

**SELECTIVE DISSEMINATION OF INFORMATION (SDI)
PDF REPRINTS AS OF JANUARY 2018**

GENERAL

FRESH VEGETABLES

Ahmed, S., et.al. 2017. Development of novel sanitizers for **fresh vegetables**. Acta Horti 1179: 143-148.

Abstract

Postharvest sanitization of fruit and vegetables is important in enhancing quality and food safety. In this study, five non-chlorine sanitizers, electrolyzed water (EO), electrolyzed alkaline water (EOAI), acidified sodium chlorite (ASC), hydrogen peroxide (H₂O₂) and scallop powder solution (SP), were evaluated for their effectiveness in reducing resident bacteria and inoculated pathogen (*Escherichia coli* O157:H7) on tomato and eggplant and compared with 200 ppm chlorine solution and distilled water (control). Tomatoes had high prevalence of total viable bacteria (5.5 log CFU g⁻¹) and coliforms (3.3 log CFU g⁻¹), and were found to contain *E. coli* (2.4 log CFU g⁻¹), *Staphylococcus* spp. (3.8 log CFU g⁻¹), *Listeria* spp. (3.6 log CFU g⁻¹) and *Yersinia* spp. (1.7 log CFU g⁻¹). A similar microbial profile was obtained on eggplants. No *Salmonella* spp. or *Vibrio* spp. were detected on either vegetable. Washing tomato and eggplant in distilled water removed some soil and other debris, but did not markedly reduce the bacterial load. The different sanitizers reduced the total viable bacteria by 2.3-3.5 log CFU g⁻¹ and coliform bacteria by 1.1-1.9 log CFU g⁻¹ on tomatoes. The resident pathogenic bacteria were also reduced to below detection limit by H₂O₂, ASC and SP. The different sanitizers had similar effects on total viable and coliform bacteria load on eggplant. However, only H₂O₂ and SP reduced the pathogenic bacteria to below the detection limit. On inoculated produce, *E. coli* O157:H7 was higher on tomato (5.4 log CFU g⁻¹) than on eggplant (4.7 log CFU g⁻¹). Chlorine, EO, H₂O₂ and SP had more potent effects on tomatoes than the other sanitizers. On eggplant, the pathogen was undetected in all sanitizing treatments, except EOAI. The results showed that SP and H₂O₂ were more promising alternatives to chlorine that could be applied in fresh produce industries.

Keywords: /Fresh Vegetables/ /Fruits and Vegetables/

FRUITS

BANANA

Trueggelmann, L., et.al. 2017. Bio-efficacy evaluation of Serenade AS® (QST 713 dried strain of *Bacillus subtilis*) as postharvest treatment in Cavendish **banana**. Acta Horti 1183: 229-232.

Abstract

Crown mold and crown rot are diseases caused by several fungi, commonly in complex (*Colletotrichum musae*, *Ceratocystis paradoxa*, *Fusarium pallidoroseum*, *Lasioidiplodia theobromae*, among others). The replacement of chemical fungicides with biorational treatments is a top priority for banana producing/exporting companies. Hence, the efficacy of the bio-fungicide Serenade AS® as

a postharvest treatment in Cavendish banana was studied against postharvest diseases. An in-vitro study using treatments T1 (untreated control), T2 (standard control Iprodione at 3 mL L⁻¹), T3 (Serenade at 5 mL L⁻¹), T4 (Serenade at 10 mL L⁻¹), T5 (Serenade at 15 mL L⁻¹) and T6 (Serenade at 20 mL L⁻¹) was repeated twice. Results showed that application of Serenade AS at higher rates (T5, Serenade at 15 mL L⁻¹, and T6, Serenade at 20 mL L⁻¹) significantly reduced growth of the target pathogens after 7 days of seeding in vitro. Additionally, a shipment simulation study was conducted over 13 days with Cavendish 'Williams' banana from two different locations and divided into the following set-ups: (a) using different rates of Serenade: T1 (untreated control), T2 (chemical control, Iprodione at 3 mL L⁻¹), T3 (Serenade spray at 5 mL L⁻¹ then alum spray), T4 (Serenade spray at 10 mL L⁻¹ then alum spray), T5 (Serenade spray at 15 mL L⁻¹ then alum spray), and T6 (Serenade spray at 20 mL L⁻¹ then alum spray) and (b) different modes/sequences of Serenade application: T1 (untreated control), T2 (chemical control, Iprodione at 3 mL L⁻¹ as spray), T3 (fruits dipped in Serenade at 15 mL L⁻¹ then alum spray), T4 (Serenade spray at 15 mL L⁻¹ without alum), and T5 (alum spray then Serenade spray at 15 mL L⁻¹). In these studies, the application of Serenade at higher rates performed better than the untreated control. Rates of 15-20 mL L⁻¹ reduced the incidence of crown mold and crown rot on fruit, especially in a manner in which Serenade was sprayed first followed by alum.

Keywords: /Banana/ /Postharvest Treatment/

BLUEBERRY

Giongo, L., et.al. 2017. Fruit quality profiling of **blueberries** for parental choice in breeding: aroma and texture at harvest and in postharvest Acta Horti 1180: 197-204.

Abstract

Parental choice is a key process in breeding, with particular regard to traits that are still poorly defined in blueberries (*Vaccinium* spp.) like flavour and texture, which are crucial in consumer acceptance. Breeding selection of these traits is generally based on non-analytical observations or assessed at a unique data point, which makes it extremely difficult to precisely address specific parameters to be ameliorated. The aim of this work was to obtain a high throughput quality profiling of blueberries, with regard to two complex and commercially important traits like aroma/flavour and texture, in order to unravel the variability present in the germplasm and use the information for breeding advancements, at the ripe fruit stage and during postharvest. We profiled 47 accessions among which different species of *Vaccinium*, southern, northern, lowbush, half-high blueberries and rabbiteyes were included. The analyses were carried out at harvest and after storage at 2°C for six weeks at normal atmosphere conditions, in order to monitor the dynamics of the different parameters of the traits for each genotype. The results of these coupled analyses, namely Texture Analysis and Proton Transfer Reaction Time of Flight Mass Spectrometry (PTR-ToF-MS), are reported, with particular emphasis on developing explanatory knowledge toward an optimized parental choice for quality in blueberry breeding programs.

Keywords: /Blueberry/

Yue, C and J. Wang. 2017. Consumer preferences for fresh **blueberry** attributes. Acta Horti 1180: 1-8.

Abstract

The objective of this study was to find the most important attributes of fresh blueberries for US consumers and how consumer socio-demographic characteristics affected their preferences for fresh blueberry attributes. We conducted an online survey with a representative sample of US consumers. Our findings suggested that freshness, juiciness, sweetness followed by blueberry-like flavor, tartness and texture were the most important attributes for blueberry consumers. Some consumer demographic characteristics, such as age, gender, education and marital status also influenced their preferences for blueberry attributes.

Keywords: /Blueberry/ /Consumer Preference/

DURIAN

Kwanhong, P., et.al. 2017. Effect of different packaging on quality changes of fresh-cut **durian** 'Monthong'. Acta Horti 1186: 171-176.

Abstract

Prolonging storage life of fresh-cut durian 'Monthong' was studied. The objective of the experiment was to evaluate the effect of packaging on quality and storage life of fresh durian pulp. Slightly ripe durian fruit were opened and the pulp with seeds was removed in hygienic conditions. After removing the seeds, durian pulp without seeds was packed in various types of packaging: polypropylene (PP) tray and over-wrapped with polyvinyl chloride (PVC) stretch film; black polystyrene (PS) tray with clear PVC lid; polyethylene terephthalate (PET) clamshell tray; polypropylene (PP) tray and placed inside PP bag (25 μ m thickness); and polypropylene (PP) tray and placed inside low-density polyethylene (LDPE) bag (25 μ m thickness). Fresh-cut durians of all treatments were stored at $10\pm 1^\circ\text{C}$. The durian pulp quality was evaluated after 0, 5, 10, 15 and 20 days of storage. It was found that the pulp in all treatments were not much different in physical and chemical quality characteristics. However, weight loss, oxygen and carbon dioxide concentration in the package differed. The eating quality of the fresh-cut durians decreased over the storage period and was unacceptable after 15 days of storage.

