GENERAL

BRUISE


Abstract

This paper presents a new method for the direct determination of apple deformation under impact loading conditions that uses a high speed camera. The separately mounted camera was not susceptible to impact oscillations, which allowed for more accurate measurements of displacement. The application of two independent measuring systems, a high speed camera and a force sensor, enabled the quantitative assessment of phenomena occurring during and after the impact of apples against a rigid, flat plate. For the apples with a mass between 170 and 180 g, bruising started at impact velocities of 0.5 m s^{-1}. Permanent deformation and maximum stress were the best parameters determining the damage under impact loading conditions. The experiment confirmed the importance of the critical stress criterion as regards the whole fruit under impact loading conditions.

Keywords: /Bruises/

EDIBLE FLOWERS


Abstract

Edible flowers are known to harbor large number of microorganisms on their surfaces, and these microorganisms may cause a high risk of food poisoning. Electrolyzed acidic water has been approved as a food additive in Japan and is reported to be as effective as sodium hypochlorite in eliminating bacteria. In this study, the representative edible flowers nasturtium (Tropaeolum majus L.), viola (Viola cornuta L.), and shiso (Perilla frutescens L.) were treated with electrolyzed acidic water and the number of microorganisms before and after treatment was compared. Three conditions were applied to each of the three edible flower species: treatment with electrolyzed acidic water, treatment with pure water, and no treatment. Changes in total viable bacterial counts were compared over time. The results showed that the total viable bacterial counts immediately reduced after treatment with electrolyzed acidic water. However, after two days, the counts increased to the same level as those obtained for samples treated with pure water. This might have occurred because the electrolyzed acidic water did not leave any residue. Thus, treatment of edible flowers with electrolyzed acidic water immediately before use could be most effective in eliminating bacterial contamination on their surfaces.

Keywords: /Edible Flowers/
FRESH CUT


Abstract

QUAFETY, a collaborative R&D project co-funded by the European Commission, aims to improve safety and quality of ready-to-eat fresh produce throughout the whole chain. Objectives of the proposal will be reached through the realization of 9 Work Packages in three years. There are 14 participants from seven countries, including six small and medium enterprises, two public research institutes and six universities, assorted in terms of scientific and technological expertise. During the first period of activity, interesting results were achieved related to the developments of diagnostic kits to predict quality and safety of raw material and final product, non-destructive and rapid evaluation tools, and innovative processes to improve quality and safety of fresh-cut products. Potential impacts may be related to the increase in scientific evidence about safety and quality, expansion of consumer awareness, increase of the innovation capacity of the industry strengthening its competitiveness, provision of scientific evidence to EC and other health authorities (also for campaigns for healthy nutrition), and a reference point for mass media.

Keywords: /Fresh-cut/ /Melon/

MICROGREENS


Abstract

Microgreens are an emerging food product with scarce information pertaining to their sensory and nutritional properties. In this study, six species of microgreens, including Dijon mustard (Brassica juncea L. Czern.), opal basil (Ocimum basilicum L.), bull’s blood beet (Beta vulgaris L.), red amaranth (Amaranthus tricolor L.), peppercress (Lepidium bonariense L.) and China rose radish (Raphanus sativus L.), were evaluated for their sensory attributes and chemical compositions. Results showed that bull’s blood beet had the highest rating on acceptability of flavor and overall eating quality while peppercress the lowest. Chemical compositions also differed significantly among the six species. China rose radish had the highest titratable acidity and total sugars, while red amaranth had the highest pH value and lowest total sugars. Regarding the phytonutrient concentrations, the highest concentrations of total ascorbic acid, phylloquinone, carotenoids, tocopherols, and total phenolics were found in China rose radish, opal basil, red amaranth, China rose radish, and opal basil, respectively. The relationships between sensory–sensory attributes and sensory–chemical compositions were further studied. It was found that overall eating quality of microgreens was best correlated with flavor score and microgreen’s pH value and total phenolic content were strongly correlated with flavor attributes, e.g., sourness, astringency, and bitterness. In general, despite the differences among individual microgreens, all of the microgreens evaluated in this study demonstrated “good” to “excellent” consumer acceptance and nutritional quality.
POSTHARVEST HANDLING


Abstract

Fruit and vegetable consumption in emerging market economies is responsive to economic factors, but also highly dependent on socio-demographic factors such as household size, occupation, and education level of consumers. Although the average consumption of fruits and vegetables is near the WHO daily recommended level, some groups may not consume an adequate amount. Using examples from Poland and Ghana, this paper illustrates the differences in choices of various fruits and vegetables and expenditure accounting for household size and occupation. The paper is based on 2011 household data from the national household panel in the case of Poland and urban consumers in the case of Ghana. Similarities and differences across countries representing two different continents provide guidance for distributors, importers, and retailers on fresh fruit and vegetables with implications for postharvest handling.

Keywords: /Postharvest Handling/

POSTHARVEST LOSSES


Abstract

Tropical and subtropical fruit have unique delicious taste and flavour and contribute to human nutrition. Expansion in tropical and subtropical fruit industry and the global trade liberalization impart a great impetus to the expansion of international trade. The export of tropical and subtropical fruit rose from 21.59 million t (9777.41 million US $) in 2000 to 31.15 million t (23696.00 million US $) in 2009 (FAO, 2012). The production and trade is expected to continue to expand further. The fruit are highly perishable, susceptible to chilling injury, diseases and pests. Postharvest losses vary from 10-80%. The consistent supply of high quality fresh and safe fruit to domestic and international consumers is a great challenge for postharvest biologists and technologists. This paper will delve into the international trade, postharvest losses, current status of postharvest research and challenges; ways to minimise undesirable effects of ethylene on fruit ripening, storage and quality; implication of low temperature, modified atmosphere and controlled atmosphere storage, amelioration of chilling injury, management of postharvest diseases and pests and future research; potentials of biotechnology and ‘omics’ in extending storage life and maintaining quality by ensuring food safety; and the research priorities for the development of postharvest technologies leading to ecofriendly, biologically safe and non-chemical approaches for sustainable postharvest management practices in tropical and sub-tropical fruits.

Keywords: /Postharvest Losses/ /Ethylene/ /Cold Storage/ /Controlled Atmosphere/ /Fruit Quality/
SUPPLY CHAIN


Abstract

If smallholder farmers are to transact with modern institutional markets, they must first learn to collaborate. Collaboration provides a mechanism for smallholder farmers to improve their offer quality, ensuring that they have a sufficient quantity and range of product to meet the buyers’ specifications. These product specifications are often highly variable, depending on the product itself, the manner in which the customer intends to use it and the quantity of product available in the market. However, in institutional markets, the quality construct itself is evolving, as more buyers seek assurances that the product is safe to eat and has been produced using sustainable and ethical production practices. Country-of-origin labelling and provenance are emerging as indicators of quality signaling superior quality attributes such as food safety, taste or a reduced carbon footprint. Changing consumer demands offer more opportunities for smallholder producers to augment the offer quality through innovative packaging and more convenient products.

Keywords: /Supply Chain/ /Food Safety/ /Postharvest Innovation/

FRUITS

AVOCADO


Abstract

Partially-ripened avocados are often held in cold storage in an attempt to enable the consistent delivery of ripe fruit to food service or retail outlets. It is also common to hold fruit without any prior ripening for a few days to several weeks prior to ethylene treatment and final ripening. The purpose of this study was to determine the impact of these practices on ripening time and subsequent fruit quality. ‘Hass’ avocados were harvested from three different orchards on six harvest dates and placed at either 5°C or 12°C immediately after harvest or after ripening to average firmness values of either 80 N (partially ripe) or 19 N (near ripe). After storage the fruit were then ripened to eating firmness (4.4–6.7 N) and evaluated for quality parameters. A portion of the fruit at harvest firmness were stored for 0 d, 7 d, 14 d or 28 d and then treated with ethylene to ripen the fruit. Continual softening during storage resulted in fruit that had been ripened prior to storage being nearly at eating firmness at the end of 14 d, especially those stored at 12°C. Stem end rot, body rot and pink staining of the vascular tissue occurred more frequently in the previously-ripened fruit after 14 d, the severity being greatest at 12°C where the incidence exceeded 50% for both stem end rot and pink staining. Both harvest date and orchard influenced the amount of pink staining observed. Storage of firm fruit prior to ethylene treatment resulted in higher levels of both stem end rot and pink staining only when the storage time exceeded 14 d. In an additional study to assess the impact of the storage of partially-ripened fruit on both quality and sensory characteristics, ‘Hass’ avocados were harvested six times at monthly intervals, ripened to approximately 16 N firmness at 20°C and then placed at either 1°C or 5°C for 7 d or 14 d.
Following storage the fruit were ripened to eating firmness and evaluated. The occurrence of fruit quality defects was not affected by the timing of ripening. Sensory panelists liked fruit ripened prior to or after cold storage equally well and there were no differences among the ripening treatments, within a storage time, in the level of rich, nutty or grassy attributes that composed the fruit flavor. There were statistically-significant differences in the degree of textural creaminess among the ripening treatments, although these differences were inconsistent and slight. Storing partially ripe ‘Hass’ avocados for up to 4 d at either 1°C, 5°C or 12°C does not greatly alter avocado quality, while storage for longer periods, such as 14 d, may be problematic due to enhanced development of decay and pink staining, especially at higher temperatures. Holding unripe avocados for longer than 14 d prior to ethylene treatment may predispose the fruit to the development of pink staining.

**Keywords**: /Avocado/ /Cold Storage/ /Maturity/ /Ripening/

**BANANA**


**Abstract**

Bananas (*Musa* sp. [AAA group, Cavendish subgroup] ‘Williams’) grown under paper bunch covers appear riper, being a lighter shade of green at maturity, than fruit grown under plastic bunch covers. However, such fruit ripen more slowly than fruit under plastic, in terms of respiration rate and ethylene release, based on measurements of individual fingers enclosed in containers at 20°C and ventilated with humidified air containing 300 μL^-1^ propylene for 36 h. There was no significant difference in soluble solids concentrations between the two lines of fruit after seven days of ripening. The objective of this study was to determine whether reflectance spectra can be correlated with physiological ripeness to monitor ripening of bananas non-destructively. Colorimetric readings showed that the initial visible differences in skin colour between the lines largely disappeared by day 5 of ripening. A number of pigment indices were calculated using these spectra, targeting chlorophyll, carotenoids and xanthophylls. Some of these measures were clearly lower in pale bananas grown under paper bunch covers but converged after day 5 of ripening. The most promising measurement for assessing ripeness stage was the chlorophyll index (calculated from the second derivative of absorbance spectra as A^800/A^700^-1), with a consistent value at harvest, despite growth condition, and increase with fruit ripening.

**Keywords**: /Banana/ /Ethylene/ /Respiration/


**Abstract**

The biochemical activity of five pathogenesis-related (PR) proteins were determined in the peel and pulp of five local banana cultivars, namely ‘Berangan’ (AAA), ‘Mas’ (AA), ‘Abu’ (AAB), ‘Rajah’ (ABB) and ‘Rastali’ (AAB) at four ripening stages, Stages I, III, V and VII. Results showed that peroxidase decreased at later stages of ripening in both the peel and pulp of the fruit. Peroxidase and polyphenol oxidase were observed to be higher in the peel than in the pulp. Conversely, both the α-amylase activity
and the trypsin inhibitory activity were observed to be higher in the pulp as compared to the peel of the fruit. Trypsin inhibitory activity was also observed to be significantly higher in the later stages of ripening. The laminarinase assay showed a decrease in activity for all cultivars except the ‘Abu’ cultivar.

**Keywords:** /Banana/ /Ripening/


**Abstract**

Ultra-violet C (200-280 nm) was able to sanitize and retard microbial growth on the surface of food without causing undesirable quality changes. Therefore, this study was conducted to determine the effect of UV-C radiation on *Musa* AAA ‘Berangan’ fruit quality after storage. Mature green banana was exposed to 0, 0.01, 0.02, 0.03, 0.04 and 0.05 kJ m-2 UV-C. Then, the fruit was packed into cartons and stored at 13°C/75% relative humidity for 0, 1, 2 and 3 weeks. At the end of each storage week, a cluster of fruit from each UV-C dose was removed from the box and initiated to ripen using 1 ml L-1 ethylene. After 24 h, the fruits were allowed to ripen at 27°C/85% relative humidity and analysis was carried out at day 0 (before ripening initiation), 1, 3 and 5 (after ripening initiation) for peel colour (L*, C* and h°), pulp firmness and soluble solids concentration (SSC). The three factors of this experiment were arranged in a randomized design with four replications. Data was analyzed using ANOVA and means were separated using Duncan’s multiple range test. The L*, C* and h° of banana peel, firmness and SSC were affected significantly by interactions between UV-C dose × storage week, UV-C dose × ripening day, storage week × ripening day, and UV-C dose × storage week × ripening day. Regardless of irradiation dose, h° values and pulp firmness of ‘Berangan’ banana decreased while L* values and SSC increased with storage. Similarly, h° values and pulp firmness of all treatments decreased while L* values and SSC increased as ripening progressed. This result indicated that UV-C irradiated ‘Berangan’ banana fruit was able to undergo normal ripening after storage.

**Keywords:** /Banana/ /Storage/ /Quality / Firmness/


**Abstract**

The perishable nature of bananas necessitates proper postharvest practices to reduce losses. This study determined the most effective packaging and storage condition to extend the shelf life of Abu and Nangka bananas. Fruits were packed using polyethylene plastic (PE), cling wrap (CW) or whole banana leaf (BL) and stored for 10 days in a cold room (4-6°C), glass house (24-32°C), room temperature (25-27°C), and immersed in water (25-27°C). Physiological changes were assessed by measuring pulp firmness, total soluble solids (TSS) and total titratable acidity (TTA). Results showed that at the end of storage, bananas stored in cold room remained green with no significant changes in pulp firmness, TSS and TTA. At room temperature, only Abu bananas packed in PE and Nangka bananas packed in PE and CW remained green after the 10-day storage period. The packaging and storage conditions established from this study could be introduced to the Orang Asli community as the technology can improve their crop shelf life therefore benefiting them economically.
Keywords: /Banana/ /Storage/ /Packaging/


Abstract

Postharvest practices are vital to ensure optimum preservation of crop quality after harvest until it reaches consumers. They can range from simple, low technology to complex advanced methods; both techniques seek to maximise farming outputs for high returns. The indigenous communities in Malaysia are heavily reliant on self-sustenance through cultural farming practices and thus the incorporation of good postharvest practices would be beneficial to their livelihood. Amongst the many agricultural choices, bananas are a major food crop that is planted by most indigenous communities. Unfortunately, the handling and processing of bananas by the indigenous communities do not meet basic requirement for shelf life extension thus resulting in high losses. At present, various technologies have been developed to help extend shelf life of bananas which are often employed by commercial banana farms or mainstream planters. After comprehensive reviews, investigations and surveys, some of these technologies were found to be viable but not affordable or practical for the use of indigenous communities. This paper presents data for some low technologies developed for these communities which are innovations adapted from current working postharvest practices.

Keywords: /Banana/ /Shelf Life/ /Quality/


Abstract

Blueberry fruit is susceptible to bruising from mechanical impact. Bruised fruit has shorter postharvest shelf life and softens rapidly in cold storage than non-bruised fruit. A blueberry packing line consists of a hopper for transferring fruit in field containers onto a conveyor line that moves fruit into trash removal equipment, electronic sorter, inspection line, and finally onto clamshell-filling equipment. Blueberry fruit drops as it is transferred from one equipment to the next on the packing line. The mechanical impacts that occur on blueberry packing line equipment were measured quantitatively with a miniature, instrumented sphere called the blueberry impact recording device (BIRD) at 11 packing houses in the United States in 2013 and 2014. The BIRD sensor recorded impacts at transfer points or wherever there was a vertical drop on the packing line. The potential for impact damage was determined in four cultivars (‘Farthing’, ‘O’Neal’, ‘Reveille’ and ‘Star’) by dropping fruit from different heights. The measured data revealed that the largest impacts (~230 g) were recorded when the sensor dropped into the hopper above the clamshell filler on eight empty lines. The cumulative peakG data showed strong correlation with overall drop height, indicating that reducing the overall drop height on a packing line could reduce the impact level. When the transfer points were padded with Poron foam sheet, significantly lower levels of impact were recorded by the sensor. The BIRD sensor also recorded lower impacts when it was run with fruit on the packing line. The severity of bruise damage resulting from fruit being dropped was related to the impact data recorded by the BIRD sensor. Using peak G-velocity change plot and the fruit bruising rate, several large impacts sufficient to cause bruising were identified, (e.g., >20% of cut surface area indicating bruise damage in 76% of ‘Reveille’ fruit). This paper
quantitatively measured the mechanical impact on blueberry packing lines for the first time and the information will assist in improving the design and configuration of blueberry packing line equipment. These changes should result in reducing the magnitude and frequency of mechanical impacts and bruise damage in blueberry fruit.

Keywords: /Blueberry/ /Bruising/ /Mechanical Damage/

CHERRY


Abstract

Pitanga (Eugenia uniflora L.) has been produced on a small commercial scale in Hawai‘i and Brazil for some years and the plants themselves are popular as ornamental hedges in both Southern Florida and many other places. Until recently, purple-fruited selections of pitanga have not been widely known or grown. It has been determined that purple pitanga fruits have substantially higher levels of certain desirable antioxidants than the common red-fruited types and that they generally have superior flavor as well. Unfortunately, the non-climacteric pitanga fruits should only be harvested at their visual and organoleptic optimum. They are highly perishable and have a short shelf life that limits marketability and potential expansion of demand. Because the pitanga has a long folk history in Brazil as a medicinal plant, considerable analysis has been performed on the effects of refrigeration on the organic constituents of the foliage. However, very little is known about the effects of postharvest refrigeration and storage on the physical or chemical qualities of the purple fruits. Our initial experiments with refrigerated storage of ripe, purple pitanga fruits in both Hawai‘i and Florida lead us to believe that pitanga fruits may tolerate standard cold storage environment longer than expected and still retain market acceptability. Visual appearance, taste, moisture content and chemical constituents of purple fruits after varying periods of cold storage are all being evaluated. Changes in volatile chemical components during storage can substantially change the taste of the fresh fruits. Our selection and characterization of purple-fruited pitanga cultivars with high levels of desirable antioxidant, pleasing flavor profile and postharvest storability is in progress.

