

**SELECTIVE DISSEMINATION OF INFORMATION
AS OF MAY 2018**

ANTHURIUM

Pour, A.S., Chegini, G., Zarafshan, P., Massah, J. (2018). Curvature-based pattern recognition for cultivar classification on anthurium flowers. *Postharvest Biology and Technology*, 139: 67-74.

Abstract

Real-time classification of agricultural products with various cultivars is an important issue in postharvest processing, which speeds up the processing and consumer delivery time. An innovative approach was developed for cultivar classification of Anthurium flowers based on image processing, B-spline curves, mathematical operations and machine learning classifiers. The algorithm was implemented and tested on a database of Anthurium flower images, which included the images of 15 cultivars of the flower with various sizes and shape categories. The boundary of the flowers was detected and reconstructed using a suitable B-spline curve. The signed curvature of the curve was calculated via mathematical operations. Then, several classifiers were implemented using the machine learning methods, Support Vector Machines (SVM), K-Nearest Neighbors, Discriminant Analysis, Decision Trees, and Naive Bayes, to detect and classify the cultivars of the flower. The experiments were carried out using a different number of training samples of the database images. The effect of various classification methods and variations in the angle of rotation of placing the flowers under the camera on classification accuracy were evaluated and the computation time of the classification process was measured. The results showed that in the unrotated sample with 1.5 pixels/mm density, the classification accuracy of the Naive Bayes and SVM algorithms had the highest classification accuracies, more than 98%. Also, the Decision Trees classifier had the lowest computation time, less than 2.5 ms. The proposed approach had proper classification accuracy and low computational load, which could be used in the real-time classification systems for Anthurium flowers.

Keywords: /Image processing/ /Curvature/ /Machine learning/ /SVM/ /Anthurium/

APPLE

Williamson, V.G., Frisina, C., Tareen, M.N. and Stefanelli, D. (2018). Storage performance of two 'Pink Lady' clones differs, but 1-MP treatment is beneficial, regardless of maturity at harvest. *Scientia Horticulturae*, 235: 142-151.

Abstract

Determining optimal apple harvest time is important for effective postharvest treatments and also for maintenance of quality along the supply chain. A non-destructive instrument, the DA meter, was used to measure changes in absorbance near the upper chlorophyll-a absorption peak and to segregate commercially harvested fruit into two ripeness levels. DA meter readings were made at harvest and following cold (regular air) storage removals for two 'Pink Lady®' clones, 'Cripps Pink' and 'Rosy Glow'. In addition, the destructive maturity and/or quality indicators of starch pattern index, fruit firmness, and soluble solids were determined and ethylene and CO₂ production were monitored at harvest and at each removal, i.e. every 1.5 months for 7.5 months, and during a 14 d simulated shelf life per removal. The DA meter readings were a reliable non-destructive technology for determining ripeness levels throughout storage. Ethylene production patterns were similar up to 4.5 months of cold storage for the two cultivars, 'Cripps Pink' and 'Rosy Glow', but the rate was approximately double in 'Rosy Glow'. Treatment with 1-methylcyclopropene (1-MCP) was effective at inhibiting ethylene evolution during cold storage and simulated shelf life, regardless of harvest maturity in both cultivars. However, this benefit only lasted until 4.5 months of cold storage for 'Rosy Glow', when ethylene production increased markedly after 7 d of simulated shelf life. The storage disorders, superficial scald and internal browning were more evident in 'Rosy Glow' fruit than in 'Cripps Pink', particularly after 6 months of cold storage. It is recommended that 'Cripps Pink' and its clone, 'Rosy Glow', be kept separately in storage and that 'Rosy Glow' not be stored for as long as 'Cripps Pink'. Alternatively, the efficacy of additional 1-MCP treatments after 4 months of cold storage could be explored in 'Rosy Glow' to maintain reduced ethylene production during longer storage.

Keywords: /'Cripps Pink'/ /DA meter/ /Ethylene/ /Internal browning/ /Maturity/ /'Rosy Glow'/ /Superficial scald/

BANANA

Li, T., Yun, Z., Wu, Q., Zhang, Z., Liu, S., Shi, X., Duan, X., and Jiang, Y. (2018). Proteomic profiling of 24-epibrassinolide-induced chilling tolerance in harvested banana fruit. *Journal of Proteomics*, 1-12.

Abstract

The mechanism of 24-epibrassinolide (EBR)-induced chilling tolerance in harvested banana fruit was investigated. Results showed that EBR pretreatment remarkably suppressed the development of chilling injury (CI) in harvested banana fruit during 12 days of cold storage at 8 °C, as indicated by lower CI index in treated fruit. Physiological measurements exhibited that EBR treatment reduced the relative electrolyte leakage and malondialdehyde (MDA) content

while increased the chlorophyll fluorescence (Fv/Fm), total soluble solids (TSS) and ratio of TSS and titratable acidity. Furthermore, the differentially accumulated proteins of banana fruit in response to EBR and cold treatment were investigated by employing gel-based proteomic in combination with MALDI-TOF-TOF MS and LC-ESI-MS/MS analyses. There were fifty five protein spots to be successfully identified. Notably, most of up-regulated proteins by EBR treatment were related to energy biosynthesis, stress response and cell wall modification. In contrast, proteins involved in protein degradation and energy consumption were down-regulated by EBR treatment. These results suggest that EBR treatment could enhance the defense ability, promote the synthesis and utilization of energy, as well as maintain the protein function via enhancing protein biosynthesis and inhibiting protein degradation, consequently contributing to improvement of cold tolerance in harvested banana fruit. Significance: To extend our understanding of chilling injury (CI) of harvested banana fruit, we reported the effect of 24-epibrassinolide (EBR) on CI of banana fruit when stored at 8 °C. It was the first report on the comprehensive proteomic analysis of banana fruit in response to EBR treatment at low temperature. EBR pretreatment significantly reduced CI in harvested banana fruit. Fifty five protein spots were successfully identified. Notably, the most of up-regulated proteins by EBR treatment were related to energy biosynthesis, stress response and cell wall modification. In contrast, proteins involved in protein degradation and energy consumption were downregulated. These results suggest that exogenous EBR treatment could enhance the defense ability and maintain high energy status. Meanwhile, EBR treatment maintained protein function via enhancing protein biosynthesis and inhibiting protein degradation. These results may help us to understand the molecular mechanism of the chilling tolerance induced by EBR treatment and broaden the current knowledge of the mechanism of CI of harvested banana fruit.

Keywords: /Banana/ /Low temperature/ /Plant hormone/ /Protein function/ /Redox stress/

BROCCOLI

Guo, L., Zhu, Y., Wang, F., (2018). Calcium sulfate treatment enhances bioactive compounds and antioxidant capacity in broccoli sprouts during growth and storage. *Postharvest Biology and Technology*, 139: 12-19.