Keywords: /Durian/ /Minimally Processed/ /Fresh-Cut/ /Packaging/

KIWIFRUIT

Huali Hu, et.al. 2018. Hydrogen gas prolongs the shelf life of **kiwifruit** by decreasing ethylene biosynthesis. Postharvest Biol & Technol 135: 123-130.

Abstract

The application of hydrogen-rich water was recently shown to inhibit senescence process of kiwifruit, but it is unclear if hydrogen gas (H_2) exerts a similar function. The present results show that the production of endogenous H_2 in kiwifruit decreases during ripening. Fumigation with H_2 not only increased endogenous H_2 concentrations but delayed the softening and cell wall disassembly in flesh. Ethylene (C_2H_4) production was also inhibited by H_2 , which was supported by a decrease in 1-aminocyclopropane-1-carboxylate (ACC) concentration, ACC synthase, and ACC oxidase activities,

and the downregulation of the corresponding gene transcripts. Further, ACC-induced C₂H₄ production and ripening were blocked by H₂ and the incidence of natural decay and disease incidence were reduced. Overall, the results suggested that the H₂-induced delay of kiwifruit ripening resulted from an inhibitory effect on C₂H₄ biosynthesis.

Keywords: /Kiwifruit/ /Shelf Life/ /Storage/ /Ethylene/ /Ripening/

Shunfeng Li, et.al. 2017. Effect of poly-ε-lysine incorporated into alginate-based edible coatings on microbial and physicochemical properties of fresh-cut **kiwifruit**. *Postharvest Biol & Technol* 134: 114-121.

Abstract

This work investigates the effectiveness of different concentrations (0.05%, 0.10% and 0.15%) of poly-ε-lysine (ε-PL) incorporated into an alginate-based edible coating to inhibit microbial proliferation and maintain physicochemical properties of fresh-cut kiwifruit stored at 4 ± 0.5 °C for 14 d. Changes in O₂ and CO₂ concentration, physicochemical indices, microbiological counts and morphological properties were measured. Results showed that low levels of ε-PL (0.05% and 0.10%) led to lower CO₂ and higher O₂ concentrations inside the packages compared with samples with control and 0.15% ε-PL treatments. Moreover, the alginate-based edible coating containing 0.05% ε-PL significantly reduced electrolyte leakage and MDA content while maintained the green color, total chlorophylls content, ascorbic acid, antioxidant capacity and morphological properties of fresh-cut kiwifruit. In addition, 0.05% ε-PL treatment reduced aerobic plate counts and yeast and mould counts by 3.5 and 2.5 log CFU/g, respectively, at the end of evaluation. Our results show that there is promise for the use of edible coating incorporated with ε-PL to preserve the quality of sliced kiwifruit.

Keywords: /Kiwifruit/ /Fresh-Cut/

MANGO

Adikaram, N.K.B., et.al. 2017. A review of the role for natural defences in the management of *Colletotrichum* rotting of ripe **mangoes**. *Acta Horti* 1183: 229-232.

Abstract

Anthracnose and blossom blight, caused by *Colletotrichum* species, are two most destructive diseases in mango. Anthracnose can occur at any stage of fruit development resulting in pre- and postharvest losses. *Colletotrichum* species cause quiescent infections in mature fruits which develop in to progressive anthracnose rots during fruit ripening. Fruit losses due to anthracnose may be reduced if fungal infections are kept in their quiescent state for extended periods. A possible way of prolonging quiescence is to maintain the natural antifungal barrier in the unripe fruit at an inhibitory level in to the post-climacteric phase. Unripe mangoes contain resorcinols and chitinase in the latex and gallotannins in the peel constituting fruit resistance at immature stage. Their gradual decline during ripening makes the fruits susceptible to fungal rotting. Mango peel tissue responds to *Colletotrichum* challenge by several early defences and enhanced phenolics and enhanced gallotannins and chitinase activity. Latex disappears in coincidence with ripening and the decline of fruit resistance. When latex was retained by harvesting fruit with a portion of pedicel, the incidence

and severity of anthracnose were significantly reduced. Fruit peel in which latex was retained had greater chitinase activity than controls. Latex plays a direct role in fruit resistance to anthracnose. Elicitor treatment enhanced fruit resistance and reduced the incidence of anthracnose in ripe mangoes. Constitutive antifungal substances could also be useful markers in the selection of resistant cultivars to postharvest fungal pathogens.

Keywords: /Mango/

Chillet, M., et.al. 2017. Alternative methods to control postharvest disease of mango. Acta Horti 1183: 319-324.

Abstract

Anthracnose, a fungal disease caused by the *Colletotrichum gloeosporioides*, and mango fruit flies (*Bactrocera zonata*) are the two main postharvest problems regarding the production of mangoes (*Mangifera indica* L.) on the islands of Reunion and Madagascar. Traditional postharvest treatments can negatively affect mango quality so that it does not comply with customers' and export countries expectations. Physical treatments are generally used against fruit flies, as well as chemical products against *C. gloeosporioides*. Our goal was to develop alternative methods for postharvest treatment, using the fungitoxic properties of various essential oils and controlled atmospheres (hypoxia). For a start, these treatments were applied in vitro, to *C. gloeosporioides* conidia, appressoria and mycelium in PDA culture, and to eggs of *Bactrocera zonata*. The fungitoxic effects of *Ravensara aromatica* and clove (*Eugenia aromatica*) essential oils were measured on spores, germination, and on the mycelium growth. Essential oil of *E. aromatica* inhibited the pathogen growth in vitro and blocked conidial germination. The effect of the hypoxic treatment was measured in vitro on hatching of *B. zonata* eggs. Four days of treatment were necessary to kill all eggs. The second step was to measure the effects these treatments had on the fruit physiology. Various polyphenols in mango peel were synthesized after both treatments. Hypoxic conditions and essential oils' effects on fruit quality were also key data. Biochemical parameters of fruit quality such as pH, acidity and sugars were measured to verify whether these treatments meet customer's expectations.

Keywords: /Mango/ /Postharvest Disease/

Deliana, Y., et.al. 2017. Marketing and value chain of 'Gedong Gincu' mango with its labeling and packaging. Acta Horti 1183: 373-382.

Abstract

'Gedong Gincu' mango, which has been exported to Singapore, Saudi Arabia, and even the USA, has unique characteristics including its taste, aroma, shape, and color. In West Java, areas that potentially produce this type of mango are Cirebon, Majalengka, Kuningan, and Indramayu, with each area producing mangoes with distinct characteristics. 'Gedong Gincu' from Cirebon and Kuningan tastes sweet and sour with its round shape and medium size. 'Gedong Gincu' from Majalengka tastes sweet with its high water content and big size. On the other hand, the same mango type from Indramayu tastes sweet but has a small size. A problem is that only 20% of the suppliers have used labeling, but they have not used packaging. However exporters have used packaging. research investigates the process of mango distribution, farmer share, and value added

with labeling and packaging. The research uses primary and secondary data by interviewing 75 farmers from three farm groups in Dukupuntang district and one farm group from Munjul district, Cirebon Regency. Also, calculation of value added and opportunity is used. The result reveals that farmer value added increases as much as Rp 4000 kg⁻¹ after labeling at the supplier level, packaging without labeling shows value added Rp 11,000 kg⁻¹, which is caused by the fact that the cost of packaging is more expensive than that of labeling. Meanwhile, packaging with labeling shows added value Rp 22,500 kg⁻¹. Consumers are willing to pay more than 20-40% after labeling as they are convinced that labeling mango quality is guaranteed. Consumers do not buy labelled mangoes for their consumption but as a souvenir or for different purposes.

Keywords: /Mango/ /Packaging/ /Value Chain/

Mizani, A., et.al. 2017. Effects of the percentage of terminal flowering on postharvest fruit quality in mango (*Mangifera indica*) 'Calypso'TM. *Acta Horti* 1183: 181-186.