Keywords: /Cherry/ /Refrigerated Storage/ /Postharvest Quality/

CITRUS


Abstract

Commonly, pre-determined copper spray volumes are indiscriminately applied to citrus orchards of different ages and sizes for control of citrus canker (Xanthomonas citri subsp. citri) leading to a waste of resources, such as water, energy, and chemicals. This study evaluated the effectiveness of copper applied following the tree-row-volume (TRV) methodology for control of citrus canker on sweet orange trees. Treatment design was based on the theoretical runoff volumes previously determined for the exterior and interior of a citrus tree. The volumes 150 (standard), 100 (internal runoff point), 70
(intermediate) and 40 mL (external runoff point) of spray mixture/m$^3$ of tree canopy were tested at the standard copper rate of 0.525 g metallic copper/L. Additionally, 70 and 40 mL/m$^3$ were also tested with copper rate correction by leveling up the theoretical deposition of copper bactericide to that obtained with 100 mL/m$^3$. Untreated control trees (UTC) were not sprayed with copper. Reduction of the spray volume did not affect disease control. While UTC trees presented a peak incidence of citrus canker on leaves of 30% in both years, copper-treated trees showed significantly lower peak incidences of 5-10%. Likewise, the average number of dropped fruits with citrus canker for the UTC was 2.0- to 1.5-fold higher than for copper treatments. At harvest, 30% of fruits from the UTC trees showed citrus canker symptoms. Conversely, only 3.3-9.8% of the fruits from the copper treatments were symptomatic. Moreover, using 40 mL/m$^3$ without adjusting the amount of metallic copper diminished disease control efficiency on leaves. Reduction of spray costs and water needs amounted to 40 and 73%, respectively. In addition to keeping effectiveness of disease control and being more environmentally friendly, the adaptation of the spray volumes and copper rates to the TRV may contribute to reducing production costs.

**Keywords:** /Citrus/ /Chemical Control/

**DRAGON FRUIT**


**Abstract**

Loss of greenness in the bract due to chlorophyll (Chl) degradation is one of the symptoms of senescence in dragon fruit (*Hylocereus* spp.). Chl degradation enzyme activities (chlorophyllase – Chlase, Mg-dechelatase – MD, chlorophyll degrading peroxidase – Chl-POX and pheophytinase – PPH), Chl derivatives (chlorophyllide a – Chlide, pheophorbide a – Pheide a, pheophytin a – Phein a and 132-hydroxychlorophyll – OHChl a), and Chl content were assayed during storage at 25°C. Chl a content decreased with storage while Chl b content remained unchanged. Chlase activity increased after one day of storage and decreased thereafter. MD and PPH activity increased gradually for the first two days of storage while Chl-POX activity increased during the first five days of storage and then decreased. Chlide a, Pheide a and OHChl a were undetectable throughout storage, while Phein a increased during storage. The results indicate that MD and PPH may be involved in Chl degradation. Chl derivatives, particularly Phein a, were accumulated as intermediate products during Chl degradation.

**Keywords:** /Dragon Fruit/


**Abstract**

Dragon fruit give certain health benefits including Irritable Bowel Syndrome (IBS) relief. It has also been claimed to have many health benefits in the cyberworld; recently it was titled “super fruit” of the month of August and “super fruit” of 2013. It is essential to produce good quality fruit for the market at least in accordance to GAP and domestic fruit standard in reference to Codex Standard for Pitahayas. This paper informs about the early period of dragon fruit industry in Thailand. Problems of pests,
cultural practices, harvesting indices, harvesting tools and other factors that affect fruit quality are presented in line with quality management. The development of good quality dragon fruit production of an amateur, semi commercial orchard is discussed.

**Keywords:** /Dragon Fruit/

**GRAPES**


**Abstract**

This study was done to evaluate the postharvest biology and the effect of temperature and application of inhibitor in extending the storage life of Burmese grapes ‘Reinthong’ at yellow and yellow-red maturity stage stored at 25°C. Respiration rate of the yellow-red fruit was 22 mg CO$_2$/kg/h, which was >20% higher than that of yellow fruit. The respiration rates in both stages were stable throughout the 12 days of storage life. Ethylene production at the rate of 1.3 μl C$_2$H$_4$/kg/h in both maturity stages was also found stable and did not change after harvest. Yellow-red fruit were softer than yellow fruit, and softened more when stored longer. Soluble solids in yellow-red fruit were 16.8%, which was >0.4% higher compared to yellow fruit. Titratable acidity was 1.1% in both maturity stages and remained stable throughout storage. The results indicate that Burmese grape is a non-climacteric fruit. The study on the storage of yellow-red fruit at 10, 12, 15 and 25°C showed that the best storage temperature was 15°C with 21 days of storage life. At this temperature, the fruit had little weight loss but the peel turned brown, the fruit rotten, and there was high level of fruit drop. Dipping the fruits in 800 ppm Naphthalene acetic acid (NAA) was found to control fruit drop effectively, while 1-methylcyclopropene (1-MCP) fumigation was not consistently effective.

**Keywords:** /Grapes/ /Ethylene/ /Respiration/ /Fruit Quality/

**GUAVA**


**Abstract**

The objectives of this research were to study 1) the effects of 0.5% acetic acid as a commonly used chitosan solvent, and 2) the additions of indole acetic acid (IAA), indole 3-butyric acid (IBA), and N6-benzyladenine (BA) into chitosan coating to prolong the shelf-life and maintain the fruit qualities of ‘Mutiara’ guava cultivar. A completely randomized design was used in each experiment of IAA, IBA, and BA. The first factor was fruit coating of three levels: control, without chitosan but 1 h soaked in 0.5% acetic acid solution, and a quick-dipped in 2.5% chitosan. The second factors consisted of hormones, namely 1) IAA (0, 5, and 10 μM), 2) IBA (0, 5, and 10 μM), and BA (0, 25, 50, and 100 ppm). The results showed that it was chitosan, not the acidic condition developed by the solvent of acetic acid, that increased the shelf-life of ‘Mutiara’ guava fruits. Regardless of hormones applied, 2.5% chitosan coating consistently increased their shelf-life while maintaining their fruit qualities. Unfortunately, the applied PGRs of IAA, IBA, and BA did not significantly affect the guava fruit shelf-life and qualities.
Keywords: / Guava/ /Surface Coating/ /Quality/

JACKFRUIT


Abstract

The application of Lactobacillus acidophilus and Lb. plantarum as 1% protective culture was recently found to be less effective than ascorbic acid and calcium lactate as antimicrobial agents on fresh-cut jackfruit. Among the two lactic acid bacteria (LAB), Lb. plantarum showed better antimicrobial efficacy. In this study, Lb. plantarum at about 109 CFU/ml was applied at 1-3% (v/w) as protective culture on ripe jackfruit arils and compared with 2.5% ascorbic acid, 150 ppm chlorine and distilled water as 2-min dip. The product samples were packed in sterile resealable 50 μm-thick polyethylene bag and stored at 7-10°C for five days. Lb. plantarum inhibited aerobic bacteria, coliform, yeast and mold population; it was most effective at 3%. This antimicrobial effect was better than that of ascorbic acid and chlorine especially with advancing storage period. The probiotic treatment had no adverse effects on the physicochemical and sensory qualities of the fresh cut produce.

Keywords: /Jackfruit/ /Fresh Cut/ /Postharvest Quality/

KIWIFRUIT


Abstract

Fruit senescence has been reported to be initiated by reactive oxygen species (ROS) and directly affects the quality of post-harvest fruit. Antioxidative systems protecting fruits against ROS-induced damages have been studied, but it remains poorly understood whether antioxidative systems are involved in the regulation of kiwifruit senescence. This study shows that senescence of kiwifruit was accompanied by elevation in ROS levels and subsequent oxidative damage in membranes and proteins. Controlled atmosphere storage (CA, 1% O₂ plus 5% CO₂), which maintained the activity of antioxidative systems, effectively suppressed the accumulation of ROS, alleviated oxidative damage and finally delayed fruit senescence, suggesting the regulatory effect of antioxidative systems on kiwifruit senescence. To further determine the underlying molecular mechanisms, expression profiles of 25 oxidative stress-related genes were analyzed by quantitative real-time polymerase chain reaction (qRT-PCR) in kiwifruit stored in air and CA, respectively. Gene-expression patterns revealed that upregulated expression of SOD3, CAT1, APX1, APX2 and GR3 in the CA may predominantly contribute to the maintenance of antioxidative systems. Addition-ally, the synergistic action of antioxidative components is one of the determinants for the competence of the antioxidative systems. These findings may broaden understanding of the multifaceted mechanism of fruit senescence and underscore the positive effect of controlled atmosphere storage on the antioxidative systems in this process.
LONGAN


Abstract

Longan (Dimocarpus longan) is an important economic fruit in Thailand with yearly export of about one billion baht. Longan produced at Chantaburi Province is mainly exported to China. The logistics costs were analyzed in this study by structured interview of growers and collectors. It was found that growers following GAP had yields averaging at 1,543 kg/rai (1 rai = 0.395 a), production cost of 8.956 baht/kg (1 baht = 0.032 USD) and logistic cost of 0.813 baht/kg. Variable cost was 8.033 baht/kg or 89.69% of the total production cost. Fixed costs included equipment depreciation of about 0.11 baht/kg or 1.23% of the total production cost. Non-GAP growers had lower yield of 1,499 kg/rai, production cost of 10.114 baht/kg, logistic cost of 1.004 baht/kg, variable cost of 8.96 baht/kg (88.59% of the total production cost), and fixed cost of 0.11 baht/kg (1.09% of total production cost). Comparing two model growers, it was found that yield, production cost and logistic cost did not statistically differ. Logistic costs of collectors included packaging materials, vehicle value depreciation and maintenance, labor, transportation, utilities and other administrative costs amounting to 11.13 baht/kg.

Keywords: /Longan/ /Supply Chain/


Abstract

The effect of chlorine dioxide (ClO$_2$) fumigation on postharvest diseases of longan fruit ‘Daw’ during storage at room temperature was investigated. Fresh longan fruit were fumigated with 0 (control), 2.5, 5, 10 and 25 mg/L ClO$_2$ for 10 min, then packed in cardboard boxes and stored at 25±1°C for seven days. ClO$_2$ significantly reduced and delayed the occurrence of disease and total microbial load in all treatments. ClO$_2$ at the concentrations of 10 and 25 mg/L were most effective with no difference in both disease incidence and total microorganisms. On day 7 of storage, treatment with 10 and 25 mg/L ClO$_2$ reduced the total microorganisms by 81.5 and 83.2%, respectively. In the second experiment, the effect of ClO$_2$ fumigation with 0 (control) and 10 mg/L ClO$_2$ for 10 min and kept at room temperature for seven days on the growth of Cladosporium sp., Lasiodiplodia sp. And Fusarium sp. isolated from longan fruit and cultured on potato dextrose agar were determined. It was shown that ClO$_2$ treatment significantly reduced growth of the three fungi. On day 7, ClO$_2$ fumigation inhibited growth of Cladosporium sp., Lasiodiplodia sp. and Fusarium sp. by 96.7, 87.4 and 31.2% respectively.

Keywords: /Longan/ /Postharvest Disease/
LONGKONG


Abstract

Insects hiding in longkong (Aglaia dookoo Griff.) clusters cause a serious problem in exporting the fruit. An experiment was conducted to control insects in longkong by fumigating the fruit harvested at 13 weeks after full bloom with ethyl formate at 0, 25, 50, 75 and 100 g/m3 for 6 h. The result showed that ethyl formate at 75 g/m3 for 6 h completely eradicated black ants (Technomyrmex sp.) and mealybug (Exallomochlus hispidus (Morrison)). CO2 fumigation at 0, 25, 50, 75 and 100% for 6 h were also tested. It was found that at 50-100% CO2, black ants were disinfested by 80-90%, while mealybugs were disinfested by only 6%. Fumigation with ethyl formate at 25 g/m3 in combination with 50% CO2 was found to completely eradicate black ants and mealy bugs. However, the combined treatment reduced the effect of 1-MCP in controlling postharvest fruit abscission.

Keywords: /Longkong/ Quality/ /1-MCP/


Abstract

The effects of the ozonated water and sodium hypochlorite pretreatment on quality changes of individual longkong (Lansium domesticum Corr.) fruits stored at 15 1°C were investigated. The fruits were soaked at 1.0 ppm ozonated water for 15 and 20 min; 100 and 200 ppm sodium hypochlorite solution for 5 min and untreated for the control. After drying under cold air, six fruits were placed in a 135×187×36 mm polypropylene tray with a water absorbent sheet underneath and a sachet of ethylene absorber (3 g/sachet) each. Each treatment were wrapped with polyvinyl chloride film which are tightly sealed with an adhesive tape, and stored at 15 1°C. No visible symptom of fruit spoilage was observed during the first 12 days of storage in all treatments. However, all treatments significantly reduced microbial populations by analyses of the total viable, yeast and mold counts on both longkong pericarp and pulp before and after 12 days storage. At 14 days of storage, the observed L* and b* values of fruit pericarp color did not differ statistically within treatment, but the fruit spoilage was significantly lower in 100 ppm sodium hypochlorite solution pre-treatment compared to the other treatments. Total soluble solids and titratable acidity gradually decreased with storage regardless of treatment. Sodium hypochlorite slightly reduced microbial population.

Keywords: /Longkong/ /Fruit Quality/ /Shelf life/

MANGO


Abstract
This study was conducted to isolate, characterize and utilize chitosan as preservative in foods with living tissue and that of a processed one. Chitosan was isolated from crab carapace in the demineralization and deproteination processes. It was found that physico-chemical characteristics of isolated crab chitosan was comparable with that of the commercial one as shown in its SEM photographs and FT-IR spectra. Application of chitosan in mango fruit reduced weight loss and significantly reduced the infection rate of stem-end rot disease. Moreover, levels of chitosan influenced the microbial count of fresh vege-fish noodles and were not able to alter the sensory attributes of vege-fish noodles. Chitosan’s multi-antimicrobial action on host tissue makes it potential for use as postharvest biopesticide to perishable food commodities and preserved to processed food products.

**Keywords:** /Mango/ /Chitosan/ /Biopesticide/


**Abstract**

The objective of the study was to evaluate the use of a robot gripper in the assessment of mango (cv. BOsteen^) firmness as well as to establish relationships between the non-destructive robot gripper measurements with embedded accelerometers in the fingers and the ripeness of mango fruit. Intact mango fruit was handled and manipulated by the robot gripper, and the major physicochemical properties related with their ripening index were analyzed. Partial least square regression models (PLS) were developed to explain these properties according to the variables extracted from the accelerometer signals. Correlation coefficients of 0.925, 0.892, 0.893, and 0.937 with a root-mean-square error of prediction of 2.524 N/mm, 1.579 °Brix, 3.187, and 0.517, were obtained for the prediction of fruit mechanical firmness, total soluble solids, flesh luminosity, and ripening index, respectively. This research showed that it is possible to assess mango firmness and ripeness during handling with a robot gripper.

**Keywords:** /Mango/ /Non-destructive/ /Firmness/ /Ripening/


**Abstract**

‘Mahachanok’ mango is very popular in domestic and export markets of Thailand. After fresh-cut processing, produce quality deteriorates quickly due to tissue darkening, development of glassy appearance, surface desiccation and loss of firmness. Very little is known about the marketable period of the fresh-cut produce. In this study, fruit were peeled, flesh removed from the seed, and then stored at 4, 7, 10 and 25°C. Results showed that 4 and 7°C storage prolonged shelf life for six days while at 10 and 25°C, shelf life was only four days and one day, respectively. Color as hue values was best maintained at 7°C whereas it declined most rapidly at 25°C. Total sugar content and firmness did not significantly differ with treatment. Titratable acidity decreased with storage at a lower rate at 7°C than at 25, 10 and 4°C.

**Keywords:** /Mango/ /Storage/ /Temperature/
Abstract

The effects of methyl jasmonate (MJ) on free radical content, antioxidant capacity and chilling injury (CI) of ‘Nam Dok Mai No. 4’ mango fruit during low temperature storage were investigated. Mango fruits were dipped in 0.1 mM MJ aqueous solution and distilled water (control) for 10 min and stored at 5°C for 42 days. They were sampled every seven days to determine superoxide radical ($O_2^•$), hydrogen peroxide ($H_2O_2$) and hydroxyl radical ($OH^•$). Total antioxidant capacities by 1,1-diphenyl-2-picrylhydrazyl (DPPH) and 3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging activity and CI index were also measured. It was shown that low temperature storage promoted free radical accumulation by gradual increase of $O_2^•$, $H_2O_2$ and $OH^•$ contents with storage time. However, both antioxidant capacities increased and reached the peak on day 21 and decreased thereafter. CI occurred on day 21 and then rapidly increased. CI symptom development appeared slower than free radical accumulation and antioxidant responses. Treatment with MJ significantly lowered free radical accumulation and enhanced antioxidant capacity associated with a reduction in the percentage of surface area affected by browning and pitting on the peel (CI index). Correlations between CI and free radical content and between CI and antioxidant capacity were highly significant. These results indicated that low temperature stress induced free radical accumulation, which resulted in CI development. MJ treatment can reduce CI of mango fruit by activating the fruit defense responses as indicated by the decrease in free radical content and increase in antioxidant capacity.

Keywords: /Mango/ /Chilling Injury/ /Low Temperature/


Abstract:

Mango ‘Baneshan’ fruits harvested at two stages of maturity (7-8 and 8-9°Brix TSS) were treated with 1-methylcyclopropene at 1000 and 2000 ppb and unpacked or packed in Xtend® bags before storage at 12.5±1°C. Fruit samples were subjected to analysis after 28, 32, 36 and 40 days of cold storage. Fruit ripening was delayed by 1-MCP treatment and Xtend® bag packaging. However, extended holding of 1-MCP treated fruit in Xtend® bags encouraged physiological and pathological deterioration. Both 1-MCP levels without packaging resulted in better quality and longer shelf life of up to 36 days as compared to other treatments.

