

**SELECTIVE DISSEMINATION OF INFORMATION
AS OF SEPTEMBER 2018**

AVOCADO

Gaona-Forero, A., Agudelo-Rodríguez, G., Herrera, A. O., & Castellanos, D. A. (2018). Modeling and simulation of an active packaging system with moisture adsorption for fresh produce. Application in 'Hass' avocado. *Food Packaging and Shelf Life*, 17, 187–195. <https://doi.org/10.1016/j.fpsl.2018.07.005>

Abstract

In an active packaging system, the control of moisture condensation can significantly reduce deterioration and loss of shelf life for fresh produce. In this study, an integrated mathematical model is proposed to represent the transport of water in an active packaging system with a moisture adsorber. For this, suitable equations were used to represent the different processes involved: a first-order kinetics and a Freundlich equilibrium equation were used to represent the adsorption from the active element. The product transpiration was represented by considering its heat of respiration and the difference in water concentration between the product and the packaging headspace surrounding it. Likewise, the differential equations of mass balance for O₂, CO₂, N₂ and water vapor were established for the active packaging. For the moisture adsorption, a mixture of sodium polyacrylate (SPA) and cotton in 'sachets' of porous vegetable paper (70% SPA w/w) was used as adsorber determining its capacity and rate of adsorption as a function of relative humidity and temperature. To validate the proposed model, 'Hass' avocado samples were stored in rigid perforated polyethylene terephthalate (PET) packages for 12 days at 12 °C. With the model it was possible to satisfactorily represent the accumulation of moisture in the package, the amount of water adsorbed by the adsorber and the weight loss of the packaged avocado fruits ($R^2 = 0.97-0.99$ for the different tests).

Keywords: /Fruit packaging/ /Moisture adsorber/ /Condensation/ /Transpiration/ /Persea americana Mill./

Mazhar, M., Joyce, D., Hofman, P., & Vu, N. (2018). Factors contributing to increased bruise expression in avocado (*Persea americana* M.) cv. 'Hass' fruit. *Postharvest Biology and Technology*, 143, 58–67. <https://doi.org/10.1016/j.postharvbio.2018.04.015>

Abstract

Mesocarp bruising is an important postharvest problem of avocado fruit. Bruise expression may be influenced by inherent fruit characteristics, and pre- and postharvest handling practices and conditions. In this supply chain focused study, the putative effects on avocado cv. 'Hass' bruise

expression and severity of fruit maturity, temporal duration before or after impact injury, fruit firmness, and fruit holding temperature were examined. Mesocarp bruising in ripening fruit decreased in a linear fashion with advancing fruit harvest maturity over 20 weeks. Bruise severity increased progressively in fruit kept for up to 5 weeks before impact injury and also for those kept for up to 7 days after injury. Hard green mature stage fruit did not express bruising at ≤ 100 cm drop height (~ 1.36 J energy absorbed). However, softening, firm ripe, and soft ripe stage fruit impacted from 50 cm (~ 0.8 J energy absorbed) developed progressively greater levels of bruising. Keeping fruit at temperatures of 2.5 °C and 5 °C as compared with 20 °C at the time of impact resulted in less bruise expression. Similarly, fruit kept at post-impact temperatures of 2.5 °C and 5 °C as compared with 7.5 °C, 10 °C, and 20 °C also resulted in less bruise expression. Fruit kept at 5 °C for the first 8 h after impact and then at 25 °C for 40 h developed less bruising than fruit kept at 25 °C for 8 h after impact and then at 5 °C for 40 h. Overall, it is proposed that harvesting fruit at $\geq 23\%$ dry matter concentration, passing them quickly through the supply chain such that bruising has less time to express, and keeping the fruit 'at' or 'below' 5 °C in the supply chain could reduce bruise expression levels in ripening 'Hass' avocado fruit.

Keywords: /Dry matter/ /Duration/ /Firmness/ /Maturity/ /Temperature/ /Time/

BANANA

Chotikakham, S., Vichaiya, T., Faiyue, B., Uthaibutra, J. and Saengnil, K. (2018). Exogenous hydrogen peroxide protects senescent spotting and oxidative membrane damage of 'Sucrier' banana fruit during storage. *Acta Horticulturae*, 1210, 123-130. doi: 10.17660/ActaHortic.2018.1210.17

Abstract

The purpose of this study was to investigate the potential of exogenous hydrogen peroxide (H₂O₂) to reduce peel spotting related to oxidative membrane damage in 'Sucrier' bananas stored at 25±1°C. Ripening bananas were dipped in 0 (control), 0.5 and 1.0% (v/v) H₂O₂ for 10 min, then they were packed in plastic trays and stored at 25±1°C with 75±5% relative humidity for 6 days. Changes in membrane damage, including malondialdehyde (MDA) and conjugated diene (CD) contents, lipoxygenase (LOX) activity and electrolyte leakage (EL), as well as total antioxidant capacity (TAC) using DPPH and ABTS assays and peel spotting score, were determined daily for 6 days. The results showed that membrane damage (indicated by MDA and CD contents, LOX activity and EL) increased during storage, coinciding with the increase in peel spotting. TAC increased gradually on the first 3 days and then decreased thereafter. Dipping bananas in H₂O₂ significantly reduced peel spotting and membrane damage as well as enhanced TAC when compared with the control during storage. The treatment of 1.0% (v/v) H₂O₂ was the most effective to protect spotting and membrane damage. These results suggest

that exogenous H₂O₂ could reduce senescent spotting by enhancing antioxidant capacity and reducing oxidative membrane damage in 'Sucrier' bananas during storage at room temperature.

Keywords: /Peel spotting/ /Oxidative damage/ /Lipid peroxidation/ /Antioxidant capacity/

Maunahan, M.V., Nuevo, P.A. and Resorez, J.M. (2018). The role of gender in maintaining quality and reducing postharvest losses: the case of 'Bungulan' (Musa genome AAA) bananas for export. *Acta Horticulturae*, 1210, 21-28. doi: 10.17660/ActaHortic.2018.1210.3

Abstract

'Bungulan' banana has found an export niche in Japan and is now gaining economic importance as means of income for smallholder farmers in the Philippines. However, huge postharvest losses due to mechanical damage are incurred along the value chain because of poor infrastructure and lack of awareness about proper handling. A case study was conducted to determine the role of gender, particularly the participation of men and women in maintaining quality and reducing losses of bananas during harvesting and other postharvest operations in selected production areas in Mindanao. Men were observed to perform heavy tasks and were involved in all activities from planting, fertilization, water management, crop protection, fruit care, deleafing, round weeding, harvesting, dehanding, hauling, loading and transport. Women performed deleafing and round weeding, and either assumed the responsibility of or assisted their husbands in planting, fertilizer application, watering plants and crop protection. Activities at the packing center such as quality inspection, sorting, trimming, cleaning, weighing and recording the number of acceptable bananas were done by women. Male workers, on the other hand, unloaded fruit, packed, and stacked and loaded the carton boxes for transport. The gender division of labor along the value chain shows that women generally take charge of evaluating quality of export of 'Bungulan' while men facilitate the product movement. Both adult men and women have distinct and shared roles in ensuring export quality and minimizing losses until bananas reach the market. Thus, women need to have equal access to training and refresher courses, and the latest information materials for them to be better equipped in performing their functions and responsibilities.

Keywords: /Postharvest, value chain/ /'Bungulan', banana/ /Loss reduction/ /Gender/ /Gender relations/

Nuevo, P.A., Maunahan, M.V. and Resorez, J.M. (2018). Minimizing losses in the postharvest handling of export 'Bungulan' (Musa genome AAA) banana grown by small farmers in the Philippines. *Acta Horticulturae*, 1210, 13-20. doi: 10.17660/ActaHortic.2018.1210.2

Abstract

In the Philippines, 'Bungulan' banana is an important source of income for smallholder farmers in the mountainous areas, and is now gaining economic importance next to the export 'Cavendish' and other popular cultivars such as 'Saba', 'Lakatan' and 'Latundan'. It has become an alternative source of livelihood for many displaced sugarcane workers, and has eventually found an export niche in Japan. There is an opportunity to ensure and sustain the marketable supply, and increase farmers' income by reducing postharvest losses from the farm to the packing center. A study was conducted to document the postharvest practices, determine the causes and extent of losses, and evaluate technical improvements. Postharvest handling operations were documented in four major production areas in Visayas and Mindanao, and packing center rejection was assessed. The critical points in the postharvest handling chain included hauling, dehanding, packaging and transport. Packing center rejects ranged from 13 to 26% depending on the area and postharvest operations. Compared to banana leaves, polyethylene (PE) foam provided better cushioning protection during hauling of dehanded fruit to the buying station and packing center in Lake Sebu, South Cotabato where the highest losses due to mechanical damage were recorded. Individual wrapping of banana hands with PE liners during bulk transport to the packing center also resulted in less bruises and cuts. The use of lining and cushioning materials during hauling and bulk transport can minimize losses and increase the supply of export-quality fruits.

Keywords: /Postharvest loss reduction/ /Handling chain/ /Bungulan', banana/ /Mechanical damage/ /Packaging/

Saengrayap, R., Rattanakaran, J. and Chaiwong, S. (2018). Maturity prediction of banana with different bunch cover materials using artificial neural networks. *Acta Horticulturae*, 1210, 213-220. doi: 10.17660/ActaHortic.2018.1210.30

Abstract

Banana production in the northern part of Thailand has grown rapidly in the past few years. Bunch cover is the common practice to prevent disease infection, damage of insects and thermal damage. Generally, the commercial bunch cover comprises several layers of the material, i.e., thin non-woven, paper, foam, and plastic sheet. Unfortunately, after harvesting, the excessive amount of the bunch cover materials cannot be reused and is always dumped as a landfill which might lead to environmental problems soon. In order to reduce waste, the recyclable non-woven based material (Tyvek) was proposed to be used as a new bunch cover material. The experiment was conducted at the banana orchard in Phaya Meng Rai District, Chiang Rai Province during December 2016-February 2017. Bananas were harvested at 15 weeks after inflorescence emergence. Image analysis was employed to analyze banana qualities, i.e., color and fruit roundness. The results showed that the temperature inside the bag played an important role for fruit maturity. The fruit weight, length, pulp/peel ratio and fruit

roundness of the commercial bunch cover were significantly greater than those of Tyvek bunch cover ($P>0.05$). As for the lightness of banana, the Tyvek bunch cover provided a significantly darker peel color ($P<0.05$) due to a greater amount light penetration intensity. In terms of maturity prediction, the predicting models were developed using artificial neural network. Temperature, bunch cover type, light intensity and hand location were assigned to be the inputs. On the other hands, hand weight, color, fruit length and peel/pulp ratio and fruit roundness were used as the outputs. The different model architectures, number of nodes, and learning functions were tested. The results showed that the developed 'Wardnet' with 3-hidden-layer provided the best prediction results with highest R^2 (0.97-0.98) and with lowest SE (0.01-0.04).