Abstract

The objective of this study was to investigate the relationship between the percentage of flowering terminals, crop load and postharvest fruit quality in the mango cultivar 'Calypso'TM (B74) grown at Dimbulah in North Queensland. The percentage of flowering terminals was manipulated experimentally by removing flowers at anthesis to give eight treatments in which trees had 5, 10, 20, 30, 40, 60, 70 or 80% of their terminals with flowers. Fruit were sampled at harvest, ripened at 23°C and, at eating ripe, were assessed for fruit number and yields per tree and fruit quality parameters including: fruit size (length, width and depth), fruit weight, background skin colour, blush colour, flesh colour, total soluble solids (TSS), dry matter and internal physiological disorders (jelly-seed, soft nose). The 5% crop load treatment (removing 95% of inflorescences from terminals) significantly reduced the average fruit yield per tree. Average fruit weights were highest in trees with 5 and 10% of terminals flowering, followed by trees with 20% of terminals flowering. There was no difference in average fruit weight between trees with 30, 40, 60, 70 or 80% of terminals flowering. Average fruit length increased significantly in trees with 5, 10 and 20% of terminals flowering compared with those with larger numbers of flowering terminals, with the longest in the 5% treatment. Fruit length was similar in treatments with 30% or more terminals flowering. Similar trends were observed for fruit width, with the widest (89.35 mm) and deepest (80.53 mm) fruit found in the 5% treatment. Although the comparative results between treatments confirmed that the highest values of fruit TSS, dry matter and percentage of blush colour occurred in fruit from trees with only 5% of terminals flowering, observations did not differ significantly among treatments.

Keywords: /Mango/

Phakdee, N. and P. Chaiprasart. 2017. Effect of modified atmosphere storage on the extending shelf life of 'Nam Dok Mai Sri Tong' mango fruits. *Acta Horti* 1178: 111-114.

Abstract

Eighty percent mature of 'Nam Dok Mai Sri Tong' mango fruits were harvested, packed in different plastic bags and kept in temperature storage. The experiment was done by using factorial with randomized complete block design (RCB) 3 replicates (3 fruits each). First factor was the types

of polyethylene bag consisted of white ethylene absorbing bag or activated alumina absorbing-agent in white bag (WEB), green absorbing bag or Zeolite absorbing-agent in green bag (GEB) and control (no bag). Second factor was different storage temperatures consisting of 15 and 27°C. The physiochemical properties were determined at every 3-day interval. The results showed that the fruits kept at 15 and 27°C extend the shelf life for 15 and 6 days, respectively, and showed higher soluble solids content (SS), titratable acidity (TA), SS/TA, color changes as shown by a* and L* value than other treatments. The shelf life of fruits packed without ethylene absorbing bag in both storage temperatures were shorter than those kept in both of WEB and GEB. Moreover, all mango fruits packed in WEB and kept at 15 and 27°C extended the shelf life for 24 and 12 days, respectively.

Keywords: /Mango/ /Shelf Life/ /Modified Atmosphere Storage/

MANGOSTEEN

Ormking, C. 2017. Effects of ethyl formate, a postharvest fumigation controlling fruit surface insect pests, on mangosteen quality. Acta Horti 1178: 155-160.

Abstract

Exporting fruits are usually treated with methyl bromide; an ozone depletion substance as a quarantine measure for controlling fruit surface insect pests. To protect the ozone layer the Montreal Protocol designed a treaty providing a timetable on which the production of several substances must be phased out and eventually eliminated. It is therefore necessary to seek an alternative for methyl bromide before the restriction in the year 2015. In our initial study the effect of ethyl formate on five insect pests, citrus mealybug, *Pseudococcus cryptus* Hempel (*Hemiptera: Pseudococcidae*), scale insect (*Coccus* sp.) (*Hemiptera: Coccidae*), chilli thrips, *Scirtothrips dorsalis* Hood (*Thysanoptera: Thripidae*), black cocoa ant (*Dolichoderus thoracicus* Smith (*Hymenoptera: Formicidae*) and tropical tyrant ant, *Iridomyrmex anceps* (Roger) (*Hymenoptera: Formicidae*), ethyl formate (EF) has the potential to control these insect pests. In this study ethyl formate carbon dioxide (CO₂), and ethyl formate in combination with CO₂ were evaluated to determine their effects on fruit quality. In fruit quality assessment fumigation of ethyl formate at 25, 50, 75 and 100 g m⁻³, for 1, 2, 3 and 4 h had no effect on the internal and external quality of mangosteen, whereas the application of ethyl formate at over 100 g m⁻³ adversely affected the quality. Calyx and stalk were shriveled dry and brown in colour. In addition, the peel colour changed to dark brown and became hardened. The fumigation of fruit with carbon dioxide CO₂, at 25, 50, 75 and 100% and ethyl formate at 25, 50, 75 and 100 g m⁻³ combined with CO₂ of 50 and 100% for 1, 2, 3 and 4 h had no effect on internal and external fruit quality of mangosteen. Calyx and stalk remained green. Fruit color development was uniform. Furthermore, flesh and its odor of treated fruits were not different from untreated fruits.

Keywords: /Mangosteen/ /Postharvest Insect Pests/

PAPAYA

Barbosa, N.C., et.al. 2018. Modeling the respiration rate of Golden papayas stored under different atmosphere conditions at room temperature. Postharvest Biol & Technol 136: 152-160.

Abstract

The present study aimed to measure the respiration rate of papayas (cv. Golden) stored under controlled atmosphere at room temperature, with decreasing O₂ and increasing CO₂ levels, in order to identify mathematical models capable of predicting respiration rate throughout storage. A model was proposed based on the Michaelis–Menten equation with uncompetitive inhibition and kinetic parameters that change during storage time. A second-order nonlinear regression model was used as reference for the mathematical approach. Nine experiments with three replicates were conducted under different controlled atmospheres to generate respiration data. A closed system method was used to measure the respiration rate at 2 d intervals over 13 d of storage at ambient temperature (23 °C). Peel color measurements indicated total ripening of fruit stored in high O₂ atmospheres, whereas ripening was minimal in atmospheres containing low O₂ and high CO₂ levels. The respiration rate remained at the lowest value, but gradually increased during storage at the lowest O₂ level associated with the highest CO₂ concentration. The nonlinear regression model obtained the lowest A/Cc value with VarPow variance, indicating a better fit than the Michaelis–Menten model. However, the latter, whose kinetic parameters change according to a polynomial second-order equation (MMQ), displayed a better fit than the nonlinear regression model evaluated by homoscedastic variance. Additionally, MM_Q was more sensitive than nonlinear regression in detecting the real change in respiration rate in a biological system as a function of different gas compositions during storage.

Keywords: /Papaya/ /Storage/

PEAR

do Amarante, C.V.T., et.al. 2017. Postharvest quality of ‘Rocha’ pears treated with different doses of 1-methylcyclopropene. Acta Horti 1179: 87-92.

Abstract

Fruit of ‘Rocha’ pear were harvested, cold-stored at 1°C for 4 days and then treated with 1-methylcyclopropene (1-MCP) at 0, 100, 200, 300, 400 or 500 nL L⁻¹. After treatment, fruit were packed in paper boxes lined with a low-density polyethylene film (40 µm) and stored for 40, 80 or 120 days at 1±0.5°C. After removal from storage, fruit were assessed for quality during shelf-life (5 and 10 days at 20±2°C). The dose of 1-MCP required to delay flesh firmness loss effectively was dependent on the period of fruit cold storage. For pears cold-stored for 40, 80 and 120 days, the effective doses of 1-MCP to preserve highest flesh firmness during 10 days of shelf-life were ≥200, ≥300 and ≥400 nL L⁻¹, respectively. Fruit treated with 1-MCP at doses ≥200 nL L⁻¹ had delayed yellowing of the skin during cold storage, after 5 or 10 days of shelf-life, with a more substantial effect for shorter cold-storage periods (40 and 80 days). Fruit treated with 1-MCP had higher values of titratable acidity (TA) and soluble solids content (SSC) and reduced incidence of decay and internal browning. Doses of 1-MCP ≥300 and ≥100 nL L⁻¹ were most effective for best preservation of TA and SSC, respectively, regardless of cold-storage and shelf-life periods. 1-MCP at doses ≥100 nL L⁻¹ was effective in controlling decay and internal browning in fruit cold-stored for 80 and 120 days.

Keywords: /Pear/ /Postharvest Quality/ /1-methylcyclopropene/

Yuan Yan, et.al. 2018. Control of postharvest blue mold decay in pears by *Meyerozyma guilliermondii* and its effects on the protein expression profile of pears. *Postharvest Biol & Technol* 136: 124-131.