Keywords: /Mango/ /1-methylcyclopropene/ /Modified Atmosphere Packaging/ /Quality/ /Shelf Life/


Abstract

Water-soluble chitosan, the product of chitosan hydrolysis with particular biological characteristics, has been used in the fields of food storage and plant protection. Hydrogen peroxide was
used to optimally degrade the crude chitosan into water-soluble chitosan (WSC). The mathematical model between independent factors (H₂O₂ level, time and temperature) and the recovery of WSC was constructed to optimize the degradation conditions using response surface methodology. The optimal conditions for highest recovery of WSC were 5.4% of H₂O₂, 47.1°C and 3.4 h, with the predicted recovery of 87.2%. The fungal strain *Colletotrichum gloeosporioides*, isolated from mango naturally infected by typical anthracnose, was used to study the antifungal activity of WSC in vitro. Results indicated that *C. gloeosporioides* was much sensitive to WSC, the inhibitory effect increased as the WSC increased. The concentration of 0.8% WSC completely inhibited the mycelial growth of *C. gloeosporioides* on PDA media and the 50% PIRG (percentage inhibition of radial growth) value was achieved with the concentration of 0.1% WSC. The micrograph study showed that WSC can cause distortion, rupture, and thinning of the conidial cell wall of *C. gloeosporioides*. These results indicate the high potential of WSC as an antifungal agent for future commercial application.

**Keywords**: /Mango/ /Chitosan/ /Mangifera indica L./ /Postharvest/ /Anthracnose/


**Abstract**

‘Nam Dok Mai’ mango for exporting plays a big part of margin, increased in fruit market of Thailand. Many researches on improvement of the quality have been published both tested in pre-harvest and post-harvest. The aim of this study was to compare supply chains of mangoes starting from orchards through export according to postharvest physical quality by surveying different grower’s practices. In the beginning, three different orchards in Phetchabun province were chosen with focusing on the differences in bagging days and pesticization. The results showed that bagging duration affected the color change on the mango skin during fruit development but postharvest diseases. On the other hand, duration of pesticide spraying before bagging showed that 1-2 days spraying before bagging revealed higher fruit diseases compared to bagging immediately after spraying.

**Keywords**: /Mango/ /Supply Chain/ /Bagging/


**Abstract**

The aim of this research was to study of the development postharvest diseases during the supply chain of exporting mango. This experiment was assorted by sampling fruit randomly from the processes during mango handling in a packing house. The mango production comprised 5 processes, which were step 1 – no treatment (mangoes were kept from the field and then transport to the exporter), step 2 – pedicle cutting to 1 cm left and then dipped with 200 ppm chlorine, step 3 – dipping into hot water at 50°C for 3 min, step 4 – dipping with tap water for a few minutes and then dipping into 400 ppm ethephon, and step 5 – incubation in hot vapor at 47°C for 20 min. The results show that steps 3-5 comprised lower infected areas and disease incidences than step 1 and 2. Therefore, step 3 was the most important step for decreasing mango postharvest diseases in the postharvest handling of exporting mango.
Keywords: /Mango/ /Supply Chain/ /Postharvest Disease/


Abstract

Thai mango ‘Nam Dok Mai Si-Thong’ has an attractive golden yellow skin colour even in immature fruit, not ready for consumption. Firmness becomes an important quality attribute to assess the ripening stage of the fruit during storage. In this study, the possibility of a non-destructive method using a texture analyser for assessing the firmness behaviour during storage was investigated in three different experiments for (1) probe selection, (2) distance selection using the selected probe and (3) evaluation of the selected probe and distance on mango quality. The results revealed that an aluminium flat probe with 35 mm diameter is a suitable probe for measurement. Limited distance compression at 1 mm was selected since that combination did not leave any compression marks on the fully ripened mangoes. Evaluation of mango quality attributes obtained by this technique could be used to assess non-destructively the firmness behaviour of the mango fruit during storage. The technique can be used to monitor the firmness of mango fruit on an individual basis, using the same fruit in successive assessments. Non-linear indexed regression can be applied to extract information on the behaviour and variation of firmness of individual mangoes. Obtained explained parts (R2 adj) frequently are well over 90%.

Keywords: /Mango/ /Non-Destructive/ /Quality Evaluation/ /Firmness/


Abstract

The effect of harvest year on near-infrared spectroscopy (NIRS) prediction models to determine postharvest quality of mango was evaluated. Diffuse reflectance spectra in region of 700–1100 nm were used to develop calibration models for firmness, total soluble solids (TSS), titratable acidity (TA) and ripening index (RPI) using partial least squares (PLS) regression analysis. The results showed that model robustness was influenced by harvest year. High prediction error was found when models from single harvest year were used to predict the data of other years, whereas using combined data from two or three years for calibration greatly enhanced the prediction accuracy. The prediction models established from three-year data performed the most suitably for prediction of TSS (R² = 0.9; SEP = 1.2%), firmness (R² = 0.82; SEP = 4.22 N), TA (R² = 0.74; SEP = 0.38 %) and RPI (R² = 0.8; SEP = 0.8). Classification of mango ripeness was successfully achieved using second derivative pretreated spectra with an accuracy of more than 80%. The results indicated that NIRS can be used as a reliable non-destructive technique for mango quality assessment and a robust model could be developed when effect of harvest year was taken into account.

Keywords: /Mango/ /Quality/ /Non-Destructive/

Abstract

This research investigated the effects of hot water, UV-C irradiation and their combination on the induction of resistance to anthracnose disease and on quality improvement in harvested mangoes. Naturally infected mango fruits were harvested, surface-disinfested with a solution of 100 ppm sodium hypochlorite and air dried. The fruits were then treated with UV-C irradiation at a dose 6.16 kJ m$^{-2}$, with hot water at 55 °C for 5 min or with hot water followed by UV-C irradiation. Untreated fruits served as the control. All fruit samples were kept at 13 °C for 12 days. The combined treatment significantly suppressed the severity of anthracnose symptoms compared with either single treatment. Additionally, the specific activities of key plant defense-related enzymes, such as phenylalanine ammonia lyase (PAL), peroxidase (POD), chitinase (CHI) and β-1,3-glucanase (GLU), increased in both the peel and the pulp of the mango fruits. The expressions of the MI-PAL, MI-POD, MI-CHI and MI-GLU genes in the mango peel were markedly enhanced in the fruits treated with the combined treatment in comparison with those treated with hot water or UV-C alone, while the control fruits showed the lowest expression of these genes. The combined treatment or UV-C treatment alone significantly delayed fruit ripening by maintaining fruit firmness, retarding the progressive increase of total soluble solids (TSS) and delaying the decrease in titratable acidity (TA). Weight loss was not significantly different among the treatments. The results suggested that the combination of hot water and UV-C treatment may be used as a tool not only for suppressing anthracnose disease but also for improving the quality of harvested mangoes by inducing the expression of plant defense-related genes.

Keywords: /Mango/ /Hot Water Treatment/ /Anthracnose/ /Quality/


Abstract

The quality and shelf life of ‘Cat Hoa Loc’ mango fruit were determined in response to wax coating methods. Mature green fruits harvested at 75-84 days after fruit set were selected for uniformity in shape, color and density and then washed and air-dried. Fruits were coated with 6% bee-carnauba wax emulsion by dipping, spraying using a spray bottle, or wiping using a smooth sponge before storage at ambient (29-33°C) for ripening. At the end of storage, fruits were assessed for total soluble solids (TSS), titratable acidity (TA), weight loss, storage life and sensory quality. The results showed that fruits waxed by dipping for 20 s had the longest storage life (9.3 days) and highest appearance quality but lowest in TSS (19.6%), taste and flavor quality. Dipping in the wax emulsion for 8 s appeared to be the most promising treatment based on storage life (8.2 days), TSS content (22.7%), appearance, taste and flavor. This treatment had comparable effects as that of waxing by spraying or wiping.

Keywords: /Mango/ /Storage/ /Quality/ /Carnauba/ /Coating/


Abstract
Ozone has been used as a postharvest treatment to delay the physiological and biochemical changes in fruit during storage. In this study, mango fruit (Mangifera indica L.) ‘Nam Dok Mai No. 4’ were fumigated with ozone at 2 μL L\(^{-1}\) for 20 min and 10 μL L\(^{-1}\) for 10 min before storage at ambient (25°C) and after three days of ambient storage. Ozone at 10 μL L\(^{-1}\) significantly decreased the respiration rate at day 4 and 6 compared with the control. It also decreased ethylene production which however increased on day 4 and 6, and resulted in lower peel L* and b* on day 4, lower pulp a*, higher hue angle and lower weight loss on day 6 than that of the other treatments. Fruit firmness, soluble solid content and titratable acidity were not significantly affected.

**Keywords:** /Mango/ /Mangifera indica L./ /Physiological Changes/ /Quality/ /Storage/


**Abstract**

Nitric oxide (NO), a highly reactive free radical gas, has been used as a postharvest treatment to delay fruit ripening and senescence. NO inhibits ethylene production and extends the shelf life of various fruit. The objective of this research was to determine the effect of sodium nitroprusside (SNP), a NO donor, on the quality of mango fruit during storage. Uniform and unblemished mango fruit cv. Nam Dok Mai Si Thong were soaked in 0.5 or 1 mM of SNP for 10 min; dipping in water for 10 min served as the control. After treatment, all fruit were stored at ambient temperature (22°C). Both SNP concentrations significantly reduced ethylene production and respiration rate. Only 1 mM SNP maintained firmness and delayed the changes in soluble solid content and titratable acidity. SNP also delayed color development of the pulp, with fruit treated with 1 mM SNP showing the highest L* and hue angle values and lowest a* and b* values. However, SNP had no effect on weight loss compared to the control. The results indicate that SNP treatment at 1 mM for 10 min can be used to maintain quality and extend shelf life of ‘Nam Dok Mai Si Thong’ mango fruit.

**Keywords:** /Mango/ /Mangifera indica L./ /Shelf Life/ /Fruit Quality/

**MELON**


**Abstract**

The shelf life of fruits is affected by moisture loss during storage after harvest. In netted melon fruit, wounding of the cuticle occurs naturally, and moisture loss from such wounds was much greater than that from the cuticle in the early stage of fruit growth. During the fruit growth, the wounds were filled with a net containing suberized wax, and the water-proofing ability of this net was as high as that of the cuticle after the completion of net tissues. In this study, using three cultivars of netted melon fruits (‘Life’, ‘Andesu’, and ‘Gurandoru’), skin tissues (cuticle with net) were isolated from hypodermal cell layers by pectinase treatment. The skin weight per unit area of ‘Life’ was lower than that of the other two cultivars. The net area increased rapidly during fruit growth, with a simultaneous decrease in moisture loss. However, moisture loss did not differ among cultivars after the completion of net tissues. Fatty acid compositions were analyzed after methylation of the dried skin powder, and each fatty acid
was identified using a GCMS system throughout fruit growth. In the skin of the non-netting stages, palmitic acid was the most abundant fatty acid, and it decreased with expansion of net area. In the skin during netting stages, behenic acid accounted for over 30% of the skin area, and it increased with expansion of net area, regardless of the cultivar. Comparing cultivars, the changes in the relative amount of behenic acid showed similar tendencies to the changes in the net area. Although no apparent difference was recognized in moisture loss after the completion of net tissues among the cultivars, the relative amount of behenic acid was the lowest in ‘Gurandoru’. These results suggest that the deposition of behenic acid in the inner surface of cell walls of net tissues acts, to a certain extent, as an effective barrier to moisture loss.

**Keywords**: Melon/ /Shelf Life/


**Abstract**

The strain CPA-7 of *Pseudomonas graminis*, isolated from apple by our group, was reported to reduce the population of food borne pathogens in minimally processed fruit. The aim of this work was to investigate its effect on physical parameters, visual quality, enzymatic activity, vitamin C content and antioxidant activity of fresh-cut melon during refrigerated storage. CPA-7 treated or untreated fresh-cut melon was packaged under air or modified atmosphere (MAP) and stored at 5 and 10°C for 8 days. Results showed a loss of texture during storage, above all at 10°C. A good visual quality was observed for samples stored at 5°C, although samples treated with the antagonistic strain CPA-7 and stored in air presented the lowest score, whereas those stored at 10°C showed a poor visual appearance and a decrease of lightness. In general, CPA-7 treated samples presented higher POD values than untreated ones at 5°C, and lower values at 10°C. PPO increased during refrigerated storage regardless of the addition of the antagonist. Also, treatment with the antagonistic strain CPA-7 retained the antioxidant activity and vitamin C content of fresh-cut melon during refrigerated storage.

**Keywords**: Melon/ /Cucumis melo/ /Fresh-cut/ /Refrigerated Storage/

**NECTARINE**


**Abstract**

The work investigate the effect of short-term heat treatment on quality of freshcut nectarines ‘Orion’. This treatment may have effects on the fruit beyond their stated purpose because a high temperature stress can trigger changes in plant tissue that affect many physiological processes. These processes include inhibition of ethylene production and other ripening and senescence related processes, induction of defense compounds against pathogens, attack and induction of resistance to other stresses, including low temperature stress. The result of the treatment is to maintain fruit quality following the heat treatment. In this work, a pre-cutting heat treatment at 40°C for 50 min and modified atmosphere packaging (5 kPa O₂ and 5 kPa CO₂) storage was evaluated. The quality-affecting parameters
were evaluated by physical and chemical methods (firmness, colour, pH, soluble solids content and titratable acidity) and by the evaluation of physiological aspects (PPO activity) as well as the changes in headspace gas composition during storage for 11 days at 4°C. Significantly lower concentrations of O₂ in the package atmosphere were recorded for heat-treated slices. In contrast, hot water treatment did not reduce firmness loss. Moreover, an insignificant effect of heat treatment and modified atmosphere on chemical composition (total soluble solids and titratable acidity) and colour parameters was observed. Also for the polyphenoloxidase activity no significant changes was recorded.

Keywords: /Nectarine/ /Modified Atmosphere Packaging/ /Minimally Processed/ /Hot Water Treatment/


Abstract

Nectarine is a climacteric fruit and exhibits increased ethylene production, respiration rate, changes in fruit texture, colour, aroma and other biochemical and physiological attributes during ripening. It has a limited storage life depending upon the cultivar. The coating of fruit with edible materials has been reported to act as a barrier to moisture and oxygen during postharvest handling and storage. Different compounds have been used as coating materials in fruits including alginate, cellulose, chitosan, chitin, lipids, milk protein, starch and wax with varying success towards extending shelf life and maintaining fruit quality. Chitosan coating had the potential to inhibit decay and hence prolong the storage life of a variety of produce including strawberries, tomatoes, citrus fruit, peaches, pears and kiwi fruit. In this study biodegradable coatings, based on chitosan, were applied to nectarine, ‘Diamond Ray’, in order to find environmentally friendly, healthy treatments with which better preserve fresh fruit quality and safety during postharvest cold storage. Physicochemical properties (weight loss, °Brix, titratable acidity, colour and texture) were determined throughout cold storage. The effects of three chitosan applications were investigated: (1) preharvest (10 g L⁻¹), (2) pre- and postharvest (10 g L⁻¹), (3) postharvest (10 g L⁻¹) (4) control (no chitosan application). Preharvest chitosan-treated nectarines were firmer and had higher soluble solids content than control ones. Also pre and postharvest application fruits showed high soluble solids content and texture values and the highest titratable acidity. Hence it can be concluded that chitosan in preharvest treatments has the potential to preserve valuable attributes and prolong the shelf-life of nectarines, presumably due to its property to inhibit the postharvest ripening and senescence processes.

Keywords: /Nectarines/ /Chitosan/ /Weight Loss/ /Storage/


Abstract

We report the effects of single-layer different bags with different colour (white, yellow, yellow outside and black inside) and double-layer bag (yellow outside and black inside) on several fruit quality traits of ‘Ruiguang 47’ nectarine. Fruit (x20 a treatment) were bagged from day 40 after full bloom till harvest, while the yellow/black bags were removed 4 days before harvest. Bagged fruit tend to have earlier ripening and higher fruit weight (white and yellow bag). Fruit treated by yellow/black bags had
better colour, anthocyanin content and anthocyanin to chlorophyll ratio (Ant/Chl). Soluble solids content (SSC) was not significantly affected by white and yellow bags but it reduced significantly when treated with yellow/black. In addition, fruit firmness with and without skin of white and yellow bag treatments decreased significantly while increased with yellow outside and black inside single layer bag. In regard to fruit treated by yellow outside and black inside double-layer bag, skin firmness improved significantly in 2011 but had no significant differences in 2012. The results indicate that bagging of ‘Ruiguang 47’ nectarine in white bag can keep better quality. However, removing yellow/black bags 4 days before harvest can improve skin colour and increase fruit firmness.

**Keywords:** /Nectarine/ /Bagging/ /Internal Quality/

**PAPAYA**


**Abstract**

‘Solo’ papaya fruit grown in southern Philippines is increasingly gaining demands in the domestic and export markets. Sea-shipping of papaya takes two weeks to foreign markets thus the possibility of disease development while in transit. Hot water treatment (HWT) at 49-51°C for 10 min followed by 5-min hydrocooling effectively reduced decay but the concern in its adoption is the long treatment time. To shorten HWT, heated azoxystrobin solution at 50°C for 10 min and 53°C for 5 min were tested on color 2 (tinge of yellow) fruit. With heated azoxystrobin, hydrocooling was not done. The conventional HWT of 50°C for 10 min and 53°C for 5 min, both with 5-min hydrocooling in azoxystrobin were also conducted. Fruits were stored for two weeks at 13°C then ripened at 25°C. Diseases (anthracnose and stem end rot) were observed even on treated fruits but was higher for control (no HWT and no hydrocooling). On the other hand, notable results were observed for those treated in heated (50°C, 10-min dip) azoxystrobin showing better disease control especially stem end rot and chocolate spot. This treatment also resulted in the highest sensory scores (peel and pulp color, sweetness and papaya flavor). Based on the results, heated azoxystrobin treatment showed potential in reducing time spent during HWT and in effectively controlling disease on papaya fruits.