Abstract

The effect of preharvest CaSO₄ treatment on antioxidant enzyme activities, bioactive compounds and antioxidant capacity in broccoli sprouts during growth and storage was investigated in this study. Application of CaSO₄ increased the biomass and reduced electrolyte leakage of broccoli sprouts. Higher antioxidant enzyme activities and antioxidant capacity in sprouts were obtained in CaSO₄-treated sprouts during growth and storage. Total phenolic content in CaSO₄-treated sprouts was lower than that in control ones during growth; but was higher than in control sprouts during storage. Additionally, the decrease of ascorbic acid was suppressed by CaSO₄ treatment during storage. CaSO₄ treatment also dramatically enhanced

glucosinolate content, especially glucoraphanin, in broccoli sprouts during growth and prevented its loss during storage. This was further supported by the up-regulation of glucoraphanin biosynthesis-related genes. During storage, CaSO₄-treated sprouts exhibited higher myrosinase activity and lower ESP activity, which resulted from higher expression of MYR and ESM1. Moreover, CaSO₄ treatment led to higher sulforaphane formation in sprouts than control during growth and storage.

Keywords: /Broccoli sprouts/ /Antioxidant enzyme/ /Antioxidant capacity/ /Glucoraphanin/ /Sulforaphane/

CARROTS

Sharma, S., Bandral, J.D., Sood, M., and Gupta, N. (2018). Effect of minimal processing and packaging on quality and shelf-life of carrots (*Daucus carota*). *The Pharma Innovation Journal*, 7 (5): 295-300.

Abstract

In the present study, peeled carrots were coated with carboxymethyl cellulose and sucrose (1, 2 and 3 per cent), surface dried and packed in polypropylene bags and trays wrapped with shrink wrap films and stored in refrigerated conditions. During storage, physiological loss in weight (PLW) showed a decreasing trend and T3 (3% CMC) recorded the minimum PLW of 2.24 per cent in polypropylene bags and 2.16 per cent in shrink wrap after 7 days of refrigerated storage. The beta carotene content of minimally processed carrot decreased with advancement in storage period and the highest value was recorded by treatment T3 (3% CMC), whereas T1 (control) recorded the lowest value. On comparing the packaging, the total phenols were higher in shrink wrap packed minimally processed carrots. There was a significant increase in total phenols content of minimally processed carrot with application of edible coatings and with advancement in storage period. The treatment T3 (2% CMC) recorded highest total phenol content of 88.90 mg/100g in polypropylene bags and 89.13 mg/100g in shrink wrap after 14 days of storage. A significant increase in ascorbic acid content was noticed after application of edible coating and highest values were observed in T3 (2% CMC). Overall T3 (2% CMC) had higher total phenols, ascorbic acid, beta carotene content and lower PLW in shrink wrap packed minimally processed carrots.

Keywords: Carrot/ /Minimal processing/ /carboxymethyl cellulose/ /Sucrose/ /Total phenol/

CHINESE JUJUBE FRUIT

Zhang, Z., Huang, J., and Li, X., (2018). Transcript analyses of ethylene pathway genes during ripening of chinese jujube Fruit. *Journal of Plant Physiology*, 224-225: 1-10.

Abstract

The fruit of Chinese jujube (*Ziziphus jujuba* Mill.) is immensely popular worldwide, while its fleshy fruit has a very short shelf life and suffers serious postharvest damage. The fruit has been controversially classified as nonclimacteric, though the mechanisms underlying its ripening behavior, particularly the role of ethylene, have remained unclear. In this study, low and stable ethylene production was detected during ripening of *Z. jujuba* 'Dongzao' fruit, with production increasing at the full maturity stage. To determine potential ripening behavior, the fruit of five cultivars were harvested at the white mature stage, and all exhibited a first decreasing and then moderately increasing respiration rate without concomitant climacteric-like ethylene production during shelf storage. Treatment with 1.0 $\mu\text{L L}^{-1}$ 1-methylcyclopropene (1-MCP) inhibited respiration and ethylene production in white mature fruit, though the effects of 100 $\mu\text{L L}^{-1}$ exogenous ethylene were not significant. The transcript levels of genes involved in ethylene biosynthesis, perception, and signal transduction were not elevated during fruit-ripening onset but substantially increased at the full-red ripening stage. Moreover, expression of genes controlling ethylene biosynthesis and perception mainly occurred in an auto-inhibited System-1-like manner, but signaling pathway genes were minimally affected by exogenous ethylene or 1-MCP. These results show that the ripening of Chinese jujube is non-climacteric. The basal level of ethylene likely plays a minor role in ripening regulation but is necessary to maintain normal ripening. This study elucidates the effects of ethylene on jujube fruit ripening, characterizing the ripening of this fruit as non-climacteric, and also provides strategies for the improvement and maintenance of fruit quality and the extension of shelf life during postharvest storage.

Keywords: /Chinese jujube (*Ziziphus jujuba* Mill.)/ /Ethylene/ /Fruit ripening/ /Non-climacteric 1-MCP/

CITRUS

Puligundla, P., Lee, T., and Mok, C., (2018). Effect of corona discharge plasma treatment for improving microbial quality and shelf life of kumquat (*Citrus japonica*) fruits. *LWT-Food Science and Technology*, 91: 8-13.

Abstract

The effect of intermittent corona discharge plasma jet (ICDPJ) treatment in improving the microbiological quality and shelf life of kumquat fruits was evaluated. Kumquats were treated by ICDPJ generated using high-voltage power generator, with an output voltage of 8 kV DC and at current levels of 2.0–4.0 A. Aerobic bacteria and yeasts and molds were detected as contaminants in the fruits in the range of 3.00–3.46 log CFU/g. The plasma treatment for a cumulative period of 2 min induced a maximum fruit surface temperature of 35.6 °C and no alterations in the color and hardness of kumquats. Upon the plasma treatment, the initial microbial counts were reduced by 0.77–1.04 log CFU/g at 2.0 A current, by 1.08–1.57 log CFU/g at 3.0 A current, and by 1.51 log CFU/g to below detection limit at 4.0 A current. There was no significant difference in taste, flavor, color, texture, and total acceptance between the untreated and ICDPJ-treated samples at 2.0, 3.0, and 4.0 A currents. During storage at 25 °C for 15 days, the kumquats treated using ICDPJ generated at all currents tested exhibited extended shelf life compared to controls, without compromising their physicochemical and sensory properties.

Keywords: /Corona discharge plasma jet/ /Intermittent mode/ /Kumquat/ /Decontamination/ /Kinetic modeling/

Wu, W., Haller, P., Cronje, P., Defraeye, T. (2018). Full scale experiments in forced-air precoolers for citrus fruit: impact of packaging design and fruit size on cooling rate and heterogeneity. *Biosystems Engineering*, 169: 115-125.