Abstract

This study assessed the biocontrol efficacy of *Meyerozyma guilliermondii* against blue mold decay caused by *Penicillium expansum* in pears and the possible mechanisms involved. The results indicated that *M. guilliermondii* significantly inhibited the blue mold decay caused by *P. expansum* without affecting the quality of the pears. *M. guilliermondii* rapidly colonized the wounds and surfaces of the pears at both 4 °C and 20 °C. The rapid growth in the population of *M. guilliermondii* in the wounds and surface environments of pears indicated that it has the potential to inhibit pathogens in pears. The activities of antioxidant enzymes (peroxidase and catalase) in the pear were improved after the application of the yeast. Phenylalanine ammonia-lyase (PAL), a key enzyme involved in lignin biosynthesis and defense related activity, was also markedly enhanced. Generally, the application of yeast induced disease resistance in the pear. The results pear proteomics profile after *M. guilliermondii* treatment showed that 17 proteins were significantly up-regulated and 13 were down-regulated in response to induction with *M. guilliermondii*. Most of the proteins were involved in defense and stress responses based on biological process. These results provided a new insight into the biocontrol mechanism of the antagonist yeast in the pear fruit.

Keywords: /Pear/

PERSIMMON

dos Santos, A., et.al. 2017. Effect of fruit treatment with 1-methylcyclopropene and Agro-Mos® and storage conditions on postharvest quality of 'Kyoto' persimmon. *Acta Hort* 1179: 93-100.

Abstract

This work was carried out to evaluate postharvest quality preservation of 'Kyoto' persimmon treated with 1-methylcyclopropene (1-MCP; 1 µL L⁻¹) and a mannanoligosaccharide-based product (Agro-Mos®; 5 mL L⁻¹) and left in cold storage (CS; 0.5±0.5°C/95±2% RH) and controlled atmosphere (CA; 2 kPa O₂ + 0.5 kPa CO₂ at 0.5±0.5°C/95±2% RH). The two fruit treatments (1-MCP and Agro-Mos®) and two storage conditions (CS and CA) were combined, resulting in eight treatments: CS, CS + Agro-Mos®, CS + 1-MCP, CS + 1-MCP + Agro-Mos®, CA, CA + Agro-Mos®, CA + 1-MCP and CA + 1-MCP + Agro-Mos®. Fruit quality was analyzed after 60 days of storage, followed by 1 and 3 days of shelf life (20±2°C and 60±5% RH). Fruit treated with 1-MCP kept a greener skin color (higher values of hue angle and lightness) under both storage conditions (CS and CA), after 1 day of shelf life, but not after 3 days of shelf life. 1-MCP and CA storage were effective to preserve flesh firmness and texture of the fruits. CA conditions delayed skin browning after 1 day of shelf life. After 3 days of shelf life, there was no difference between CA and CS conditions for skin browning. Under CA, decay incidence was lower in fruit treated with 1-MCP than with Agro-Mos®. The results show that treatment with 1-MCP associated with CA storage preserves postharvest quality of 'Kyoto' persimmon.

Keywords: /Pear/ /Postharvest Quality/ /1-methylcyclopropene/

PITAYA

Brunini, M.A., et.al. 2017. **Pitaya** quality during refrigerated storage. Acta Horti 1178: 129-134.

Abstract

The objective of this study was to evaluate the quality and shelf life of pitaya fruits stored under an ambient temperature (21-27°C with 44-63% RH) and at a low temperature (12±1°C, with 85-90% of RH). The quality of the fruit was monitored during the storage, using the parameters: weight loss, the external coloration, the titratable acidity, the amount of soluble solids, amount of vitamin C, the enzymatic activity of pectin methyl esterase the respiration rate and the sensory acceptability (flavor, coloration, texture, global impression) Through the results it may be concluded that the shelf life of pitaya could be extended for 18 days by storing at refrigerated temperature (12±1°C) compared with those stored at room temperature. The use of refrigerated temperature (12±1°C) however increased the loss in fresh weight and enzymatic activity of pectin methyl esterase (PME), which is associated with the softening of fruits. The quality of fruit was influenced by the storage temperature and storage time, however storage of fruits at the refrigerated temperature (12±1°C) showed small change in the fruit quality. In general, it may be concluded that the refrigerated temperature (12±1°C) was the best to maintain pitaya fruit quality.

Keywords: /Pitaya/ /Storage/

RAMBUTAN

Tengrang, S., et.al. 2017. Observations of the effect of different bioplastic packaging on prolonging the storage life of **rambutan** and biodegradability of the packaging. Acta Horti 1186: 177-184.

Abstract

Effect of bio-packaging materials on postharvest life of rambutan fruit was investigated in this study. Three different bio-packaging materials, polylactic acid (PLA), polybutylene succinate (PBS) and Mater-Bi®, were blown-molded into bags to contain 1 kg rambutan fruit, while low-density polyethylene (LDPE) bags were used as the control group. There was no addition of additive compounds into PLA or PBS film during the forming process. All films were measured for mechanical properties, water vapor and oxygen transmission rates, and biodegradability. Afterwards, rambutan fruits were randomly divided into four groups, packed in the different bag types and stored at 13±2°C with 78% RH. Mater-Bi® and PBS bags were easier to produce and use than PLA bags. The highest levels of both water vapor and oxygen transmission rates were detected in Mater-Bi® film followed by PBS and PLA bags, respectively. Percentage of elongation of Mater-Bi® in machine direction and across direction were significantly higher than other films, while the tensile strength of Mater-Bi® had the lowest values in both directions followed by PBS and PLA, respectively. Mater-Bi® and PLA films took over 100 days to start degrading in moist soil, whereas PBS film began to degrade at 16 days and its degradation increased to 31.25% in 161 days. Rambutan kept in PBS bags had the lowest weight loss (%) with yellowish-red skin and fresh green spintern. The greater weight loss and brown skin appearance was found in rambutan packed in Mater-Bi® bags followed by those in LDPE. Results indicated that packaging made from PBS film could extend postharvest life of rambutan for

15 days at 13°C storage, and these bags begin to biologically degrade more quickly. The findings are observations only, since no statistical analyses are presented, although significant differences are referred to in the text.

Keywords: /Rambutan/ /Packaging/ /Storage Life/

STRAWBERRY

Shaohui Zhang, et.al. 2017. Sigma factor FaSigE positively regulates **strawberry** fruit ripening by ABA. *Plant Growth Regul* 83: 417-427

Abstract

Bacterial sigma factor E (SigE) is a positive regulator of sugar catabolism via its interaction with the H subunit of Mg-chelatase (CHLH), which serves as both putative abscisic acid (ABA) receptor (ABAR) in *Arabidopsis thaliana* and positive regulator of strawberry fruit ripening. However, whether SigE influences strawberry fruit ripening has not been determined. We used RNA sequencing and a qPCR to confirm that the expression of the strawberry *SigE* gene (*FaSigE*) is rapidly upregulated in fruits turning red, suggesting FaSigE might mediate strawberry fruit ripening. Silencing *FaSigE* by intron-spliced hairpin RNA-mediated RNA interference significantly inhibited fruit ripening. This observation was confirmed by analyses of fruit firmness, soluble sugar, ABA, and anthocyanin contents, as well as transcript levels of genes related to fruit ripening and ABA signaling. Interestingly, a firefly luciferase complementation assay revealed that FaSigE can interact with FaABAR, while an in vitro fruit disc incubation test indicated ABA induces *FaSigE* expression. Moreover, a surface plasmon resonance assay proved that FaABAR produced in yeast cells can bind to ABA, with a binding dissociation constant of 50 μ M. In conclusion, FaSigE can interact with FaABAR and positively regulates strawberry fruit ripening via ABA.

Keywords: /Strawberry/ /Ripening/

TABLE GRAPES

Bahar, A., et.al. 2017. Evaluation of methods for determining rachis browning in **table grapes**. *Postharvest Biol & Technol* 134: 106-113.