**Keywords:** /Papaya/ /Carica papaya L./ /Disease Control/ /Hot Water Treatment/


**Abstract**

The present study investigated the effects of acidified sodium chlorite as an antimicrobial compound on the microbial growth and storage quality of shredded green papaya (Carica papaya L.). Flesh of green papaya fruit were shredded and divided into four groups, and immersed in distilled water, 1 gL⁻¹ citric acid, 0.5 gL⁻¹ sodium chlorite, or 1 gL⁻¹ acidified sodium chlorite solution for 1 min. Treated shreds were air dried, packed in 16×16 cm polyethylene bags (100 g/pack) and stored at 10°C for 10 days. Acidified sodium chlorite solution effectively inhibited the growth of coliforms and aerobic bacteria through four days of storage, whereas yeast and mold were completely inhibited throughout storage. Furthermore, the acidified sodium chlorite application suppressed the respiration rate and
showed higher shear force throughout the storage. Therefore this application maintained the storage quality of shredded green papaya better than other treatments.

**Keywords:** /Papaya/ /Shredded Papaya/


**Abstract**

The objective of this study was to investigate effect of hot water treatments on quality changes of shredded green papaya during storage. The shreds prepared pre-treatments from green papaya fruit, were dipped in hot water at 25 (control), 50 and 60°C as a control for 1 min and then cooled with distilled water at 4°C for 1 min. Excess water from treated shreds were removed by spinning in a machine. Shreds at 100 g were then packaged in 9×12 cm polyethylene bags for subsequent storage at 10°C for six days. The result indicates that hot water treatments at 50 and 60°C revealed a decrease in their respiration rates. The lower respiration rate was related to ethylene production, weight loss, and color changes. Especially, hot water treatment at 50°C could maintain shear force indicated by lowest water soluble pectin and polygalacturonase activity of shreds throughout the storage. Furthermore, hot water treatments at 50 and 60°C reduced total coliforms, aerobic plate count at initial three days of storage compared with control.

**Keywords:** /Papaya/ /Hot Water Treatment/ /Shredded Papaya/ /Quality/


**Abstract:**

‘Frangi’ papaya is F₁ hybrid cultivar which was developed and released by a Malaysian company in 2006. As quarantine requirements, papaya fruit need to go through double hot water immersion. Immediate cooling of fruit after hot water immersion is needed to remove the heat from fruit. Since ‘Frangi’ papaya is a new hybrid and its physiology may differ from other cultivar. Therefore, this study was carried out to determine optimum cooling water temperature for ‘Frangi’ papaya after hot water dipped treatment. Mature green papaya fruit were dipped in 42°C for 30 min then 49°C for 20 min. This followed by cooling the fruit with (i) running tap water of 26°C, (ii) cool water of 15°C and (iii) cool water of 4°C. The cooling was carried out for 20 min for all the temperature of water. Fruit that did not cool with water act as control. The fruit was then initiated to ripening using 1 ml L⁻¹ ethylene. Fruit peel colour (L*, C* and h°), firmness, soluble solids concentration (SSC), titratable acidity (TA) and pH at day 0, 3 and 6 were being analysed. The h°, SSC, TA and pH of fruit was affected significantly by interaction between water temperature × ripening day. There were no significant differences in h° values among treatment at ripening day 0 and 6. At day 3, control has significant lower h° than fruit cooled with 15 and 4°C of water. The firmness of ‘Frangi’ papaya was not affected by water temperature but decreased significantly when fruit ripened from day 0 to 3. At day 0, SSC was not affected by water temperature. By day 6, SSC of control was significantly higher than others cool water treated fruit. At day 0, the control fruit has significant lower TA than others treatment fruit. As ripening progressed, no significant differences were found among treatments. For pH, all treatments did not show any differences at day 0. By day 3, fruit cooled with 26°C water has the highest pH but by day 6, fruit cooled with 4°C has the
highest pH. The quality of ‘Frangi’ papaya whether cooled with water or not after hot water dip was almost the same except SSC and pH.

**Keywords:** /Papaya/ /Firmness/ /Quality/


**Abstract**

‘Sunrise’ papaya fruit harvested at two stages of maturity (colour break; <10 and 25% yellow peel colour) were treated with 100 nl L⁻¹ 1-methylcyclopropene (1-MCP) then ripened at 25°C. Enzyme activities of polygalacturonase (PG), pectin methyl esterase (PME), and β-galactosidase (β-Gal) were determined and the degree of methylesterification (DME) was measured by Fourier Transform Infrared Spectroscopy (FT-IR). The 1-MCP relatively reduced PG, β-Gal, and PME activities of the fruits cell wall in both ripening stages. The DME of papaya fruit generally decreased corresponding to storing period in the control fruit. However, the DME of the colour break fruit was apparently seen in the water soluble pectin (WSP) and higher than those in the EDTA- and Na₂CO₃-soluble polysaccharide fractions. The 1-MCP treatment significantly abolished WSP in treated <10 and 25% yellow peel colour during ripening and also reduced DME in EDTA-soluble pectin fraction at two stages of maturity only when over-ripe.

**Keywords:** /Papaya/ /1-MCP/


**Abstract**

‘Sunrise’ papaya fruit harvested at two stages of maturity (colour break; <10 and 25% yellow peel colour) were treated with 100 nl L⁻¹ 1-methylcyclopropene (1-MCP) then ripened at 25°C. Enzyme activities of polygalacturonase (PG), pectin methyl esterase (PME), and β-galactosidase (β-Gal) were determined and the degree of methylesterification (DME) was measured by Fourier Transform Infrared Spectroscopy (FT-IR). The 1-MCP relatively reduced PG, β-Gal, and PME activities of the fruits cell wall in both ripening stages. The DME of papaya fruit generally decreased corresponding to storing period in the control fruit. However, the DME of the colour break fruit was apparently seen in the water soluble pectin (WSP) and higher than those in the EDTA- and Na₂CO₃-soluble polysaccharide fractions. The 1-MCP treatment significantly abolished WSP in treated <10 and 25% yellow peel colour during ripening and also reduced DME in EDTA-soluble pectin fraction at two stages of maturity only when over-ripe.

**Keywords:** /Papaya/ /1-MCP/ /


**Abstract**

The neutral sugar composition in water-, EDTA-, and Na₂CO₃-soluble pectin fractions in the pulp of ‘Kaek Dum’ and ‘Red Maradol’ cultivars of papaya (Carica papaya) treated with 100 μl L⁻¹ of 1-
methylcyclopropene (1-MCP) and then ripened at 25±2°C was determined. Results revealed that the predominant neutral sugars in the water-, EDTA- and Na₂CO₃-soluble pectin fractions were galactose (Gal), followed by arabinose (Ara), and rhamnose (Rha) in both control and 1-MCP treated fruit. The changes in neutral sugar composition of cell wall in each fraction showed differences on day 4 for both papaya cultivars, especially the changes in water soluble pectin fraction. The presence neutral sugars in each fraction of 1-MCP treated fruit of both papaya cultivars was within group of control fruit but changes of neutral sugars in 1-MCP treated fruit was lower compared to control fruit.

**Keywords**: /Papaya/ /1-MCP/


**Abstract**

There is a huge opportunity for increased export profitability and competitiveness of Philippine ‘Solo’ papaya in the Singapore market. Market research showed an undersupply of fruits in standard retail outlets which service 80% of this market. Consumers preferred medium-sized and blemish-free papaya. Wholesalers, on the other hand, desired a consistent supply of quality fruits – green upon arrival with a small amount of skin color and of even size per box. Using an approach based on value chain analysis (VCA) combined with action learning, the paper shows that postharvest improvement to meet the Singapore customer and consumer requirements can increase benefits to chain players, particularly farmers, providing incentive for them to organize and increase production of quality fruits. In doing so, they can demonstrate the benefits of collaborative value chain management.

**Keywords**: /Papaya/ /Solo Papaya/ /Carica papaya L./ /Value Chain / /Fruit Quality/

**PEACH**


**Abstract**

Peach germplasm in Italy includes white- and yellow-flesh peaches, all of them characterized by a persistent aroma and an excellent flavor. However, their behavior, in terms of postharvest maintenance and suitability for minimal processing, has never been investigated. The aim of this study was to investigate the effects of passive atmosphere and chemical treatment, with 2% ascorbic acid and 1% calcium lactate, in order to prevent fruit browning and to maintain the quality of fresh cut slices of the white-flesh peach cultivar ‘Settembrina di Bivona’. To achieve a passive atmosphere condition, approximately 150 g of peach fruit slices were placed in rigid bi-oriented polystyrene bags and stored for 3, 5, 7 and 12 days at 5°C and 95% RH. At each storage duration, color, visual quality score, respiration rate, soluble solids and acidity were measured. Fresh cut slices were also stored in perforated bi-oriented polystyrene bags with or without 2% ascorbic acid and 1% calcium lactate, as the control. The shelf life of peach fresh cuts stored at 5°C under passive atmosphere, with or without chemical treatment, was extended by up to 7 days. In all cases a longer storage period resulted in fruit decay. On the other hand, chemical treatment significantly reduced browning of peach fresh cuts for up to 5 days.
after packaging in perforated bags and storage in air. Peach fresh cuts with no chemical treatment and under passive atmospheres showed significant browning symptoms 3 days after packing.

**Keywords:** /Peach/ /Chemical Treatment/ /Browning/


**Abstract**

‘Bianc di Bivona’ is a white-flesh peach cultivar, which ripens during the last week of July and the first of August. Its fruit are known because of their distinct flavour and aroma, which make them highly accepted, particularly in the local markets. However, nothing is known about their postharvest physiology and storage conditions. In order to investigate the effect of: (a) fruit ripening stage at harvest and, (b) storage temperatures, ‘Bianc di Bivona’ peaches were picked at mature-green, (60.0±1.3 N), and ripe stage (30.7 ± 2.1 N) determined by flesh firmness, and then stored at 0°C and 5°C (90% RH). Flesh firmness, total soluble solids, titratable acidity, weight loss and DA index, measured with a DA-Meter, were evaluated after harvest and every 7 days during a 4 weeks storage period. Mature-green peaches after 21 days of storage at 5°C showed a rapid decline in fruit titratable acidity and flesh firmness. On the other hand, fruit storage at 0°C for 28 days did not result in significant changes of fruit titratable acidity and flesh firmness. Ripe peaches (30.7±2.1 N) stored at 5°C showed a sharp decline of flesh firmness after 7 days of storage, while their storage period lasted until 14 days at 0°C.

**Keywords:** /Peach/ /Fruit Ripening/ /Storage/


**Abstract**

Peach genotypes in Southern Italy include the white-flesh ‘Pesca di Bivona’ (‘Murtiddara’, ‘Biancà’, ‘Agostina’ and ‘Settembrina’) and the yellow-flesh ‘Pesca di Leonforte’ (‘Settembrina’, ‘Giallone’ and ‘Ottobrina’) landraces, with non-melting clingstone fruit, characterized by a persistent aroma and an Excellent flavor that is highly appreciated by consumers. The aim of this work was to assess the suitability of these white- and yellow-flesh landraces to be processed as fresh-cut product with regard to the persistence of their quality and sensory profiles. Fruit of ‘Pesca di Bivona’ and ‘Pesca di Leonforte’ landraces were cut into slices and stored at 5 °C for 3, 5, 7, 12 d. Fresh-cut slices’ color (L*, B-index, DE, Croma and Hue”) appearance, crunchiness, ascorbic acid and phenolics content were measured and sensory profiles were evaluated at each sampling date, together with CO₂ content in the package. The yellow-flesh ‘Settembrina di Leonforte’ and the white-flesh ‘Settembrina di Bivona’ had the best visual score during the storage period, accompanied by the lowest degree of the browning index and the highest scores of all sensory descriptors at each sampling date. The browning index and the hedonic evaluation of flesh firmness were the best markers of fresh-cut quality, being highly correlated to the visual score and overall liking. The overall liking of the fresh-cut slices was correlated to the visual score and the flesh firmness in both white-flesh and yellow-flesh landraces.

**Keywords:** /Peach/ /Minimally Processed/ /Browning/

Abstract

In peaches, the potential shelf life and the quality at consumption are closely related to the ripeness stage of these fruits at harvest. Usually, the harvest is based on color, firmness, sugar and acids content of the fruit, although these determinations are carried out through destructive methods and in a limited number of samples. The technique of Vis/Nir spectroscopy was used for the development of an index, not destructive, based on the difference of absorbance (IDA) between two wavelengths near the absorption peak of chlorophyll-a, and allows monitoring of changes in ripeness processes directly in the field. The objective of this paper was to track changes in quality that occur along the peach ripeness of ‘Jubileu’ and ‘Eldorado’ cultivars and their relationship with non-destructive indexes obtained with the DA-Meter equipment. The experiment was conducted in the didactic orchard of the Agricultural Center of Palma/ FAEM- UFPel, and fruits were weekly monitored for the evolution of the IDA index from October to December, directly in the field, in the 2010/2011 harvest. In both cultivars, the IDA index presented similar behavior in during the growing phase of the fruits, but, at ripening, the values for the ‘Jubileu’ cultivar decreased significantly compared to the ‘Eldorado’ cultivar. The IDA index presents significant linear correlation with the quality parameters throughout the period of harvest, being a promising index to assess the ripeness and the quality of peaches directly in the field.

Keywords: /Peach/ /Non-Destructive/


Abstract

The objective of this comparative study was to determine the quality changes in five peach genotypes [Prunus persica (L.) Batsch] during ripening of fruit harvested at commercial maturity (i.e., fruit picked mature but not fully ripe), and at full physiological maturity. The genotypes used were ‘Big Top’ nectarine, ‘Redhaven’, and its white-fleshe mutant ‘Redhaven Bianca’, ‘IFF331’, and ‘IFF785’ white-fleshed stony hard selections. After 1, 7 and 11 days at 20°C the following fruit quality parameters were analysed: firmness, skin background colour, soluble solids content, and titratable acidity. Ethylene production and abscisic acid concentration were also measured. Carotenoid and volatile compound compositions were also evaluated in order to assess variation in nutritional and sensory quality within and between genotypes. Results showed that in ‘Redhaven’ fruit carotenoid production increased with duration of shelf life (from 400 to 780 μg/100 g fw), and increased in its white mutant (from 25 to 70 μg/100 g fw). Principal component analysis of total carotenoids together with the volatile compounds derived from their cleavage underlined that, at commercial maturity, carotenoid concentration was negatively related to geranyl acetone.

Keywords: /Peach/ /Storage/ /Maturation/ /Shelf Life/

Abstract

The purpose of this trial was to develop an objective internal flesh browning (IFB) assessment methodology for fresh peach. Six peach and three nectarine cultivars were used in this research. The fruit was maintained at 4 °C for 21 and 31 days. They were then evaluated after three additional days of maintenance at 20°C. The differences in the CIELAB color parameters of the flesh ΔL*, ΔE*, Δh°*, ΔC*, Δa*, and Δb* were then assessed. ΔL* were assessed with both fresh fruit and fruit after postharvest treatments; after regression analysis, this resulted in the best CIELAB parameter to describe IFB. A trained sensory panel was used to corroborate the results. Between ΔL* and the panel assessment of IFB, was obtained the highest determination coefficient (R² = 0.84). Furthermore, through a triangular test, it was determined that ΔL* = 4.7 corresponds to the IFB peach flesh threshold, as perceived by the panel. Afterward, through a regression tree, four IFB categories were defined: (1) no IFB symptoms, when ΔL* < 4.7; (2) incipient IFB symptoms, when 4.7 < ΔL* < 8.0; (3) severe IFB symptoms, when 8.0 < ΔL* < 21; and (4) extreme IFB symptoms, when ΔL* ≥ 21. We recommend the use of ΔL* when objective phenotyping of IFB of peach flesh is required.

Keywords: /Peach/ /Sensory Evaluation/ /Chilling Injury/ /Postharvest/ /Browning/


Abstract

The aim of this study was to define harvest indexes, based on peach skin ground color, suitable to allow mechanical grading and reach at the same time high fruit quality. Two cultivars, ‘Springbelle’ and ‘Douceur’, were included in this research. In the first year of the study, harvest was performed in three pickings, fruit samples were graded with a mechanical sizer, and divided into seven categories based on their ground skin color, measured with a colorimeter. On the same fruit, soluble solids content, titratable acidity, and flesh firmness were measured. Moreover, the evaluation of damage eventually caused by grading and organoleptic tests were performed. These data were used to define harvest indexes based on the a* coordinate of skin ground color. The harvest indexes obtained during the first year were used as harvest index in the second year of the trial to test their suitability. The results showed that the method can be used successfully depending on the cultivar. Indeed, the model seems to work better on ‘Springbelle’, whereas skin ground color did not correlate with the qualitative characteristics and the ripening level of ‘Douceur’.

Keywords: /Peach/ /Bruising/ /Postharvest/


Abstract

One of the most limiting factors for the shelf life of fresh-cut fruits is the browning of cut surfaces. In the case of fresh-cut peaches, cut surface browning as well as excessive flesh softening and pit cavity breakdown are the major causes of quality deterioration. Surface treatments are necessary to delay physiological decay in fruit tissues, thus stabilizing the fruit surface and preventing degradative
processes that affect the quality of the product. The aim of this research was to investigate the effect of postharvest chemical treatments, as antioxidants and firming agents, on fresh-cut peach fruits quality. The study was developed on a yellow fleshed nectarine (Prunus persica L. var. Nectarina ‘Venus’), a yellow fleshed peach (Prunus persica L. ‘K18’), and a clingstone peach (Prunus persica (L.) Batsch ‘Federica’). Fruits were cut into wedges and dipped in antioxidant solutions for 3 minutes. The solutions contained respectively, ascorbic acid (2%), cysteine (0.5%), calcium lactate (1%) and their combinations (2% ascorbic acid + 1% calcium lactate, and 0.5% cysteine + 1% calcium lactate). After treatment, wedges were stored at 5°C for 8 days. Initially and during storage, chemical, physical, enzymatic, and sensorial analyses were performed. Among treatments, only cysteine showed a positive effect on quality retention, in particular on product appearance. Browning development and polyphenol oxidase activity were both lower for cysteine treated samples than for other treatments. Obviously, ascorbic acid treatment increased vitamin C concentration, and slightly affected the total phenolics content. The presence of calcium lactate affected the firmness only in ‘Venus’. For color, the total color change (ΔE) values were very low in all samples. Our results confirmed that the high variability among cultivars may influence the effect of antioxidant and firming agents. Above all cysteine might be useful to keep visual quality of fresh-cut peaches during cold storage.