Keywords: /Artificial neural network modeling/ /Bunch cover/ /Banana/ /Image analysis/ /Maturity/

CARNATION FLOWER

Liu, J., Zhang, Z., Li, H., Lin, X., Lin, S., Joyce, D. C., & He, S. (2018). Alleviation of effects of exogenous ethylene on cut 'Master' carnation flowers with nano-silver and silver thiosulfate. *Postharvest Biology and Technology*, 143, 86–91. <https://doi.org/10.1016/j.postharvbio.2018.04.017>

Abstract

Postharvest treatment with nano-silver (NS) extends the longevity of many cut flowers, including carnation (*Dianthus caryophyllus* L.). Its beneficial effects are generally attributed to the inhibition of bacterial growth in basal stem-ends. However, Ag^+ ions released from NS are also potential blockers of ethylene action. In the present study, we investigated the efficacy of NS pulse treatment, compared with conventional silver thiosulfate (STS) treatment, for alleviation the effects of exogenous ethylene on cut standard 'Master' carnation flowers. Cut carnations exposed to 5 or 10 $\mu\text{L L}^{-1}$ ethylene for 12 h showed reduced vase life, inhibited flower opening, premature wilting, and petal discoloration, which markedly diminished their ornamental quality. A NS pulse treatment of 250 mg L^{-1} (2.3 mmol L^{-1}) for 1 h prior to ethylene exposure reduced the inhibited flower opening and, thereby, prolonged the vase life. These effects were comparatively inferior in terms of flower opening and vase life extension to those obtained with a 1.0 mmol L^{-1} STS pulse for 1 h. However, without exogenous ethylene NS treatment was nearly as effective as STS treatment for enhancing flower opening and extending vase life. NS treated cut carnation stems (exposed to exogenous ethylene or not) also maintained higher relative fresh weight during the vase period than those treated with STS. The Ag concentration in the stem-ends of the NS-treated cut carnations was higher than that in those of STS-treated stems, and was also higher than that in other tissues. Moreover, Ag provided by NS also reached the receptacles, calyxes, and petals. Overall, NS pulse treatments enhanced the ornamental quality and extending the vase life of cut 'Master' carnation flowers by antagonizing

the deleterious effects of ethylene and probably inhibiting the proliferation of bacteria at the cut stem-ends.

Keywords: /Cut carnation/ /*Dianthus caryophyllus* L./ /Ethylene/ /Flower opening/ /Nano-silver/ /Silver thiosulfate/

CAULIFLOWER

Madonna, M., Caleb, O. J., Sivakumar, D., & Mahajan, P. V. (2018). Understanding the physiological response of fresh-cut cauliflower for developing a suitable packaging system. *Food Packaging and Shelf Life*, 17, 179-186. Retrieved from <http://search.ebscohost.com/login.aspx?direct=true&db=edsbl&AN=vdc.100065878540.0x000001&site=eds-live>

Abstract

Wilting and decay are the general postharvest problems of fresh-cut cauliflower during marketing. The objectives of this study were; (i) to investigate the product physiological responses on transpiration and respiration rates (TR and RR) under different storage temperatures (1, 5, 10 and 15 °C) and relative humidity (RH) (60, 76, 86 and 96%), in order to design packages; and, (ii) to evaluate the impact of packaging design (using PeakFresh (PF), poly-propylene (PP), and NatureFlex (NF)) on the quality of fresh-cut cauliflower at 5 °C for 12 days. Based on the physiological responses, two packages were designed; package-1 (20NF; 20% NF + 80% PP) and package-2 (40NF; 40% NF + 60% PP), while PF (100% PF) and PP (100% PP) served as control. Mathematical model adequately predicted respiration rates as a function of storage time and fitted to the experimental data ($R^2 = 0.98$). The RR of fresh-cut cauliflower was significantly higher than that of the uncut cauliflower and was within the range of 120 and 77.5 mg/kg.h at 5 °C for fresh-cut and uncut cauliflower, respectively. Transpiration rate for fresh-cut cauliflower was lowest at 96% RH across all storage temperatures ($p \leq 0.05$). Optimal package was achieved as a function of fresh-cut cauliflower physiological responses. At the end of storage day 12 at 5 °C, optimized 20NF package had the best performance compared to other packages; gas composition was within the range of 5% O₂ and 10% CO₂, with 0% in-package water vapour condensation but at expense of 7% weight loss.

Keywords: /*Brassica oleracea* var. *L botrytis*/ /Respiration/ /Transpiration/ /Packaging design/ /Sensory properties/

CHERRY TOMATOES

Yingsanga, P. (2018). The relationship of physical characteristics and sweetness of cherry tomatoes. *Acta Horticulturae*, 1210, 193-198. doi:

10.17660/ActaHortic.2018.1210.27

Abstract

Fruit appearance is important for the customer who is used to assess the quality and taste of fresh product influencing the purchase decision. The objective of this research was to correlate physical quality and taste of cherry tomatoes fruit. Cherry tomatoes were obtained from a supermarket in Bangkok. The total soluble solids (TSS), color (L, a*, b* and hue value), weight, wide and length of fruits were measured. The relationship between TSS and color, weight, width and length were assessed using the Pearson correlation coefficient (r), the coefficient of determination (r²) and linear regression were expressed by Excel. Hue value had low correlation with TSS. Simultaneously, L, a*, b*, weight, width and length had very low correlation with TSS. This research showed that taste of tomatoes could not be judged by physical characteristics.

Keywords: /Appearance/ /Purchase decision/ /Total soluble solid/ /Color/ /Tomato/

CHINESE CABBAGE

Choi, H.J., Bae, Y.S., Hong, Y.P., Lee, J.S., Park, M.H. and Kim, J.G. (2018). Changes of quality characteristics during storage of Chinese cabbage by atmospheric non-thermal plasma treatment. *Acta Horticulturae*, 1210, 157-164. doi: 10.17660/ActaHortic.2018.1210.22

Abstract

Chinese cabbage (*Brassica rapa* L. ssp. *pekinensis*) is widely used in Korea and the main ingredient of kimchi. To retain the freshness of two different cultivars of Chinese cabbage harvested at spring or summer season, plasma treatment was applied for 2 h a day during storage at 2°C. Changes in weight loss, softening, decay rate, freshness and yellowing score were investigated during storage. The measured ozone concentration by plasma treatment was stabilized after 10 min and occurred on average 0.5 to 1 ppm during operation. Chinese cabbage treated with plasma had significantly lower decay rate during storage compared to the control, and higher freshness until the last storage day compared to the control. However, severe shriveling and slightly higher weight loss during storage time were shown. The yellowing score of Chinese cabbage treated with plasma had significantly low discoloration. These results indicate that plasma treatment seemed to be effective in controlling the softening, freshness, discoloration and decay rate.

Keywords: /Plasma/ /Storage/ /Decay rate/ /Quality/ /Freshness

CUCUMBER

Jia, B., Zheng, Q., Zuo, J., Gao, L., Wang, Q., Guan, W., & Shi, J. (2018). Application of postharvest putrescine treatment to maintain the quality and increase the activity of antioxidative enzyme of cucumber. *Scientia Horticulturae*, 239, 210–215. <https://doi.org/10.1016/j.scienta.2018.05.043>

Abstract

Cucumber is easy to decay caused by oxidative reactions and inactivation of enzymes during storage time. It is well-known that putrescine (PUT) can be used for prolonging the storage time of vegetables and fruits. The effects of PUT treatment on cucumber fruit have been investigated. PUT at 4.0 mM was applied to cucumber stored at 20 °C with 85–90% RH for 10 days. The results showed that the cucumber of PUT treatment had lower weight loss and malondialdehyde (MDA) content. It also inhibited the decrease of total soluble solid (TSS) and vitamin C content. The sensory quality including firmness and color was also enhanced by PUT treatment. Moreover, the activity of peroxidase (POD), ascorbate peroxidase (APX), catalase (CAT) in PUT treatment was improved during storage time. These results suggest that PUT treatment is a promising method to maintain the quality of cucumber fruit at the storage temperature of 20 °C.

Keywords: /Cucumber/ /Putrescine/ /Physiological indexes/ /Postharvest/ /Antioxidant enzyme/

DRAGON FRUIT

Uthairatanakij, A., Cholmaitri, C., Aiampa-or, S. and Jitareerat, P. (2018). Gamma irradiation as phytosanitary treatment for red flesh dragon fruit. *Acta Horticulturae*, 1210, 145-150. doi: 10.17660/ActaHortic.2018.1210.20

Abstract

Gamma irradiation is one of the most commonly used phytosanitary techniques for disinfection of product to control fruit flies. Tropical fruit requires gamma irradiation for export from Thailand to the US. However, gamma irradiation may affect fruit quality after treatment and during storage. The aim of this study was to determine the effect of gamma irradiated dragon fruit (pitaya red flesh) quality. Fruit were exposed to gamma ray at 400-600 Gy before storage at ambient conditions. Results showed that gamma irradiation did not affect either pulp or bract colour changes (L^* , a^* , b^* values and hue angle). In addition, the treatment had no effect on

total soluble solids content and fruit firmness during storage for 9 days. Thus, gamma irradiation can be used as phytosanitary treatment for dragon fruit export to the US.