Abstract

Rachis browning is an important quality parameter of table grapes which can limit the development of novel storage technologies. Previous research has shown the feasibility of using image analysis by photography or scanning to measure rachis quality. Here, these two methods were compared, and rachis browning was also evaluated by auto-fluorescence. Two table grape cultivars, Mystery and Superior, were stored under different conditions and durations and the three objective methods were employed, in addition to a subjective evaluation. As shown in the past, weight loss was poorly correlated to rachis browning. Correlation coefficients between image analyses by photography and scanning were 0.88 and 0.98 for 'Mystery' and 'Superior', respectively, suggesting that the two methods are interchangeable. Auto-fluorescence compared to photographic image analysis yielded correlation coefficients of 0.73 and 0.90 for 'Mystery', which had a low range of

browning, and 'Superior' which had a wide range of browning, respectively. For 'Superior' the lower median of browning had a low correlation to auto-fluorescence whereas the high median range was highly correlated. In general, all methodologies asserted that 3 d of shelf life is a feasible time frame for both cultivars under the conditions tested. A web-based application <http://www.agri.gov.il/en/blogs/chapter.aspx?peopleId=21&chapterId=472> was established to upload images and retrieve rachis-browning data.

Keywords: /Table Grapes/ /Postharvest/

VEGETABLES

CAULIFLOWER

Gautam, D.M., et.al. 2017. **Cauliflower** handling trials integrating best practice and developed technologies to reduce postharvest losses in Nepal. Acta Horti 1179: 207-212.

Abstract

In Nepal, farmers usually harvest cauliflower curds with few leaves and short stalks and transport to market. A handling trial was conducted to determine the extent of potential loss reduction. Cauliflower 'Snow Mystique' at the tight-curd stage was harvested from a local farm and grouped into three treatments: retention of five or six small leaves (farmers' practice), removal of all leaves, and removal of all leaves followed by wrapping the curd with newspaper. Each group of curd samples was further divided into four subgroups representing the following packaging methods: nylon net bags, general plastic bags, plastic crates with newsprint liner, and 50 μ low-density polyethylene (LDPE) bags. Five packages of produce of 10 kg each were used for each treatment, each pack representing a replicate. They were then transported on the cargo load of a small truck from the farm in Kavre to Chitwan, about 200 km. After transport, the curds were taken from the containers and stored under ambient conditions (30.1 \pm 0.9 $^{\circ}$ C and 79.5 \pm 9.5% RH). Removal of all leaves together with wrapping with newspaper was very promising, not only to reduce damage but also to eliminate the cost of handling the unmarketable leaves and stalks of the curds. During transport, weight loss was highest in nylon net bag (4%), followed by plastic crate and general plastic bag. During subsequent ambient storage, curds packed in plastic crates had the longest shelf-life (10 days), while those in MAP had the shortest (<6 days). Thus, complete sealing in MAP was not beneficial. The results also demonstrate that techniques developed from laboratory trials may not work under actual conditions and, therefore, should be tested under and refined to suit commercial situations.

Keywords: /Cauliflower/ /Postharvest Losses/ /Packaging/ /Transportation/

Mishra, B.P., et.al. 2017. Modified atmosphere packaging of **cauliflower** under ambient and evaporative cooling conditions in Nepal. Acta Horti 1179: 177-182.

Abstract

An experiment was carried out to evaluate the efficacy of perforated modified atmosphere packaging (MAP) on shelf life and quality of cauliflower in an evaporative cooling (EC) structure and ambient room conditions. Freshly harvested cauliflowers 'Snow Mystic' were sealed in 50 μ low-

density polyethylene (LDPE) bags with different numbers of perforations and kept in EC (28.3±3.7°C, 90-99% RH) and ambient room conditions (30±6°C, 76±15% RH). Perforations were made with an ordinary punching machine. The treatments were: no perforations, four perforations, eight perforations, 12 perforations, 16 perforations, and open in tray (control). Each treatment consisted of four heads of cauliflower and was replicated three times. All the MAPs were opened on the 5th day, and cauliflowers were held under the same conditions for further study. During holding in MAP, bulging of the bag and condensation of water were very high in MAP without perforations. The more perforations, the less was the condensation of water. At the 5th day, all cauliflowers with no perforations were completely spoiled. Weight loss and other physicochemical changes were less in all MAP compared with the controls. All the changes were delayed and shelf life was maintained better in EC. MAP with 16 perforations was the best among all treatments. With the smaller numbers of perforations, the occurrence of browning was higher.

Keywords: /Cauliflower/ /Modified Atmosphere Packaging/ /Storage/

LETTUCE

Charles, F., et.al. 2018. Visible light as a new tool to maintain fresh-cut **lettuce** post-harvest quality. *Postharvest Biol & Technol* 135: 51-56.

Abstract

Fresh-cut lettuces are susceptible to tissue browning and quality deterioration during post-harvest storage, even if they are kept in cold temperature. In this study we tried to counteract these undesirable physiological disorders by testing either storage under continuous light or after short treatments (2 d) with intermittent light (2 h on/2 h off) followed by storage in darkness. Two light intensities, 50 and 150 $\mu\text{mol m}^{-2} \text{s}^{-1}$, were studied. Continuous light (50 or 150 $\mu\text{mol m}^{-2} \text{s}^{-1}$) significantly inhibited tissue browning but stimulated dehydration. However, intermittent light during 2 days minimized browning and water loss and showed a global positive residual physiological change during the following 5 d of storage in darkness. All light treatment maintained the photosynthetic capacity of fresh cut lettuces excepting for high continuous light (150C). The photosystem II efficiency was negatively affected by both the continuous and intermittent light at 150 $\mu\text{mol m}^{-2} \text{s}^{-1}$ but not by the moderate intermittent light (50 $\mu\text{mol m}^{-2} \text{s}^{-1}$). Finally, among the overall conditions tested, the short treatment (2 d) of fresh-cut lettuce by intermittent moderate level light (50 $\mu\text{mol m}^{-2} \text{s}^{-1}$) followed by storage in darkness appeared to be the best compromise. Although not yet ideal, this treatment could maintained the product quality by reducing browning, minimizing weight loss and respiration and also keeping high level of photosynthetic capacity. Future studies in this context of visible light based post-harvest treatments are consequently promising.

Keywords: /Lettuce/ /Fresh-cut/ /Postharvest Quality/

Cortellino, G., et.al. 2018. Shelf life of fresh-cut lamb's **lettuce** (*Valerianella locusta* L.) monitored by electronic nose and relationship with chlorophyll a fluorescence and mechanical-acoustic test. *Postharvest Biol & Technol* 136: 178-186.

Abstract

The principal aim of this work was to investigate the applicability of electronic nose, as non-destructive technique, in monitoring freshness decay of fresh-cut *Valerianella locusta*. In addition it was evaluated the possibility to monitor texture changes due to senescence by the mechanical (firmness, dF/dS, area as work required to puncture) and acoustic (dB_{break} , dB_{max} , N_{sounds} , $N_{sounds > 50 dB}$) puncture tests. The sampling was performed for Valerianella samples, packed in air (control) and in three modified atmospheres: nitrogen, CO₂/O₂/N₂ mix and argon, stored at 4 °C up to 13 d. The experimental plan was repeated twice. The Fv/Fm ratio, an index of chlorophyll a fluorescence, showed a negative trend for all the samples, even though with some fluctuations, along the shelf life. Samples packed in air showed the least decay and the highest final Fv/Fm value, while those packed in argon and CO₂/O₂/N₂ mix showed the lowest final Fv/Fm values. Chlorophyll a fluorescence was confirmed to be an useful tool for monitoring the senescence of ready to eat Valerianella. The mechanical acoustic puncture test was not found to be appropriate to evaluate textural property throughout shelf life. No differences were found between the electronic nose profiles (E-nose) of the two repetitions, except for samples packed in nitrogen. Sensor responses significantly depended on packaging atmosphere. W1C, W5C and W3C sensors showed an overall decreasing trend in response throughout shelf life. The sensors W2S, W1S and W5S showed an increasing trend in response for samples packed in argon and in packages with a mixed gas atmosphere. Principal component analysis was applied to E-nose measurements. The highly significant correlation ($P < 0.001$) was found between PC-1 and Fv/Fm ratio, demonstrating that the E-nose technique, applied directly on Valerianella bags, could be proposed as a rapid and non-destructive method for monitoring shelf life.

Keywords: /Lettuce/ /Shelf Life/

MUSTARD

Peoun, P, et.al. 2017. Modified atmosphere packaging of leaf **mustard** during evaporative cooling and CoolBot cold storage. Acta Horti 1179: 173-176.