**Keywords**: /Peach/ /Fresh Cut/ /Browning/ /Firmness/


**Abstract**

Current consumer preferences, hand labor costs, and global markets are forcing changes in the breeding, production, and delivery of fresh peaches and processed minimally processed peach produce. Over the last 20 years, the peach fruit quality concept has evolved from large bright red color fruit to a flavorful, healthy, ready and easy to eat, safe peach with high consumer acceptance. Breeding efforts using new genetic pools are being carried out to develop peaches that ripen uniformly in the canopy with diverse predominant visual, shape, flavor, and texture attributes; and physiological traits at ripening that are adapted to minimal processing. The peach genotype and phenotype expression diversity, especially related to flesh softening, ethylene production, browning development, and wound responses, can be utilized for prolonging storage/shelf life and minimally processed products. For example, different melting level types (none, soft, firm, very-very firm), slow ripening (SR), and stony hard (SH) genotypes are interesting biological sources for the ready-to-eat produce concept. Because of recent advances in new nondestructive sensor technology and the long-term lack of peach flavor in the market, there is high interest for using nondestructive sensors online to segregate fruit according to their postharvest/shelf life potential and consumer acceptance. However, the use of nondestructive sensor technology to segregate cultivars prior to consumption should be focused on flavor and loss of flavor. Furthermore, consumers should be willing to pay a premium to justify the extra cost of using any new nondestructive sensor technology.

**Keywords**: /Peach/ /Consumer Acceptance/ /Minimally Processed/

Abstract

The changes of physio chemicals associated with fruit quality, ascorbic acid and polyphenol content, and antioxidant properties during the last month on-tree ripening were investigated. Identification and quantification of ascorbic acid and polyphenols were performed using HPLC method. The antioxidant activities were evaluated by means of several in vitro assays, such as the β-carotene/linoleate model system, ABTS, DPPH and FRAP. The fruit growth resulted in statistically increased content of TSS and the reductions of the acidity (p < 0.05). Concurrently, the ascorbic acid and polyphenol content as well as antioxidant activities decreased (p < 0.05) dramatically over the ripening period. The results indicated that dropped unripe peaches are excellent sources of bioactive and antioxidant compounds, and can be explored for their health promoting values in food products. Furthermore, the antioxidant activity may be highly affected by hydroxycinnamates (chlorogenic and neo-chlorogenic acid) and flavan-3-ols contents.

Keywords: /Peach/ /Ripening/


Abstract

The effect of peach and nectarine physiological maturity at harvest on severity of chilling injury (CI) expression during cool storage has yet to be fully elucidated. Measurements of index of absorbance difference (IAD) and ethylene production were used to determine fruit maturity classes for Prunus persica (L.) ‘Fire Sweet’ nectarine and ‘Zee Lady’ peach. Harvested fruit was categorized into one of three maturity classes; climacteric, onset climacteric or pre-climacteric using a portable vis-NIR DA-meter. Flesh browning severity in ‘Fire Sweet’ nectarine was low in fruit within all maturity classes after 28 days of storage at 7°C. Flesh bleeding was significantly higher in climacteric fruit compared to pre-climacteric fruit during the first 21 days of storage. At each storage period little difference in flesh texture was detected between maturity classes, but mealiness increased significantly with increasing storage period within all classes. CI severity was marginally higher in ‘Zee Lady’ peach with flesh browning significantly higher in climacteric fruit than in fruit from the other two maturity classes after 14, 21 and 28 days of storage. Increases in peach flesh mealiness scores were marginal during storage but mealiness was significantly higher in climacteric fruit compared to pre-climacteric fruit after 21 and 28 days of storage. In this study CI severity was shown to increase with fruit ripeness at harvest as measured by index of absorbance, and with cool storage period when fruit were stored at a temperature conducive to CI expression. A limitation of this work was the relatively low CI severity found in both cultivars over the storage period. Further work will verify the results obtained here using mid and late season peach and nectarine cultivars with a higher susceptibility to chilling injury.

Keywords: /Peach/ /Chilling injury/ /Maturity/ /Ethylene/ /Cold Storage/


Abstract
The aim of this work was to define the most appropriate time of harvesting early ripening peach fruit using destructive and non-destructive quality indexes such as the index of absorbance (IAD), measured with the DA-Meter, a portable equipment able to measure the degradation of chlorophyll in the pericarp. In this context our research was carried out in 2009 and 2010 on several peach cultivars. Total soluble solid content increased while flesh firmness and total acidity decreased with IAD values, but no significant correlation was found between destructive and non-destructive parameters.

Keywords: /Peach/ /Fruit Ripening/ /Quality/


Abstract

‘Settembrina di Bivona’ peaches were cut into slices to assess their suitability as fresh-cut produce. Untreated (control) and treated with calcium lactate fresh cut slices were closed in plastic boxes for 24 hours (T1) or five days of storage (T2) at 5°C, and then placed at 20°C to assess consumers’ liking. Soluble solids content, titratable acidity, firmness and pH were measured. A sample of n = 750 consumers was selected taking into consideration three variables: age (from 25 to 55 years old), professional status (employed) and aptitude to buy fresh-cut fruit for personal use. A systematic sampling was used, with a detection point based in a properly selected supermarket during the peak hours. Respondents were asked to give a score to the fresh-cut fruit, offered blindcoded, at the two different times after cutting (T1 and T2), for four sensory parameters: visual appearance, flavor, crunchiness and taste. The results showed that slices treated with calcium lactate, after 5 days of storage, received the highest rating for all the parameters considered, and, in particular, regarding flavor, crunchiness, and taste. The high suitability of the white peach ‘Settembrina di Bivona’ to maintain, after the treatment with calcium lactate, its organoleptic requirements and taste, according to consumers, shows that this cultivar has excellent potential as fresh-cut produce. Consumers’ ratings did not depend on changes in either soluble solids content or titratable acidity, or firmness and pH, that changed marginally during the fruit storage period, but were highly related to visual score. The more the fruit slices lost their brightness and external browning increased, the more it decreased consumers’ ratings for flavor and taste.

Keywords: /Peach/ /Fresh Cut/ /Fruit Quality/


Abstract

This work aimed at studying the influence of non-destructively grading fruit at harvest by time-resolved reflectance spectroscopy (TRS) on E-nose pattern, sensory attributes and flavor components of peaches stored for 1 month at different temperatures. At harvest, 240 ‘Spring Belle’ peaches were measured by TRS, ranked according to decreasing μa670 (increasing maturity) in three maturity classes (less, medium, more mature) and stored at 0°C and 4°C. After 2 and 4 weeks of storage, peaches were put at 20°C and less (LeM) and more (MoM) fruit were analyzed after 2 and 3 days of shelf life for firmness, expressible juice, E-nose pattern, sugar and organic acid composition and were submitted to
sensory analyses. Data were analyzed by PCA and four functions were extracted explaining 75% of total variance. PC1 grouped total acids, citric acid, malic acid, sourness, mechanical and sensory firmness against Su/Ac ratio, expressible juice, juiciness and sweetness and discriminated fruit according maturity marking the highest scores for LeM fruit stored for 2 weeks at 0°C at d2 of shelf life. PC2 was mainly related to E-nose sensors, opposing W1C, W3C and W5C sensors to W2S, W1S, W5S, W2W, W1W, W3S and W6S ones and its scores decreased with increasing storage time and decreasing temperature. PC3 was positively related to glucose, fructose and sorbitol and negatively to W5S, sourness and W1W and decreased with storage time but only at 0°C. PC4 was strongly linked to sucrose and total sugars. These results showed that sorting peaches at harvest in different maturity classes by using TRS resulted in fruit developing different mechanical, chemical and sensory characteristics after storage. Peaches classified as less mature at harvest showed higher firmness and acids content and lower sugars and were consequently judged more firm, sour, less sweet, juicy and aromatic than more mature ones. E-nose discriminated fruit mainly according to storage conditions rather than to maturity degree, even if W5S, W1W and W2W showed the highest responses in the most mature fruit, that is in fruit belonging to the more mature class stored at 4°C.

Keywords: /Peach/ /Quality/ /Non-Destructive/ /Cold Storage/ 


Abstract

Peaches are harvested selectively based on size and color, both peel background color and extent of blush. The background color of the fruit changes from green to yellow as chlorophyll disappears, and in many cultivars with red coloration this is hard to determine. A portable instrument that measures IAD (the index of absorbance difference between 670 and 720 nm) was used for monitoring the progression of ripening in two peach cultivars. IAD was measured at harvest in ‘Oded’ (an early season, fast melting flesh peach) and ‘September Snow’ (a late season, slow melting flesh peach). After harvest the fruits were divided into comparable lots and held at 20°C. The IAD and firmness were measured daily on a different lot. Two analytical methods were applied to the data. In the first, firmness decrease during shelf life was analyzed by nonlinear regression, using the IAD measured at harvest to determine the maturity of the fruit, and to estimate the biological shift factor (BSF) which is related to the biological age of fruit. In the second, a prediction equation for firmness was developed as a function of initial IAD, giving a table of the probability of a fruit to be less than 20 N on each day of shelf life. In both these methods the measurement of IAD at harvest could be used to separate fruit into different groups according to their rate of softening, and, therefore, potential shelf life.

Keywords: /Peach/ /Ripening/ /Non-Destructive/ 

PEAR


Abstract
The objective of this study was to determine the effect of colloidal chitin on the control of blue mold caused by Penicillium expansum in pear fruit. The results indicated that colloidal chitin at 0.1–1% reduced disease incidence of blue mold when P. expansum was inoculated 24 h after colloidal chitin treatment. Moreover, the co-treatment with colloidal chitin and P. expansum induced a significant increase in the activities of polyphenol oxidase and peroxidase, compared with those that were treated with colloidal chitin or inoculated with the pathogen alone. In addition, colloidal chitin had no adverse effect on pear fruit quality. These results suggest that the application of colloidal chitin may be an effective method to control postharvest fungal diseases, and its mechanisms of action may be associated with the elicitation of defense-related enzymes in fruit.

**Keywords:** /Pear/ /Blue Mold/ /Postharvest Disease/


**Abstract**

The fruits of semi-soft pear (*Pyrus communis*) cv. Punjab Beauty harvested at three different harvest dates were stored at 0–10°C temperature with 90–95% Relative Humidity for 30, 45, 60 and 75 days to assess the physical and chemical changes during storage. After every storage interval, the fruits were removed and kept at room temperature for 3 and 6 days to study the shelf life of fruits. Immature fruits always had the highest values of flesh firmness; optimum-mature fruits had the next and over-mature fruits the lowest at each corresponding sampling period during storage. The fruits harvested at optimum stage of maturity exhibited significantly (p<0.05) lower incidence of fruit softening and physiological loss in weight. These fruits retained excellent quality up to 60 days of storage in cool chamber with 3 days shelf life at ambient temperature. The fruits of first harvest date were incapable of developing acceptable flavor and quality upon ripening throughout the storage period. However, the fruits harvested at post-optimum stage recorded maximum physiological loss in weight and lesser firmness thus making them suitable for immediate consumption with no shelf life at ambient temperature storage.

**Keywords:** /Pear/ /Cold Storage/ /Harvesting/ /Quality/ /Shelf Life/ /Storage/

**PERSIMMON**


**Abstract**

Persimmon fruit’s top rot is a kind of physiological disease which damages fruit quality and product value at harvest. This study used ‘Gongcheng’ persimmon of Guangxi to test the influence of calcium and boron on top rot disorder. Results showed that disease incidence increased markedly in middle of October, supplement of calcium decreased the incidence significantly (7.7 and 12.2% lower than control/blank), while application of EGTA enhanced the incidence (32.4-39.7% higher than control/blank). Calcium supplement increased both calcium and boron content in fruits and leaves, boron supplement in part decreased the calcium in leaves, and application of EGTA totally reduced boron in fruits. The results showed certain relationship between persimmon’s top rot incidence and...
calcium and boron in fruits and leaves. Effective way to improve their calcium and boron content might be helpful to prevent the disorder.

**Keywords:** /Persimmon/ /Top Rot Disease/

**PINEAPPLE**


**Abstract**

Five maturity stages of ‘MD2’ pineapple fruit were determined for its antioxidant activity using 80% methanol and water extracts. The five stages of ‘MD2’ fruit maturity was based on peel colour with stage 1 = mature green, stage 2 = 25% yellow; stage 3 = 50% yellow, stage 4 = 75% yellow and stage 5 = 100% yellow. Three assays, 1,1-diphenyl-2-picrylhydrazyl (DPPH), 2,2’-azinobis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) and ferric-reducing antioxidant power (FRAP) were used to evaluate the antioxidant activity of extracts. The antioxidant activity of pineapple fruit determined by DPPH assay for both methanol and water extraction showed an increase of activity as maturity stages progressed, then decreased as fruit reached maturity stage 4 and 5. The pineapple fruit antioxidant activity using FRAP assay showed an increase from stage 1 to 3, and decrease from 4 to 5 for both methanol and water extraction. For the ABTS assay, the antioxidant activity of pineapple fruit increased significantly from stage 1 to 3, and decreased significantly as fruit reached maturity stage 4 in methanol extraction but no significance difference between stage 3 and 4 in water extraction. These results indicate that the maturity stages significantly affect antioxidant activity of ‘MD2’ pineapple fruit. The highest antioxidant activity was found in fruit at stage 3. In this study, 80% methanol was a better extraction solvent than water.

**Keywords:** /Pineapple/ /Maturity/


**Abstract**

The new low acid pineapple (*Ananas comusus* L.) hybrids developed for the fresh fruit market have become the preferred types and have expanded rapidly to supply the fresh fruit markets of the USA, Japan and Europe. The newer low acid hybrid cultivars present new challenges in pineapple production to and maintenance fruit quality. The challenges include natural flowering, which can significantly increase harvest costs and production losses, flesh translucency and too low acid levels, and recurrence of chilling injury. In this presentation, we will focus on the postharvest quality issue: translucency that is tied to both preharvest production practices and postharvest handling. Translucency is correlated with susceptibility to mechanical injury and nonpathogenic fungal growth on the broken peduncle both are of concern with marketers and consumers. Fruit translucency or water soaked appearance of the flesh is possible due to calcium nutrition, photosynthetate competition between the crown and the fruit during the initial period of crown growth, and fruit temperature. Postharvest chilling injury is still a problem especially as the decline in acidity at harvest seems to parallel a loss of ascorbic acid that can reduce the browning that following exposure to chilling temperatures. Transgenic lines
have been developed that though they do not stop chilling injury, they have down-regulated flesh browning enzymes. Cultivar and field management, such as fertilization and irrigation, developed for canning may not be the most appropriate for the production of low acid hybrids.

**Keywords:** /Pineapple/ /Chilling Injury/


**Abstract**

Natural preservation using biological agents such as probiotic lactic acid bacteria (LAB) has been singled out as among the emerging technologies where research should focus in order to develop safer and sustainable antimicrobial system. This study was conducted to determine the antimicrobial efficacy of probiotic LAB and the physicochemical and sensory qualities of fresh cut pineapple. Freshly harvested ripening ‘Queen’ pineapple fruits (about 25% shell yellowing) were obtained from a local plantation, peeled, and sliced as commercially practiced. Pure culture of Lb. plantarum at 109 CFU/ml was applied at 1-3% (v/w) as protective culture. Control treatments included 150 ppm chlorine and distilled water as 2-min dip. The product samples were packed in sterile resealable 50 μm-thick polyethylene bag and stored at 7-10°C for five days. Lb. plantarum at 2-3% inhibited aerobic bacteria, coliform and yeast and mold proliferation on pineapple. At 3%, Lb. plantarum reduced the microbial load by about 99% relative to water control after five days of cold storage. Probiotic LAB with 3% concentration had no significant effect on the physicochemical and sensory quality of fresh cut pineapple.

**Keywords:** /Pineapple/ /Fresh Cut/ /Postharvest/ /Quality/


**Abstract**

This study determined the antimicrobial efficacy of ascorbic and lactic acids on freshcut pineapple and evaluated the physicochemical and sensory qualities of the produce. Freshly harvested ripening ‘Queen’ pineapple fruits (about 25% shell yellowing) were obtained from a local plantation, peeled, and sliced as commercially practiced. Ascorbic and lactic acids were applied at 1.5-2.5% as 2 min dip, with 150 ppm chlorine and distilled water as 2 min dip as control. Product samples were packed in sterile resealable 50 μm-thick polyethylene bag and stored at 7-10°C for five days. Lactic acid was more effective than ascorbic acid in reducing aerobic and coliform bacteria as well as yeast and mold population. The antimicrobial activities of organic acids were comparable to chlorine after 3 h from treatment but were much better than chlorine after five days of storage. The physicochemical and sensory qualities of freshcut pineapple were not adversely affected by the treatments.

