expansum* was more susceptible to higher levels of H₂O₂ than *P. digitatum*, especially at 25°C. The lesion diameter in compatible interactions increased significantly with fruit maturity in apples and oranges. Fruit maturity also increased susceptibility to non-host pathogen interactions, especially reducing apple resistance to *P. digitatum* in the over-mature stage. H₂O₂ production showed different patterns depending on the fruit. In apples, the higher resistance of immature harvested fruit to pathogen infection correlated with an increase in H₂O₂ production (biphasic oxidative burst), whereas in oranges, immature and commercial harvests exhibited a similar pattern of H₂O₂ production among treatments. Production of H₂O₂ in oranges and apples following abiotic (wounding) and biotic (pathogen and non-host pathogen) stresses depended on the harvest date.

Keywords: /Orange/ /Fruit Maturity/

PASSION FRUIT

Janzantti, Natalia S. Magali Monteiro. 2014. Changes in the aroma of organic **passion fruit** (*Passiflora edulis* Sims f. *flavicarpa* Deg.) during ripeness. *LWT – Food Sci. & Technol.* 59: 612 – 620.

Abstract

The odoriferous importance of volatile compounds during maturation of organic passion fruit was studied. The volatile compounds were analyzed using GC-FID-OSME and GC-MS. The volatile profile changed throughout maturation. Relative peak area improved from the 1/3 to 2/3 yellow skin color state of ripeness and was still improved from the 2/3 to 3/3, but the profile remained. Ethyl butanoate showed the highest relative peak area and importance for the aroma of the organic passion fruit in the 1/3 yellow skin color. Ethyl butanoate and hexanoate, propyl acetate and alpha-terpineol showed odoriferous importance from the 2/3 yellow skin color, and together with diethyl carbonate and cis-3-hexen-1-ol were the most important compounds in the 3/3 yellow skin color state of ripeness. PCA allowed clearly differentiate all ripening states, indicating that hexanal and caramel, earthy and synthetic aroma were most closely associated with the unripe passion fruit. 2-methylpropyl acetate characterized the passion fruit at the 2/3 yellow skin color together with cis-beta-ocimene, benzaldehyde and aroma sweet and passion fruit, skin, which also were associated with the 3/3 yellow skin color. Esters, terpenes, alcohols, octanal, dodecanol and aroma of passion fruit, fruity, citric, candy and plastic were closely associated with the whole maturation.

Keywords: /Passion fruit/ /Ripening/

Yumbay, Peninah, et.al. 2014. Effect of modified atmosphere packaging on the shelf life and postharvest quality of purple **passion fruit**. *J. Postharvest Technol.* 02(01): 025 – 036.

Abstract

Passion fruit (*Passiflora edulis* Sims) being highly perishable is susceptible to rapid water loss after harvest leading to diminished quality. This study evaluated the efficacy of active bag which is a new modified atmosphere packaging (MAP) product in the Kenyan market. Fruits harvested at 60-65 and 75-80 days after anthesis were either packaged in activebag® or ordinary polyethene bags and allowed to ripen under ambient room conditions. MAP maintained the quality of fruits harvested at both stages of maturity and prolonged their shelf life by at least 14 days compared to the unpackaged controls. Packaging significantly slowed weight loss, which was lower at 7% compared to the unpackaged controls that lost up to 26% of the weight. Both MAP packages reduced ethylene production and respiration rate and slowed other physicochemical changes associated with passion fruit ripening. Although the ordinary polythene bag packaging prolonged the fruits' shelf life compared to unpackaged control, their positive effect was negated by high incidence of rotting evident after 14 days of storage. These results indicate that use of activebag® can prolong the shelf life by maintaining quality attributes and external appearance of purple passion fruits and hence extend their marketing period.

Keywords: /Passion Fruit/ /Ethylene/ /Respiration/ /Water Loss/ /Physicochemical/

PEACH

Kamal, Hemat M., Mohamed A. Eissa and Ahmed A. Albayaty. 2014. Effect of calcium and boron foliar application on postharvest quality of Florida prince peach fruit. J. Hort. Sci. & Ornamentals Plants. 6(1): 34 – 40.

Abstract

The current research was carried out during two successive seasons (2012 and 2013) to examine the effect of calcium and boron applications on quality and storability of Florida prince peach fruits. This study conducted on six years old peach trees grown in a sandy soil in a private orchard. The trees treated with, calcium green (34% Ca), micro net.30/1 (30% Ca + 1% B), micro net 18/6 (18% Ca + 6% B) while the control sprayed with water only. At maturity stage fruits were picked and stored under (0°C and 90-95% RH). Results indicated that, spraying calcium green at different concentration reduced fruit decay during storage and increased fruit firmness. In addition, treat the fruit with calcium green during of storage time gave the highest total soluble solid, total sugars contents and the lowest phenol contents. The micro net (30/1) and micro net (18/6) were less efficient in improving fruit quality compared with calcium green. Calcium green improved fruit quality and extend storage period with good quality.

Keywords: /Peach/ /Postharvest/ /Fruit Quality/

Scattin, Claudia, et.al. 2014. Post-harvest UV-B irradiation induces changes of phenol contents and corresponding biosynthetic gene expression in peaches. Food Chem. 163: 51 – 60.

Abstract

In the present study the possibility of enhancing phenolic compound contents in peaches and nectarines by post-harvest irradiation with UV-B was assessed. Fruits of 'Suncrest' and 'Babygold 7' peach and 'Big Top' nectarine cultivars were irradiated with UV-B for 12 h, 24 h and 36 h. Control fruits underwent the same conditions but UV-B lamps were screened by benzophenone-treated polyethylene film. The effectiveness of the UV-B treatment in modulating the concentration of phenolic compounds and the expression of the phenylpropanoid biosynthetic genes, was genotype-dependent. 'Big Top' and 'Suncrest' fruits were affected by increasing health-promoting phenolics whereas in 'Babygold 7' phenolics decreased after UV-B irradiation. A corresponding trend was exhibited by most of tested phenylpropanoid biosynthesis genes. Based on these results UV-B irradiation can be considered a promising technique to increase the health promoting potential of peach fruits and indirectly to ameliorate the aesthetic value due to the higher anthocyanin content.

Keywords: /Peach/ /Nectarine/ /Postharvest/

PEAR

Shumye, Getachew, Kebede Woldetsadik and Ibrahim Fitiwi. 2014. Effect of integrated postharvest handling practices on quality and shelf life of cactus pear. J. Postharvest Technol. 02(01): 068 – 079.

Abstract

This experiment was conducted to determine the effect of postharvest handling practices on quality and shelf life of cactus pear [*Opuntia ficus-indica* (L.) Mill.] fruits through integrating postharvest chemical, packaging, and storage treatments. Storage in evaporative cooler (EC) significantly improved all the quality parameters of fruits due to the decrease in mean temperature by 2.81°C and increase of relative humidity by 11% than ambient storage. Packaging maintained fruit quality better than that of non-packaged ones. Similarly, chemical treatments, especially CaCl₂ and 2, 4- Dichlorophenoxyacetic acid enabled better retention of physical and chemical quality characteristics of fruits. The combined effects of the treatments resulted in maintenance of lower levels of pH and higher levels of total soluble solids, titratable acidity, ascorbic acid, pulp firmness, as well as marketability of cactus pear fruits. Hence, the shelf life of cactus pear fruits could be extended for two to three weeks with nutritional quality attributes maintained in good condition using combinations of chemicals, packaging fruits in polyethylene sheet and then storing them under EC.