Abstract

Leaf mustard is a highly perishable vegetable, and wilts rapidly within hours of harvest. Postharvest techniques are therefore vital to maintain freshness for longer. This study was conducted to determine the storability of leaf mustard using the simple evaporative cooler (EC), developed in an earlier research project, and the low-cost CoolBot cold chamber set at 13°C. This was combined with modified atmosphere packaging (MAP) using a 25-micron-thick polyethylene bag. Storage at ambient temperature with and without MAP was also included as a control. All treatments were replicated three times, with each replicate having 10-15 crowns of leaf mustard. Ambient storage in the open resulted in rapid wilting and weight loss that exceeded 15% after only 1 day of storage. EC and CoolBot storage kept weight loss below 10% during this period. MAP was very effective in reducing weight loss, regardless of the storage conditions. Leaf color did not change much during the first 2 days of storage. With prolonged storage, the mustard yellowed, as indicated by an increase in colorimetric L* values. MAP seemed to favor yellowing over this period. Shore values for hardness of the leaves did not show a clear treatment effect. Total soluble solids did not change much with storage, except that they increased in the later part of storage in the open at ambient temperature or in the CoolBot chamber when the mustards became senescent. The results demonstrate the effectiveness of MAP, EC and CoolBot storage in slowing mustard dehydration.

Keywords: /Mustard/ /Modified Atmosphere Packaging/ /Shelf Life/ Storage/

TOMATO

Gautam, D.M., 2017. Effectiveness of non-chlorine sanitizers in enhancing quality and shelf life of tomato in Bangladesh, Cambodia and Nepal. *Acta Horti* 1179: 149-156.

Abstract

Chlorine is the most widely used sanitizer for fresh vegetables and fruit. However, it reacts with organic matter in the produce to form highly carcinogenic trihalomethanes; consequently, chlorine use is being phased out in several countries. This research examined the feasibility of using hydrogen peroxide (H₂O₂) and calcinated calcium (CCa) in enhancing the quality of tomato in Cambodia and Nepal; the Bangladesh trials used only CCa, which was the most promising treatment found in an earlier study. Results of the Cambodia trials showed CCa to be more promising than H₂O₂, which induced fruit surface browning. The effect of CCa in reducing total bacterial counts was comparable to that of chlorine right after treatment. This was sustained after 5 days under ambient conditions in modified atmosphere packs (MAP), whereas chlorine-treated fruit had increased bacterial counts, similar to water wash. CCa also reduced weight loss and increased shelf life of the fruit. CCa at 0.01% was sufficient to yield these effects. In the Bangladesh trials, 0.01% CCa significantly increased fruit shelf life both under ambient conditions and in MAP. Use of cold CCa had no added benefit. CCa increased total soluble solids (TSS), particularly in ambient-stored fruit, but had no noticeable effect on fruit weight loss or firmness. In the Nepal trials, bacterial and fungal loads decreased after treatment with H₂O₂ and CCa. Microbial load increased sharply in the control to more than 8 log CFU g⁻¹ from less than 5 log CFU g⁻¹ after treatment and after 5 d in MAP. CCa and chlorine suppressed microbial growth and maintained microbial loads of 4 log CFU g⁻¹. Furthermore, CCa reduced rot incidence, lowered weight loss, and maintained higher vitamin C content of the fruit. The results show the potential of CCa as an effective alternative to chlorine.

Keywords: /Tomato/ /Storage/ /Shelf Life/

Gautam, D.M., 2017. Effect of maturity stage and packaging method used in transportation on reduction of transportation loss and extension of shelf-life in tomato. *Acta Horti* 1179: 201-206.

Abstract

Postharvest losses of tomato fruit in Nepal are very high because farmers usually harvest fruits at full-ripe stage and transport in bamboo baskets and ordinary plastic crates. To identify the appropriate maturity stage for harvesting and packaging method, tomatoes 'Srijana' grown in protected cultivation in farmers' fields were harvested at breaker and orange-yellow stage and held in ordinary plastic crates without lining, with newspaper lining or plastic lining, or in modified atmosphere packaging (MAP) in 50µ low-density polyethylene (LDPE), and transported from Kavre to Chitwan (200 km) in a mini truck. Significantly less damage and lower weight loss were observed in breaker-stage tomatoes during transportation. All packaging methods except ordinary crates minimized damage and weight loss during transportation. The lowest transportation loss was recorded in breaker-stage tomatoes held in 50µ LDPE perforated bags. Visually undamaged fruits from all treatments were selected and stored under ambient conditions (29.3±2.7°C and 85±7.5%

RH). Observations were made on physicochemical changes and ripening behavior. Irrespective of packaging treatments, shelf-life of breaker tomatoes (color index 1 (CI-1)) was 19.25 days, compared with 13 days for those harvested at yellow-color stage (CI-4). Physicochemical properties of the fruits at ripened stage were not affected by either the stage of fruit at harvest or the method of packaging during transportation.

Keywords: /Tomato/ /Modified Atmosphere Packaging/ /Postharvest Loss/

Gautam, D.M., 2017. Effects of modified atmosphere packaging on the quality and shelf life of tomatoes in Nepal. Acta Horti 1179: 183-188.

Abstract

This study determined the efficacy of modified atmospheric packaging (MAP) in enhancing the quality and shelf-life of tomato 'Samjhana' under ambient conditions during winter (March 2015: 15.5±4.5°C; 82±17% RH). MAP treatments were 25 micron-thick low-density polyethylene (LDPE), 50 micron-thick LDPE, 25 micron-thick polypropylene (PP), 50 micron-thick PP, and commercial clingwrap film. Samples held under ambient conditions in the open served as the control. Ten kg breaker fruits were used for each treatment per replicate; four replicates were used. Fruit were held in the MAP for 5 and 10 days to simulate short- and long-term holding and transport, respectively. After treatment, the samples were kept in the open. MAP was very effective in prolonging the shelf life of tomato. Fruit in 25-50 micron-thick LDPE showed better color retention and firmness, lower weight loss, and longer shelf life than the other treatments. The 5-day holding period in the MAP resulted in better quality and longer shelf life than the 10-day holding period. The results indicate that tomatoes can be successfully stored in MAP to minimize perishability and reduce postharvest losses.

Keywords: /Tomato/ /Modified Atmosphere Packaging/ /Shelf Life/ /Ripening/

Gautam, S., et.al. 2017. Volume and value of postharvest losses: the case of tomatoes in Nepal.. Brit Food J 119(12): 2547-2558.

Abstract

Purpose – The purpose of this paper is to develop a straightforward method to quantify volume and value of postharvest losses in the tomato postharvest value chain in Nepal and estimate the monetary loss shouldered by value chain actors.

Design/methodology/approach – The study combines interview data to quantify volume and prices with produce sampling to quantify quality losses, and does this at four nodes of the tomato value chain in Nepal: farmers, collectors, wholesalers, and retailers to estimate volume and value of postharvest losses. **Findings** – Almost one-fourth of the total tomato harvest weight that enters the value chain is lost before it reaches consumers, and other one-fifth is traded by the value chain actors at reduced price due to quality damage. The total volume of postharvest loss (weight and quality loss) is not the same for all value chain actors and the average monetary loss ranges from 4 percent of gross revenues for farmers to 12 percent for wholesalers.

Practical implications – A standard method to account for both physical weight losses and quality losses of horticultural produce is lacking in estimates of the monetary value of postharvest losses for horticultural crops. Knowing such losses is essential for postharvest technology

generation, promotion, and adoption. This study provides a framework that can be adopted and improved in future loss assessment studies for estimating the volume and value of postharvest losses in a horticultural value chain.

Originality/value – The uniqueness of the method used in this study is that it combines interview data to estimate price and volume with produce sampling to quantify quality losses, and does this at four nodes of the value chain: farmers, collectors, wholesalers, and retailers. This method could become a standard approach for assessment of postharvest weight and quality losses and to estimate the monetary value of total postharvest losses in the value chain for horticultural crops.

Keywords: /Tomato/ /Postharvest Loss/ /Value Chain/

Jun-E Guo, et.al. 2017. Silencing of histone deacetylase *SIHDT3* delays fruit ripening and suppresses carotenoid accumulation in tomato. *Plant Sci* 265: 29-38.