**Keywords:** /Pineapple/ /Postharvest/ /Quality/ /Fresh-Cut/


**Abstract**
Thailand is one of the world’s leading producers and exporters of processed pineapple products such as juice and canned products, but it lags behind in fresh fruit export. Main factor limiting exports of fresh pineapples is the development of internal browning. This physiological disorder could possibly be minimized by preharvest management of nutrients such as calcium, boron and silicon. This study was conducted to determine the effect of preharvest application calcium on internal breakdown and quality of pineapple fruit ‘Pattavia’ during storage at 10°C. Three months before harvest, pineapple fruits were sprayed every two weeks with calcium chloride at concentrations of 1.5 and 3.0 g/fruit; unsprayed fruit served as the control. Calcium at 1.5 g/fruit was found to reduce internal browning and translucent symptoms when compared to the control. It also reduced disease severity during storage. Total soluble solid from all treatments did not show any significant change during storage while titratable acidity slightly increased. Combined application of 1.5 g calcium chloride, 0.4% boron or 40 mM silicon further reduced internal browning. This result suggests the great potential of calcium application alone or in combination with boron and silicon as a preharvest component in the total management of internal breakdown and quality of pineapples after harvest.

**Keywords:** /Pineapple/ /Ananas comosus L./ /Fruit Quality/ /Physiological Disorder/
RH) starting at 6 WAT. Fruit also had a visual quality significantly better than other fruit at 9 and 12 WAT. While 1-MCP concentration did not affect granulation and decay, electrolyte leakage tended to be lower in treated fruit at 12 WAT. There was no consistent trend with TSS and TA as influenced by 1-MCP concentration. There was lower weight loss at 3, 6 and 9 WAT as well as lower granulation and higher TSS at 12 WAT when fruit were treated for 8 h. Cured ‘Magallanes’ pummelo had better quality at ambient when treated with 500 nl L⁻¹ 1-MCP for 8 h.

**Keywords:** Pummelo/ 1-methycyclopene/ Postharvest/ Quality/

**RAMBUTAN**


**Abstract**

Fruit quality of spinterned and non-spintered rambutan (Nephelium lappaceum Linn.) ‘Rongrien’ was compared. Spinterned (intact fruit) and nospintered (spinterns cut off) rambutan fruits were stored in ambient relative humidity (60-70%) at 25°C for four days. The changes of weight loss, total soluble solid (TSS), the ratio of TSS and titrable acid (TSS/TA) and peel color (L*, a* values and hue angle) were measured. Before storage, non-spintered fruits showed the higher L and a values than that of spintered fruits, but there were no differences in the other fruit qualities. During storage, the percent of weight loss both spintered and non-spintered fruits was the highest on day 4 of storage, and the spintered fruits had a trend to increase than that of non-spintered fruits. L*, a* values and hue angle of spintered or non-spintered fruits decreased by the storage time, but these color values were not different between spintered and non-spintered fruits. TSS and TSS/TA of both rambutan fruits were unchanged all the time. This research implies that the quality changes of rambutan during storage and shelf-life were not influenced by their spinterns. The study suggests that non-spintered rambutan fruits might be advantageous to prolong shelf-life by coating treatment and improve postharvest management compared to spintered fruits.

**Keywords:** Rambutan/ Storage/Spinsters/ Fruit Quality/

**RASPBERRY**


**Abstract**

Fruit of 9 genotypes of red raspberry (*Rubus idaeus* L.) were assessed for market-life when held at 1°C in air or controlled atmosphere (CA, 12.5 kPa CO₂/7.5 kPa O₂) with 95% RH over 2 harvest years. Fruit were assessed for firmness, soluble solids and titratable acids as well as sugar, acid and volatile composition immediately after harvest. Groups of 16 fruit were individually assessed for decay and physiological breakdown (PB) every 2–3 d. The lag period of decay and PB development was the number of days until the first sign of deterioration. The rate of fruit loss was the linear rate of deterioration following the lag period. CA storage strongly suppressed fruit decay of all genotypes with the lag period extended to >45 d compared to 19–29 d for genotypes stored in air. The lag of PB, which was expressed
as juice leakage, ranged from 6 to 28 d in air-stored fruit and increased by -1.0 to 9.7 d in CA-stored fruit depending on genotype. Loss of fruit firmness was similar during storage in air and CA. Sugar content of fruit averaged 51% fructose, 26% glucose and 23% sucrose. Acids averaged 75% citric, 13% quinic, 6% succinic and 6% malic. Both sugar and acid composition varied among genotypes. The majority of fruit volatiles were composed of C13 norisoprenoids, which totaled 65–93% of the total volatile content. Monoterpenes comprised 2.6–20.2% of total volatiles. Firmness prior to storage correlated with resistance to PB during storage. The development of PB negatively correlated with C13 norisoprenoid content, while correlations with other volatiles had no significant correlation with decay or PB development. No relationship between sugar and acid content and fruit storage-life was found.

Keywords: /Raspberry/ /Quality/ /Decay/ /Firmness/ /Storage/

**SANTOL**


Abstract

The postharvest quality of waxed and cling-wrapped ‘Bangkok’ santol [Sandoricum koetjape (Burm. f.) Merr.] fruit held under ambient room conditions (24±0.63°C, 86±4% RH) was evaluated. At 13 DAT (days after treatment), wrapped fruit still had a good visual quality (rating of 5.4) with the least weight loss of 5.4%. The lightness, L*, and yellowness, b*, of the skin color of santol were likewise better maintained. Consistently better visual quality and reduced decay were observed in wrapped fruit compared with the control and waxed fruit particularly at the later periods of holding where the latter fruit were fair to poor. As in control, early fruit shriveling was evident in waxed fruit while the onset was delayed in wrapped fruit. Aril pH tended to increase with time. Total soluble solids, firmness, and browning did not vary with treatment. Based on the results, the postharvest quality of ‘Bangkok’ santol fruit held at ambient is better maintained by using cling wrap film.

Keywords: /Santol/ /Postharvest/ /Quality/ /Waxing/

**STARFRUIT**


Abstract

The objectives of this research were to study 1) the effects of chitosan concentrations, 2) packaging volumes, and 3) interaction between chitosan concentrations and packaging volumes on starfruit shelf-life and qualities under passive and active packaging technologies. A completely randomized design with two factors was assigned onto passive- and active-packagings. The first factor was surface coating of 0, 1, 2, and 3% chitosan. The second factor was chamber volume of 1.5, 3.0, 4.0, and 5.0 L, assigned onto passive- and active-packagings. This research showed that (1) under both active- and passive-packagings, chitosan statistically did not affect starfruit shelf-life compared to the control. However, plastic wrapping which is a common starfruit postharvest handling in the markets has to be avoided due to environmental reasons, 3% chitosan proofed to be the best treatment; (2)
Postharvest handling of starfruit with 3% chitosan under active packaging showed the best treatment by prolonging starfruit shelf-life and less weight loss with other fruit qualities unaffected; (3) Postharvest handling with 3% chitosan applied as a surface coating was suited for starfruits under a passive packaging of any volumes.

**Keywords:** /Starfruit/ /Chitosan/ /Shelf-Life/ /Quality/ /Packaging/

**STRAWBERRY**


**Abstract**

The effect of the UV-B radiation on the latent fungi infection in strawberry fruit, on plant production and on physico-chemical quality parameters of strawberry fruits during postharvest preservation was investigated. The experiments were conducted under field conditions in two seasons during 2012. The different UV-B treatments were: Ambient solar UV-B; Ambient solar UV-B reduced by 80% [UV-B(−)] and Ambient solar UV-B supplemented with UV-B lamps [UV-B(+)]. An electronic modulation system was used to keep the increase on UV-B rate at constant levels throughout the day. The parameters evaluated were latent infection of fungi, dry matter of plants, physico-chemical attributes, color of the peel and fruit production. There was no significant difference among the irradiation treatments regarding the incidence of *Rhizopus nigricans* and *Botrytis cinerea* at both seasons. Independently on the season and the irradiation treatment, the incidence of *R. nigricans* was higher than the *B. cinerea* and this was considered the main postharvest fungi in the experiment. The incidence of *Colletotrichum acutatum* was limited to second season and it was higher on UV-B(+) treatment. The irradiation treatments had no influence on the dry matter, fruit production, the physico-chemical parameters and color. A strong correlation of both average temperature and precipitation on the incidence of *R. nigricans* and *B. cinerea* three weeks before harvesting was detected on both seasons using the Pearson correlation coefficients. The incidence of *R. nigricans* was positively correlated with precipitation and negatively correlated with average temperature. The inverse has been observed for B. cinerea. The results indicate that, on environmental conditions of a higher UV-B radiation, the probability of spoilage of strawberry fruit would be increased only by C. *acutatum* incidence.

**Keywords:** /Strawberry/ /Radiation/ /Fruit Quality/

**TABLE GRAPES**


**Abstract**

Mealybug species such as long-tailed mealybug *Pseudococcus longispinus* (Targioni-Tozzetti) and citrus mealybug *Planococcus citri* (Risso) are sometimes present in Australian table grapes and grapefruits at harvest. Quarantine restrictions in some markets require fruit to be fumigated with methyl bromide at or above 21°C before shipment. Problems of phytotoxicity and reduced shelf life make this treatment unattractive. Alternative treatments, fumigation with ethyl formate and carbon
dioxide for 2.5 h in export cartons in simulated cool down from 15 to 10°C were found to control mealybugs without damaging the produce. These treatments satisfy “generally regarded as safe” criteria and are suitable for use in grapes and grapefruits produced under organic certification.

**Keywords:** /Table Grapes/ /Quarantine/

**TANGERINE**


**Abstract**

The reduction of Ethion, a frequently used pesticide in tangerine production was carried out by titanium dioxide (TiO\(_2\)) photocatalysis with different concentrations (5, 10, 20, 40 and 60 mg ml\(^{-1}\)) and exposure times (0, 15, 30, 45 and 60 min) under a UV lamp. To evaluate the oxidation potential by TiO\(_2\) photocatalysis effects, iodine liberation from the reaction was measured. Iodine yield, which increased with increasing concentration and reaction time, was highest at 60 mg ml\(^{-1}\) of TiO\(_2\) and longest at 60-min exposure time. TiO\(_2\) photocatalysis at the highest concentration was the most effective (60%) at reducing Ethion concentration with the highest rate of degradation occurring within the first 15 min (60%). When treated for a longer exposure time, the reduction of Ethion became insignificant.

**Keywords:** /Tangerine/ /Pesticide/

**WATERMELON**


**Abstract**

Biochar is increasingly used in agriculture as soil conditioner as well as to contribute to carbon sequestration and mitigate global warming. In a replicated field experiment, watermelon ‘Sweet 16’ (Citrullus lanatus) plants with or without grafting to squash ‘Suprema’ (Cucurbita maxima) rootstock were applied with 1.0- 2.0 L of biochar (carbonized ricehull) per plant. Fruits were harvested at commercial maturity and subjected to physicochemical and sensory analysis. Fruit color and rind thickness, acidity, and sensory appearance, juiciness, crunchiness and mouth feel were not significantly affected by biochar application regardless of grafting treatment. Soluble solids content markedly increased in response to biochar application; this contributed to higher sweetness than that of fruit from biochar-free plants. Higher amount of biochar was needed to increase soluble solids content of fruit from non-grafted plants compared to that of grafted plants. Biochar application increased the potassium content of the plants.

**Keywords:** /Watermelon/

Abstract

Grafting technique is increasingly used in vegetable production to improve resistance to adverse soil conditions and increase yield and quality. This study investigated the effects of grafting watermelon ‘Sweet 16’ (*Citrullus lanatus*) onto rootstock of either squash ‘Suprema’ (*Cucurbita maxima*) or bottle gourd ‘Tambuli’ (*Lagenaria siceraria*). Grafted watermelons produced considerable number of hermaphrodite flowers; this was absent in ungrafted watermelons. However, grafting reduced fruit yield, particularly when bottle gourd was used as rootstock. This was attributed to partial blocking of water, nutrients, and other growth factors across the callus bridge at the graft union. Fruit from grafted plants had much higher total soluble solids (TSS) content than those from ungrafted plants. Squash was a better rootstock than bottle gourd in increasing TSS content. TSS correlated with sensory sweetness.

**Keywords:** Watermelon / Fruit Quality/

**YOUNG COCONUT**


**Abstract**

The objectives of this study were to investigate the effect of maturity stages (6, 7, 8 and 9 months after flowering) on quality and chemical compositions of coconut kernel (*Cocos nucifera* L.). Proximate analysis and quality parameters (press yield, pH and hardness) of the kernel were evaluated. The results showed that coconut kernel at different maturity stages were not significantly different in protein (3.6-4.5%), fat (45.7-52.5%), ash (2.5-3.0%), press yield (43.1-47.2%) and pH (6.5- 6.9) ($p>0.05$) while moisture content, total carbohydrate, crude fiber and hardness were significantly different at $p≤0.05$. The 6-months coconut kernel contained the highest moisture content (58.5%), and total carbohydrate (18.7%). The 9-months coconut kernel contained the highest crude fiber (34.7%) and hardness (126.9 N). Sugars profiles were also determined using gas chromatography techniques with external standards. The results showed that major sugar detected in coconut kernel was sucrose and sorbitol while minor sugar was fructose, glucose and myo-inositol. The 7-months coconut kernel contained the highest sucrose, sorbitol, fructose, glucose and myo-inositol content at 22.7 and 2.5 g/100 g, and 83.7, 102.2 and 125.2 mg/100 g, respectively. The 6-months coconut kernel contained the highest galactose content 62.4 mg/100 g and trace amount of raffinose was also detected in coconut kernel (0.003-0.03 mg/100 g).

**Keywords:** Young coconut / Maturity / Quality/

**VEGETABLES**

**BITTERGOURD**


**Abstract**
This study was conducted to determine the shelf-life of bitter gourd coated with phytochemical extracts and analyze the free radical scavenging activity (FRSA) of the coated fruits upon storage at ambient. Galaxy hybrid bitter gourd fruits were coated with phytochemical extracts derived from cat’s whisker (Orthosiphon aristatus (Blume) L.), hagimit (Ficus minahasse Miq.), and turmeric (Curcuma longa L.). Extraction of phytochemicals was accomplished using distilled water, ethanol, and acetic acid solvents through a percolation method. A 1% solution was used and applied by dipping fruit for 1 min. FRSA was determined using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay with Trolox as standard. The results showed that the shelf-life of bittergourd was significantly enhanced by the phytochemical coatings. The ethanolic cat’s whisker and the ethanolic hagimit extracts best enhanced the shelf-life of bittergourd fruits for 7.5 days and 7 days, respectively. The untreated bittergourd and those treated by the extracting solvents showed a shelf-life of about four to five days. This significant difference in the shelf-life of coated fruits can spell a big leap on the profitability of the bittergourd. The freshly harvested mature fruit of bitter gourd has an average free radical scavenging activity of 337.8 μmol TE/100 gram sample. The result also showed that the free radical scavenging activity of the vegetable fruit diminished upon storage under ambient condition. However, it is clear that the shelf-life of bittergourd was enhanced and the drastic decline of its free radical scavenging activity was incrementally reduced by phytochemical coatings.

Keywords: /Bittergourd/ /Coating/

BROCCOLI


Abstract

The effects of combined treatments with hot water (HW) and sodium chlorite (SC) solution on microbial reduction, quality and antioxidant properties of fresh-cut broccoli florets were determined during storage at low temperature. Broccoli heads were cut into individual florets using sterile knives. Fresh-cut broccoli florets were then pre-washed with cold tap water (8-10°C) for 2 min, dipped in HW at 45°C for 1 min, cooled with tap water, and then dipped in 300 ppm of SC solution for 1 min at ambient temperature (25±2°C). The samples were packed in clamshell plastic boxes and stored at 4±1°C for 12 days. Results revealed that washing with either HW combined SC solution or pre-washing with tap water reduced microbial loads. The combined treatments had a powerful effect by decreasing the total aerobic bacteria, coliforms, and yeasts and molds during storage within the ranges of 1.31-1.97, 1.06- 1.33 and 1.08-1.96 log CFU.g⁻¹, respectively, which are lower than in non-treated samples. The combined treatment had no negative effects on color quality (lightness and hue angle), ascorbic acid, and total chlorophyll content throughout the storage period, while the antioxidant capacity (DPPH) was maintained. These results indicate that the combined treatment may have potential to reduce microbial contamination and preserve the antioxidant capacity of fresh-cut broccoli.

Keywords: /Broccoli/ /Minimally Processed/ /Fresh-Cut/
CABBAGE


Abstract

This study determined the presence of *E. coli* and *Salmonella* spp. in Chinese cabbage under different cultivation practices employing the most probable number (MPN). Seven treatments were used: T₀ – no weeding, T₁ – weeding twice and applying manure fertilizer, T₂ – weeding twice, applying compost fertilizer, and rice straw mulching about 5 cm, T₃ – weeding twice, applying compost fertilizer, and applying herbicide once, T₄ – no weeding but with rice straw mulching 5 cm, T₅ – weeding twice, applying compost fertilizer, mulching, and applying herbicide once, and T₆ – weeding once and rice straw mulching 7.5 cm. Soil samples before planting from all treatments were found to be contaminated with *E. coli* except T₅ and with *Salmonella* spp. except T₁ and T₃. Soil samples collected after harvest were detected with *E. coli* in T₁, T₅, T₆ and with *Salmonella* spp. in all treatments. Water samples were negative of the two microorganisms as a closed containment system was used. Vegetable was detected with *E. coli* but only in T₃, T₅ and T₆ while *Salmonella* spp. was found in all treatments. Soil, manure, human and animals were the sources of contamination.

Keywords: /Cabbage/ /Chinese Cabbage/ /Microbial Contamination/ /Food Safety/

CUCUMBER


Abstract

Enhancing quality and food safety of freshcut products is a great challenge in the fresh produce industry as consumers are increasingly patronizing ready-to-eat fruits and vegetables. This study was conducted to evaluate the antimicrobial efficacy of ascorbic and lactic acids and evaluate the physicochemical and sensory qualities of cucumber slices. Ascorbic and lactic acids were applied at 1.5-2.5% as 2- min dip, with 150 ppm chlorine and distilled water as control treatments. The product samples were packed in sterile resealable 50 μm-thick polyethylene bag and stored at 7-10°C for five days. Both organic acids were ineffective against bacterial load but markedly reduced yeast and mold population, with 1.5% level being sufficient. In most cases, the antimicrobial activities of organic acids were either comparable to or better than that of chlorine. These antimicrobial agents had also no remarkable effects on the physicochemical and sensory qualities after five days of cold storage.