Keywords: /Colour change/ /Firmness/ /Respiration/ /Ethylene production/

DURIAN

Kongtragoul, P. (2018). In vitro fungicidal effect of chitosan with different molecular weights on fungicide-resistant *Phytophthora* fruit rot on durian from the export market. *Acta Horticulturae*, 1210, 65-72. doi: 10.17660/ActaHortic.2018.1210.9

Abstract:

Fruit rots of durian were collected from the export market in Chumphon province, Thailand. The causal organism, *Phytophthora* spp. was isolated on PAR(PH)-V8 selective medium by tissue transplanting technique. Resistance to dimethomorph, fosetyl-AI, metalaxyl and mancozeb was detected from the mycelial growth on V8 agar amended with fungicide. Multiple fungicide resistant (Mu-FHR) and sensitive (Mu-FS) isolates are used to study the fungicidal effect of chitosan with different molecular weights. The low, medium and high molecular weight chitosan at 0 (control), 500, 1,000 and 2,000 ppm were evaluated for the development of Mu-FHR and Mu-FS isolates on mycelial growth by poisoned food technique and on sporangium production and zoospores release by culture disc technique. The results indicated that the fungicidal effect of three types of chitosan strengthened as the concentration of chitosan increased for mycelial and sporangium inhibition. However, all chitosan treatments were not significant in zoospores release.

Keywords: /Biocontrol/ /Postharvest disease/ /Fungicide resistant/

Youryon, P., Rattanaphon, J., Supapvanich, S. and Krairiksh, M. (2018). Physicochemical factors related to 'Monthong' durian fruit maturity. *Acta Horticulturae*, 1210, 165-170. doi: 10.17660/ActaHortic.2018.1210.23

Abstract

Heterogeneous maturation of durian fruit on the market is a main problem. The aim of this work was to investigate certain factors related to the maturity of 'Monthong' durian fruit. The durian fruit at immature, onset of maturation, onset of ripening, ripe and full ripe stages were harvested. Non-destructive factors such as specific gravity and total soluble solids (TSS) content of peduncle and destructive factors such as cut-fruit visual appearance, pulp dry weight, colour, TSS content and carotenoids content were monitored. Both specific gravity and TSS content of peduncle were increased until the onset of ripening stage and then remained

constant during ripening. The visual appearance showed the increase in pulp yellowness and space between pulp and peel which positively changed with the maturation increase. The pulp dry weight and b* value were increased whilst L* value was decreased as the ripening increased. The pulp TSS concentration was dramatically increased until full ripe and then remained constant. Carotenoids content of the pulp was also obviously increased from immature to the onset of ripening stage and it then remained constant. In conclusion, the decrease in specific gravity and increase in peduncle TSS concentration could be non-destructive factors indicating durian fruit ripening.

Keywords: /Durian fruit/ /Maturity/ /Specific gravity/ /Peduncle TSS/

FOOD QUALITY AND SAFETY

Rouphael, Y., & Kyriacou, M. C. (2018). Quality and safety of fresh fruits and vegetables at harvest. *Scientia Horticulturae*, 239, 78-79. <https://doi.org/10.1016/j.scienta.2018.05.006>

Description

Alongside the pressing issue of global food security, an imminent challenge for the world horticultural industry is the demand for higher quality fresh fruits and vegetables in a changing environment. Breeding efforts in the past few decades have heavily focused on improving yield, on imparting disease resistance to crops and extending the postharvest life of horticultural products, arguably at the expense of desirable sensory attributes, such as texture and flavor (Kyriacou and Rouphael, 2018). In recent years, interest in high quality fresh fruits and vegetables is on the rise, compelled by the growing interest of consumers, nutritionists and scientists in foods and diets that support health and longevity.

Keyword: /Food safety/ /Quality/ /Fresh fruits/ /Vegetables/

GUAVA

Ahmad, U., Purwanto, Y.A. and Cahyo, L.D. (2018). Study on measuring the ripeness level of the 'Crystal' guava fruit using NIR (near infrared) spectroscopy. *Acta Horticulturae*, 1210, 43-50. doi: 10.17660/ActaHortic.2018.1210.6

Abstract

'Crystal' guava is a cultivar of guava that is widely cultivated in Indonesia, recently. The crispy and sweet flesh of a mature 'Crystal' guava gives a different taste from some other cultivars of guava already known in the country. However, measurement of 'Crystal' guava maturity is still done manually, so that the results are less accurate and less objective. This study aims to study

and determine the correlation of 'Crystal' guava ripeness parameters obtained by NIR spectroscopy as one of many common non-destructive methods with those obtained by destructive method. The destructive ripeness parameters tested were flesh hardness, total soluble solids, and moisture content. The sample used was 180 'Crystal' guava fruits with three different ripeness levels, 60 fruits for each level of ripeness. The equipment for spectroscopy measurement was N-500 spectrometer NIRFlex solids optical fiber at wavelengths of 1000-2500 nm. The NIR spectra data pre-processing was employed to improve the accuracy of prediction of the flesh hardness, total soluble solids, and moisture content, as three ripeness parameters using the NIR spectra. The results showed that the spectra could be used to predict total soluble solids and moisture content as the ripeness parameters with good accuracy, while they were less viable to predict the flesh hardness as the other ripeness parameter of the guava.

Keywords: /Guava/ /NIR/ /Total soluble solids/ /Moisture/ /Flesh hardness/

Antonio Augusto Marques Rodrigues, Silvanda de Melo Silva, Ana Lima Dantas, Antonio Fernando da Silva, Leonardo da Silva Santos, & Dayse das Neves Moreira. (2018). Physiology and postharvest conservation of 'Paluma' guava under coatings using Jack fruit seed-based starch. *Revista Brasileira de Fruticultura*, 40 (2), 352. <https://doi.org/10.1590/0100-29452018352>

Abstract

The aim of this work was to evaluate the effect of jackfruit seed starch-based (S) coatings, added to chitosan and alginate on the physiology and maintenance of quality of cold stored 'Paluma' guavas, followed by transfer to the room condition. The design was the completely randomized, in a 4x2 factorial scheme, in 4 replications, with 4 coatings (dispersion of S - 4%; S 2% + chitosan - 2% (SC); S - 2% + alginate - 2% (SA); and the uncoated control), in 2 environments (refrigerated (10 ± 2 °C e $80\pm 2\%$ RH) with transfer to room condition (25 ± 3 °C e $75\pm 4\%$ HR)), on the 16th and 20th day of cold storage. The SC and SA coatings were efficient in reducing the respiratory rate in fruits during 10 days at room condition. The SC coating delayed fruit ripening, and maintained firmness and color, with intention of purchasing and appearance higher than the limit of acceptance for another 6 days, following transferring to room condition, at the 16th day of refrigeration.

Subject Terms: /Artocarpus heterophyllus/ /Fruit waste/ /Chitosan/ /Sodium alginate/ /Fruit quality/ /Plant culture/

LONGAN

Intarasit, S., Chotikakham, S., Chumyam, A., Uthaibutra, J. and Saengnil, K. (2018). Protective effects of chlorine dioxide solution on postharvest pericarp browning and

oxidative damage of longan fruit. *Acta Horticulturae*, 1210, 177-184. doi: 10.17660/ActaHortic.2018.1210.25

Abstract

Occurrence of postharvest pericarp browning and rapid decay limits the postharvest storage life of longan fruit. The purpose of this study was to evaluate the efficiency of aqueous chlorine dioxide (ClO₂) in reducing pericarp browning related to oxidative membrane damage in longan fruit. Longan fruits were dipped in 0 (control), 25, 50 and 100 mg L⁻¹ ClO₂ solutions for 10 min. After dipping, the fruits were packed in cardboard boxes and stored at 25±1°C with a relative humidity of 82±5% for 5 days. The results showed that the fruits treated with ClO₂ solutions had lower browning index (BI) than that of the control group during storage for 4 days, although no significant difference was found on day 5. Fruits treated with ClO₂ solutions maintained BI of below 3 for 2-3 days depending on concentrations, whereas the control maintained this index for only one day. Reactive oxygen species (ROS) levels, including hydrogen peroxide (H₂O₂) and hydroxyl radical (OH), and membrane damage, as measured by electrolyte leakage (EL), lipoxygenase (LOX) activity, malondialdehyde (MDA) and conjugated diene (CD) contents in pericarp were significantly lower in the ClO₂-treated group than those in the control group and correlated with BI. ClO₂ solution at concentrations of 50 and 100 mg L⁻¹ was the most effective in reducing pericarp browning and oxidative damage. Results of the study indicated that aqueous ClO₂ could reduce ROS free radical and oxidative membrane damage, resulting in reducing pericarp browning of harvested longan fruits during storage for 4 days.

Keywords: /Longan/ /Pericarp browning/ /Chlorine dioxide solution/ /Oxidative damage/ /ROS/

Li, T., Wu, Q., Zhou, Y., Yun, Z., Duan, X., & Jiang, Y. (2018). I-Cysteine hydrochloride delays senescence of harvested longan fruit in relation to modification of redox status. *Postharvest Biology and Technology*, 143, 35–42. <https://doi.org/10.1016/j.postharvbio.2018.04.011>

Abstract

Longan fruit has a limited postharvest life due to aril breakdown, a typical senescence characteristics. In this study, effects of l-cysteine hydrochloride (LCH) on senescence of harvested longan fruit associated with modification of redox status were investigated. Application of LCH delayed aril breakdown and maintained fruit quality, accompanied by reduced H₂O₂ accumulation and alleviated protein oxidation. Furthermore, expression of several genes related to elimination of H₂O₂ and peroxide, APX and GST, regeneration of glutathione and ascorbic acid, GR and DHAR, were up-regulated by LCH. Moreover, LCH treatment well maintained the expression level of three oxidized-protein repair-related genes,

Msr, MsrA5 and MsrB2. Additionally, LCH treatment inhibited expression of EGase, PLD and LOX. EGase was associated with degradation of cell wall, while PLD and LOX were associated with degradation of cell membrane. Overall, these findings suggested that LCH treatment enhanced anti-oxidant and oxidized-protein repair capacities, and maintained higher reducing state, which contributed to reducing oxidative damage and, thereby, delayed senescence of longan fruit.