Abstract

Forced-air cooling (FAC) is a widely applied postharvest technology to rapidly remove the field heat of packed fresh fruit. The cooling uniformity of the fruit in different pallets and cartons during FAC is critical but often remains unknown in commercial operations. This study investigated the cooling rate and heterogeneity of packed citrus fruit in a full-scale, forced-air precooler with 40 pallets of fruit. The influence of package design (package type and wrapping) and fruit size on the precooling performance was quantified in several experiments with three types of citrus fruits ('Navel' orange fruit, 'Nova' mandarin fruit and 'Eureka' lemon fruit). Results showed that the cooling heterogeneity mainly occurred along the flow direction. Cooling was uniform between horizontal regions at the same side of the pallets and between the different heights in the precooler. High resolution measurements with 25e30 sensors in a single pallet gave an even better insight in this heterogeneity. Fruit wrapping induced a much slower cooling rate and larger cooling heterogeneity, especially in the cartons at the outflow side of the pallet. The 'Nova' mandarin fruit in Opentop cartons cooled 24% (at the inflow side of the pallet) and 42% (at the outflow side of the pallet) faster than the 'Eureka' lemon fruit with similar fruit size in

Supervent cartons, showing the impact of packaging design. These experiments quantified the cooling heterogeneity of the commercial precoolers.

Keywords: /Precooling/ /Citrus fruit/ /Package/ /Wrapping/ /Forced-air cooling/

Yao, S., Cao, Q., Xie, J., Deng, L., Zeng, K., (2018). Alteration of sugar and organic acid metabolism in postharvest granulation of Ponkan Fruit revealed by transcriptome profiling. *Postharvest Biology and Technology*, 139: 2-11.

Granulation is a serious physiological disorder in citrus fruit, accompanied by deterioration of sugars and organic acids, of which the relevant mechanism remains largely unknown. Postharvest granulation was found to begin at the stem region and then gradually extend towards the styler end of the segment in Ponkan fruit. Hence, stem and styler juice vesicles within the same fruit with either non-granulation or granulation were analyzed by RNA-Sequencing. Through a comparison of incipient granulated and entire granulated fruit, the results demonstrated that 768 genes were reliably identified to be differentially expressed under granulation. A significant increase in transcript levels was observed in genes encoding enzymes involved in the degradation pathways of sugars and citric acid (e.g., invertase, hexokinase, aconitase, isocitrate dehydrogenase and α -ketoglutarate-dehydrogenase) and in the biosynthesis of cell wall materials including pro-pectin, cellulose and lignin (e.g., UDPglucuronate 4-epimerase, UDP-glucose pyrophosphorylase and cinnamyl alcohol dehydrogenase) under granulation. Further, there was a distinct decrease in transcript levels of genes encoding enzymes involved in the synthesis pathway of sucrose and citric acid (e.g., sucrose phosphate synthase, sucrose phosphatase, aspartate aminotransferase and malate dehydrogenase) and the degradation pathway of cell wall components (e.g., pectin methylesterase and β -D-xylosidase) under granulation. Together with the decline in content of soluble sugars and acids (sucrose, glucose, fructose, citric acid and malic acid) and the increase in content of cell wall components (lignin, pro-pectin and cellulose) under granulation, the results suggested that sugar and organic acid metabolism adjusted to the synthesis pathway of cell wall components upon granulation at the expense of sugars and acids. This study is the first to unravel the global picture of the network of sugar and organic acid metabolism underlying fruit granulation.

Keywords: /Granulation/ /Transcriptome profiling/ /Sugar metabolism/ /Organic acid metabolism/ /Ponkan fruit/

FIGS

Mahmoudi, S., Khali, M., Benkhaled, A., Boucetta, I., Dahmani, Y., Attalah, Z., and Belbraouet, S. (2018). Fresh Figs (*Ficus carica* L.): pomological characteristics,

nutritional value, and phytochemical properties. *European Journal of Horticultural Sciences*, 83 (2): 104-113.

Abstract

Ficus carica L. (*Moraceae*) is a wild spread tree including more than 600 cultivars with different phenotypic characteristics. Their fruits are a good natural source of nutrients, minerals, and phytochemicals, which may improve human health. The pomological characteristics of nine Algerian cultivars of fresh figs were determined using descriptors resulting from the IPGRI and CIHEAM list. The consumer test was carried out using an in-store consumer test. The proximal components (dry matter, ash, titratable acidity, crude protein (Kjeldahl), ascorbic acid, and carbohydrates) were estimated using the AFNOR and Dubois methods. Minerals (Ca, K, and Na) were analyzed using a flame spectrophotometer. Phosphorus, phenolic, flavonoid, anthocyanin, and condensed tannin concentrations were quantified by UV-spectrophotometer. The antioxidant capacity was evaluated using the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay. The pomological results obtained made it possible to discriminate between the different fig cultivars. Skin color results indicate two groups (light skin and dark skin groups). The consumers preferred 'Boughandjo', 'Bither', and 'Bakkor Biadh', with high percentages of acceptance (68.75, 70.31 and 75%). Figs are a good source of carbohydrates (especially 'Safra' pulp [26.02±0.63 g 100 g⁻¹ Fresh weight]), vitamin C (10.67±0.31 mg 100 g⁻¹ Fresh weight for 'Onk Elhamam' peel), and potassium and calcium (266.67±2.78 and 125.44±3.37 mg 100 g⁻¹ Fresh weight for 'Bakkor Khal' peel, respectively). In the majority of the tested cultivars, peels exhibited higher phenolic (1.63 vs. 1.11 mg gallic acid equivalents g⁻¹ Fresh weight), flavonoid (147.76 vs. 83.82 µg quercetin equivalents g⁻¹ Fresh weight), anthocyanin (64.82 vs. 41.72 µg cyanidin-3-rutinoside equivalents g⁻¹ Fresh weight) and condensed tannin (6.08 vs. 2.06 µg catechol equivalents g⁻¹ Fresh weight) levels and antioxidant activities (18.91 vs. 29.51 mg mL⁻¹) than pulps. Peels of dark cultivars showed higher phytochemical and antioxidant properties than those of light cultivars. Antioxidant activity was correlated with total phenolic and condensed tannin concentrations (r=0.521 and 0.659). The pomological characterization and consumer tests reported here are important for allowing farmers to judge about the potential of the tested cultivars and could be helpful during fig breeding and cultivar selection. Based on their diversity, tastes, nutritional and phytochemical attributes, we recommend figs (especially those with dark skin) as healthy food.