Keywords: /Pear/ /Cactus Pear/ /Chemical Treatment/ /Evaporative Cooler/ /Packaging/ /Quality/

PLUM

Fanning, Kent J. et. al. 2014. Japanese **plums** *Prunus salicina* Lindl. and phytochemicals breeding, horticultural practice, postharvest storage, processing and bioactivity. J. Sci. Food Agric. 94: 3137 – 2147.

Abstract

Previous reviews of plum phytochemical content and health benefits have concentrated on the European plum, *Prunus domestica* L. However, the potential bioactivity of red- and dark red-fleshed Japanese plums, *Prunus salicina* Lindl., so-called blood plums, appears to warrant a significant increase in exposure, as indicated in a recent review of the whole *Prunus* genus. Furthermore, Japanese plums are the predominant plum produced on an international basis. In this review the nutrient and phytochemical content, breeding, horticultural practice, postharvest treatment and processing as well as bioactivity (emphasising *in vivo* studies) of Japanese plum are considered, with a focus on the anthocyanin content that distinguishes the blood plums.

Keywords: /Plums/ /Postharvest/ /Storage/ /Phytochemicals/

Martínez-Esplá, Alejandra, et. al. 2014. Preharvest application of methyl jasmonate (MeJA) in two **plum** cultivars. 1. Improvement of fruit growth and quality attributes at harvest. Postharvest Biol. & Technol. 98: 98 – 105.

Abstract

Two plum (*Prunus salicina* Lindl.) cultivars 'Black Splendor' (BS) and 'Royal Rosa' (RR) were treated with methyl jasmonate (MeJA) at 3 concentrations (0.5, 1.0 and 2.0 mM) along the on-tree fruit development: 63, 77 and 98 days after full blossom (DAFB). On a weekly basis, fruit samples were taken for measuring fruit size and weight and parameters related to quality. Results revealed that MeJA was effective in increasing fruit size and weight, the 0.5 mM being the most effective for BS cultivar and 2.0

mM for RR. At harvest, those fruit treated with 0.5 mM MeJA had the highest firmness and colour Hue values. Total acidity was also generally higher in MeJA-treated fruit than in controls, while the content of total soluble solids remained unaffected. In addition, total phenolics and total antioxidant activity were found at higher concentrations in 0.5 and 2.0 mM MeJA-treated than in control fruit over at last 3 weeks of fruit development for BS and RR cultivars, respectively. Overall results suggest that MeJA could be a promising preharvest tool to increase plum size and quality with enhanced bioactive compounds and antioxidant activity, although the optimum concentration is cultivar dependent.

Keywords: /Plum/ /Preharvest treatment/ /Fruit size/ /Firmness/Antioxidant/

Zapata, Pedro J. et.al. 2014. Preharvest application of methyl jasmonate (MeJA) in two **plum** cultivars. 2. improvement of fruit quality and antioxidant systems during postharvest storage. *Postharvest Biol. & Technol.* 98: 115 – 122.

Abstract

'Black Splendor' (BS) and 'Royal Rosa' (RR) plums were treated preharvest with methyl jasmonate (MeJA) at three concentrations (0.5, 1.0 and 2.0 mM) along the on-tree fruit development: 63, 77 and 98 days after full blossom (DAFB). Both control and treated fruit were harvested at the commercial ripening stage and stored in two temperature conditions: 9 days at 20°C or at 2°C + 1 day at 20°C for 50 days. Preharvest MeJA at 2.0 mM significantly accelerated whereas 0.5 mM delayed the postharvest ripening process for both cultivars, since ethylene production, respiration rate and softening were reduced significantly at the two storage conditions for 0.5 mM. In these fruit, total phenolics, total antioxidant activity (hydrophilic fraction, HTAA) and the antioxidant enzymes peroxidase (POD), catalase (CAT) and ascorbate peroxidase (APX) were found at higher levels in treated than control plums during postharvest storage, which could account for the delay of the postharvest ripening process and the extension of shelf-life.

Keywords: /Plum/ /Preharvest treatment/ /Firmness/ /Antioxidant/

RASPBERRIES

Giovanelli, Gabriela, Sara Limbo, Susanna Buratti. 2014. Effects of new packaging solutions on physico-chemical, nutritional and aromatic characteristics of red **raspberries** (*Rubus idaeus* L.) in postharvest storage. *Postharvest Biol. & Technol.* 98: 72 – 81.

Abstract

Postharvest life of raspberries (*Rubus idaeus* L.) is limited due to their high respiration rate, loss of firmness and freshness and susceptibility to fruit rot. The aim of this research was to evaluate the effects of various packaging solutions on physico-chemical, nutritional and aromatic properties of raspberries during storage at +4°C up to 7 days. Plastic materials with low (LDPE) and high (LDPE/EVOH/LDPE) gas barrier, a bio polymeric film (PLA) with medium gas barrier and micro perforated stretch film (PVC) were used. The packaging material modified the composition of the atmosphere in the package, which depended on the combined action of the respiration activity of the fruit and the permeability of the material. Results showed that the most sensitive parameters for the assessment of raspberry decay were percentage of damaged berries, weight loss, fruit softening and the aromatic

profile development, evaluated by an electronic nose; these parameters showed significant changes during storage and were influenced by the packing material. All samples showed a clear loss of firmness after 4 days of storage, which was maximally, reduced in the case of LDPE/EVOH/LDPE and PLA packages. Raspberries stored in PVC packaging material had an aromatic development similar to the control, whereas berries stored in the medium and high barrier materials showed important changes in the aromatic profile, reflecting anaerobic metabolism of fruit. Soluble solids, pH, total phenolics and ascorbic acid did not change significantly; changes in colour and total anthocyanins were observed, with differences depending on the kind of packaging.

Keywords: /Raspberries/ /Packaging/ /Plastic materials/ /Shelf-life/ /Firmness/

STONEFRUIT

Rungjindamai, Nattawut, Peter Jeffries & Xiang-Ming Xu. 2014. Epidemiology and management of brown rot on **stone fruit** caused by *Monilinia laxa*. Eur. J. Plant Pathol. 140: 1 – 17.

Abstract

Stone fruit is attacked by various pathogens, of which brown rot disease is one of the important diseases. There are three *Monilinia* species mainly responsible for the brown rot disease: *Monilinia fructicola* is mainly found in North America and Australasia, and *M. laxa* and *M. fructigena* mainly in Europe. Both *M. fructicola* and *M. laxa* can infect flowers, resulting in blossom blight, as well as both healthy and wounded fruit, resulting in brown rot. On the other hand, *M. fructigena* can only infect wounded fruit. Compared to the two other species, *M. fructicola* has been extensively studied, whereas the equally important *M. laxa* has had less attention. This paper addresses this imbalance and reviews research on the biology, epidemiology and management of *M. laxa* on stone fruits. Due to EU regulations, the number of fungicides available for controlling plant diseases has been steadily decreasing, particularly in the post-harvest environment. This has placed much more emphasis on alternative control methods, a focus of the present review. Numerous physical and biological approaches to control have achieved successful outcomes but often in small scale trials and in isolation from integrated strategies. Promising physical control methods include removal of mummified fruit in orchards and post-harvest hot-water treatment. Many micro-organisms have been shown to have biocontrol potential against brown rot but only a few have been commercially formulated. It is generally agreed that the use of biocontrol agents needs to be integrated with other measures. Current research focuses on disease management from flowering to post-harvest period. Recent results have suggested that reducing overwintering inoculum should be considered as one of key aspects of integrated management of brown rot on stone fruit. Finally, we make recommendations about future research and development on integrated pest management strategies for control of *M. laxa*, especially on strategic deployment of biocontrol agents and interactions among brown rot pathogens.