Keywords: /Cucumber/ /Cucumis sativus/ /Postharvest/ /Quality/

EGGPLANT

Abstract

Organic farming is increasingly adopted to add value to vegetable production and marketing. This study was conducted to determine the effects of preharvest vermicompost application and postharvest modified atmosphere packaging (MAP) on the quality, shelf life and total antioxidant activity of eggplant fruits. Vermicompost was applied at 2.5 kg/plant at planting and compared with inorganic fertilizer application (farmer’s practice) and without fertilizer applied. Harvested fruits were individually packed in 0.02 mm thick low density polyethylene (PE) bag or 0.05 mm thick polypropylene (PP) bag and stored at ambient; unpacked fruit served as control. Fertilizer application using vermicompost or inorganic material reduced weight loss and shrivelling of the fruit. Modified atmosphere packaging (MAP) was very effective in delaying shrivelling, reducing weight loss, improving visual quality, and extending shelf life of fruits. Fruit antioxidant activity was generally higher with vermicompost application than with chemical fertilizer application. Fruit browning, respiration rate and decay incidence did not differ with treatment after seven days of ambient storage.

Keywords: /Eggplant/ /Modified Atmosphere Packaging/ /Postharvest/ /Quality/


Abstract

The study was conducted to evaluate the shelf-life of harvested eggplant coated with phytochemical extracts and to assess the free radical scavenging activity (FRSA) of the coated fruits upon storage. ‘Morena’ hybrid eggplant fruits were coated with phytochemical extracts derived from cat’s whisker (Orthosiphon aristatus (Blume) L), hagimit (Ficus minahasse Miq.), and turmeric (Curcuma longa L.). The extraction of phytochemicals was accomplished using distilled water, ethanol, and acetic acid solvents. The concentration of the phytochemical extracts as coating solutions was set at 1% and the fruits were coated for a dipping time of 1 minute only. FRSA was determined using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay with Trolox as the standard. The results showed that the shelf-life of eggplant was significantly enhanced by the phytochemical coatings. The acetic acid turmeric and ethanolic cat’s whisker extracts best enhanced the shelf-life of eggplant fruits for eight and 7.7 days, respectively. The untreated eggplants and those treated by the extracting solvents showed a shelf-life of about four days only. This significant difference in the shelf-life of coated fruits can spell a big leap on the profitability of the said vegetable. The freshly harvested mature fruit of eggplant has an average free radical scavenging activity of 338.2 μmol TE/100 g sample.

Keywords: /Eggplant/ /Shelf Life/Phytochemical Coatings/

LETTUCE


Abstract:

Lettuce (Lactuca sativa L.) is a high-value leafy vegetable that can be produced under aggregate hydroponics system. The study was conducted to determine the responses of ‘Iceberg’ lettuce to
application of novel organic nutrient solution derived from A. pintoi leaves, G. sepium leaves and Musa sp. peel solution. The plants were grown under aggregate hydroponics system in a protected structure. They were applied with the organic solution with or without inorganic salts. The commercial hydroponic alternative to Peter’s hydrosol solution served as control. The novel organic nutrient solution alone produced the highest yield and best quality lettuce. This indicates that the novel organic solution can be used as a good nutrient source for the production of lettuce in soilless culture.

Keywords: /Lettuce/ /Iceberg Lettuce/ / Lactuca sativa L./ /Quality/

MUSHROOM


Abstract

The study examined the in vitro antimicrobial and the complement/macrophage stimulating effects of a hot water extract from mycelium of the oyster mushroom Pleurotus sp. The extract activated the microbial autolytic system of eight strains: seven autolyzing strains with intensity values ($I_s$) ranging from 2.7% in Candida sp. To 36.1% in Saccharomyces cerevisiae, while autolysis was of 1.8% in one non-autolyzing strain (Bacillus cereus). The activation of the alternative pathway of the complement (APC) was dose and time dependent as judged by the lysis of rabbit red blood cells. Two main polysaccharide fractions of the extract significantly bind human immunoglobulin G (IgG) which could result in activation of the classical pathway of the complement (CPC). The extract (5–100 μg/well) enhanced the acid phosphatase activity in murine peritoneal macrophages to 133–184% compared to controls. The findings introduce a novel “bifunctional” approach (antimicrobial-immunomodulatory) to the nutraceutical potential of the Pleurotus hot-water mycelial extract. Industrial relevance: At present, between 80% and 85% of all edible-medicinal mushroom products are derived from the fruiting bodies and only 15% are based on extracts from mycelia. The present study suggests that not only Pleurotus mushrooms but also their mycelia may be a good renewable and easily accessible resource for developing functional foods/nutraceuticals or even pharmaceutical agents with antimicrobial and immunomodulatory effects. Additionally, the application of the extract as food bio ingredient could represent an innovative strategy for preventing and/or reducing the negative effects of food microbial spoilage. Hence the hot-water extract from mycelia of the oyster mushroom Pleurotus sp. is considerably relevant to the food and pharmaceutical industries.

Keywords: /Mushroom/ /Antimicrobial Activity/ /Nutraceutical/

PAKCHOI


Abstract
Pakchoi [Brassica rapa ssp. chinensis (L.) Hanelt] is a popular high-value leafy vegetable in the Philippines that could be grown hydroponically. This study was conducted to evaluate the responses of pakchoi to organic nutrient solution under aggregate hydroponics system. The organic nutrient solution was a novel preparation from A. pintoi leaves, G. sepium leaves and Musa sp. peel. It was applied to the plants with or without added inorganic salts. The commercial hydroponics nutrient solution was included as control. The plants were found to be more responsive to commercial hydroponics’ nutrient solution than to organic nutrient solutions. This was expressed in terms of leaf size, plant weight and total yield.

**Keywords:** /Pakchoi/Leafy Vegetable/ /Hydroponics/ /Quality/

**SPINACH**

de Frias, Atilio, J. et.al. 2015. Improving spinach quality and reducing energy costs by retrofitting retail open refrigerated cases with door. Postharvest Biol. & Technol. 110: 114 - 120.

**Abstract**

The prevalence of open-refrigerated display cases is ubiquitous in retail supermarkets, even in the face of the non-uniform temperature conditions present in these cases. In this paper, the temperature variations (ΔT) of packaged ready-to-eat baby spinach were evaluated for an open display case and a display case with glass doors, in order to assess the advantages of this physical barrier in minimizing ΔT and decay rate, and improving the visual quality of the samples after four days of storage. The two 3.66 m display cases were installed in the same room and conditions were constant at 21°C and 60–70% of relative humidity, with a thermostat setting for both cases set at 0.6°C. Results showed that the display case with doors significantly improved temperature uniformity and compliance with the U.S. Food and Drug Administration (FDA) Food Code recommendation of 5°C or less to prevent microbial pathogen growth in packaged leafy greens. Only 1% of the temperature readings over four days in the case with doors were non-compliant with the FDA Food Code, while 24% of the readings in the open case were non-compliant; mostly recorded by the front positions of the case. The lower temperatures and ΔT of the case with doors were consistent with the higher visual quality scores (P < 0.001) for the baby spinach samples recorded by trained panelists, based on a 9-point hedonic scale, at 7.2 and 6.6 for the case with doors and the open case, respectively. Differences in decay rate were significant (P < 0.001) by the front of the case, with mean values of 8.8% for the open case and 5.5% for the case with doors. Furthermore, operational energy costs were 69% less than the open display case and the cost of door retrofits can be recouped in less than two years by energy savings alone.

**Keywords:** /Spinach/ /Quality/

**TOMATO**


**Abstract**

Tomato fruit at the breaker stage were stored in two types of modified atmosphere packs (MAP-1 using polyethylene film and MAP-2, food wrapping film with polystyrene foam as practiced in
supermarkets) or in the open at 15°C or ambient. The fruit lost weight and ripened with storage based on changes in color a* values, titratable acidity (TA) and total soluble solids (TSS). Of the storage treatments, keeping fruit in food wrapping film with polystyrene foam at 15°C was the most effective in reducing weight loss and retarding ripening. The fruit eventually turned full red and maintained higher TA than that of the other treatments. Fruit stored in the open at ambient had the highest weight loss and shortest shelf life due to rapid ripening.

**Keywords:** /Tomato/ /Solanum lycopersicum/ /Postharvest/ /Quality/ /Packaging/ /Storage/ /Shelf-Life/ Castellanos, Diego A. et.al. 2015. Modelling the evolution of O₂ and CO₂ concentrations in MAP of a fresh product application to tomato. J. Food Eng. 168: 84 – 95.

**Abstract**

Through modelling of modified atmosphere packaging (MAP) systems, it is possible to predict evolution of gas composition in the package headspace and ease the selection of favorable packaging conditions for the optimal preservation of the packaged product. However, it is necessary to adequately describe the associated phenomena: product respiration and gas exchange through the package. In this work, a mathematical model was established to describe the evolution of the O₂ and CO₂ concentrations in a MAP system, considering packages with perforations and of variable volume and validated for tomato. Respiration rates of the packed product were described using Michaelis–Menten kinetics while gas exchange through the packaging films and the perforations was described with Fick equations of diffusion. The influence of temperature in these kinetics was considered to follow Arrhenius’ law. In order to validate the model proposed, an experiment was conducted packaging tomatoes in PP, PLA and LDPE perforated bags for 12 days at 13.5 °C. The prediction capacity of the model agrees with the experimental data, with a coefficient of determination (R²) equal to 0.89–0.98 for O₂ concentrations and 0.83–0.97 for CO₂ concentrations. The model was used to define the required package surface area or perforation diameter to achieve a specific O₂ concentration in the headspace.

**Keywords:** /Tomato/ /Packaging/ /Modified Atmosphere Packaging/


**Abstract**

In this work, immature green tomatoes were exposed to different doses of either PL or UV-C irradiation (1-8 J/cm²) and then stored at 20±2°C for up to 21 days. The effects of light treatments on the physical-chemical properties and antioxidant compounds of tomato fruits, were evaluated during storage and compared with those of untreated samples. Results indicated that, at the energy doses investigated, pH and °Brix of all samples were not affected by light treatments and storage period. The skin colour of untreated and treated fruits turned from green to red during storage and no appreciable influence of the light treatments was detected. However, the content of lycopene, total carotenoid, phenolic compounds and antioxidant activity of light treated samples increased during storage up to, respectively, 6.2, 2.5, 1.3, and 1.5-fold, when compared with the untreated samples. These results demonstrated that PL and UV-C irradiation have the potential to enhance the accumulation of health-
beneficial food compounds in tomatoes without significant changes of the physical properties of the product during storage.

**Keywords:** /Tomato/ /Post-harvest/ /Storage/


**Abstract**

The effect of UV-C treatments (0.32, 0.97, 2.56, 4.16 and 4.83 kJ.m$^{-2}$ at 254 nm) on the physical-chemical properties [colour, texture, total phenolic content (TPC), weight loss (WL)], and mesophylic counts of whole tomato, was evaluated during 15 days at 10 °C. During storage, the Ctr samples acquired faster red colour than all UV-C samples (higher a* and lower h* values). Comparing texture of Ctr and UV-C samples at 15th storage day, an increase of 9 and 8 % on firmness of treated samples at low UV-C intensities (0.32 and 0.97 kJ.m$^{-2}$, respectively) was observed. At the end of the storage, Ctr samples showed ca. 4 Log10 of mesophylic load, and the samples treated at 0.97 and 4.83 kJ.m$^{-2}$ revealed the lowest microbial load (1.9 and 3.2 Log10, respectively). These results indicate that UV-C radiation, at an appropriate dose, combined with low storage temperature (10°C) are an effective method to preserve the postharvest life of tomato, without adversely affecting quality parameters.

**Keywords:** /Tomato/ /UV-C radiation/ /Tomato/ /Quality/ /Storage/


**Abstract**

Refrigeration is the main postharvest technology for increasing shelf life of horticultural products; however, it has a detrimental effect on tomato (*Solanum lycopersicum*) flavor. The objective of the present study was to evaluate the effect of refrigerated storage at 12.5°C on tomato aroma profile, sensory quality, and consumer’s flavor perception. C6 and 3-methyl butanol volatile levels were determined by GC. Enzyme activity and gene expression of alcohol dehydrogenase (ADH) and lipoxygenase (LOX), involved in the oxylipin biosynthetic pathway were also determined. A quantitative descriptive analysis (QDA) and a consumer test were carried out to compare the effect of refrigerated storage on flavor perception at 10°C and 12.5°C to non-refrigerated tomatoes. Refrigerated storage at 12.5°C caused a general decrease on total aroma volatiles that were detected from 9 d onward. A lack of accumulation of hexanal, hexanol and cis-3-hexenol, a transitory increase of trans-2-hexenol and the accumulation of 3-methyl butanol were observed. Trained judges perceived these changes as an increase of the musty/damp descriptor which was higher in fruit stored at 10 C than at 12.5°C. Tomatoes stored at 10°C were the less preferred by consumers perceived as less fresh and with the presence of off odors. Consumers did not find differences between tomato stored at 12.5°C and 20°C. Results showed that tomato fruit stored at 12.5°C maintain a better sensory quality than those stored at 10°C.

**Keywords:** /Tomato/ /Refrigeration/ /Sensory Evaluation/

Abstract

Wood vinegar (pyroligneous acid or pyrolysis oil), a liquid produced through natural carbonization of plant refuse, has several potential benefits to agriculture and human health and has been reported to improve harvest quality and shelf life of fruits and vegetables but may also promote ethylene production. In this study, we used wood vinegar derived from citrus tree refuse and corn stover and applied on breaker tomato ‘Diamante’ at dilutions with distilled water of 1:10 or 1:5 (10 and 20%) as postharvest dip for 3 min before storage at ambient (25-30°C) or refrigerated condition (8-10°C) for 2 weeks. No remarkable effects of wood vinegar on quality changes were noted except in terms of weight loss and reddening (a* values). Fruit stored at ambient and pretreated with 10-20% wood vinegar from corn stover or 20% wood vinegar from citrus refuse had lower weight loss than the control (water dip). Fruit reddening was favoured at low temperature than at ambient. Sensory quality, soluble solids content, acidity and fruit decay incidence were not affected.

Keywords: /Tomato/ /Solanum lycopersicum Mill./ /Quality/


Abstract

This research evaluated the shelf life and free radical scavenging activity (FRSA) of tomato ‘Diamante Max’ harvested at different stages of maturity, coated with aqueous, ethanol and acetic acid extracts of cat’s whisker (Orthosiphon aristatus (Blume) Miq.), turmeric (Curcuma longa L.), hagimit (Ficus minahasse Miq.), and starfruit (Averrhoa carambola L.), and stored at ambient (24-32°C, 65-88% RH). The aqueous hagimit extract (AQHE) best enhanced the shelf-life of mature-green fruit (97 days), ethanolic hagimit extract (ETHE) for breaker fruit (83 days), and acetic acid star fruit extract (AASE) for red fruit (31 days). FRSA, measure by the 1,1-diphenyl-2-picrylhydrazyl (DPPH) method, was highest in red fruit. The phytochemical extracts increased FRSA in mature green and breaker fruit during storage.

Keywords: /Tomato / /Solanum lycopersicum Mill. // Shelf Life/


Abstract

Assuring food safety is vital to cater to consumer demand for quality and safe produce and improve the market competitiveness of fruit and vegetable industries. In an attempt to develop safe antimicrobial treatment, this study was conducted to optimize the application of probiotic Lactobacillus plantarum and evaluate the physicochemical and sensory qualities of tomato and cucumber slices. Lb. Plantarum at 109 CFU/ml was applied at 1-3% (v/w) as protective culture. Control treatments included 150 ppm chlorine and distilled water as 2-min dip. The product samples were packed in sterile resealable 50 μm-thick polyethylene bag and stored at 7-10°C for five days. Lb. plantarum inhibited coliform and aerobic bacteria and was consistently most effective at 3% on both tomato and cucumber.
It also reduced yeast and mold population but only in tomato. In most cases, the antimicrobial activities of Lb. *plantarum* were either comparable to or better than that of chlorine. Lb. *plantarum* had no remarkable effects on the physicochemical and sensory qualities of the fresh cut products after five days of cold storage.

**Keywords**: /Tomato/ /Solanum lycopersicum/ /Postharvest/ /Quality/

**YARDOING BEAN**


**Abstract**

Yardlong bean is widely produced in Thailand and consumers prefer tender pods. Organic yardlong bean is now highly demanded in export markets. Little is known about the postharvest quality changes of organic produce. Usually, quality decreases rapidly after harvest due to pod swelling and softening. This study was conducted to determine the relationship between storage temperature and cultivation system on pod quality. The conventional and organic yardlong bean pods were stored at 4 and 13°C. Storage at 4°C efficiently slowed losses in weight, ascorbic acid content and total chlorophyll content. Pod swelling increased gradually during storage at 13°C. The organic produce stored at 4°C had delayed pod swelling and higher chlorophyll content compared with that of conventional produce. The results indicated that storage at 4°C maintained quality better than at 13°C and that organic produce had better quality than conventional produce.

**Keywords**: /Yardlong Bean/ /Cold Storage/ /Shelf Life/

**HERBS AND SPICES**

**CHILLI PEPPER**


**Abstract**

A study was conducted at AVRDC-The World Vegetable Center, Tainan, Taiwan, to evaluate yield and quality of different chilli pepper genotypes grown under drip and furrow irrigation systems, identify multi-disease resistant genotypes; and compare the shelf-life of the fruits at different storage temperatures. The experiments were laid-out in a split plot arranged in a randomized complete block design with irrigation system as the main plot and the chili pepper cultivars/hybrids as the sub-plot. Based on a total of six harvests, drip irrigated plants produced greater number and heavier fruits which resulted in 10% higher fruit yield compared to furrow irrigated plants. Drip irrigated plants were also less infected with powdery mildew. Among the genotypes, ‘CCA321’, an AVRDC bred, out yielded the Indonesian cultivars by as much as 43% but was the most susceptible to powdery mildew. Among Indonesian cultivars, ‘Jatilaba’ was the highest yielder and ‘KR-Bogor’ was the most susceptible to powdery mildew. ‘Laris’ F1 hybrid displayed the least infection by powdery mildew. All genotypes were
resistant to phytophthora, Gemini virus, and anthracnose. Capsaicin content was found to be higher in drip irrigated plants by about 12% more than that in furrow irrigated plants. ‘CCA321’ gave higher capsaicin content than other genotypes. In terms of shelf-life, both irrigation systems gave comparable results. Among genotypes, ‘CCA321’ had the longest shelf-life of 10 days at ambient while ‘Jatilaba’ had the longest shelf life of 40 days at 4-6°C.