Keywords /Consumer test/ /Cultivars/ /Descriptors/ /Minerals/ /*Moraceae*/ /Phenolics/ /Proximal components/

GENERAL

Bantis, F., Smirnakou, S., Ouzounis, T., Koukounaras, A., Ntagkas, N., Radoglou, K. (2018). Current status and recent achievements in the field of horticulture with the use of light-emitting diodes (LEDs). *Scientia Horticulturae*, 235: 437-451.

Abstract

Light-emitting diode (LED) technology has rapidly advanced the past years and it is nowadays irrevocably linked with controlled-environment agriculture (CEA). We provide here an amalgamation of the recent research achievements in the horticulture and floriculture industry, ranging from greenhouse applications to climate rooms and vertical farming. We hope this overview bestows ample examples for researchers and growers in the selection of the appropriate LED light solution for amending crop yield, phytochemical content, nutritional value, flowering control, transplant success, pre-harvest and postharvest product quality, and production of regeneration material. We leave the reader with some future prospects and directions that need to be taken into account in this ever-growing field.

Keywords: /Light quality/ /Greenhouse/ /Growth chamber/ /Vertical farming/
/Photomorphogenesis/ /Plant metabolism/

Fabrizi, S., Olsen, S.I., Owsianiak, M. (2018). Improving environmental performance of post-harvest supply chains of fruits and vegetable in Europe potential contribution from ultrasonic humidification. *Journal of Cleaner Production*, 182: 16-26.

Abstract

Post-harvest losses of fruits and vegetables during refrigerated storage, transportation and retail are an important contributor to total environmental impacts of food supply chains in Europe. Ultrasonic humidification can reduce these post-harvest losses, but it is currently unknown whether implementing the technology in practice improves the environmental performance of the supply chains. Here, using life cycle assessment we showed that ultrasonic humidification has the potential to reduce environmental impacts, including climate change impacts, of selected fruits and vegetables in Europe by up to 23% compared to conventional supply chains. The greatest potential is obtained when humidifiers are applied to fruits and vegetables chains with total inherent losses higher than 24% and when humidifiers allow reducing post-harvest losses in each post-harvest stage by 20% or more. Our results suggest that humidification may be an attractive technology for making supply chain management more sustainable.

Keywords: /Humidification/ /Life cycle assessment/ /Food supply/ /Food loss/ /Food waste/
/Ultrasonic/

Guardado-Valdivia, L., Tovar-Perez, E., Chacon-Lopez, A., Lopez-Garcia, U., Gutierrez-Martinez, P., Stoll, A., and 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.

Abstract

Anthrachnose 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 they 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: /*Bacillus atrophaeus*/ /Antifungal activity/ /Biocontrol/ /*Colletotrichum gloeosporioides*/ /Anthrachnose/

Porat, R., Lichter, A., Terry, L.A., Harker, R., and Buzby, J. (2018). Postharvest losses of fruit and vegetables during retail and in consumers' homes: quantifications, causes, and means of prevention. *Postharvest Biology and Technology*, 139: 135-149.

Abstract

The issue of food loss and waste (FLW) reduction has recently achieved much public attention as part of worldwide efforts to combat global hunger and improve food security. Studies conducted by various international and national organizations led by the FAO indicated that about one third of all food produced on the planet and about a half of all fruit and vegetables (F&V) are lost and not consumed. FLW occurs during five key stages of the food supply chain: agricultural production, postharvest handling and storage, processing, distribution, and consumption. Large portions of FLW in developed countries occur during retail and

consumption, and are largely related to logistic management operations and consumer behaviors. In light of the great importance of FLW reduction, the United Nations set up in September 2015 an ambitious goal to halve per capita global food waste by 2030, and this decision was adapted by the US Federal Government, the EU Parliament, and many other countries. This first Adel Kader review article is dedicated to the subject of F&V losses during retail and consumption, and contains the following chapters: 1) Introduction of the problem of global food losses; 2) Quantifications of F&V losses during retail and consumption in the UK, US and other countries; 3) Causes and consumer decisions related to F&V wastage; 4) Emerging new technologies for prevention of F&V losses, including advances in logistics and cold chain management, retail packaging and technological innovations; 5) Other means to reduce F&V losses, including consumer awareness campaigns, advertisement of home storage instructions and policy and legislative measures. Due to the great importance of reducing F&V losses, we encourage postharvest researchers to become more engaged with logistics and food supply-chain operations, and to conduct multidisciplinary research incorporating consumer behavior studies into postharvest research.

Keywords: /Food loss/ /Fruit/ /Postharvest/ /Retail/ /Vegetables/ /Waste/

Reis, C.G., Gazarini, L., and Ribeiro, M. (2018) Fruit production from *Opuntia ficus-indica* ecotypes in comparison to commercial Italian clones. *Horticultural Sciences*, 45 (2): 92-100.

Abstract

Fruit production, as an elementary chemical characteristic of the fruit, was evaluated in 16 *Opuntia ficus-indica* Portuguese ecotypes cultivated in a marginal soil without tillage, in the second and third years after plantation. The *O. ficus-indica* ecotypes were compared with the Italian cultivars 'Bianca' and 'Gialla'. Significant differences were found among the *O. ficus-indica* ecotypes in biomass-related parameters and fruit yield, and different groups were established. Two spineless ecotypes (OFI-12 and OFI-13) had highest biomass production, with 9.9 Mg/ha dry matter on average. This was not significantly different from the 'Gialla' cultivar, which averaged 11.9 Mg/ha, for a density of 2,667 plants/ha, in the third year after plantation. Among Portuguese ecotypes, the fruit yields ranged from 2.4 to 10.1 Mg/ha fresh weight. The cultivars 'Gialla' and 'Bianca' had the highest fruit yield (13.8 and 13.6 Mg/ha fresh weight, respectively). The 'Gialla' cultivar and the group of ecotypes with orange pulp produced fruits of larger size and weight compared to the 'Bianca' cultivar and the group of ecotypes with white pulp.

Keywords: /Biomass/ /fruit yield/ /fruit size/ / prickly pear/

Porat, R., Lichter, A., Terry, L.A., Harker, R., and Buzby, J. (2018). Postharvest losses of fruit and vegetables during retail an in consumers' homes: quantifications, causes, and means of prevention. *Postharvest Biology and Technology*, 139: 135-149.