Keywords: /LonganSenescence-Cysteine hydrochloride/ /Reactive oxygen species (ROS)/ /Protein oxidation/ /Anti-oxidant/

LICHI FRUIT

Zhang, D., Xu, X., Zhang, Z., Jiang, G., Feng, L., Duan, X., & Jiang, Y. (2018). 6-Benzylaminopurine improves the quality of harvested litchi fruit. *Postharvest Biology and Technology*, 143, 137–142. <https://doi.org/10.1016/j.postharvbio.2018.05.002>

Abstract

6-Benzylaminopurine (BAP), a synthetic cytokinin, can elicit plant growth and development by stimulating cell division. In this study, the effects of BAP on decay and pericarp browning of harvested litchi fruit in relation to phenolics and ROS metabolism were investigated. Application of BAP significantly inhibited decay incidence of harvested litchi, associated with a direct inhibition on *Peronophythora litchii*, the major pathogenic fungi. In addition, BAP-treated fruit showed significantly lower pericarp browning, accompanied by reduced PPO activity, increased PAL activity and higher contents of anthocyanin and total phenolic compounds. Moreover, BAP reduced H₂O₂ accumulation and lipid peroxidation, which may account for browning inhibition to an extent. Furthermore, higher activities of SOD, CAT and APX and DPPH radical scavenging capacity in BAP-treated fruit possibly benefited reducing ROS accumulation and lipid peroxidation. Overall, application of BAP showed great potential to control decay and browning and extend shelf life of harvested litchi.

Keywords: /6-Benzylaminopurine/ /Litchi/ /Decay/ /Peronophythora litchii/ /Pericarp browning/ /Reactive oxygen species/

LILY

Wei, F., Wang, J., Huang, S., & Gong, B. (2018). Effect of pre-harvest application of promalin and 1-MCP on preservation of cut lily and its relationship to energy metabolism. *Scientia Horticulturae*, 239, 1–8. <https://doi.org/10.1016/j.scienta.2018.04.071>

Abstract

Lilies (*Lilium* spp.) are in demand worldwide because of their superior commercial and ornamental value. To develop new and practical preservation technologies, effects of pre-harvest treatment of Promalin (a.i. 1.8% each of 6-benzyladenine (6-BA) and gibberellic acid (GA4 + 7)) and 1-Methylcyclopropene (1-MCP) on cut lily under cold storage were investigated. Oriental lily 'Sorbonne' was selected for this study. The field plants at coloring stage were sprayed with 25 mg L⁻¹ Promalin, 30 µL L⁻¹ 1-MCP additionally, their combination (1-MCP + Promalin) was also tested. Deionized water was used as control. The flower stems were harvested 24 h later and stored at 3 ± 1 °C. Preservation effect and physiological changes, e.g. inflorescence life, flower life, opening rate, dry weight loss rate, respiration rate, ethylene production rate, malondialdehyde (MDA) content, lipoxygenase (LOX) activity, energy metabolism related indexes including adenosine triphosphate (ATP) content, energy charge, activities of ATP synthase (ATPase), succinate dehydrogenase (SDH), cytochrome oxidase (CCO) and Ca²⁺-ATPase were determined. The results showed that 1-MCP or Promalin treatment extended the vase life of stored cut lilies and inhibited the decline of the dry weight of petals, reduced respiration rate, ethylene production rate, LOX activity and the accumulation of MDA. They also maintained the activity of ATPase, Ca²⁺-ATPase, SDH, CCO, ATP content and energy charge of cut lilies at a higher level than control. 1-MCP + Promalin exhibited an additive effect. Combination treatment maintained the flower opening ability as high as 89.3% after five-week storage, control merely maintained it till 3 weeks. These data indicate growth regulators (e.g. 1-MCP or Promalin) can extend the storage life of cut lily 'Sorbonne' through cutting down respiration consumption and manipulation of energy balance.

Keywords: /Cut lily/ /Pre-harvest treatment/ /Promalin/ /1-MCP/ /Energy metabolism/

MANGO

Boonyaritthongchai, P., Supapvanich, S., Wongaree, C., Uthairatanakij, A., Jitareerat, P., Pongprasert, N. and Kaewmanee, N. (2018). Application of natural extracts from pineapple juice on inhibiting browning symptom of fresh-cut 'Nam dok mai' mango. *Acta Horticulturae*, 1210, 235-240. doi: 10.17660/ActaHortic.2018.1210.33

Abstract

As a preliminary experiment, the effects of pineapple juice extracted from core and pulp on the browning process occurring in fresh-cut 'Nam Dok Mai' mango was investigated. We found that pineapple juice extracted from core effectively reduced surface browning of fresh-cut mango. So, efficiency of 50% pineapple core juice on physical and physiological changes of fresh cut mango was determined. Fresh-cut mangos were dipped into 50% pineapple juice extracted from core, then exposed to air drying and packing in a clamshell plastic box and stored at 4°C. The results showed that mango treated with pineapple juice had lower browning value than

untreated mango. The brightness expressed as L* values of treated fruit was higher than the control. The L* value significantly decreased with time in the control sample held in air, but not in those treated with pineapple juice. The change in the L* value was due to slight browning on the surface of the fresh-cut mango. Browning intensity value of treated fresh-cut mango was lower than the untreated sample during storage. Polyphenol oxidase (PPO) and phenylalanine ammonia-lyase (PAL) activity of the control sample was significantly higher than in the pineapple juice-treated mango. Furthermore, fresh cut mango treated with pineapple juice dipping also exhibited significantly higher levels of total phenolic content than untreated fresh-cut mango. Firmness of pineapple juice-treated mango was higher than the untreated sample while the control sample revealed a high amount of malondialdehyde (MDA) compared to pineapple juice-treated fresh-cut mango. Sensory evaluation proved the efficacy of pineapple juice dipping by maintaining the overall quality of fresh-cut mango during the storage period for 6 days.

Keywords: /Fresh-cut mango/ /Pineapple juice/ /Browning/

Marjan Sadat Hosseini, seyed morteza zahedi, Mahdiah Karimi, & Asghar Ebrahimzadeh. (2018). Postharvest Application of Spermidine Polyamine on the Storage Quality and Vase Life of Mango (*Mangifera indica* L.) in Dipped Conditions. *Majallah-i 'Ulum-i Bāghbānī*, 31 (4):765-777. <https://doi.org/10.22067/jHORTS4.v31i4.60625> [Arabic language with last page in English]

Description

Mango (*Mangifera indica*) is a tropical fruit native to India whose global production in 2014 reached nearly 45 million tones. Mango is a commercially important fruit and improvement in its storage is of special importance. Mango is a Climacteric fruit whose ripening is done by exogenous or endogenous ethylene. In plants, Polyamines such as spermine, spermidine, and putrescine contradict ethylene because of a common precursor (s-adenosyl methionine (SAM)). During ripening, different qualitative and nutritional changes occur in the fruit, e. g. changes in color, tissue softening, accumulation of sugars and organic acids, and great changes in taste, flavor, aroma and plant biochemical materials. Fruit ripening is a complicated process, complementary to fruit development, and a start to its senescence. In general, senescence of a fruit is related to loss of membrane lipids, destabilization of membrane matrix, and lipid peroxidation. Recently, naturally active biological products are applied in a large amount for increasing the storage life and quality of the fruits and delaying their senescence. This study was carried out to investigate the effect of different concentrations of spermidine on the quality and vase life of a local mango variety of Minab. Materials and Methods: Healthy fruits, uniform in size, shape, color, and degree of maturity were selected from a mango orchard in Minab and their original physical and chemical characteristics on the first day were measured after washing with water and drying. Statistical analysis of data was done by a general linear model (GLM) with SAS (version 9.1) and mean comparisons were performed using Duncan's multiple range

test. Treatment solution in the rate of 0, 0.5, 1, and 2 mM spermidine (SIGMA) was made and its pH was set to 5 using NaOH. One liter of distilled water was used in the control treatment.

Keywords: /Dipped/ /Mango/ /Phenol/ /Spermidine/ /Storage/

Nirmal Kumar MEENA, & Ram ASREY. (2018). Tree Age Affects Postharvest Attributes and Mineral Content in Amrapali Mango (*Mangifera indica*) Fruits. *Horticultural Plant Journal*, 4 (2): 55-61. <https://doi.org/10.1016/j.hpj.2018.01.005>

Abstract

The study was carried out to investigate the effect of tree age on postharvest attributes and mineral content of Amrapali mango fruits. Effect of 3 different tree ages (6, 18 and 30 years) on functional components, including the antioxidant activity (AOX), total phenols, total carotenoids, ascorbic acid and minerals like Ca, K, Mg, Fe, Zn, Cu, Mn and B along with total sugars, total soluble solids (TSS) and titratable acidity (TA), respiration rate, polygalacturonase (PG) and pectin methylesterase (PME) activities in Amrapali cultivar were studied. With tree ageing total phenols, ascorbic acid and antioxidant activity decreased whereas total carotenoids increased. Ca diminished and K elevated with the tree age progression while, B, Fe, Cu, Zn, and Mn showed an indefinite pattern. Total soluble solids and total sugars were recorded higher in 18 year old tree fruits. Fruit respiration rate, polygalacturonase and pectin methylesterase activities showed an upward trend with tree ageing. The study indicates that fruit produced from middle age group mango orchard (18 year old) suits to the requirement of consumers as well as industry.