Keywords: /Stone fruit/ /Biological Control/

STRAWBERRY

Eshghi, Sara, et.al. 2014. Effect of nanochitosan-based coating with and without copper loaded on Physicochemical and bioactive components of fresh **strawberry** fruit (*Fragaria x ananassa* Duchesne) during storage. Food Bioprocess Technol. 7: 2397 – 2409.

Abstract

Edible coatings based on nano chitosan (50– 110 nm) with and without copper loaded were evaluated on physicochemical and bioactive components of strawberry. Fresh fruits were coated with copper-free and copper-loaded nano chitosans and stored at 4 ± 1 °C with 70 % relative humidity for 20 days. Both nano chitosan coatings provided an effective control in reducing weight loss and firmness as well as delayed changes in the respiration rate during 3 weeks. The antioxidant activity declined throughout the storage period of strawberries, although the decrease in antioxidant activity showed a slower rate in the strawberries coated with copper free nano chitosan followed by copper-loaded nano chitosan compared with the control. Anthocyanin concentrations increased in fruits coated with copper free as well as copper loaded nano chitosan at the first 12 days of storage followed by reduction in slow rates. However, no increase of anthocyanin was recorded for uncoated samples. Intensive reduction was recorded in ascorbic acid content of strawberries coated with copper-loaded nano chitosan, while the minimum loss of the ascorbic acid content was related to the copper-free nano chitosan. Also, both nano chitosans showed a significant suppression on the polyphenol oxidase and peroxidase activity, whereas a high rate of increase was recorded in control strawberry. The nano chitosan coatings with or without copper loaded significantly suppressed the visual loss and fungal decay of the strawberries during the storage compared with the control. The sensory evaluation of coated strawberries revealed that no effect on the consumer acceptability was detected as well as that copper-free nano chitosan showed better results in the point of preserving the overall flavor and appearance compared with the copper-loaded one.

Keywords: /Strawberry/ /Nanochitosan/ /Coating/ /Qualities/

Futsuki, D. et. al. 2014. Expression of **strawberry** allergen *Fra a 1* gene during fruit ripening. Acta Hort. 1049: 323 – 328.

Abstract

Consumption of fresh strawberries (*Fragaria ×ananassa*) can cause oral allergy syndrome for susceptible individuals. To produce strawberries with low allergen contents a selection of hypoallergenic genotypes and the establishment of culture methods are required. Since several studies have reported that *Fra a 1* is a major allergen of strawberry, the expression profiling of the *Fra a 1* gene could be an indicator of the allergic potential. In this study, the expression of the *Fra a 1* gene was investigated in strawberry during fruit (receptacles and achene) development. The fresh weight and anthocyan content of fruits were also measured to assess their potential correlations with *Fra a 1* expression. Fruit of the strawberry were harvested for analyses from a working farm at seven different ripening stages. Real-time PCR revealed the transcript level of the *Fra a 1* gene was highest at the early stage of ripening and decreased to approximately 1/70th that level by the red-colored stage. Considering that *Fra a 1* belongs to the pathogenesis-related protein 10 family, this result was in line with the report that strawberry fruit may be attacked by oxygen species at the early stage of ripening. Additionally, *Fra a 1* gene homologues in *Fragaria vesca* were surveyed to assess the inducibility of their expression. We found that a gene coding *Fra a1 a2* seemed to be expressed in response to stress, and it had major stress-related elements in its promoter region. These results indicate that *Fra a 1* expression can be induced by stress, and preharvest treatment to reduce the allergen content will be possible by studying the transcriptional activity of *Fra a 1*.

Keywords: /Strawberry/ /Fruit Ripening/

Jiang, G.H., et.al. 2014. Technology of anthracnose control on increasing **strawberry** plantlets. Acta Hort. 1049: 669 – 672.

Abstract

Strawberry anthracnose is caused by several species of fungi and *C. gloeosporioides* is the major fungus in Zhejiang province of China. It is difficult to raise strawberry plantlets at the main rain season. In this paper we describe a useful technology to raise strawberry plantlets in high temperature and humidity environments. (1) Use of disease-free planting material. Disinfectants like Cabrio and Mancozeb also can be used to sterilize the mother plants. (2) Soil disinfection and sterilization. Solar soil disinfection technology is a cost-effective method. Soil disinfectants such as chlorine dioxide and trichloroisocyanuric acid can also be used in the course of solarization. (3) Rain-shelter and shading cultivation. This measure can keep the plantlets free of rain. The most suitable sunshade net provides 80% shade. Under this cultivation, anthracnose disease incidence was reduced to 6.2% while the control was 61.7%. (4) Use of fungicide combinations. The intensified fungicides reduced the disease incidence to 8.7%, significantly lower than those of a single fungicide treatment. It's better to use plant growth retardants in order to grow fine plantlets by early July. Plantlet quality was increased significantly compared with the control.

Keywords: /Strawberry/ /Anthracnose/ /Fungicide/

Kanto, T., et.al. 2014. A new UV-B lighting system controls powdery mildew of **strawberry**. Acta Hort. 1049: 655 – 660.

Abstract

We have produced a new UV-B lighting system comprising a UV-B fluorescent lamp, a reflective aluminum plate, a timer, and a control board. UV-B radiation induces resistance to strawberry against pathogens, especially powdery mildew (*Sphaerotheca aphans* var. *aphans*). We demonstrated control of powdery mildew with UV-B radiation in soil culture and in drip fertigation. The lighting system was suspended from the ceiling at intervals of 5 m in a line in the middle of a vinyl house. The lamp height was ca. 2 m above the strawberry plants. Strawberry plants were radiated using UV-B fluorescent lamps daily during 9:00-15:00. Plants received light energy of ca. 2-7 kJ m⁻² d⁻¹. The lighting system suppressed powdery mildew. Control was 100% at best. UV-B radiation induced transcription of strawberry genes associated with disease resistance, such as phenylalanine ammonia lyase (PAL), chalcone synthase (CHS), chalcone isomerase (CHI), β -1,3-glucanase, and osmotin-like protein. Furthermore, production of antifungal substances was induced in leaves. UV-B radiation also made strawberry fruits more red than the control, reflecting the accumulation of anthocyanin in fruits. Consequently, the new UV-B lighting system.

Keywords: /Strawberry/ /Powdery Mildew/ /Disease Control/

Mortazavi, S.M.H., et.al. 2014. The effects of polyamines and UV-C irradiation on postharvest quality of **strawberry** fruit. Acta Hort. 1049: 749 – 754.