Abstract

The issue of food loss and waste (FLW) reduction has recently achieved much public attention as part of worldwide efforts to combat global hunger and improve food security. Studies conducted by various international and national organizations led by the FAO indicated that about one third of all food produced on the planet and about a half of all fruit and vegetables (F&V) are lost and not consumed. FLW occurs during five key stages of the food supply chain: agricultural production, postharvest handling and storage, processing, distribution, and consumption. Large portions of FLW in developed countries occur during retail and consumption, and are largely related to logistic management operations and consumer behaviors. In light of the great importance of FLW reduction, the United Nations set up in September 2015 an ambitious goal to halve per capita global food waste by 2030, and this decision was adapted by the US Federal Government, the EU Parliament, and many other countries. This first Adel Kader review article is dedicated to the subject of F&V losses during retail and consumption, and contains the following chapters: 1) Introduction of the problem of global food losses; 2) Quantifications of F&V losses during retail and consumption in the UK, US and other countries; 3) Causes and consumer decisions related to F&V wastage; 4) Emerging new technologies for prevention of F&V losses, including advances in logistics and cold chain management, retail packaging and technological innovations; 5) Other means to reduce F&V losses, including consumer awareness campaigns, advertisement of home storage instructions and policy and legislative measures. Due to the great importance of reducing F&V losses, we encourage postharvest researchers to become more engaged with logistics and food supply-chain operations, and to conduct multidisciplinary research incorporating consumer behavior studies into postharvest research.

Keywords: /Food loss/ /Fruit/ /Postharvest/ /Retail/ /Vegetables/ /Waste/

GRAPES

Garcia-Rojas, M., Meneses, M., Oviedo, K., Carrasco, C., Defelippi, B., Gonzalez-Aguero, M., Leon, G., and Hinrichsen, P. (2018). Exogenous gibberellic acid application induces the overexpression of key genes for pedicel lignification and an increase in berry drop in table grape. *Plant Physiology and Biochemistry*, 126: 32-38.

Abstract

Most table grape (*Vitis vinifera* L.) varieties require gibberellic acid (GA3) applications to obtain an adequate berry size in order to satisfy market requirements. However, GA3 treatments also produce severe berry drop in some cultivars, which occurs mainly after a cold storage period during post-harvest. Berry drop in bunches treated with GA3 has been related to the hardening and thickening of the pedicel produced by the over-accumulation of cellulose and its lignification. The main goal of this study was to compare the morphology and gene expression in pedicel samples of genotypes contrasting for berry drop susceptibility. These genotypes are Thompson Seedless, which exhibits a low incidence of berry drop, and a genetic line (Line #23) of INIA's breeding program that is very susceptible to berry drop at harvest and after storage in bunches sprayed with GA3. The parameters measured to study this phenomenon during fruit growth and post-harvest storage included fruit detachment force (FDF), hardness and thickness of the pedicel and berry drop frequency. Histological analyses of pedicel structures at harvest showed an increase in cell size and deposition of lignin in the cortex zone in both contrasting genotypes treated with GA3. The expression profile in both genotypes of the key lignin biosynthesis genes Vv4CL4, VvCCR1L and VvCAD1 analyzed by quantitative real time PCR (qPCR) revealed evident changes in response to GA3 treatments. In particular, gene VvCAD1 is overexpressed (100X) in pedicels of line #23 treated with GA3 after 30 and 45 days in cold storage compared to control. Moreover, the frequency of berry drop was higher for Line #23 treated with GA3 than for the control (23% vs. 1%). Our results suggest that gibberellic acid regulates the expression of the biosynthesis of lignin genes, generating changes in cell wall composition and pedicel structure that result in an increase in berry drop.

Keywords: /Gibberellic acid/ /Berry drop/ /Gene expression/ /Fruit detachment force/

Xu, D., Deng, Y., Han, T., Jiang, L., Xi, P., Wang, Q., Jiang, Z., Gao, L. (2018). In vitro and in vivo effectiveness of phenolic compounds for the control of postharvest gray mold of table grapes. *Postharvest Biology and Technology*, 139: 106-114.

Abstract

As the natural antimicrobial metabolites, phenolic compounds were reported to be effective in the inhibition of phytopathogenic fungi, including the postharvest decay agents. However, comprehensive study on the biological activity of phenolic compounds and their application on controlling postharvest gray mold of table grapes is lacking. In this study, the antifungal effect of 18 natural or synthetic phenolic compounds purchased from commercial suppliers, including simple phenolic, phenolic acids, stilbenes and flavonoids, were determined on four gray mold strains by an in vitro agar dilution assay. Overall, seven phenolic compounds were effective on inhibiting *B. cinerea* growth and were selected to test their activity on conidial germination as well as in vivo application on grape berries. Pterostilbene showed the highest antifungal activity and greatly reduced the growth of the mycelia, caused hyphae deformation, suppressed conidial germination of *B. cinerea*, and completely inhibited the germination of conidia at the concentration of 50 mg L⁻¹. Furthermore, treatment of grape berries with pterostilbene and

piceatannol significantly reduced the disease incidence and severity. Our results demonstrate the antifungal activity of phenolic compounds and highlight their potentials as an alternative strategy in the control of postharvest gray mold of table grapes.

Keywords: /Antifungal activity/ / Piceatannol/ /Postharvest decay/ /Pterostilbene/

Melo, N., Mendonca Soares, B., Diniz, K., Leal, C., Canto, D., Flores, M., Tavares-Filho, J., Galembeck, A., Stamford, T., Stamford-Arnaud, T., Stamford, T.M. (2018). Effects of fungal chitosan nanoparticles as eco-friendly edible coatings on the quality of postharvest table grapes. *Postharvest Biology and Technology*, 139: 56-66.

Abstract

Chitosan edible coatings are a potential alternative for extending the postharvest life of fruit. The properties of chitosan can be enhanced when it is used in the form of nanoparticles. The aim of this study was to evaluate the in vitro antimicrobial activity and the effect of gel + fungal chitosan nanoparticles on some physicochemical properties (total soluble solids, pH, titratable acidity, reducing sugar content and moisture content) and sensory characteristics of grapes stored at 12 °C and 25 °C. The chitosan nanoparticles were prepared by ionic gelation and then underwent a heat treatment (50 °C/1200 × g/30 min). Characterization of the particles was carried out by dynamic light scattering and scanning electron microscopy. The microdilution test was used to determine the minimum inhibitory (MIC) and bactericidal concentration (MBC) of chitosan nanoparticles against food-borne pathogenic bacteria. To obtain the coatings to be tested, chitosan was solubilized in 1% acetic acid (20 g/L⁻¹) and nanoparticles were subsequently added (MIC/2, MIC and 2MIC). The produced nanoparticles were spherical, had a medium size of 128.3 nm and showed an inhibitory effect against pathogenic foodborne bacteria with MIC values ranging from 2 to 3 g/L⁻¹. The edible chitosan nanoparticle coatings were responsible for delaying the ripening process of the grapes resulting in decreased weight loss, soluble solids and reducing sugar contents as well as increased moisture retention and preservation of the titratable acidity values and sensory characteristics. Therefore, the use of edible coatings containing chitosan nanoparticles at different concentrations (MIC/2, MIC, 2MIC) can be a promising strategy to improve the post-harvest quality of grapes.