Keywords: /Mango (*Mangifera indica*)/ /Tree age/ /Functional parameter/ /Mineral/

Pattanapo, W., Boonrueng, N., Kumpoun, W. and Chanasut, U. (2018). Degradation of pesticide residue in 'Mahajanaka' mango fruit during storage at different conditions. *Acta Horticulturae*, 1210, 73-78. doi: 10.17660/ActaHortic.2018.1210.10

Abstract

The degradation of pesticide in mango 'Mahajanaka' from Wiang Nong Long district, Lumphun province, was studied. Profenofos and carbaryl residue of mango fruits was measured after dip in profenofos + carbaryl in 500 and 850 mg L⁻¹, respectively. The results found that at 25°C profenofos degraded faster than at 5 and 13°C. The concentrations of profenofos were 0.23, 0.29 and 0.46 mg kg⁻¹ after dip in pesticide at 6, 15 and 18 days, respectively. The carbaryl residue was non-detectable in the mango stored at 13 and 25°C for 3 days, while in the stored mango in 5°C, 0.13 mg kg⁻¹ of the residue was still detected, which is lower than the MRL of Thai Agricultural Standard, established by the National Bureau of Agricultural Commodity and

Food Standards.

Keywords: /'Mahajanaka' mango/ /Residues/ /Degradation/

Perumal, A. B., Sellamuthu, P. S., Nambiar, R. B., Sadiku, E. R., Phiri, G., & Jayaramudu, J. (2018). Research paper: Effects of multiscale rice straw (*Oryza sativa*) as reinforcing filler in montmorillonite-polyvinyl alcohol biocomposite packaging film for enhancing the storability of postharvest mango fruit (*Mangifera indica* L.). *Applied Clay Science*, 158, 1–10. <https://doi.org/10.1016/j.clay.2018.03.008>

Abstract

Biodegradable materials, prepared from rice straws (RS), were used as fillers in montmorillonite clay-polyvinyl alcohol (Mt-PVA) matrix in order to develop a biocomposite packaging film for determining the storability of mango fruit. The RS was treated ($\times 3$ times) with alkali sodium hydroxide (NaOH) followed by sodium chlorite (NaClO₂) and acetic acid (CH₃COOH) ($\times 3$ times). Subsequently, cellulose nanocrystals (CNC) were isolated by sulfuric acid (H₂SO₄) hydrolysis. The extracted CNC were scaled at a length (L) of 831 ± 45.0 nm and a diameter (D) of 44 ± 12 nm to obtain an aspect ratio (L/D) of 18.8. Transmission electron microscopy results showed the needle-like structures of CNC. X-ray diffraction showed that the crystallinity of the fiber increased after every treatment. Morphological observations of the untreated, treated RS fibers and biocomposites were evaluated by using field emission scanning electron microscopy. Our study suggested that the thermal stability and tensile properties of the biocomposite films significantly improved by increasing the filler concentration up to 6 wt%. Furthermore, the mango fruit sealed with packaging film exhibited a shelf life extension until 19 ± 2 d with good quality parameters (phenol, flavonoid content and DPPH antioxidant activity), reduced mass loss, increased CO₂ and low O₂ level. The present study revealed the efficiency of the bio-nanocomposite film for improving the storability of freshly harvested mangoes.

Keywords: /Packaging/ /Storage/ /Mango/

Rahman, M.A., Esguerra, E.B., Saha, M.G. and Rolle, R. (2018). Managing quality and reducing postharvest losses in the mango value chain. *Acta Horticulturae*, 1210, 1-12. doi: 10.17660/ActaHortic.2018.1210.1

Abstract

Postharvest technologies and best practices were integrated in the mango value chain of Bangladesh to manage quality and reduce losses throughout the marketing channel. The experiment was conducted at Volahat, Chapainawabganj, a commercial mango producing area, with an active Mango Grower Foundation, alongside traditional practices in order to measure

the impacts of improved technologies and practices. Interventions piloted in the improved value chain included the introduction of an improved harvesting tool, referred to as the 'BARI mango harvester', use of plastic crates as field and transport containers, trimming of the long stems attached to the fruit, delatexing after trimming using the 'BARI delatexing tray', and hot water treatment (HWT) at 53°C for 5 min followed by hydro-cooling for 5 min in tap water. Traditional practices included harvesting mangoes using a bamboo pole with a net attached at the end that detached the fruit from the tree with or without leaving a long stem attached to the fruit. Long stems were then detached by manual pulling, allowing fresh latex to drip on the fruit. Field containers used were bamboo baskets that were sometimes lined with newspaper. Sorted mangoes were packed in plastic crates and transported to the collection centre for eventual marketing. Mangoes handled using both the traditional and improved practices packed in plastic crates, were loaded on to a truck and transported together with the commercial load to the wholesale market in Gazipur district, some about 500 km away, and a 10-h drive. Mangoes were distributed to four retail shops at Gazipur fruit wet market for subsequent observation and data collection. Mangoes handled using the improved practices, particularly keeping 8-10 mm stalk attached to the fruit along with HWT, were of better keeping quality and were marketable on day 3 to day 5 in retail. The incidence of stem end rot in traditionally handled mangoes was greater (14.3%) than that of anthracnose on day 5, while it was only 5.6% in HWT mangoes. On the other hand, the incidence of anthracnose was 9.6% in traditionally handled mangoes, and only 0.8% with HWT. Unmarketable mangoes which considered as postharvest loss accounted for 25.1% of the traditionally handled mangoes, while a 7% loss resulted in mangoes handled using the improved practice. With the improved practice, the reduction in losses ranged from 70 to 72% over 3 to 5 days at retail shop. Through a partial budget analysis it was estimated the additional gross weekly income of a trader by selling 4000 kg of mango applying HWT in the improved practice would be BDT 71,937 (US\$ 900). Additional benefits of HWT included reduced levels of latex staining on the fruit and enhancement of fruit ripening both in terms of softening and change in peel colour from green to light yellow. Thus, the interventions piloted proved highly beneficial for the mango industry in Bangladesh and would help to promote mango exports.

Keywords: /Mango/ /Bangladesh/ /Delatexing/ /Hot water treatment/ /Value chain/ /Fruit quality/ /Loss reduction/

MANGOSTEEN

Klaykruayat, S., Mahayothee, B. and Duangmal, K. (2018). Control of enzymatic browning in fresh-cut mangosteen using alginate coating. *Acta Horticulturae*, 1210, 185-192. doi: 10.17660/ActaHortic.2018.1210.26

Abstract

In recent years, fresh-cut fruit consumption is increasing due to fresh-like quality and high

nutritional value. Cut surface color is one of the most important appearances for customers' purchase decision. Edible coating could be one of the alternatives to maintain product quality. The objective of this work was to delay browning in fresh-cut mangosteen using antibrowning agents and edible coating. Three sets of antibrowning agents were tested: 1% (w/v) citric acid (CA), 1% (w/v) citric acid plus 0.5% (w/v) ascorbic acid (CA+AA) and 1% (w/v) citric acid plus 0.5% (w/v) sodium erythorbate (CA+SE). Fresh-cut mangosteen without antibrowning agents was set as the control. Color assessment showed that the use of antibrowning agents retarded the color change at the cut of mangosteen rind. The sensorial analysis result on browning index score also confirmed that CA was the most effective antibrowning agent. Citric acid was then selected to incorporate into alginate coating. Five conditions were tested: 1% (w/v) citric acid without coating (CA-n-Alg), without citric acid but coating with 2% (w/v) sodium alginate followed by either 1.0 or 1.5% (w/v) calcium chloride (n-CA-Alg-Ca1.0, n-CA-Alg-Ca1.5), and 1% (w/v) citric acid and coated with 2% (w/v) sodium alginate followed by either 1.0 or 1.5% (w/v) calcium chloride (CA-Alg-Ca1.0, CA-Alg-Ca1.5). The results showed that coating significantly lowered browning score on the aril of mangosteen. Water loss in the samples with alginate coating was lower than in the uncoated one ($p < 0.05$). Color change (lightness, chroma and hue values) and browning index on the cut surface of mangosteen rind treated with alginate coating and inhibitors in different treatments were monitored. During 9 days of storage, the fresh-cut mangosteen with alginate coating appeared to be similar to the fresh one. The microbiological shelf-life of fresh-cut mangosteen, stored at $8 \pm 2^\circ\text{C}$ with 85% RH, was 9 days.

Keywords: Fresh-cut/ /Browning/ /Mangosteen, edible coating, alginate coating, color assessment

NAVEL ORANGE

Gao, Y., Kan, C., Wan, C., Chen, C., Chen, M., & Chen, J. (2018). Quality and biochemical changes of navel orange fruits during storage as affected by cinnamaldehyde -chitosan coating. *Scientia Horticulturae*, 239, 80–86. <https://doi.org/10.1016/j.scienta.2018.05.012>

Abstract

Quality and biochemical changes of navel orange (*Citrus sinensis* L., Osbeck) fruits in response to cinnamaldehyde-chitosan coating were studied during 120 day of storage at $10 \pm 1^\circ\text{C}$ and 80–90% RH. The results showed that the coating significantly reduced the decay rate and weight loss of the navel orange fruits, delay the decrease of the content of total soluble solids (TSS), titratable acidity (TA) and vitamin C (Vc), effectively inhibited the content of MDA. Furthermore, the coatings maintaining enhanced the activity of SOD, CAT, POD and PPO, delay the senescence of fruits. The high performance liquid chromatography analysis showed that coating treatment inhibited the decrease of total sugar content of fruits and slowed down the decline of total organic acids by slowing down the degradation of sucrose, fructose and citric acid content. Compared with chitosan coating, cinnamaldehyde- chitosan coating could

significantly reduce the decay rate and had no adverse effects on fruit quality. Meanwhile, it could improve CAT, SOD and POD activity, induce the activity of PPO to increase, and improve the disease resistance of navel orange fruits. This study suggests that cinnamaldehyde-chitosan coating can extend the storage time and maintain quality of citrus fruit.