Abstract

The aim of this study was to improve strawberry fruit storability by testing the effect of treatment with polyamines and UV-C irradiation. Strawberry fruits of cultivar 'Selva' were immersed in distilled water as control, putrescine 1 mM, putrescine 2 mM, spermidine 1 mM and spermidine 2 mM for 5 min and then half of treated fruits were exposed to UV-C irradiation at 0.72 kJ m⁻² dosage. During ten days of storage at 4°C, changes in fruit quality, firmness, weight loss, vitamin C, titratable acidity, anthocyanin content and antioxidant capacity were evaluated at 2-day intervals. The results showed that almost all traits were affected by polyamine and among four polyamine treatments applied; putrescine 2 mM was more effective in maintenance of quality attributes. Polyamine treated fruits showed less weight loss, a higher firmness value, and less variation in titratable acidity, vitamin C and antioxidant capacity than control. UV-C irradiation could only affect on some evaluated traits such as anthocyanin content and fruit firmness. Best results were recorded for integrated treatment of application of 2 mM putrescine and UV-C irradiation.

Keywords: /Strawberry/ /Postharvest/ /1-MCP/ /Quality/

Nam, M. H., et al. 2014. Biological control of anthracnose crown rot in strawberry using *Bacillus velezensis* NSB-1. Acta Hort. 1049: 685 – 688.

Abstract

Bacillus velezensis NSB-1 isolate, selected from strawberry leaves in Korea, has shown levels of antagonism towards *Colletotrichum gloeosporioides*, the causal organism of anthracnose crown rot (ACR) in vitro. The isolate was identified as *B. velezensis* based on morphological, biochemical and molecular characteristics. NSB-1 was evaluated for control of ACR of strawberry cultivar 'Seolhyang' in pot or field trials conducted in Nonsan. In the pot trials, the optimum concentration of NSB-1 to control ACR was 107 colony-forming units (CFU)/ml, and protective and curative control efficacy were 76.5 and 65.0%, respectively. In the 2009, 2010 and 2011 nursery field trials, the biological control efficacy of NSB-1 was similar to that of a conventional fungicide when compared with a non-treated control. Therefore, the results indicate that *B. velezensis* NSB-1 might have potential to control ACR in strawberries.

Keywords: /Strawberry/ /Crown Rot/ /Anthracnose/

Peng, L.T. and S. Z. Yang, Y.C. Gu. 2014. Effect of packages on mechanical injury and quality of strawberries during storage. Acta Hort. 1049: 755 – 758.

Abstract

The effects of different packages on mechanical injury and quality of strawberries during storage at ambient conditions (13°C, 85% RH) were investigated. Fruits were packaged with containers: A (PE plastic bag); B (hard plastic tray with lid); C (egg blister tray); D (egg blister tray combined with filter paper bags separately after harvest). The injury and decay rates, sensory scores, and quality parameters of fruits were determined within six days of storage. The results showed packaging container D effectively decreased mechanical injuries and decay of strawberries compared with the other

containers. The fruits packaged in container D had lower weight loss and maintained better edible quality and quality parameters, including TSS (total soluble solids), TA (titratable acid), and vitamin C than the fruits packaged with the other three containers A, B and C. These results demonstrated that egg blister trays combined with filter paper bags could be used to extend the shelf life of strawberries.

Keywords: /Strawberry/ /Postharvest/ /Fruit Quality/

Perez, C. et.al. 2014. Influence of different chemical sanitizers on shelf-Life of fresh cut **strawberry**. Acta Hort. 1049: 763 – 766.

Abstract

Different chemical sanitizers were tested in vitro on strawberry tissue. The most effective of them were used to carry out in vivo experiments on fresh cut, washed and MAP strawberry. Shelf-life of fresh cut strawberry processed on a Turatti continuous flow washing device, was also studied. Self life was monitored as a function of physicochemical, microbiological and sensory quality parameters. In vitro experiments on samples prepared using Muller Hilton culture medium in a 1:9 proportion of strawberry: medium resulted in FH2-FH6 as the most effective sanitizers. The results of color, texture, pH and water soluble solids measurements do not show significant differences in fresh cut strawberry quality treated with FH2-FH6, throughout eight days storage. From the microbiological results we can conclude that gently washing the fresh products, prior to processing, reduces the microbiological content significantly. Physicochemical measurements of strawberry processed on a continuous flow washing system model. Camel equipped with UV lamp as sanitizer show no variations throughout ten days storage. From the microbiological results a shelf-life of ten days can be reported for processed strawberry (MA = 17.5% O₂ and 3% CO₂).

Keywords: /Strawberry/ /Fresh Cut/ /Shelf Life/

VEGETABLES

BABY LEAF VEGETABLE

Santos,J., et.al. ,2014. Assessment of nutritional and metabolic profiles of pea shoots: the new ready-to-eat **baby-leaf vegetable**. Food Res. Int'l. 58: 105 – 111.

Abstract

Pea-shoots are a new option as ready-to-eat baby-leaf vegetable. However, data about the nutritional composition and the shelf-life stability of these leaves, especially their phytonutrient composition is scarce. In this work, the macronutrient, micronutrient and phytonutrients profile of minimally processed pea shoots were evaluated at the beginning and at the end of a 10-day storage period. Several physicochemical characteristics (color, pH, total soluble solids, and total titratable acidity) were also monitored. Standard AOAC methods were applied in the nutritional value evaluation, while chromatographic methods with UV-vis and mass detection were used to analyze free forms of vitamins (HPLC-DAD-ESI-MS/MS), carotenoids (HPLC-DAD-APCI-MS_n) and flavonoid compounds (HPLC-DAD-ESI-MS_n). Atomic absorption spectrometry (HR-CS-AAS) was employed to characterize the mineral content of the leaves. As expected, pea leaves had a high water (91.5%) and low fat (0.3%) and

carbohydrate (1.9%) contents, being a good source of dietary fiber (2.1%). Pea shoots showed a high content of vitamins C, E and A, potassium and phosphorous compared to other ready-to-eat green leafy vegetables. The carotenoid profile revealed a high content of β -carotene and lutein, typical from green leafy vegetables. The leaves had a mean flavonoid content of 329 mg/100 g of fresh product, mainly composed by glycosylated quercetin and kaempferol derivatives. Pea shoots kept their fresh appearance during the storage being color maintained throughout the shelf-life. The nutritional composition was in general stable during storage, showing some significant ($p < 0.05$) variation in certain water-soluble vitamins.

Keywords: /Baby Leaf Vegetables/ /Storage/

_____. 2014. Phenolic profile evolution of different ready-to-eat **baby-leaf vegetables** during storage. J. Chromatography A. 1327: 118 – 131.

Abstract

Ready-to-eat baby-leaf vegetables market has been growing and offering to consumers convenient, healthy and appealing products, which may contain interesting bioactive compounds. In this work, the composition and the evolution of the phenolic compounds from different baby-leaf vegetables during refrigerated storage was studied. The phenolic compounds were extracted using pressurized liquid extraction (PLE) and the phenolic profile of each sample was analyzed and quantified by using LC-MS and LC-DAD methods, respectively, at the beginning and at the end of a 10-day storage period. The baby-leaf vegetables studied included green lettuce, ruby red lettuce, swiss chard, spinach, pea shoots, watercress, garden cress, mizuna, red mustard, wild rocket and spearmint samples and a total of 203 phenolic compounds were tentatively identified and quantified. The main naturally phenolic compounds identified correspond to glycosylated flavonoids, with exception of green lettuce and spearmint leaves which had a higher content of hydroxycinnamic acids. Quantification of the main compounds showed a 10-fold higher content of total phenolic content of ruby red lettuce (483 mg g⁻¹) in relation to the other samples, being the lowest values found in the garden cress (12.8 mg g⁻¹) and wild rocket leaves (8.1 mg g⁻¹). The total phenolic content only showed a significant change ($p < 0.05$) after storage in the green lettuce (+17.5%), mizuna (+7.8%), red mustard (-23.7%) and spearmint (-13.8%) leaves. Within the different classes of phenolic compounds monitored, the flavonols showed more stable contents than the hydroxycinnamic and hydroxybenzoic acids, although the behavior of each compound varied strongly among samples.