Keywords: /Biopolymer/ / Fruits Nanomaterials/ / Shelf life/

GUAVA

Iqbal, Z., Randhawa, M.A., Asghar, M., Beaudry, R. (2018). Influence of 1-methylcyclopropene of physico-chemical properties of Gola and Surahi guava (*psidium guajava* L.) under air storage. *Pakistan Journal of Agricultural Sciences*, 55 (2): 389-396.

Abstract

1-Methylcyclopropene (1-MCP) was used as an ethylene antagonistic in the present research to suppress the ethylene induced ripening and preserve the post-harvest quality of guava. Physiologically mature guava (cvs. 'Gola' and 'Surahi') were exposed to 1-MCP with different levels (0, 200, 500 and 800 nL·L⁻¹). Samples were held at 10°C and 80% RH and ripening indices were measured every 6 days for 1 month. The patterns for soluble solids and ethylene were typical of climacteric fruit for both cultivars. Results illustrated that ripening advanced rapidly for the fruits without 1-MCP. 1-MCP significantly reduced the weight loss, which was higher in 'Gola' compared to 'Surahi'. Control fruits started to decay at day 12, whereas, treated decayed on day 18. Low to intermediate levels of 1-MCP was effective in preserving desirable firmness. Control fruits showed change in Hue angle from yellowish green to ripe yellow at 6th day compared to 1-MCP treated which delayed the color change to 12-18 days. The data suggest that dose levels of 1-MCP below 800 nL·L⁻¹ were not sufficient to saturate the response to 1-MCP.

Keywords: /1-methylcyclopropene/ /Myrtaceae/ /Guava/ /Ethylene/ /Climacteric fruits/ /Postharvest storage/

Lo ay, A.A., Taher, M.A. (2018). Influence of edible coatings chitosan/PVP blending with salicylic acid on biochemical fruit skin browning incidence and shelf life of guava fruits cv. 'Banati'. *Scientia Horticulturae*, 235: 424-436.

Abstract

The effect of chitosan/poly-vinyl-pyrrolidone (CS/PVP) combined with a salicylic acid (SA) at different concentrations (0, 1, and 2 mM) of 'Banati' guava fruits were harvested at three color maturity development stages (M1; green, M2; green-yellow, and M3; yellow). the experiment was carried out during seasons 2016–2017 in a commercial orchard near Damietta Gov., Egypt. Fruits were coated by consolidated biopolymer CS/PVP-SA to minimize browning spots during shelf life at room temperature (27 ± 1 °C and air relative humidity $48 \pm 2\%$) for fifteen days. The measurements were estimated each three-day interims to assess physical and chemical quality attributes. The physical estimations, for example, water loss rate, fruit peel color hue angle (h°), fruit skin browning index, and fruit firmness. The chemical properties, total soluble solids (SSC%), fruit acidity (TA%), and SSC/TA-ratio. The browning parameters were studied such as total phenolic compounds (TP), polyphenol oxidase (PPO; EC:1.14.18.1), and phenylalanine ammonia-lyase (PAL; EC:4.3.1.24). Furthermore, cell wall degradation enzyme activities were determined such as cellulase (CEL; EC: 3.2.1.4), lipoxygenase (LOX; EC: 1.13.11), and pectinase (PT; EC: 3.2.1.15). Furthermore, cell wall degradation enzyme activities were determined such as cellulase (CEL; EC: 3.2.1.4), lipoxygenase (LOX; EC: 1.13.11), and pectinase (PT; EC: 3.2.1.15). The changes in browning and cell wall degradation enzymes activities during shelf life are related to the presence of SA in biopolymer (CS/PVP) to fruits

were delayed. The CS/PVP-SA treatment could be improved the antioxidant activities. It is, therefore, possible to point out that the treatment of guava fruits with CS/PVP-SA 2 Mm treatment after harvesting can be considered as a tool to reduce browning in fruit skin.

Keywords: /Coating/ /Guava/ /Shelf life/ /Browning incidence/

Rashid, R., Bhat, A., Dayal, A., Sood, M., Sharma, S. (2018). Study of storage capability of guava RTS. *The Pharma Innovation Journal*, 7 (5): 230-233.

Abstract

A study was undertaken for preparation of guava ready to serve and its physiochemical characteristics viz., TSS, acidity, total sugars and microbiological count as well as organoleptic attributes viz., colour, flavour, taste and overall acceptability of RTS were evaluated at an interval of 2 months up to 6 months of storage. Results indicated that the minimum physico-chemical changes viz., TSS (10.11-10.17°Brix), acidity (0.42-0.50%), reducing sugars (3.27-3.58%), total sugars (6.26-7.02%) and sensory attributes showed decreasing values with duration of storage. Considering above chemical constituents as well as sensory attributes of processed nectar. The guava is commercially used in processing industry due its attractive pulp colour and could make significant contribution to food industry.

Keywords: /Guava/ /TSS, /Bio-chemical parameters/ /storage/

LONGAN

Sun, J. Lin, H., Zhang, S., Lin, Y., Wang, H., Lin, M., Hung, Y.C., Chen, Y. (2018). The roles of ROS production-scavenging system in *Lasiodiplodia theobromae* (Pat.) Griff. & Maubl.-induced pericarp browning and disease development of harvested longan fruit. *Food Chemistry*, 247: 16-22.

Abstract

Effects of *Lasiodiplodia theobromae* on reactive oxygen species (ROS) production-scavenging system during *L. theobromae*-induced pericarp browning and disease development of harvested "Fuyan" longans were investigated. Compared with control longans, *L. theobromae*-inoculated longans exhibited higher pericarp browning index and fruit disease index, higher pericarp O₂ -% generation rate and MDA content. Moreover, *L. theobromae* infection also resulted in lower contents of pericarp AsA and GSH, lower levels of pericarp DPPH radical scavenging ability and reducing power. Additionally, *L. theobromae* infection decreased the activities of pericarp SOD, CAT and APX from day 2 to day 5. These findings suggested that *L. theobromae*-induced pericarp browning and disease development of harvested longans might be due to reduction of

ROS scavenging ability and increase in ROS production, which might stimulate membrane lipid peroxidation, disrupt cellular membrane structure, and cause the loss of cellular compartmentalization and disease resistance, in turn, resulting in pericarp browning and disease development.

Keywords: /Longan (*Dimocarpus longan* Lour.) fruit/ /Pericarp browning/ /Disease development/ /Active oxygen metabolism/ /Reactive oxygen species (ROS)/ /ROS scavenging capacity/ /*Lasiodiplodia theobromae* (Pat.) Griff. & Maubl/

MANGO

Klangmuang, P., and Sothornvit, R. (2018). Active hydroxypropyl methylcellulose-based composite coating powder to maintain the quality of fresh mango. *LWT-Food Science and Technology*, 91: 541-548.