Keywords: /Quality/ /Biochemical/ /Navel orange/ /Cinnamaldehyde/ /Chitosan/

ONION

Ji, S. H., Kim, T. K., Keum, Y. S., & Chun, S.-C. (2018). The Major Postharvest Disease of Onion and Its Control with Thymol Fumigation During Low-Temperature Storage. *Mycobiology*, 46(3), 242–253. <https://doi.org/10.1080/12298093.2018.1505245>

Abstract

Onion (*Allium cepa* L.) is one of the major vegetable crops in Korea that are damaged and lost by pathogenic fungal infection during storage due to a lack of proper storage conditions. The aim of this study was to determine an appropriate control measure using thymol to increase the shelf life of onions. To control fungal infections that occur during low-temperature storage, it is necessary to identify the predominant fungal pathogens that appear in low-temperature storage houses. *Botrytis aclada* was found to be the most predominant fungal pathogen during low-temperature storage. The antifungal activity of the plant essential oil thymol was tested and compared to that of the existing sulfur treatments. *B. aclada* growth was significantly inhibited up to 16 weeks with spray treatments using a thymol solution. To identify an appropriate method for treating onions in a low-temperature storage house, thymol was delivered by two fumigation treatment methods, either by heating it in the granule form or as a solution at low-temperature storage conditions (in vivo). We confirmed that the disease severity was reduced up to 96% by fumigating thymol solution compared to the untreated control. The efficacy of the fumigation of thymol solution was validated by testing onions in a low-temperature storage house in Muan, Jeollanam-do. Based on these results, the present study suggests that fumigation of the thymol solution as a natural preservative and fungicide can be used as an eco-friendly substitute for existing methods to control postharvest disease in long-term storage crops on a commercial scale.

Keywords: /*Allium cepa*/ /*Botrytis aclada*/ /Fumigation/ /Long-term storag/ /Postharvest disease/ /Sulfur/ /Thymol/

Sinha, R., Khot, L. R., Schroeder, B. K., & Sankaran, S. (2018). FAIMS based volatile fingerprinting for real-time postharvest storage infections detection in stored potatoes and onions. *Postharvest Biology and Technology*, 135, 83-92. <https://doi.org/10.1016/j.postharvbio.2017.09.003>

Abstract

Storage infections in potato and onions were detected using FAIMS. * Early detection was reported at 25[degrees]C and reduced (4[degrees]C) temperatures. * Characterized were temporal release patterns of volatile biomarkers. * FAIMS data templates associated with volatiles were identified for alarm-alerts. * Crop specific ketones, alcohols and sulfides were associated with storage infections.

Keywords: /Potato/ /Onion/ /Postharvest storage/

PACKAGING

Huang S, Li H, Wang Y, et al. (2018). Monitoring of oxygen using colorimetric indicator based on graphene/TiO₂ composite with first-order kinetics of methylene blue for modified atmosphere packaging. *Packaging Technology and Science*, 31, 575–584. <https://doi.org/10.1002/pts.2384>

Abstract

Oxygen is crucial to food preservation and food spoilage. For the purpose of monitoring the integrity of modified atmosphere packaging (MAP) by nondestructive testing and controlling the reaction rate during recovery stage, we reported on a convenient and visual colorimetric oxygen indicator based on a graphene/titanium oxide composite, incorporating glycerol, methylene blue (MB), hydroxyethyl cellulose, and polyvinyl alcohol. The graphene/titanium oxide composite was synthesized from a modified Hummers synthesis of graphene oxide, followed by the hydro-thermal treatment with butyl titanate without using any reducing agent, then the morphology and structure characteristics were analysed by X-ray diffraction, Fourier transform infrared, Raman spectra, ultraviolet-visible spectroscopy, SEM, and TEM. Supported by the performance tests using ultraviolet-visible spectroscopy and CIElab, the indicator demonstrated the pseudo first-order kinetics of MB for MAP in detecting stage. The results confirmed that the prepared colorimetric indicator could actually detect the integrity of MAP without destruction. Additionally, the reaction time of indicator in recovery stage can be controlled by changing the concentration of MB because of pseudo first-order kinetics.

Keywords: /CIElab/ /Colorimetric oxygen indicator/ /Graphene//Titanium oxide composite/ /Kinetics analysis/ /Nondestructive testing/

PAPAYA

Ding, X., Zhang, L., Hao, Y., Xiao, S., Wu, Z., Chen, W., ... Zhu, X. (2018). Genome-wide identification and expression analyses of the calmodulin and calmodulin-like proteins reveal their involvement in stress response and fruit ripening in papaya. *Postharvest Biology and Technology*, 143: 13-27. <https://doi.org/10.1016/j.postharvbio.2018.04.010>

Abstract

Calcium (Ca²⁺) is an important second messenger involved in diverse developmental and adaptive processes in plants. Calmodulin (CaM) and calmodulin-like (CML) proteins are primary Ca²⁺ sensors that control diverse cellular functions. In this study, 41 genes encoding CaM and CML proteins were identified in the papaya genome, three of which were CaM and others were CML. Sequence alignment, gene structural and phylogenetic analyses revealed that all CaM/CMLs contained the EF-hand, but not other functional domains, and CaM proteins were quite conservative while CML proteins exhibited sequence diversity and structural multiformity. Promoter analysis identified different types of cis-elements related to plant growth and development, hormone response, light response, stress response and transcriptional enhancement in promoter regions of CpCaM/CML genes. Gene expression analysis showed distinctive expression profiles of the CaM/CMLs in different tissue types, different fruit developmental stages and different fruit storage conditions. Several groups of CaM/CML genes were positively or negatively regulated by high and low temperature stresses, such as CML16, CML17.1, CML24 and CML36, indicating that they may play a role in temperature stress adaption. Notably, some CaM/CML genes were rigorously regulated by ethylene (ethephon and 1-MCP treatment), either in a positive or a negative manner, such as CaM7, CML15, CML16, CML17.1, CML37 and CML46. All these results indicated that CaM and CML gene families might play important roles in fruit development, in response to temperature stresses and in fruit ripening process.

Keywords: /CalmodulinCalmodulin-like protein/ /PapayaGene expression/ /Fruit ripening/ /Stress response/

Zillo, R. R., da Silva, P. P. M., de Oliveira, J., da Glória, E. M., & Spoto, M. H. F. (2018). Carboxymethylcellulose coating associated with essential oil can increase papaya shelf life. *Scientia Horticulturae*, 239, 70–77. <https://doi.org/10.1016/j.scienta.2018.05.025>

Abstract

The use of essential oils (EO) associated with coatings in the post-harvest treatment of papaya is a little studied alternative to avoid post-harvest losses. Therefore, the antifungal activity of *Eucalyptus staigeriana*, *Lippia sidoides* and *Pimenta pseudocaryophyllus* essential oils (EOs) was tested in vitro against *Colletotrichum gloesporioides*, the causal agent of anthracnose in papaya. The EO with the highest activity was evaluated regarding its chemical composition, in vivo activity and its effects on papayas post-harvest quality, when associated with a

carboxymethylcellulose coating. *L. sidoides* EO presented the highest in vitro antifungal activity, with thymol as the predominant compound in its composition. In vivo, the fruit treated with CMC associated with *L. sidoides* EO presented a reduction in disease severity and maintained post-harvest parameters, besides slowing the appearance of rot and shriveling in the fruit on the ninth day of storage, whereas in the control and treatment with only CMC, this behavior occurred on the fifth and seventh days, respectively. Thus, the association of *L. sidoides* EO with CMC was effective in the rise of papayas shelf life, preserving their post-harvest characteristics for nine days, indicating that this treatment can be considered a viable alternative for the extension of the fruit commercialization period.

Keywords: /*Lippia sidoides*/ /*Eucalyptus staigeriana*/ /*Pimenta pseudocaryophyllus*/ /*Colletotrichum gloesporioides*/ /Edible coating/ /Quality control/

PEAR

Wang, L., Wang, L., Zhang, Z., Ma, M., Wang, R., Qian, M., & Zhang, S. (2018). Genome-wide identification and comparative analysis of the superoxide dismutase gene family in pear and their functions during fruit ripening. *Postharvest Biology and Technology*, 143, 68–77. <https://doi.org/10.1016/j.postharvbio.2018.04.012>

Abstract

Superoxide dismutases (SODs), a key antioxidant enzyme family, are supposed to play an important role in the ripening of climactic fruit. However, information on SODs in pear, as well as their role in pear ripening process, is rudimentary. In this study, a comprehensive analysis was conducted on the characteristics of the SOD gene family in pear. In total, 11 PbrSOD genes were identified in pear (*Pyrus bretschneideri*) genome and were phylogenetically classified into five subgroups. Whole genome duplication (WGD)/segmental duplication was the main driving force for the expansion of the PbrSOD family genes, which harboured distinct types and numbers of conserved motifs and cis-acting elements in their promoters. During postharvest pear (*Pyrus pyrifolia* cv. 'Fengshui') ripening, the accumulation of oxidative stress was associated with a decrease in SOD activity. The expression patterns of 11 PbrSODs were distinct as postharvest pear fruit ripened, and the changes of some specific mRNAs were correlated with SOD activity. In combination with the results of the impact of postharvest treatments (ethefl and 1-MCP) on postharvest pear ripening process, PbrSODs gene expression and physio-chemical attributes, PbrCDS5 and PbrFSD1 were selected as the candidates involved in postharvest pear ripening.

Keywords: /Superoxide dismutases/ /Pear/ /Gene family/ /Postharvest ripening/

PLUM

Kleina, H. T., Pádua, T., Jacomino, A. P., & May De Mio, L. L. (2018). Postharvest quality of plums in response to the occurrence of leaf scald disease. *Postharvest Biology and Technology*, 143, 102–111. <https://doi.org/10.1016/j.postharvbio.2018.04.018>

Abstract

Plum leaf scald (PLS) is considered the main barrier to expanding plum cultivation in Brazil. The disease causes water flow to be obstructed in the xylem of infected plants. Infected host plants produce fruit of lower quality; however, no information is available about the postharvest quality attributes in plum. Fruit from the 'Gulfblaze' and 'Reubennel' plant cultivars, both with and without PLS symptoms, were collected from commercial orchards. Bacterial presence was confirmed using a polymerase chain reaction, and the physicochemical, biochemical, and physiological properties were evaluated. Brown rot incidence was also determined during the ripening period. According to a molecular analysis, symptomatic plants used in the assay carried *Xylella fastidiosa* (which causes PLS), but healthy plants did not. Fruit collected from infected plants had a reduced diameter and weight in the 2015/2016 growing season. There was a greater reduction in pulp firmness and higher pectin methylesterase enzyme activity in fruit harvested from infected compared with healthy plum trees. The total soluble solids content was higher in fruit from 'Gulfblaze' and 'Reubennel' diseased compared with disease-free plants. A higher incidence of brown rot was observed in plants with leaf scald symptoms. The highest phenylalanine ammonia-lyase activity was observed in fruit from 'Gulfblaze' diseased plants. CO₂ and ethylene production was higher in the infected than healthy plants, indicating that the presence of *X. fastidiosa* can accelerate fruit ripening mechanisms.