Keywords: / Baby Leaf Vegetables/ /Storage/

BROCCOLI

Atallah, Shady S., et al. 2014. Localization effects for a fresh vegetable product supply chain: **broccoli** in the eastern United States. Food Policy. 49: 151 – 159.

Abstract

What are the costs of increased food system localization in the case of a fresh vegetable product? When production is reallocated across space and seasons, how do supply chain costs and consumer

prices change? In this article, we use a production and transportation model to answer these questions, along with illustrative simulation results from increased production of fresh broccoli in the eastern United States. Contrary to previous findings in other industries, we find that localization through reallocation of production may take place at no cost to the consumer, even at a small decrease in price. Localization may also reduce total broccoli supply chain costs and food miles.

Keywords: /Broccoli/ /Food Supply Chain/

Rybarczyk-Plonska, Anna, et.al. 2014. Vitamin C in **broccoli** (*Brassica oleracea* L. var. *italica*) flower buds as affected by postharvest light, UV-B irradiation and temperature. *Postharvest Biol. & Technol.* 98: 82 – 89.

Abstract

In this study, the changes in vitamin C, l-ascorbic acid (AA) and l-dehydroascorbic acid (DHA) levels in broccoli flower buds were examined during pre-storage and storage periods, simulating refrigerated transport with wholesale distribution and retail, respectively. Broccoli heads were pre-stored for 4 or 7 days at 0°C or 4°C in the dark and then stored for 3 days at 10°C or 18°C. During storage the broccoli heads were exposed for 12 h per day to three different levels of visible light (13, 19 or 25 $\mu\text{mol m}^{-2}\text{s}^{-1}$) or a combination of visible light (19 $\mu\text{mol m}^{-2}\text{s}^{-1}$) and UV-B irradiation (20 $\text{kJ m}^{-2}\text{d}^{-1}$), or they were stored in the dark. The vitamin C content in broccoli flower buds during storage was significantly affected by pre-storage period and temperature. Higher vitamin C levels in flower buds after storage were observed for broccoli heads pre-stored for 4 days or at 0°C as compared to those pre-stored for 7 days or at 4°C. Storage temperature also affected vitamin C in broccoli flower buds, with higher levels observed for broccoli stored at 10°C than at 18°C. Hence, vitamin C in broccoli flower buds was demonstrated to decrease together with increasing pre-storage period, pre-storage temperature and storage temperature. AA in broccoli flower buds was influenced mainly by storage temperature and to a minor extent by pre-storage temperature. The DHA level and DHA/AA ratio were stable in flower buds of broccoli pre-stored for 7 days, whereas increasing tendencies for both DHA level and ratio were observed after pre-storage for 4 days. These results indicate a shift in the ascorbate metabolism in broccoli flower buds during storage at low temperatures, with its higher rate observed for broccoli pre-stored for shorter time. There were no effects of the light and UV-B irradiation treatments on vitamin C, AA and DHA levels in broccoli flower buds.

Keywords: /Broccoli/ /Storage/

CABBAGE

Somsak Kramchote, Somsak, et.al. 2014. Rapid determination of **cabbage** quality using visible and near-infrared spectroscopy. *LWT-Food Sci. & Technol.* 59: 695 – 700.

Abstract

The feasibility of Vis-NIR spectroscopy was investigated for its ability to determine the quality of cabbage. This study aims to compare the prediction ability of interreflectance and reflectance measurements in determining the quality of cabbage (moisture, SSC and ascorbic acid contents). The wavelength ranges of 500–1100 nm were used in this experiment. Two types of data pre processing

were applied to enhance the calibration model based on partial least squares (PLS) regression with respect to the logarithms of reciprocal absorbance ($\log(1/R)$), its first and second derivatives. The PLS regression models for moisture content yielded correlation coefficients (R^2) of 0.48e0.67 and root mean square error of prediction (RMSEP) of 2.34e2.83 g/kg for interactance, with R^2 of 0.58e0.74 and RMSEP of 2.50e3.25 g/kg for reflectance. The PLS statistics for SSC were R^2 of 0.59e0.66 and RMSEP of 0.20e0.22 °Brix for interactance and R^2 of 0.53e0.64 and RMSEP of 0.22e0.27 °Brix for reflectance, respectively. Statistics for ascorbic acid content were R^2 of 0.24e0.61 and RMSEP of 0.11e0.15 g/kg FW for interactance and R^2 of 0.35e0.38 and RMSEP of 0.13 g/kg FW for reflectance. Finally, it is possible to use the Vis/NIR spectroscopy as a rapid tool for evaluating the cabbage quality.

Keywords: /Cabbage/ /Quality/

Dhall, R. K., et.al. 2014. Development of post-harvest protocol of **okra** for export marketing. J. Food Sci. 51(8): 1622 – 1625.

Abstract

The study was carried out on the harvesting and handling methods of okra with the objective to maintain the best quality of pods from harvesting to end consumer especially for export marketing. For that purpose okra cv. 'Punjab- 8' pods were harvested with minimum handling (least injuries to the pubescence on the ridges of pod) and normal handling (no safety taken to prevent injuries on pods). Pods were pre cooled at $15\pm 1^\circ\text{C}$, 90–95% RH; jumble packed in the CFB boxes of 2.0 Kg capacity and than stored at $8\pm 1^\circ\text{C}$, 90–95% RH. The quality parameters of okra namely texture, chlorophyll content, physiological loss in weight, rotting percentage and general appearance were studied. The pods harvested with minimum handling and field packaging can retain their green colour, crisp texture (maximum force to puncture pod 500.2 g) with minimum rotting (3.0%) and physiological loss in weight (15.8%) and good appearance up to 13 days of cold storage whereas normal handled pods can be stored up to 5 days at $8\pm 1^\circ\text{C}$, 90–95% RH and thereafter lost their general appearance on the 7th day of storage and were discarded. Therefore, in order to maintain high quality of okra from harvesting to the final destination (consumer), the okra pods should be harvested with minimum handling followed by field packaging in CFB boxes.

Keywords: /Okra/ /Quality/ / Texture/

ONION

Sang, Mee Kyung, et.al. 2014. Penicillium brasilianum as a novel pathogen of **onion** (*Allium cepa* L.) and other fungi predominant on market onion in Korea. Crop Prot. 5: 138 – 142.

Abstract

Onion (*Allium cepa* L.) is an important vegetable crop in Korea, but its production is severely affected by fungal pathogens during plant growth and bulb storage. We investigated the occurrence of fungi on market onion bulbs; identified the predominant fungal species based on the internal transcribed spacer region, β -tubulin region, and elongation factor 1- α gene sequences; and tested the pathogenicity of each predominant fungal species in onion bulbs. The genera *Aspergillus* (63.9%), *Penicillium* (15.5%), *Fusarium* (6.4%), *Rhizopus* (5.2%), and others (9.0%) were detected in the samples.