Abstract

Edible composite coating powder based on hydroxypropyl methylcellulose (HPMC), beeswax (BW), nanoclay and ginger oil was developed using spray-drying and freeze-drying methods. The antifungal activity of the freeze-dried HPMC-based composite powder was better than from spray drying. The Arrhenius equation used to accelerate shelf-life testing based on antifungal performance indicated that the shelf-life of the active coating powder was 160 days at 25 °C. The active coating powder was applied on mangoes cv. Namdokmai Sithong to verify its effectiveness. It is proved that the coating powder maintained the quality of the coated mangoes by reducing the weight loss, firmness loss, changes in flesh color, soluble solids content and disease severity. The shelf-life of coated mangoes was extended to 18 days at 13 °C. Therefore, coating powder of HPMC-based composite incorporated with ginger oil will reduce the loss of agricultural produce due to its antifungal activity, convenience and ease of use.

Keywords: /Hydroxypropyl methylcellulose/ /Mango/ /Powder/ /Essential oil/ /Shelf-life/

Rosalie, R., Léchaudel, M., Dhuique-Mayer, C. Dufossé, L., Joas, J. (2018). Antioxidant and enzymatic responses to oxidative stress induced by cold temperature storage and ripening in mango (*Mangifera indica* L. cv. 'Cogshall') in relation to carotenoid content. *Journal of Plant Physiology*, 224-225: 75-85.

Abstract

The effects of 15 days of storage at 12 °C and 7 °C followed by fruit ripening at 20 °C on oxidative status, antioxidant defense systems and carotenoid accumulation were studied for two successive years in mango fruits (*Mangifera indica* L.) cv. Cogshall. Changes in the

non-enzymatic (ascorbate) and enzymatic (SOD, CAT, APX, MDHAR, DHAR and GR) antioxidant systems, as well as oxidative parameters (H₂O₂ and MDA) and the contents of the major carotenoids were measured for three maturity stages, at harvest and after ripening following cold temperature storage. In control conditions (20 °C), ripening induced an increase in oxidation resulting in ROS production and a decrease in ascorbate content. Fruit tissue protection was activated by means of antioxidant and ascorbate regeneration enzyme systems. Carotenoid accumulated exponentially during ripening. Storage at low temperatures increased respiration crisis intensity and therefore increased oxidation in the fruit pulp. Fruit response to this increase varied according to the maturity stage, i.e., enzymatic responses in younger fruits were very low in comparison to the control, whereas second harvest fruits had a significantly higher degree of enzymatic activity to cope with the oxidative stress. Carotenoid contents decreased with low temperatures and first harvest fruits showed significantly lower values than the control, in opposition to second harvest fruits that appeared not to be affected. We also suggest that, based on a review of the literature, a link can be made between antioxidant system defense and carotenoid metabolism since ROS seems to play a central role as a stress signal in plants.

Keywords: /Ascorbate/ /Carotenoids/ /Cold storage/ /Mango/ /Reactive oxygen species/

Vithana, M., and Singh, Z., and Johnson, S.K. (2018). Cold storage temperatures and durations affect the concentrations of lupeol, mangiferin, phenolic acids and other health-promoting compounds in the pulp and peel of ripe mango fruit. *Postharvest Biology and Technology*, 139: 91-98.

Abstract

Mangoes are usually stored above 13 °C to avoid chilling injury. We investigated the effects of cold storage temperatures (5 and 13 °C) and durations (12 and 24 d) on the concentrations of lupeol, mangiferin, phenolic acids (gallic, chlorogenic, vanillic, ferulic and caffeic), ascorbic acid, carotenoids, total phenols and antioxidants in the pulp and peel of ripe 'Kensington Pride' mango fruit. Mature green mangoes were stored at 5 °C (chilling) or 13 °C (non-chilling) temperature for 12 and 24 d prior to ripening at ambient temperature (21 ± 1.5 °C). Chilling injury and concentrations of health-promoting compounds were determined at eating soft ripe stage. Chilling injury symptoms were only developed on ripe fruit following storage at 5 °C for 24 d. The concentrations of lupeol in pulp and peel, chlorogenic and caffeic acids in the pulp were significantly higher in fruit stored at 5 °C than 13 °C, whilst mangiferin, gallic, chlorogenic, vanillic, ferulic, and caffeic acids, total phenols, antioxidants and carotenoids in the peel were significantly higher when stored at 13 °C. The concentrations of lupeol and chlorogenic acid in pulp and peel and gallic acid in the pulp were significantly lower when stored for 24 d compared to 12 d, whilst vanillic acid, total phenols, total antioxidants and ascorbic acid in the pulp and caffeic acid in both pulp and peel were significantly higher when stored for 24 d. In conclusion, cold storage temperatures and duration influence the concentration of lupeol, mangiferin,

phenolic acids and other health promoting compounds in the pulp and peel of ripe mango fruit. Storage of mature green mangoes at chilling temperature (5 °C) for 12 d prior to ripening (21 ± 1.5 °C) seems to be a promising tool for maximizing the levels of lupeol in the pulp and peel of the fruit.

Keywords: Mango/ /Low-temperature storage/ /Chilling injury/ /Health-promoting compounds /Lupeol/ /Mangiferin/ /Phenolic acids/

MUSHROOM

Hou, L., Lin, J., Ma, L., Qu, S., Li, H., Jiang, N. (2018). Effect of 60 Co gamma irradiation on postharvest quality and selected enzyme activities of *Volvariella volvacea*. *Scientia Horticulturae*, 235: 382-390.

Abstract

Volvariella volvacea fruit bodies were exposed to six different dosage levels (0, 0.2, 0.4, 0.6, 0.8, and 1.0 kGy) of 60 Co gamma ray source, and then stored at 16 °C and 55–60% relative humidity for 7 d. Storage of the 0.8-kGy treatment group resulted in the highest sensory evaluation score, (increase by 51.85% than other treatments). The activity of selected enzymes involved in postharvest deterioration were also studied. The results showed that irradiation treatments have achieved significantly better commercial appearance after 7 d of storage due to slower postharvest mushroom softening, browning, weight loss (10.53%–34.73%) and respiration rate (17.20%–48.72%) than control. respectively. Samples irradiated with the 0.8-kGy dose performed better than other treatments. The control showed a significantly higher malonaldehyde (MDA) level than the irradiated samples (5.5%–45.27%). Increased catalase (CAT) activity ($P < 0.05$) was also observed in the samples receiving doses of 0.8 and 1.0 kGy after storage for 4 and 5 d, respectively. Superoxide (SOD) dismutase activities in the irradiated samples (13.68–40.53%) were significantly higher than those of the control, while the microbial populations decreased in all irradiated samples compared with the control. These findings suggested that irradiating *V. volvacea* mushrooms with 0.8 kGy of 60Co gamma rays could maintain their quality.