Abstract

The acetylation levels of histones on lysine residues are regulated by histone acetyltransferases and histone deacetylases, which play an important but understudied role in the control of gene expression in plants. There is an increasing research focus on histone deacetylation in crops, but to date, there is little information regarding tomato. With the aim of characterizing the tomato HD2 family of histone deacetylases, an RNA interference (RNAi) expression vector of *SIHDT3* was constructed and transformed into tomato plants. The time of fruit ripening was delayed and the shelf life of the fruit was prolonged in *SIHDT3* RNAi lines. The accumulation of carotenoid was decreased by altering of the carotenoid pathway flux. Ethylene content was also reduced and expression of ethylene biosynthetic genes (*ACS2*, *ACS4* and *ACO1*, *ACO3*) and ripening-associated genes (*RIN*, *E4*, *E8*, *PG*, *Pti4* and *LOXB*) was significantly down-regulated in *SIHDT3* RNAi lines. The expression of genes involved in fruit cell wall metabolism (*HEX*, *MAN*, *TBG4*, *XTH5* and *XYL*) was inhibited compared with wild type. These results indicate that *SIHDT3* functions as a positive regulator of fruit ripening by affecting ethylene synthesis and carotenoid accumulation and that *SIHDT3* lies upstream of *SIMADS-RIN* in the fruit ripening regulatory network.

Keywords: /Tomato/ /Fruit Ripening/

Rahman, M.A., et.al. 2017. Efficacy of non-chlorine sanitizer, precooling and modified atmosphere packaging in improving shelf life of tomato during evaporative cooling and CoolBot cold storage. *Acta Hort* 1179: 157-164.

Abstract

This study combined the use of non-chlorine sanitizer, precooling and modified atmosphere packaging (MAP) as prestorage treatments for tomato kept in a simple evaporative cooler (EC) or CoolBot cold storage (CS). Precooling was done by dipping the fruit in 10°C water until fruit temperature decreased to 13-15°C. As a non-chlorine sanitizing treatment, dipping fruit in 0.01% calcinated calcium (CCa) for 5 min at ambient temperature was used. For a combined precooling and sanitizing treatment, 10°C CCa solution was used. Tomatoes were stored in the EC or CS. Ambient storage was included for comparison. Fruits of a summer tomato cultivar, 'BARI Tomato-8', were used in this study. EC temperatures (24.3-27.5°C) were consistently lower and less fluctuating than

ambient temperatures (27.8-31.0°C). The CoolBot temperature was maintained at 13±1°C. RH was about 75±2% in CS, whereas it was 75-95% under ambient conditions and 85-99% in the EC. Because of these conditions, together with the relatively high temperatures, fruit rotting was favored and limited the shelf life to 12-13 days, both under ambient conditions and in the EC. Fruit in the CS lasted for 18 days. Rotting affected >50% of the fruit on day 15 of ambient storage and of EC storage. In the CS, fruit rotting was first noted on day 9, increased gradually, and reached around 14-18% on day 18. Sanitizing treatment had little effect, but precooling had no extra benefits in reducing rot incidence. MAP significantly reduced weight loss in all storage conditions, showing a greater effect in the CS. Changes in fruit firmness and surface color were delayed significantly in CS compared with ambient conditions or EC storage. After 18 days of storage, the firmness of tomatoes remained higher when stored in CS, showing values of about 5.0 N. Vitamin C content was effectively maintained in the CS, and was about 12.6 mg 100 g⁻¹ after 18 days of storage. EC- and ambient-stored fruit, on the other hand, had similar vitamin C contents at the end of their 12-day storage life.

Keywords: /Tomato/ /Shelf Life/

Seng, M., et.al. 2017. Low-cost cold storage of **tomato** in modified atmosphere packaging. Acta Hort 1179: 197-200

Abstract

Refrigerated storage is the most effective method of preserving fruit quality, but its high cost deters adoption by smallholder producers and entrepreneurs. Several low-cost cooling methods have been developed, but they cannot maintain the recommended cold-storage temperature. The development of the CoolBot device to create and maintain the 13°C temperature required by most tropical produce at low cost is a promising breakthrough. It was tested in the present study on tomato in combination with modified atmosphere packaging (MAP) using 25 micron-thick low-density polyethylene (PE) or polypropylene (PP) bags. Fruit stored in the open at room temperature served as the control. Results showed that the CoolBot storage chamber maintained the desired temperature of 13°C; in contrast, room temperatures varied from 24 to 32°C. As a result, fruit ripening was remarkably slowed in the lower-temperature environment. Fruit turned red-ripe soft (a* values of more than 20) after about 1 month of storage, whereas fruit at room temperature changed after 12 days of storage. Similarly, losses in weight, firmness, total soluble solids and titratable acidity were retarded during CoolBot storage. PP seemed to better than PE as MAP film to enhance fruit quality and shelf life.

Keywords: /Tomato/ /Storage/ /Modified Atmosphere Packaging/

HERBS AND SPICES

BASIL

Changawake, K., et.al. 2017. Retarding changes of postharvest qualities of Sweet **Basil** (*Ocimum basilicum* Linn.) by vapor-phase vinegar. J. Herbs Spices Med Plants 23(4): 284-298.

Abstract

Fresh leaves of sweet basil (*Ocimum basilicum*) were exposed to ambient upland rice vinegar (URV) vapor containing 4% acetic acid (AA) for 0, 2, 4, 6, 8, or 10 min, before packing in polyethylene bags and storing at 12°C. This extended the postharvest storage life of sweet basil by retaining greenness, freshness, and antioxidants. The gas chromatography-mass spectrometry (GC-MS) results showed a number of other volatiles in URV vapor, including ethyl acetate, propane, pentanal, and acetic acid.

Keywords: /Basil/ /Postharvest Quality/

BELL PEPPER

Cheema, A., et.al. 2018. Postharvest hexanal vapor treatment delays ripening and enhances shelf life of greenhouse grown sweet **bell pepper** (*Capsicum annum* L.). Postharvest Biol & Technol 136: 80-89.

Abstract

Aqueous compositions of hexanal, an inhibitor of phospholipase D, has been shown to enhance the shelf life and quality of fruits and vegetables. In the present study, sweet bell pepper fruit were exposed to hexanal vapor and its effect on quality attributes, shelf-life, and antioxidant enzyme activities were evaluated during storage at 7 day intervals for 21 d. Peppers subjected to hexanal vapor treatments (0.005, 0.01, and 0.02%, w/w) showed a significant ($p < 0.05$) delay in ripening process and preservation of postharvest qualities than untreated peppers, even at 21 d of storage. Treated fruit were characterized by increased firmness, a reduction in physiological water loss and lower electrical conductivity than control fruit, which indicated better membrane preservation. These treatments also resulted in an increase in the levels of antioxidant enzyme activities, specifically that of superoxide dismutase, catalase, glutathione reductase and guaiacol peroxidase. Evidences from the present study indicate that postharvest hexanal vapor treatment at optimal levels can effectively enhance the quality and shelf life of sweet bell peppers.

Keywords: /Bell Pepper/ /Postharvest Quality/ /Ripening/ /Shelf Life/

CHILI

Jitareerat, P., et.al. 2017. Effect of chitosan on anthracnose disease and physiology of harvested **chili** 'Jinda'. Acta Horti 1179: 119-124.

Abstract

Chili pepper fruits 'Jinda' were wound-inoculated with the anthracnose pathogen *Colletotrichum gloeosporioides*, and then coated with chitosan solution at 0 (control), 1.2 or 1.6% (w/v). Chitosan delayed disease development and weight loss, with 1.6% giving better results than 1.2%. However, 1.6% chitosan caused fruit fermentation. Chitosan coating at 1.2% reduced respiration rate and ethylene production, but did not delay firmness loss or color changes (L^* and a^* values). The effect of 1.2% chitosan coating on the induction of peroxidase (POD), phenylalanine-ammonia lyase (PAL), β -1,3-glucanase (GLU) and chitinase (CHI) activities was determined in chili fruits after wound-inoculation with *C. gloeosporioides* for 0 to 48 h. The result showed that chitosan coating had not induced these enzymes, but POD, GLU and CHI increased in response to wounding.