Keywords: /Fruit quality/ /Xylella fastidiosa/ /Xylem obstruction/

POSTHARVEST DISEASES

Shukla, A.C. (2018). Essential oils as green pesticides for postharvest disease management. *Acta Horticulturae*, 1210, 199-206. doi: 10.17660/ActaHortic.2018.1210.28

Abstract

Essential oils are the volatile constituents of chemical compounds with multiple mode of action that enhances their activity due to the synergistic effects of the constituents. The majority of them serve as chemical messengers for 'postharvest disease management'. The volatility of EOs makes them suitable as fumigants, in protected environments, for protection of postharvest diseases of horticultural crops, but they also have demonstrated utility for management of 'pests and diseases' of field crops. Many EOs and their major active constituents, monoterpenes and sesquiterpenes, have shown contact toxicity to postharvest insect pests but their utility is broadened due to their sublethal behavioral effects as deterrents and repellents. These

bioactivities result from synergistic effect among particular terpenes, and with the neurotransmitter-mediated toxic action of the terpenes. Many EOs and their active constituents have shown potential bioefficacy against the insect pests when tested in laboratory, but only few of them - those used extensively in 'flavor and fragrance industries' - have been used for developing pesticidal formulations. These include the essential oils from the family Asteraceae, Myrtaceae, Lamiaceae, Lauraceae, Poaceae, etc.; and have begun to establish its market presence in some countries, as essential oil-based pesticides.

Keywords: /Essential oil/ /Bioactive constituents/ /Postharvest pest/ /Green pesticide/

RAMBUTAN

Jitareerat, P., Sripong, K., Puangnim, S., Aiamla-or, S., Limmatvapirat, S. and Uthairatanakij, A. (2018). Effects of shellac and modified coconut oil on the quality of gamma irradiated rambutan fruit. *Acta Horticulturae*, 1210, 139-144. doi: 10.17660/ActaHortic.2018.1210.19

Abstract

The aim of this study was to investigate the combined effects of shellac (SH), modified coconut oil (MCO), and gamma irradiation on controlling fruit rot and the quality of rambutan cultivar LSQUORong rienRSQUO. Naturally infected fruit were coated with the mixture of 4% SH and 2% MCO (SH-MCO) solutions and sequentially irradiated with 400 Gy gamma ray. Non-coated-irradiated fruit and gamma irradiated fruit served as the controls. All fruit samples were stored at 13°C for 10 days. Treatment of fruit with gamma irradiation and SH-MCO significantly retarded fruit rot disease severity, and slightly promoted the development of pericarp color (a^* and Hue values), however, there were no significant differences in sprintern color with non-coated-irradiated fruit. The treatments of SH-MCO with gamma ray delayed weight loss, maintained respiration rate and firmness throughout the storage period whilst ethylene production suppressed immediately after treating on the beginning date and then increased the same as other treatments. This result suggested that coating with a mixture of SH-MCO solution may have the property to delay fruit rot and maintain gamma irradiated fruit quality.

Keywords: Ionizing irradiation/ /Fruit rot/ /Nephelium lappaceum Linn./ /Postharvest disease/ /Wax coating/

Pongprasert, N. and Srilaong, V. (2018). Carbon dioxide micro-bubbles in combination with chlorine dioxide to reduce peel browning and disease incidence of rambutan fruit. *Acta Horticulturae*, 1210, 117-122. doi: 10.17660/ActaHortic.2018.1210.16

Abstract

This research aimed to investigate the effect of carbon dioxide micro-bubbles (CO₂-MBs) in combination with chlorine dioxide (ClO₂) solution to reduce disease incidence and peel browning of rambutan fruit. Rambutan fruits were dipped in water (control), CO₂-MBs, 3 ppm of chlorine dioxide (ClO₂) and CO₂-MBs combined with 3 ppm of ClO₂ solution for 5 min and then stored at 13°C for 12 days. Fruits dipped in CO₂-MBs or 3 ppm of chlorine dioxide showed a lower weight loss during storage. Control fruit started to exhibit disease symptoms after 3 days of storage. CO₂-MBs treatment combined with 3 ppm of ClO₂ was the most effective to delay and reduce disease severity of rambutan fruits until 9 days of storage. In addition, CO₂-MBs combined with 3 ppm of ClO₂ also reduces the browning symptoms of peel by inhibiting the total phenol accumulation, polyphenol oxidase activity and quinone. These results indicated that and CO₂-MBs combined with 3 ppm of ClO₂ was an effective treatment to control the postharvest disease and maintain the quality of rambutan fruit during storage.

Keywords: /Carbon dioxide micro-bubbles/ /Chlorine dioxide/ /Browning/

Yingsanga, P. and Srinon, T. (2018). Shelf life extension of 'Rongrien' rambutan fruit, non-spinterned, using aloe vera gel. *Acta Horticulturae*, 1210, 151-156. doi: 10.17660/ActaHortic.2018.1210.21

Abstract

Storage of rambutan fresh fruit at normal temperature causes a very high loss of water, resulting in rapid deterioration, wilting, and browning due to the number of spinterns on the surface of fruit. The objective of this research, therefore, was to extend the shelf-life of rambutan fruit by coating with aloe vera gel. The experiment was conducted by using fresh 'Rongrien' rambutan fruit, non-spinterned (cut-off spinterns). Four treatments were applied: 1) no dipping; 2) dipping with distilled water; 3) dipping in aloe vera gel of 50% concentrate; and 4) dipping in 100% aloe vera gel. The fruits were then stored at 25°C, relative humidity of 60-70%. All treatments were browned during day 2 of storage. However, the 'Rongrien' rambutan, spintern cut, dipped with 100% aloe vera gel, showed significantly slowest weight loss throughout the shelf life ($p > 0.05$).

Keywords: /Rambutan/ /Aloe vera gel/ /Spintern/ /Coating/

SOURSOP

Guardado-Valdivia, L., Tovar-Pérez, E., Chacón-López, A., López-García, U., Gutiérrez-Martínez, P., Stoll, A., & Aguilera, S. (2018). Identification and characterization of a new *Bacillus atrophaeus* strain B5 as biocontrol agent of postharvest anthracnose

disease in soursop (*Annona muricata*) and avocado (*Persea americana*). *Microbiological Research*, 210, 26–32. <https://doi.org/10.1016/j.micres.2018.01.007>

Abstract

Anthraxnose is a fungal disease caused by *Colletotrichum* species that is detrimental to numerous fruit, including soursop and avocado. The use of fungicides to maintain the high quality of fruit creates a potential health risk. One alternative to this problem is the biological control, which has been applied successfully during postharvest. The *Bacillus* species are one of the most studied biological agents against postharvest pathogens because accomplish their biocontrol performance by producing a variety of metabolites. In this study, we evaluated the activity of metabolites contained in the cell free supernatant, obtained from *Bacillus* strain B5 culture, against micelial growth and spore germination of two virulent strains of *C. gloeosporioides* isolated from soursop and avocado. On the basis of 16S rDNA gene sequence analysis, this strain was identified as *Bacillus atrophaeus*. A preventive treatment using cell free supernatant, reduced severity and incidence of anthracnose disease on harvested soursop and avocado fruit. *B. atrophaeus* strain B5 harbors genes involved in the production of antibiotics such as surfactin, bacillomycin and iturin, which could be contributing to the efficiency of the preventive treatment during postharvest. The antagonistic role of metabolites contained in the cell free supernatant against anthracnose disease, provide a new approach by which to attack this problem and can help reduce the use of chemical pesticides, environmental pollution, leading to the safer fruit preservation.

Keywords: /Postharvest disease/ /Soursop/ /Avocado/

STRAWBERRY

Affan, M., Lestari, R.D.N. and Mangunwikarto, J. (2018). Application of chitosan edible coating on fresh strawberry fruit (*Fragaria* sp. 'Holibert') during storage in a tropical environment. *Acta Horticulturae*, 1210, 95-102. doi: 10.17660/ActaHortic.2018.1210.13

Abstract

Quality of fresh strawberry (*Fragaria* sp. 'Holibert') in tropical environment conditions sharply decreases and the fruit has a short shelf-life. We applied a coating method using chitosan to preserve quality of the strawberry fruit during storage. Chitosan is a semi-crystalline polymer as a biopolymer gel coating to cover strawberry fruit skin with standard formulation. Strawberry fruit at full and 70% maturity level are used and the quality parameter of fresh strawberry were measured such as weight loss, texture, color of skin, water content, total soluble solid content, vitamin C and titratable acidity. Tropical storage temperature without controlled temperature was used as a control and then compared with controlled temperature at 4°C with RH 90-92% and 10°C with 62-68% RH. Several quality parameters of strawberry fruit such as weight loss,

texture, color of skin, and water content could be kept stable in conditions using chitosan coating at controlled temperature and non-controlled temperature storage. However, other quality parameters of strawberry fruit such as titratable acidity, vitamin C, and total soluble solid content were not significantly affected. Storage of strawberry fruit in lower temperature in tropical conditions with and without chitosan coating were better than higher temperature storage conditions. Shelf-life of strawberry fruit using chitosan edible coating can be longer than uncoated strawberry fruit. Chitosan coating can preserve physical quality conditions and increase shelf life of strawberry fruit during storage in tropical environment conditions.