Among these genera, *Aspergillus awamori*, *Fusarium oxysporum*, *Penicillium brasilianum*, and *Rhizopus oryzae* were identified as the predominant species. All of the fungi tested could infect both the inner layers and outer surfaces of onion bulbs and be re-isolated from the infected tissues. To our knowledge, this is the first report that *P. brasilianum* is a fungal pathogen of onion bulbs.

Keywords: /Onion/ /Postharvest Disease/

PUMPKIN

Mohammed, M. et. al. Effects of curing treatments on physico-chemical and sensory quality attributes of three **pumpkin** cultivars. *Acta Hort.*1047: 57 – 62.

Abstract

Studies were conducted to investigate the extent of physical, chemical and sensory quality changes in three pumpkin cultivars, 'Bodles Globe', 'Future NP 999' and 'Crapaud Back' before, during and after curing treatments. Fresh weights of pre-cured fruits were 6882.0, 4391.0 and 6394.5 g for 'Bodles lobe', 'Future NP 999' and 'Crapaud Back' respectively. Progressive increases in percentage fresh weight losses were noted before, during and after curing for each cultivar. Fruit length for each of the three cultivars was significantly different. Other fruit dimensions such as fruit diameter and cavity volume for 'Bodles Globe' and 'Crapaud Back' were almost twice as much compared to 'Future NP 999'. Flesh firmness was consistently higher as curing time increased for the three cultivars. The rough 'Crapaud Back' cultivar skin had a lighter cream coloured skin than the 'Bodles Globe' cultivar; although a slight fading was noted after curing. The bright yellow flesh colour at pre-curing with 'b' values of 75.05 was noted for 'Bodles Globe', representing the highest value for all three cultivars while the lowest "b" value of 65.85 was obtained for 'Future NP 999'. 'Crapaud Back' was the only cultivar which had consistent increases in total soluble solids before, during and after each curing period. Each cultivar exposed to 9 and 18 days of curing resulted in higher pH values when compared to their control counterparts where no curing was administered. Among the three cultivars 'Future NP 999' secured the best sensory quality ratings in terms of cooking quality, overall acceptability score, purchase preference score and recommended marketability score.

Keywords: /Pumpkin/ /Curing/

TOMATO

Adepoju, Abimbola O. 2014. Postharvest losses and welfare of **tomato** farmers in Ogbomosho, Osun State, Nigeria. *J. Stored Products & Postharvest Res.* 5(2): 8 – 13.

Abstract

Crop losses, especially along the postharvest food supply chain, have been identified as on especially along the postharvest food storage problems in most developing countries and in Nigeria in particular. Vegetable farmers such as those that grow tomatoes often record great amount of produce loss which translates to a waste of resources, a reduction in their income and ultimately their welfare. This study examined the effects of postharvest losses on the welfare of 107 tomato farmers in Ogbomosho selected through a multi-stage sampling procedure. The analytical tools used in the study

include descriptive statistics, gross margin analysis, Ordinary Least Square (OLS) and regression model. Results revealed that majority of the tomato farmers were male, married and had no formal education. The average gross margin values N3, 229.45 and N72, 905.80 were obtained with and without postharvest losses for the tomato farmers respectively. The implied a 95.5% postharvest loss incurred by the farmers. Household size and total value of postharvest losses were found to significantly affect the per-capita income and hence welfare of the tomato farmers negatively. The study recommends that farmers engaged in tomato production be adequately trained on postharvest crop handling techniques. In addition, priority should be given to investment in postharvest processing technologies and establishment of processing industries especially in the production areas.

Keywords: /Tomato/ /Postharvest Losses/

Castagna, Antonella, et.al. 2014. Effect of post-harvest UV-B irradiation on polyphenol profile and antioxidant activity in flesh and peel of **tomato** fruits. Food Bioprocess Technol. 7: 2241 – 2250.

Abstract

In the present study, the possibility of enhancing phenolic and flavonoid concentration in tomato (*Solanum lycopersicum* L.) fruits by post-harvest irradiation with UV-B light was assessed. Fruits of the commercial cv Money Maker (MM) and the mutant genotype high pigment-1 (hp-1), constitutively rich in these compounds, were harvested at mature green and turning stages and left to ripen within climatic chambers where they were daily treated with UV-B radiation (1 h, 6.08 kJ/m² day). In control chambers, UV-B radiation was screened by benzophenone-treated polyethylene film. The treatment was generally effective in increasing phenolic, flavonoid and flavonol concentration in both peel and flesh of MM and hp-1 fruits, although in this latter the positive response to UV-B treatment was mainly evident in fruits harvested at mature green stage. Following UV-B treatment, antioxidant activity increased in the peel of both genotypes independently from the harvesting stage and in the flesh of hp-1 fruits harvested at mature green stage. Hydroxycinnamic acids of both genotypes reacted to UV-B treatment differently depending on harvesting stage and tissue localisation, generally showing an increase in the peel of fruits harvested at mature green stage. With few exceptions, UV-B irradiation also induced a higher accumulation of individual flavonoids both in the peel and in the flesh of MM and hp-1 fruits independently from harvesting stage. Based on these results, UV-B irradiation can be considered a promising technique to increase the nutraceutical potential of tomato fruits by non-molecular tools.

Keywords: /Tomato/ /Postharvest/ /Antioxidant/

Kalidas, K. and K. Akila. 2014. Micro level investigation of marketing and postharvest losses of **tomato** in Coimbatore district of Tamilnadu. J. Stored Products & Postharvest Res. 5(1): 1 – 7.

Abstract

Most vegetables are perishable in nature, and in that postharvest losses distribution channel plays a vital role in price fixation of vegetables, especially in tomato which is sensitive to much environment genetic interaction disorders which may be manifested during postharvest ripening or postharvest inspection. A substantial quantity of production is subjected to postharvest losses at various stages of its marketing. The quantum loss is governed by factors like perishable nature, method of harvesting and

packaging, transportation, etc. Tomato being a third most cultivated crop, the postharvest losses is significant in terms of quantity and economic value. This study undertaken in Coimbatore on tomato has suggested marketing loss in the estimation of marketing margins, price spread and efficiency and has used a modified formula for it. It has been observed that a majority of tomato producers sell third produce to the wholesalers facilitated by commission agents at different stages. The aggregate postharvest losses from farm gate to consumers in tomato ranges from 13 to 26%. It has indicated the necessity of reducing the market intermediaries, for minimizing postharvest losses and providing remunerative price to the producers. The results have emphasized that efforts should be made to adopt improved packaging techniques, cushioning material at the farm level. The producer's share in consumer price as estimated by old methods has been found higher and the inclusion of marketing loss in the estimation method unduly over states the farmers' net price and profit margins to the marketing margins and price spread and efficiency has indicated that the old estimation method unduly over-states the farmers' net price and profit margins to the market middlemen. It is appropriate to use modified methods for the estimation of marketing margins and price spread.

Keywords: /Tomato/ /Postharvest Losses/ /Marketing/

Lazzeri, Valerio, et.al. 2012. Carotenoid profiling and biosynthetic gene expression in flesh and peel wild type and hp-1 **tomato** fruit under UV-B depletion. J. Agric. & Food Chem. 60: 4960 – 4969.