This result implies that the delayed disease development may not be caused by an indirect effect of chitosan to induce plant defense response, but by its direct effect.

Keywords: /Chili/

SWEET PEPPER

Bayogan, E.V. and A.T. Lacap. 2017. Physicochemical quality of **sweet pepper** (*Capsicum annuum* 'Smooth Cayenne') treated with 1-methylcyclopropene. Acta Horti 1179: 101-106.

Abstract

Four concentrations (0, 0.1, 1 or 10 $\mu\text{L L}^{-1}$) of 1-methylcyclopropene (1-MCP) were applied to sweet pepper (*Capsicum annuum* L. 'Smooth Cayenne') fruit that was then stored for 10 days under ambient conditions ($27.4\pm 0.7^\circ\text{C}$, $82.0\pm 10.1\%$ RH). Treated sweet pepper consistently maintained better visual quality and reduced shriveling starting from 4 days after treatment (DAT). Ripening was delayed best by 10 $\mu\text{L L}^{-1}$ 1-MCP, followed by 1 $\mu\text{L L}^{-1}$ 1-MCP, as exhibited by lower a^* (greenness) and chroma (intensity) during the initial period of storage. Later, skin lightness (L^*) and b^* (yellowness) were higher in treated fruit. Vitamin C content and total soluble solids were only slightly affected at 4 and 6 DAT, respectively. Shriveling and decay were reduced in treated fruit. Weight loss did not vary with treatment. There was delayed ripening and better postharvest quality maintenance of sweet pepper under ambient conditions using 10 $\mu\text{L L}^{-1}$ 1-MCP for 12 h.

Keywords: /Sweet Pepper/

Bayogan, E.V., et.al. 2017. Quality changes in **sweet pepper** (*Capsicum annuum* L. 'Smooth Cayenne') under simulated retail conditions. Acta Horti 1179: 213-220.

Abstract

The handling chain of 'Smooth Cayenne' sweet pepper produced in Digos City, southern Philippines, was tracked from harvest to wholesale. Quality was evaluated after transit at wholesale and at simulated retail for 15 days. Farmers harvested fruit at different maturities, but with more green fruit. There was an increase in light and full-red sweet peppers after a total of 25 h from harvest. Upon receipt at the retail level, losses at each section (i.e., top, middle, bottom) of the polypropylene sack were determined and quantified. Damage found at the bottom section included bruised (3.8%), cracked/split (48.1%), detached pedicel (23.1%), disease and rots (23.1%) and combination of damage (1.9%). The quality of sweet pepper during the simulated retail as affected by maturity (i.e., green, breaker, turning, orange and red) and container section was also evaluated. Those packed in the upper third of the sack had the fewest cracks and least weight loss, shriveling and decay relative to fruit from the middle and bottom portions. Further, fruit in the upper third also exhibited the slowest ripening and best visual quality. Mature green fruit had slower color change than the other maturity stages, as depicted by lower color index, a^* value (green or red on surface) and chroma. Visual quality was better in turning and orange fruit until 9 d, while shriveling was less at 15 d. Overall, sweet pepper located in the upper portion of the polypropylene sack and green fruit had better quality after 15 d of simulated ambient retail conditions compared with fruit in lower portions of the container and later maturity stages, respectively

Keywords: /Sweet Pepper/ /Handling Chain/ /Postharvest Loss/

ROOTCROPS & TUBERS

POTATO

Ierna, A., et.al. 2017. Effects of micronutrient fertilization on the overall quality of raw and minimally processed **potatoes**. *Postharvest Biol & Technol* 134:38-44.

Abstract

Micronutrient fertilization may affect quality characteristics of potatoes. Here, compared to control (Micro-), the influence of pre-harvest foliar micronutrients fertilization (Micro+) including B, Cu, Fe, Mn, Mo and Zn on both quality of raw potatoes and of minimally processed potato tubers of cv Bellini was investigated. In raw tubers physico-chemical and nutritional parameters were analysed at harvest, in minimally processed potatoes physico-chemical, nutritional and microbiological parameters were analysed after 0, 3, 6, 9 and 12 d of storage at 4 °C. Preliminary results showed that micronutrients fertilization improved quality characteristics of raw potatoes, through an increase of firmness (+17%), total solids content (+16%), total soluble solids content (+12%), reducing sugars content (+12%), and ascorbic acid contents (+40%). Improved quality characteristics of Micro+ raw tubers allowed better performance of Micro+ minimally processed potatoes compared to Micro-, through higher firmness (+16%) total solids (+11%), total soluble solids (+21%), reducing sugars content (+20%), ascorbic acid content (+35%), as well as lower microbial growth, that allowed three days longer shelf life. Micronutrient fertilization could be a valuable pre-harvest treatment as it proved effective at improving physico-chemical and nutritional quality both of raw potatoes and of minimally processed potatoes and at extending their shelf-life.

Keywords: /Potato/ /Minimally Processed/ /Shelf Life/

ORNAMENTALS

ROSE

Byung-Chun In and Jin Hee Lim. 2018. Potential vase life of cut **roses**: Seasonal variation and relationships with growth conditions, phenotypes, and gene expressions. *Postharvest Biol & Technol* 135: 93-103.

Abstract

In this work, we identified the interrelationships between gene expression levels, environmental factors, phenotypic characteristics, and vase life of cut rose 'Lovely Lydia' between seasons and across years. We also determined the contribution of each factor to potential vase life (PVL) of cut roses. The vase life of the cut flowers was longest in spring (12.2 d), followed by summer (11.3 d), autumn (10.0 d), and winter (9.2 d). The environmental conditions in winter were characterized by high relative humidity (RH) and low vapor pressure deficit, and cut flowers grown under these conditions had less-functional stomata and consequently excessive water loss after harvest, resulting in shortened vase life. Leaf brix was not significantly correlated with PVL, but it was strongly correlated with flower diameter, indicating that congenital sucrose may be more

important for providing the substances required for flower opening than for determining the longevity of cut roses. Correlation analysis revealed that initial transcript levels of the ethylene receptor *RhETR4* and the signaling component *RhEIN3-2* are very important factors in determining PVL of cut roses, as are preharvest RH conditions, stomatal function, and transpiration. The transcript levels of these genes were significantly modified by growth environment, including high RH and low temperature. Importantly, we show that RH conditions during cultivation not only determine stomatal characteristics but also modify the initial transcript levels of the ethylene responsive genes, thereby modifying the PVL. Understanding the interrelationships of genetic variation with other factors in the modulation of PVL will greatly help to improve growth environments and postharvest treatments across seasons as well as to develop techniques for guaranteeing the longevity of cut flowers.

Keywords: /Rose/ /Cut Flowers/ /Vase Life/

TORCH GINGER

Bayogan, E.V. And V.K.H. Bajade. 2017. Vase life and quality of **torch ginger** (*Etlingera elatior*) inflorescences treated with 6-benzyladenine. Acta Horti 1179: 165-172.

Abstract

The postharvest quality and vase life of torch ginger (*Etlingera elatior*) inflorescences treated with 6-benzyladenine (BA) under ambient conditions of 23-25°C and 89-91% RH were evaluated. In separate experiments, newly harvested inflorescences at 75% maturity were either mist-sprayed to dripping or dipped for 30 min in different BA concentrations (0, 50, 100, 150 and 200 mg L⁻¹). Initial days to bract browning, glossiness, visual quality, water uptake, weight change and vase life of the inflorescences were evaluated regularly. Of the two methods of BA application, dipping yielded better results compared with spraying. BA as dip at 200 mg L⁻¹ resulted in delayed bract browning, longer retention of inflorescence gloss, better visual quality and 1.6-fold-extended vase life. Water uptake and inflorescence weights generally declined during holding. In another set-up, 200 mg L⁻¹ BA was compared with 200 mg L⁻¹ 8-hydroxyquinoline citrate (8-HQC), 150 mg L⁻¹ citric acid (CA) and 5% sucrose. Electrolyte leakage increased with holding. On day 6, electrolyte leakage was lower in inflorescences dipped in the preservative mixture compared with those sprayed with or dipped in 200 mg L⁻¹ BA. However, visual quality and vase life were similar in samples treated with BA alone or dipped in the preservative mixture.

Keywords: /Torch Ginger/ /Vase Life/