Keywords: /Chitosan/ /Edible coating/ /Quality/ /Strawberry/ /Tropical environment/

Rajapakse, R.P.S.S. and Tanaka, M. (2018). Comparison of rice hull biochar and cedar bark as growing media on the yield and postharvest quality of 'Sachinoka' strawberry. *Acta Horticulturae*, 1210, 273-280. doi: 10.17660/ActaHortic.2018.1210.38

Abstract

Strawberry is regarded as a highly perishable fruit due to its extreme tenderness and high respiration rate. Amongst all, Japanese 'Sachinoka' strawberry is highly favored in Japan for its sweetness and deep red skin color, but it has comparatively low firmness leading to sensitive postharvest quality. Preharvest factors can minimize postharvest quality deterioration, but growing medium has not gained much attention as an important factor. Therefore, this study was conducted to compare the effect of two growing media on the postharvest quality preservation of the strawberry. Plants were grown in cedar bark (BM) and rice hull biochar media (HM) and arranged in completely randomized block design inside greenhouse. Marketable yield was measured and stored in cold storage (3°C, 95% RH). Strawberry fresh weight loss, surface colour measured in CIELAB colour space, total soluble solids content (TSS) using °Brix index, acidity and firmness were recorded in 3-4 day intervals, up to 14 days. Marketable yield was higher in BM with 20% higher total yield than HM. Fresh weight loss percentage increased similarly in both media up to 3-4% of the initial fresh weight. All L*a*b* colour aspects prior to storage were similar in the fruits grown in both media but HM fruits turned darker than BM, during storage. Even though with significantly low TSS in the beginning, HM fruits maintained around 10% higher TSS content than the BM throughout the storage. Acidity was higher in BM fruits. All firmness parameters were higher in HM, just after harvesting and throughout the storage. Strawberries grown in BM had higher yield, but HM had higher quality preservation and less potential postharvest loss due to possible physiological differences caused by the media.

Keywords: /Postharvest quality/ /Marketable yield/ /Total soluble solids/ /Acids/ /Firmness/ /Colour/

TOMATO

Huang, Y., Lu, R., Hu, D., & Chen, K. (2018). Quality assessment of tomato fruit by optical absorption and scattering properties. *Postharvest Biology and Technology*, 143, 78–85. <https://doi.org/10.1016/j.postharvbio.2018.04.016>

Abstract

This paper reports on the measurement of optical properties of tomato fruit over the wavelength range of 550–300 nm by means of a spatially-resolved diffuse reflectance technique, for assessing the firmness, soluble solids content (SSC) and pH. Spatially resolved diffuse reflectance spectra of 600 'Sun Bright' tomato samples harvested at six maturity stages were acquired using a newly developed spatially resolved spectroscopy (SRS) system, from which the reduced scattering (μ_s') and absorption (μ_a) coefficients were estimated using an inverse algorithm for the diffusion theory model. Tomato firmness was measured using two reference methods, i.e., compression and puncture, while SSC and pH were measured using the standard refractometry and pH meter. Partial least squares (PLS) models were developed, based on μ_s' , μ_a , and their combinations, for predicting the three quality parameters. While both μ_s' and μ_a were correlated with tomato firmness, SSC and pH, better prediction results were obtained for the multiplication of μ_s' and μ_a (i.e., $\mu_s'\mu_a$) except for puncture maximum force. PLS models gave good predictions of compression maximum force and puncture maximum force, slope and flesh firmness, with the correlation coefficients of 0.894, 0.915, 0.923, 0.835, respectively, while they had poor predictions of tomato SSC and pH with the correlation coefficients of 0.623 and 0.769, respectively. This research demonstrated that the SRS technique, along with the absorption and scattering coefficients, has potential for nondestructive measurement of quality attributes, especially firmness, of tomato fruit.

Keywords: /Hyperspectral imaging/ /Spatially resolved spectroscopy/ /Absorption/ /Scattering/ /Tomato/ /Quality/

Mandal, D. and Hazarika, T.K. (2018). Salicylic acid maintained quality and enhanced shelf life of tomato 'Samrudhi' at refrigerated storage. *Acta Horticulturae*, 1210, 207-212
doi: 10.17660/ActaHortic.2018.1210.29.

Abstract

Tomatoes are a frequently consumed fruit vegetable of the Solanaceae family and is rich in nutraceuticals. It faces rapid deterioration in edible quality during ambient storage, while refrigerated storage generally causes chilling injury. Therefore, an attempt was made with salicylic acid (SA), a safe phenolic having identified anti-ethylene effect, to evaluate its effect on shelf life and quality of tomatoes stored in refrigerated conditions. Fruits of tomato cultivar 'Samrudhi' at pink to light red stage were treated with different concentrations of salicylic acid

(0.2-1.2 mM) along with control (water dipped) and were kept at 4-5°C with 65-80% relative humidity in four replications following completely randomized design. Results showed that SA treated fruits had better retention than control. At 21 days after storage (DAS), fruits kept as control showed maximum weight loss (14.65%) compared with the fruits treated with SA at 1.2 mM (5.88%). Fruits treated with SA at 1.2 mM had minimum chilling injury index (1.42), having high TSS (5.76 °Brix) and ascorbic acid (17.18 mg 100 g⁻¹) retention. SA treated fruit in relatively higher concentration (0.8-1.2 mM), maintained fruit quality attributes with consistent intensification of carotenoids and lycopene even at 21 DAS. Shelf life was recorded maximum (33.25 days) in SA 1.2 mM treated fruits followed by SA 1.0 mM (30.25 days) compared with control (23.75 days).

Keywords: /Tomato/ /Refrigerated storage/ /Salicylic acid/ /Ascorbic acid/

WALNUT

Gharaghani, A., Mohammadi Javarzari, A., & Vahdati, K. (2018). Kaolin particle film alleviates adverse effects of light and heat stresses and improves nut and kernel quality in Persian walnut. *Scientia Horticulturae*, 239, 35–40. <https://doi.org/10.1016/j.scienta.2018.05.024>

Abstract

Spraying with kaolin is becoming a feasible and cheap treatment to alleviate the destructive effects of light and heat stresses. Here, the effects of spraying with kaolin were investigated on leaf temperature, photosynthesis and gas exchange rate, sunburn and quality of nut and kernel, potassium (K) and sodium (Na) concentrations and proline content of the walnut. Three spraying levels of kaolin (0%, 3% and 6%) were used in 5 replicates during two consecutive years. Results indicate that the kaolin spray increases leaf area and chlorophyll content (up to 14.71% and 11.99%, respectively) comparing to the control. The severity of leaf, husk, and kernel sunburn of kaolin treated trees was reduced up to 50% comparing to the control plants. Considering physiological parameters kaolin treatment reduced leaf temperature (4.4 °C and 5.6 °C, respectively in kaolin 3% and 6% compared to the control), but increased photosynthesis rate (A_{max}), gas exchange (g_s), internal CO₂ partial pressure (C_i) and the water use efficiency (up to 29.85%, 30%, 10.97% and 19.88%, respectively) comparing to the control. Kaolin application also improved nut and kernel weight, kernel percentage and kernel oil content (up to 8.2%, 16.1%, 7.7% and 11.29%, respectively) comparing to the control. Kaolin treatments increased potassium level and K:Na ratio, but decreased Na and proline content, both in leaf and kernel, in comparison with the control. However, there was no significant difference between the results of applying kaolin at concentrations of 3% and 6% in almost all of the measured characteristics, but improved results were obtained with higher levels of kaolin, except for nuts and kernel quantities. Considering global warming, using kaolin application can

be recommended as a suitable and cheap method for the acclimation of walnut to high temperatures and solar radiation.

Keywords: /Walnut/ /Sunburn/ /Heat stress/ /Gas exchange/ /Proline/ /Water use efficiency/

WATERMELON

Lee, Y.Z., Wilson, M.D., Ross, T., Davies, N.W. and Stanley, R.A. (2018). Effects of pre- and post-cut storage temperatures on fresh-cut watermelon quality and shelf-life. *Acta Horticulturae*, 1210, 249-256. doi: 10.17660/ActaHortic.2018.1210.35

Abstract

Fresh-cut watermelon is increasingly popular among consumers but challenges remain in keeping its eating quality. Processing removes the protective skin layer that usually provides a buffer for internal fruit tissues against environmental stresses and maintains elevated CO₂ and lowered O₂ gas levels. Low temperatures are used to slow microbial growth and prolong shelf-life of cut fruit by reducing oxidative, enzymatic and metabolic reactions that lead to accelerated senescence. However, little information is available on the interactive effects of the initial whole fruit temperature with subsequent fresh-cut product storage temperature on the consequences for shelf-life of fresh-cut watermelons. Whole watermelons were stored for 21 h at 4, 21 or 30°C, before being sanitised, cut into cubes, packaged and stored at 4 or 7°C until analysed. Interaction between the factors of storage temperature before and after cutting led to juice drip pH and soluble solid content changes. Lower whole-fruit temperature and lower storage temperature of fresh-cuts significantly reduced O₂ consumption and CO₂ production rates. Headspace ethylene levels were also reduced by lower fresh-cut watermelon storage temperatures. Preliminary trials show fruit aroma levels at day 5 scored higher when whole watermelons were stored at 21°C than either 4 or 30°C. In a second experiment, watermelon cubes were processed together with honeydew, rockmelon, pineapple and apple and then sealed individually or as a fruit-mix and stored at 4°C until analysed. Ethylene levels as high as 95 ppm were measured in the headspace of fruit-mix samples, with increased water soaking appearance of watermelon cubes. Our results demonstrate the need to consider the storage temperature of both whole and fresh-cut watermelons to extend shelf-life by controlling physiological aspects such as respiration. There is also potential for selecting fruits in fresh-cut fruit-mixes that minimise ethylene production to lower the impacts on fresh-cut watermelon shelf-life.

Keywords: /Carbon dioxide/ /Ethylene/ /Fresh-cut/ /Minimally processed/ /Oxygen/ /Respiration/ /Shelf-life/ /Storage/ /Temperature/ /Watermelon/ /Whole-fruit/