Abstract

Although light is recognized as one of the main factors influencing fruit carotenogenesis, the specific role of UV-B radiation has been poorly investigated. The present work is addressed to assess the molecular events underlying carotenoid accumulation in presence or absence of ultraviolet-B (UV-B) light in tomato fruits of wild-type and high pigment-1 (hp-1), a mutant characterized by exaggerated photo responsiveness and increased fruit pigmentation. Gene expression analyses indicated that in wild-type fruits UV-B radiation mainly negatively affects the carotenoid biosynthetic genes encoding enzymes downstream of lycopene both in flesh and peel, suggesting that the down-regulation of genes CrtL-b and CrtL-e and the subsequent accumulation of lycopene during tomato ripening are determined at least in part by UV-B light. In contrast to wild-type, UV-B depletion did not greatly affect carotenoid accumulation in hp-1 and generally determined minor differences in gene expression between control and UV-B-depleted conditions.

Keywords: /Tomato/ /*Lycopersicon esculentum*/

HERBS & SPICES

GINGER

Duy Phu,L. et.al. 2014. Pythium soft rot of ginger: detection and identification of the causal pathogens, and their control. Crop Prot. 65: 153 – 167.

Abstract

Ginger is considered by many people to be the outstanding member among 1400 other species in the family Zingiberaceae. Not only it is a valuable spice used by cooks throughout the world to impart

unique flavour to their dishes but it also has a long track record in some Chinese and Indian cultures for treating common human ailments such as colds and headaches. Ginger has recently attracted considerable attention for its anti-inflammatory, antibacterial and antifungal properties. However, ginger as a crop is also susceptible to at least 24 different plant pathogens, including viruses, bacteria, fungi and nematodes. Of these, *Pythium* spp. (within the kingdom Stramenopila, phylum Oomycota) are of most concern because various species can cause rotting and yield loss on ginger at any of the growth stages including during postharvest storage. *Pythium gracile* was the first species in the genus to be reported as a ginger pathogen, causing *Pythium* soft rot disease in India in 1907. Thereafter, numerous other *Pythium* spp. have been recorded from ginger growing regions throughout the world. Today, 15 *Pythium* species have been implicated as pathogens of the soft rot disease. Because accurate identification of a pathogen is the cornerstone of effective disease management programs, this review will focus on how to detect, identify and control *Pythium* spp. in general, with special emphasis on *Pythium* spp. associated with soft rot on ginger.

Keywords: /Ginger/ /Soft Rot/

HERBS

Santos, J., et.al. 2014. Fresh-cut aromatic **herbs**: nutritional quality stability during shelf-life. LWT – Food Sci. & Technol. 59: 101 – 107.

Abstract

Fresh-cut vegetables are a successful convenient healthy food. Nowadays, the presence of new varieties of minimally processed vegetables in the market is common in response to the consumers demand for new flavours and high quality products. Within the most recent fresh-cut products are the aromatic herbs. In this work, the objective was to evaluate the nutritional quality and stability of four fresh-cut aromatic herbs. Several physicochemical quality characteristics (colour, pH, total soluble solids, and total titratable acidity) were monitored in fresh-cut chives, coriander, spearmint and parsley leaves, stored under refrigeration (3 ± 1 °C) during 10 days. Their nutritional composition was determined, including mineral composition (phosphorous, potassium, sodium, calcium, magnesium, iron, zinc, manganese and copper) and fat- and water-soluble vitamin contents. Total soluble phenolics, flavonoids and the antioxidant capacity were determined by spectrophotometric methods. The aromatic herbs kept their fresh appearance during the storage, maintaining their colour throughout shelf-life. Their macronutrient composition and mineral content were stable during storage. Coriander had the highest mineral and fat soluble vitamin content, while spearmint showed the best scores in the phenolic, flavonoid and antioxidant capacity assays. Vitamins and antioxidant capacity showed some variation during storage, with a differential behaviour of each compound according to the sample.

Keywords: /Parsley/ /Coriander/ /Spearmint/ /Chives/

HOT PEPPER

M. Mohamed and P. Brigemohan. 2014. Hot peppers: rapid qualitative assessment methodology to determine postharvest levels of capsaicinoid content in ornamental **hot pepper** crosses. Acta Hort. 1047: 69 – 74.

Abstract

In the thrust to increase fixed oil or capsaicinoid [8-methyl-N-vanillyl-1-6- nonamide] in Caribbean hot peppers, a complex breeding programme has been instituted at The University of Trinidad and Tobago (UTT). The crosses include four of the world's hottest peppers, a wide selection of local colored, 'seasoning' and ornamental peppers. While selection is based on gains in crop yield, the relative hotness or pungency is determined quantitatively using HPLC and GC/MS procedures. However, for a rapid assessment of the fixed oil or capsaicinoid, a paper chromatography method was devised using acetone and ethanol. The data obtained from the chromatograms allow for the gains in the different selections to be determined qualitatively leading to selection for further quantitative analysis. The chromatograms showed that 'Carvalho Hot' continues to dominate with respect to pungency. The relative hotness (capsaicinoid) for local ornamental seasoning peppers is for the first time assessed for further breeding and selection.

Keywords: /Hot Pepper/ /Pungency/ /Postharvest/

SWEET PEPPER

Eudoxie, G., M.Martin and M. Mohammed. 2014. Substrate evaluation on postharvest quality of **sweet pepper** (*Capsicum annum* L.) fruit under gravity fed fertigation. Acta Hort. 1047: 87 – 92.

Abstract

Fruit quality attributes and nutritive value are affected by nutrient availability and uptake, which is influenced by the chemical reactivity of the growing media. A greenhouse trial was conducted investigating four physically and chemically different media; perlite (P), coconut coir (CC), and combinations of perlite with either rice straw compost (RSC) or bagasse based spent mushroom substrate (SMS) influence on sweet pepper ('Destra') fruit quality and nutrient content. Three fruits per treatment were collected for determination of elemental nutrient content and fruit quality attributes respectively during early harvest. The pH and EC of the growing media were also measured at that stage. Significant differences were seen across media for fruit Ca and K content, pericarp thickness and vitamin C content. For all quality properties except vitamin C content, P and P+SMS showed greater concentrations. Correlation analysis revealed some association between fruit nutrient content and quality indices, with further influence of media EC and pH. The effects of chemically reactive media on physiological disorders and fruit quality should be considered.

Keywords: /Sweet Pepper/ /Fruit Quality

ORNAMENTALS

ANTHURIUM

Eliboxa, w. and P. Umharan. v2014.v Morphophysiological parameters associated with vase life of cut-flowers of ***Anthurium andraeanum*** Hort. Acta Hort. 1047: 99 – 108.

Abstract

Twelve cut-flower morphological and six physiological quantitative parameters along with vaselife were evaluated for 9 cultivars of *Anthurium andraeanum* Hort., with the objective of identifying the interrelationships between morphological and physiological parameters affecting vaselife in anthurium. There were significant ($P < 0.05$) cultivar differences for all the parameters except for adaxial hydathode number. Vaselife showed a significant correlation ($P < 0.05$) with duration of steady state transpiration ($r = 0.86$), rate of steady state transpiration ($r = 0.67$) and lab colour space parameter a^* ($r = -0.82$). Rate of steady state transpiration also showed a significant negative correlation with a^* ($r = -0.77$, $P < 0.05$). Principal component analysis of 18 parameters showed that the first five principal components explained 89.3% of the variation in the data. Vaselife loaded on the third principal component and was found to be closely associated with duration of steady state transpiration, rate of steady state transpiration and a^* ($-a^*$ values = green spathe colour). The correlation circle on the $F1 \times F3$ axes showed that vaselife was also positively associated with larger L^* values (white spathe colours), small abaxial stomata and hydathode numbers and short time to steady state transpiration.