**Keywords:** /Chilli Pepper/ /Powdery Mildew/ /Fruit Quality/

**GARLIC**


**Abstract**

Garlic is usually stored for long periods after harvesting until they are marketed. The main problem during storage is sprouting. Maleic hydrazide (MH) had been used for sprout inhibition but at present it is prohibited due to health hazards. This study was conducted to find alternative treatments to MH for sprouting inhibition. Pre-harvest treatment using protocatechuic acids (PCA) at 0, 500, 1,000, 1,500, 2,000 and 2,500 ppm, and abscisic acids (ABA) at 0, 5, 10, 15, 20 and 25 ppm, compared with 2,500 ppm MH, as spray to leaves three weeks before harvest. Harvested garlic cloves were cured at ambient conditions and then stored at 5°C, 90-95% RH or ambient (30°C), 70-75% RH. Results showed that 2,500 ppm PCA, 25 ppm ABA and 2,500 ppm MH and storage at ambient gave the longest storage life of 300 days, with 30% of the stored cloves being sprout-free. This result indicates the potential of PCA and ABA as MH substitute.

**Keywords:** /Garlic/ /Storage/

**HERB**


**Abstract**

Alkaline herb (*Gynura procumbens*) is one of the medicinal plants with many health benefits. This study was conducted to determine the effects of growing medium supplemented with vermicast on the quality and chlorophyll content of the herb. Three growing media were used; garden soil alone (control), 25% vermicast + 75% garden soil, and 50% vermicast + 50% garden soil. Prior to planting of cuttings in the different growing media, alpha naphthalene acetic acid and vermitea were applied to promote rooting. Growing media with vermicast increased the leaf surface area and chlorophyll content compared to the control plants. Plants grown in medium with 50% vermicast had the highest chlorophyll content of 171.12 ml/g fresh weight with highest visual quality rating. Green color quality and lightness (*L* *) were not significantly affected.

**Keywords:** /Herb/
SWEET BASIL


Abstract

The effect of drying methods on color quality of sweet basil (Ocimum basilicum Linn.) was investigated under the condition of hot air drying (HAD) at 55, 65 and 75°C and microwave drying (MWD) at 335, 400 and 545 W. These drying methods reduced the moisture content of sweet basil from 5.23 to 0.064 g water/g dry matter. The dried samples were then analyzed in the CIE (L*-a*-b*) color system, the total color difference (ΔE) of rehydrated dried sweet basil and the Chroma values. The lightness (L*) values of dried sweet basil with HAD at 55, 65 and 75°C and MWD at 335, 400 and 545 W were 25.72, 27.25, 24.74 and 30.82, 28.47, and 29.35, respectively. a* values were 0.48, 0.53, 0.94 (red color) and -3.55, -3.54, -3.52 (green color), respectively. Total color difference (ΔE) of rehydrated dried sweet basil using HAD and MWD method gave average values of 6.62, 7.17, 7.53 and 6.53, 5.57, and 5.67, respectively. Chroma values were 4.48, 2.59, 2.56 and 8.48, 9.60, and 10.05, respectively. Fresh sweet basil and rehydrated dried sweet basil of MWD showed better quality than HAD. In addition, the specific energy consumption of MWD was 13.64-17.36 times lower than HAD.

Keywords: /Sweet Basil/ /Quality/

TUBERS AND ROOTCROPS

BURDOCK


Abstract:

Fresh-cut burdock is susceptible to browning. The effect of short-term carbon dioxide (CO₂) treatment on inhibiting browning of fresh-cut burdock during storage at 2–4°C was investigated. The results showed that the burdock slices treated with CO₂ for 4 h, 6 h and 8 h exhibited better visual quality during 8 d storage, compared with the ones treated with air. CO₂ treatment for 6 h on the fresh-cut burdock slices reduced the respiration rate, lowered the activity of PPO and PAL, and the content of total phenolic compounds. On the other hand, CO₂ treatment increased the content of H₂O₂, enhanced the activity of CAT, POD, and SOD, maintained DPPH inhibition rate and decreased the content of MDA. The results indicate that the short-term pure CO₂ treatment can extend the shelf life of fresh-cut burdock by inhibiting its browning and improving its quality.

Keywords: /Burdock/ /Fresh-Cut/ /Browning/

GINGER

Le, Duy P. Smith, M., et. al. 2015. Pythiogeton ramosum, a new pathogen of soft rot disease of ginger (Zingiber officinale) at high temperatures in Australia Crop Prot. 77: 9 - 17
Abstract

Pythium soft rot (PSR) of ginger caused by a number of Pythium species is of the most concern worldwide. In Australia, PSR outbreaks associated with Pythium myriotylum was recorded in 2007. Our recent pathogenicity tests in Petri dishes conducted on ginger rhizomes and pot trials on ginger plants showed that Pythiogeton (Py.) ramosum, an uncommon studied oomycete in Pythiaceae, was also pathogenic to ginger at high temperature (30-35°C). Ginger sticks excised from the rhizomes were colonised by Py. ramosum which caused soft rot and browning lesions. Ginger plants inoculated with Py. ramosum showed initial symptoms of wilting and leave yellowing, which were indistinguishable from those of Pythium soft rot of ginger, at 10 days after inoculation. In addition, morphological and phylogenetic studies indicated that isolates of Py. ramosum were quite variable and our isolates obtained from soft rot ginger were divided into two groups based on these variations. This is also for the first time Py. ramosum is reported as a pathogen on ginger at high temperatures.

Keywords: /Ginger/ /Soft Rot/

SWEET POTATO


Abstract

The use of clean planting materials is a good agricultural practice to improve crop yield, quality and food safety. This is of particular importance for asexually propagated crops such as root crops. Sweet potato (Ipomoea batatas L.), cassava (Manihot esculenta Crantz) and yam (Dioscorea alata L.) are usually propagated using vine cuttings, stem cuttings and tuber slices, respectively; as such, pathogen load accumulates and is passed on from one generation to the next. The systemic presence of pathogens within the plant has no visible symptom except for depressed vigor and yield which is usually misdiagnosed resulting in unnecessary use of additional farm inputs such as pesticides and fertilizers. In an attempt to produce clean planting materials, several ex vitro and in vitro methods were tested; among these methods, the serial application of greenhouse preconditioning, thermotherapy, and meristem culture was established to be the best technique. Virus indexing tests confirmed the disease-free nature of the plantlets which were then mass propagated for field evaluation in comparison to conventional propagules. Plants produced from clean propagules remarkably outperformed those from conventional propagules as they had better field performance and higher yields than the latter. It is strongly recommended that Good Agricultural Practice (GAP) for root crops and other asexually propagated crops should integrate the use of clean planting materials.

Keywords: /Sweet Potato/


Abstract

Salinity and low temperature are the main limiting factors for sweet potato (Ipomoea batatas) growth and agricultural productivity. Various studies have shown that plant NHX-type antiporter plays a
crucial role in regulating plant tolerance to salt stress by intracellular Na\(^+\) compartmentalization. The *Arabidopsis thaliana* AtNHX1 gene that encodes a vacuolar Na\(^+\)/H\(^+\) antiporter was introduced into the sweet potato cultivar Xushu-22 by *Agrobacterium*-mediated transformation to confer abiotic stress tolerance. Stable insertion of AtNHX1 into the sweet potato genome and its expression was confirmed by Southern blot and reverse transcription-polymerase chain reaction (RT-PCR). A remarkably higher Na\(^+\)/H\(^+\) exchange activity of tonoplast membrane from transgenic sweet potato lines (NOE) in comparison with wild-type (WT) plants confirmed the vacuolar antiporter function in mediating Na\(^+\)/H\(^+\) exchange. Under salt stress, NOE plants accumulated higher Na\(^+\) and K\(^+\) levels in their tissues compared with WT plants, maintaining high K\(^+\)/Na\(^+\) ratios. Consequently, NOE plants showed enhanced protection against cell damage due to the increased proline accumulation, preserved cell membrane integrity, enhanced reactive oxygen species (ROS) scavenging (e.g. increased superoxide dismutase activity), and reduced H\(_2\)O\(_2\) and malondialdehyde (MDA) production. Moreover, the transgenic plants showed improved cold tolerance through multiple mechanisms of action, revealing the first molecular evidence for NHX1 function in cold response. The transgenic plants showed better biomass production and root yield under stressful conditions. These findings demonstrate that overexpressing AtNHX1 in sweet potato renders the crop tolerant to both salt and cold stresses, providing a greater capacity for the use of AtNHX1 in improving crop performance under combined abiotic stress conditions.

**Keywords:** /Sweet Potato/  
**YACON**


**Abstract**

To control enzymatic browning in minimally processed yacon (*Smallanthus sonchifolius*), strategies combining anti-browning agents and modified atmosphere were investigated. Yacon slices were immersed in anti-browning agent solutions—sodium metabisulfite (0.5 %), L-cysteine (0.5 %), or the acids lactic (1 %), malic (1 %), succinic (1 %), ethylene diaminetetra acetic (EDTA; 1 %), ascorbic (3 %), citric (3 %) or tartaric (3 %), or a control (0.5 % de sugar)—for 5 min, then packaged with air or modified atmosphere (N\(_2\)) and stored at 5 °C. Sensory and physical-chemical (soluble solids, phenolic content, peroxidase activity, pH, color, instrumental texture, and mass variation) analyses were performed. For a given anti-browning agent, any significant difference was not found between yacon slices stored under air or N\(_2\). However, when comparing the different antibrowning agents, only ascorbic, citric, and tartaric acids were effective enzymatic browning inhibitors without significantly changing typical sensory attributes of yacon. Among them, tartaric acid is not often reported in literature for controlling enzymatic browning in vegetal products, contrarily to the two others.

**Keywords:** /Yacon/ /Sensory Quality/ /Enzymatic Browning/ /Minimally Processed/ /Modified Atmosphere/

**ORNAMENTALS**

**ANTHURIUM**

**Abstract**

The optimum temperature storage of anthurium flowers is 12.5–20°C because they are very sensitive to chilling injury (CI). CI is associated with the loss of membrane integrity which can be aligned to phenolic oxidation due to polyphenol oxidase (PPO) activity, the enzyme responsible for tissue browning. The increment of phenylalanine ammonia-lyase (PAL) activity, the enzyme responsible for phenols accumulation, in response to chilling stress has been considered as defense mechanism to chilling stress. In this study, the effects of 0, 1, 5, 10, 15 and 20 mM γ-aminobutyric acid (GABA) treatment applied by preharvest spraying or postharvest stem-end dipping (15 min at 20°C) on CI of anthurium flowers (cv. Sirion) stored at 4°C for 21 days was investigated. CI symptoms were accompanied by spathe browning and increase in electrolyte leakage as well as malondialdehyde (MDA) content. GABA treatment at 1 and 5 mM by pre and postharvest treatment, respectively, delayed spathe browning and increases in electrolyte leakage and MDA accumulation. The GABA treated anthurium cut flowers exhibited significantly higher PAL enzyme activity, associated with lower PPO activity. Higher PAL enzyme activity in anthurium cut flowers treated with GABA coincided with higher total phenol accumulation and higher DPPH scavenging activity than control flowers during storage at 4°C for 21 days. Also, proline content in anthurium cut flowers treated with GABA was significantly higher than control flowers during storage. These results suggest that GABA treatment can be used as a useful technology for enhancing tolerance of anthurium cut flowers to postharvest chilling injury by increasing total phenol and proline accumulation and decreasing MDA content, and thus maintaining membrane integrity.

**Keywords:** Anthurium / Chilling Injury / Postharvest


**Abstract**

Anthurium bacterial blight caused by **Xanthomonas axonopodis pv. dieffenbachiae** (**Xad**) is an important and destructive disease worldwide, and no effective technique has been developed for its control. Detection of infection (latent) in anthurium plants is critical to evaluate disease progress and strengthening management to avoid a serious epidemic in the fields. In this paper, we presented a novel molecular method to detect **Xad** in anthurium using loop-mediated isothermal amplification (LAMP) technique (**Xad-LAMP**). The **Xad-LAMP** reaction could be finished by incubating at 61–65 °C for 1 h, and the amplificons were confirmed through gel electrophoresis, HpaII enzyme analysis, and visually inspected using SYBR Green I/calcein stain and lateral flow dipstick (LFD) assay. The specificity of **Xad-LAMP** primers set was widely validated on **Xad** and nontarget strains. In sensitivity testing, **Xad-LAMP** allowed detection as low as 1–10 f. pure genome DNA or 104 CFU/ml cells, 10–100 times more sensitive than conventional PCR. In addition, combining with the optimized DNA extraction, **Xad-LAMP** detections were successfully performed on both latent and disease samples, derived from artificially and naturally infected plants respectively. In all, this study provided a promising and practical molecular tool for **Xad** detecting, will facilitate the forecasting and control of anthurium blight disease.
Keywords: Anthurium/ Bacterial Blight/

CARNATION


Abstract

We searched for new chemicals which modify flower opening and senescence using cut carnation flowers as a model ornamental, and found three chemicals with such activities; xyloglucan oligosaccharides (XGO), palatinose and 2,4-pyridinedicarboxylic acid (PDCA). XGO enhanced flower opening, probably by acting as a substrate for xyloglucan endo transglycosylase and causing enhanced slippage of cellulose microfibrils, promoting expansion growth of petal cells. Palatinose did so probably by supplying glucose and fructose after its hydrolysis by α-glucosidase. PDCA prolonged flower vase life by acting as a competitive inhibitor of ACC oxidase with respect to ascorbate, resulting in reduced ethylene production.

Keywords: Carnation/ Senescence/

CUTFLOWER


Abstract

In this study, effects of ethanol and1-methylcyclopropene (1-MCP) were investigated on the senescence of cut Narcissus tazetta var. chinensis Roem. to prolong the vase life safely and cost-effectively. Ethylene treatment at 500 μl L-1 for 24 h significantly shortened the vase life of both florets and spikes, showing that it is ethylene sensitive. Gaseous 1-MCP treatment at 1 μl L-1 was effective in extending the vase life of florets but not the spikes. Ethanol treatment with 0.1% holding solution was significantly effective in delaying the senescence of the florets and extend the vase life of both the florets and spikes of the cut flowers.

Keywords: Cutflower/ Ethylene/ Senescence/

TORCH GINGER


Abstract

Separate experiments determined the vase life and some postharvest characteristics of torch ginger inflorescences as influenced by harvest maturity stage (25, 50, 75, and 100%) and 1-methylcyclopropene (0, 100, 500, 1000 nl L^{-1} for 6 h). The various stages can each be characterized by the number of layers of involucral bracts, flexing of involucral bracts, appearance of cone (floral bracts),
presence of true florets and days to reach the stage. The vase life of torch ginger inflorescences was terminated when involucral and floral bract browning, wilting and reduced visual quality became distinct; and when true florets senesced. Vase life was longest at 75% and shortest at 25 and 100% opened stages. Water uptake was highest in fully opened torch gingers. 1-Methylcyclopropene did not prolong vase life but tended to hasten the appearance of the true florets.

**Keywords:** /Torch ginger/ /1-methylcyclopropene/ /Vase Life/


**Abstract**

Torch ginger (*Etlingera elatior*) is a native plant in Malaysia that is commonly used in culinary. The use of torch ginger inflorescence as cut flower is new in Malaysia and studies only emphasized as medicinal plant. The aim of this study was to examine the cellular structure of torch ginger inflorescence in relation to its potential to be used as cut flower. Cross section of the upper part of peduncle which held the inflorescence and basal parts which is near to soil surface was examined using light microscope. The outermost layer of inflorescence bract was observed under scanning electron microscope. The upper and basal parts of peduncle were made up of two spirals sheaths and core part. The vascular bundles at the basal part of peduncle were heavily lignified with thickened cell walls. In contrast, a minimal lignification of vascular bundles was found in upper part of peduncle. Besides, starch granules can be found abundantly at the outer zone of core of peduncle and its density decreased as cells moved towards inner core of peduncle. A high density of opened-stomata were scattered on the surface of torch ginger bracts which implied severe water loss via transpiration has occurred in bracts. The findings of this study have provided a clear picture of the inflorescence morphology which further could be used to develop this plant as cut flower.

**Keywords:** /Torch Ginger/ /Cutflower/

**TUBEROSE**


**Abstract**

The tuberose, *Polianthes tuberosa* L., is in the family Agavaceae. Its scent is very sweet and is used in perfumery as a source of essential oil and aroma compound. Therefore, the objective of this study was to investigate the emission profile of volatile compounds in different floral developing stages and diurnal times of the day to find the best condition for volatile releasing patterns in tuberose flowers. The flowers were divided into three stages, bud, half-full bloom and full bloom, and incubated in a small vial (25 ml) for 30 min at 25°C. The chemical composition of the tuberose was analyzed by gas chromatography-mass spectrometry (GC-MS) every 6 h (started at 9 am, 3 pm, 9 pm and 3 am) for one day using SPME fiber 65 μm, PDMS-DVB coating. The results showed that the main chemical components detected in fresh flowers were methyl benzoate, eucalyptol, methyl salicylate, and methyl antharilate in all stages of flowers. Isopropanoid and phenylpropanoid pathways were the main volatile biosynthesis in the flowers. The more mature the flower, the higher concentration of the volatile
compounds. Ester compounds produced highly in full bloom flowers and during night time. The quality and quantity of volatile compounds at 9 pm and 3 am were higher while the lowest amount of volatiles was found at 3 pm. The proper condition for volatile release in tuberose flowers was in full bloom flowers at 3 am.

**Keywords:** /Tuberose/