Keywords: /Anthurium/ /Vaselife/ /Cut flower/

GERBERA

Perik, R.J., et.al. 2014. Stem bending in cut **Gerbera jamesonii** flowers: Effects of a pulse treatment with sucrose and calcium ions. *Postharvest Biol. & Technol.* 98: 7 – 13.

Abstract

The vase life of cut Gerbera flowers (*Gerbera jamesonii* cv. Tamara) is often short due to stem bending. The purpose of this study was to find a pulse treatment, to be applied directly after harvest, which would delay this bending. Bending was hypothesized to be due, at least in part, to a xylem blockage by bacteria (leading to early turgor loss), to lack of osmotic pressure, and to lack of cell wall stiffness. Chemicals tested included antimicrobial compounds, surfactants (to bypass xylem occlusion), sugars, inorganic ions, and chemicals affecting cell wall rigidity. When used as a pulse treatment, antimicrobial compounds such as chlorine and silver ions had no effect. Only a buffer at pH 3.0–3.5, which inhibits bacterial growth, delayed bending. A range of surfactants tested, many of which had antimicrobial activity, had no effect. Sugars delayed the time to bending, if accompanied by an efficient antimicrobial compound. Cell wall rigidity can be affected by calcium ions and H^+ concentration. Treatment with calcium chloride delayed bending. Vanadate, an inhibitor of H^+ transport to the cell wall, almost completely prevented stem bending, but resulted in unwanted petal discoloration. By contrast, fusicoccin, a promoter of H^+ transport to cell walls, drastically hastened bending. A mixture of chemicals (50 mM calcium chloride, 25 g L⁻¹ sucrose, buffered at pH 3.5 by citric acid and K_2HPO_4) was satisfactory as a 24 h pulse treatment, prior to 24 h of dry storage at 20°C and vase life at 20°C. It delayed the time to bending during vase life in cv. Tamara and six other cultivars tested which are prone to stem bending.

Keywords: /Gerbera/ /Cutflowers/ /Bending/ /Sucrose/

GLADIOLUS

Sunil Kumar, Sunil and A.K. Gupta. Postharvest life of *Gladiolus grandiflorus* L. cv. Jessica as Influenced by pre-harvest application of gibberellic acid and kinetin. J. Postharvest Technol. 02(03): 169 – 176.

Abstract

Effects of pre-harvest sprays of gibberellic acid and kinetin on postharvest life of gladiolus cv. Jessica was assessed. The field experiment was laid out in randomized block design, replicated thrice, with two levels of gibberellic acid (100 and 200 ppm) and kinetin (50 and,100ppm) by dipping the corms overnight and foliar spray during growth period. The laboratory experiment was laid out in completely randomized design, replicated thrice, with sucrose 4 percent and 8-HQC at 200ppm as vase solution to increase the postharvest life of cut flower. The plant growth regulators significantly enhanced the postharvest life of cut gladiolus spike. Pre-soaking and foliar spray of gibberellic acid 100ppm was the best for early emergence of spike, maximum number of florets per spike, daily elongation of spike and enhanced period for elongation of spike, increased water uptake, delayed opening of basal floret, more number of florets per spike open at the time of senescence of basal floret and before stem collapse, prolonged longevity, increased total anthocyanin, carotenoid content and reduced pH of vase solution.

Keywords: /Gladiolus/ /Vase Life/ /Sucrose/

TUBERS & ROOTCROPS

Biruk-Masrie Z, et.al. 2014. Influence of combined application of inorganic N and P fertilizers and cattle mManure on quality and shelf-life of potato (*Solanum tuberosum* L.) tubers. J. Postharvest Technol. 02(03): 152 – 168.

Abstract

Potato tuber qualities, including dry matter content, specific gravity, total soluble solids, and crude protein content, are important parameters for human consumption. Tuber physiological weight loss, rotting, and sprouting during storage are important aspects that influence the keeping quality of the crop for profitable production. These tuber quality parameters can be affected by fertilizer management in the sense that inadequate or excess fertilizer application reduces tuber quality and shelf-life. Therefore, a study was conducted during two successive cropping seasons of 2012 and 2013 to determine the effect of combined application of nitrogen, phosphorus, and cattle manure on potato tuber quality and shelf-life during storage. The treatments consisted of three rates of nitrogen (0, 60 and 120 kg N ha⁻¹), three rates of phosphorus (0, 46 and 92 kg P₂O₅ ha⁻¹) and three rates of cattle manure (0, 15 and 30 t ha⁻¹). The experiment was laid out as a randomized complete block design (RCBD) and replicated three times per treatment. Analysis of the results revealed that the main as well as the interaction effects of the three fertilizers significantly influenced tuber quality and shelf-life characteristics. The maximum tuber N (1.736%) and crude protein (10.85%) contents were obtained in response to the combined application of 120 kg N ha⁻¹ and 30 t cattle manure ha⁻¹. The maximum tuber dry matter contents of 23.48%, 21.97% and 22.085 were obtained in response to the application of 120 kg N ha⁻¹, 92 kg P₂O₅ ha⁻¹ and 30 t cattle manure ha⁻¹, respectively. The combined application of the

highest rates of N, P and cattle manure resulted in the specific gravity (1.18) and total soluble solid (10.44%) after harvest. However, these combined rates of the three fertilizers led to the highest physiological weight loss (27.89%) and rotten tuber (29.43%) after 90 days of storage. In conclusion, the combined application of maximum rates of inorganic N, P and organic cattle manure exacerbated the deterioration and increased decay percentage compared with the other treatments. Therefore, appropriate management of integrated fertilizer application is required to increase yield without little compromise of tuber quality and the shelf-life of ware potatoes.

Keywords: /Potato/ /Physiological Weight Loss/ /Shelf Life/ /Quality/

YAM

Sreerag, R. S., et.al. 2014. Physico-chemical and textural changes in elephant foot **yam** (*Amorphophallus paeoniifolius*) tubers infested by the mealy bug, *Rhizoecus Amorphophalli* Betrem during storage. J. Postharvest Technol. 02(03): 177 – 187.

Abstract

Elephant foot yam, *Amorphophallus paeoniifolius* is an edible aroid cultivated in the tropical countries. Corm or tuber is the storage organ and is used as seed material or as a vegetable after cooking. Owing to the indisputable palatability, cooking quality, medical utility and therapeutic values of its tubers, this has been dubbed as "King of tubers". Infestation by the mealy bug, *Rhizoecus amorphophalli* is a serious problem during its long-term storage. This study aims at analysing the physicochemical and textural changes in the mealy bug infested tubers of elephant foot yam. For the study, infested and uninfested tubers were stored for 4 months at ambient conditions and data on the physico-chemical and textural changes were evaluated at monthly interval. The moisture content showed a regular decreasing trend in both uninfested and infested tubers registering higher loss for infested set throughout the storage period. Starch and sugar content decreased with storage period whereas fibre and ash content increased. Functional properties of flours from the uninfested tubers were low compared to the infested tubers and these parameters slightly increased with storage period. Texture profile analysis showed that the firmness of the infested tubers were more than that of the uninfested tubers in their native form.

Keywords: /Yam/ /Storage/ /Physico-Chemical Properties/ /Texture/