Keywords: /Fruit body quality/ /Postharvest senescence/ /*Volvariella volvacea*/ /60 Co gamma irradiation/

OLIVES

Kafkaletou, M. and Tsantili, E. (2018). The paradox of oleuropein increase in harvested olives (*Olea europea* L.). *Journal of Plant Physiology*, 224-225: 132-136.

Abstract

Olives are non-climacteric fruit. In a previous article, oleuropein (OE) increased substantially in fresh green olives exposed to 20 °C for 7 d, but the increases were lower in preharvest treated fruit with an ethylene synthesis inhibitor. The present aim was to investigate whether phenolic compounds, including OE, were affected by ethylene treatment in green harvested olives. Postharvest treatments with the ethylene perception inhibitor, 1-methylcyclopropene (1-MCP) at 1.5 µL L⁻¹ for 12 h, and/or ethylene at 1000 µL L⁻¹ at 20 °C for up to 10 d were applied to fruits of 'Konservolia' cultivar. The results showed that ethylene and/or 1-MCP had similar effects on total phenolics (TP), total antioxidant capacity (TAC) and OE and these results are revealed for the first time in olives. Ethylene had no effect on green loss, but 1-MCP prevented it slightly. In all treated fruit, but not in controls, TP and TAC were increased soon after harvest and remained almost stable throughout exposure, whereas OE increased in controls and all treated at later stages (as confirmed by HPLC-DAD-ESI-MS) independently of degreening. The present experiments could be applied to studies of ethylene perception and transcription related responses in these non-climacteric fruit. In practice, harvested olives do not lose their antioxidant capacity, but the OE elevation in short-stored olives at ambient temperature might have an impact on olive products quality.

Keywords: /Ethylene 1- methylcyclopropene (1-MCP)/ /Oleuropein (OE)/ /Olives/ /Phenolic compounds/

PAPAYA

Hernandez-Montiel, L.G., Gutierrez-Perez, E.D., Murillo-Amador, B., Vero, S., Chiquito-Contreras, R.G., Rincon-Enriquez, G. (2018). Mechanisms employed by *Debaryomyces hansenii* in biological control of anthracnose disease on papaya fruit. *Postharvest Biology and technology*, 139: 31-37.

Abstract

The mechanisms of action associated with the biocontrol capacity of *Debaryomyces hansenii* against *Colletotrichum gloeosporioides*, causal agent of anthracnose in papaya, were studied by means of in vitro and in situ assays. In vitro the yeast exhibited a variety of different antagonistic mechanisms against the phytopathogenic fungus including: volatile organic compounds (VOCs) production, β-1, 3 glucanase and protease activity, inhibition of spore germination, and the competition for saccharose, glucose, fructose and total carbohydrates. Results in situ indicated that disease incidence and lesion diameter of anthracnose on papaya var. Maradol fruit was

significantly reduced with a higher concentration of *D. hansenii*. Our study indicates that *D. hansenii* is an excellent agent of control to anthracnose disease on papaya var. Maradol fruit.

Keywords: /Papaya/ /Colletotrichum gloeosporioides/ /Postharvest diseases/ /Biocontrol/ /*Debaryomyces hansenii*/

PEACHES

Kirinus, M.B.M, Barreto, C.F., da Silva, P. S., Farias, P.D., and Malgarim, M.B. (2018). Salicylic acid (SA) addition influences postharvest quality of 'Jubileu' peaches (*Prunus persica*). *Australian Journal of Crop Science*, 12 (5): 788-793.

Abstract

The SA organic elicitor is an alternative to extend the useful life of fruits by inducing the defenses of the plant and decreasing fruit rot. This study aimed at evaluating not only the effects of SA applied after the harvest in the cold storage period, but also the marketing simulation of the maintenance of physicochemical characteristics of 'Jubileu' peaches. The experimental design was thoroughly randomized in a double factorial scheme. Fruits were picked at proper maturity, in agreement with the maturity index. In the laboratory, they were submitted to SA doses of 0, 2, 4 and 6 mM and, then, kept in a cold room at 1 ± 1 °C, at $90 \pm 5\%$, for 7, 14 and 21 days. Afterwards, a 3-day shelf life was simulated at 25 ± 5 °C. Characteristics under evaluation were fruit mass loss, firmness, color, solids/acidity and rot. Predictive points of the variables under analysis were observed because they are important to determine the interaction between time and dose. Regarding parameters of solids/acidity, the predictive point ranged from 14.88 to 3.51 SA in 11.5 days. SA application decreased mass loss in 11.1 days at 2.16 mM and firmness, in 11.3 days at doses of 2.75 mM. The predictive point of rot incidence was 5.96 at 3.97 mM SA in 8.48 days whereas the one of color brightness was 68.32 at 1.25 mM SA in 19.7 days. Finally, the one of hue was 87.92 at 2.81 mM SA in 15.3 days. SA was efficient to keep the general quality of 'Jubileu' peaches.

Keywords: /Cold storage/ /Elicitors/ /Fruit/ /*Prunus persica*/ /Rot control/

Minas, I.S., Tanou, G., and Molassiotis, A. (2018). Environmental and orchard bases of peach fruit quality. *Scientia Horticulturae*, 235: 307-322.

Abstract

This article provides an overview of preharvest factors that affect peach fruit quality attributes. Improvement of peach fruit quality is impossible postharvest. Hence, optimum peach quality at

harvest and during postharvest and subsequently, consumer satisfaction, is achievable through understanding the influence of preharvest environmental and orchard factors. 'Quality' definition for producers, packers, shippers and consumers is discussed, with a description of the most important peach quality attributes and the physiological mechanisms that affect them. The effect of cultivar, rootstock, harvest time, crop load management, light manipulation, fruit position in the canopy, irrigation, fertilization and the impact of the growing environment on peach and nectarine harvest quality are reviewed. The development of new technologies that help clarify the biological and horticultural bases of preharvest factors on peach fruit quality can help increase peach consumption.

Keyword: /Canopy architecture/ /Crop load/ /Irrigation/ /Mineral nutrition/ /Preharvest/ /Prunus persica Rootstock/

Santin, M., Lucini, L., Castagna, A., Chiodelli, G., Hauser, M-T., and Ranieri, A. (2018). Post-harvest UV-B radiation modulates metabolite profile in peach fruit. *Postharvest Biology and Technology*, 139: 127-134.

Abstract

The possibility to modify plant metabolic profile of plants and fruit to improve their healthy properties using ecofriendly tools, rather than transgenic approaches, gained interest in the last decades. Ultraviolet-B (UV-B) radiation, at low levels, thanks to its ability to influence plant secondary metabolism, could be successfully used to achieve this goal. However, few studies have been conducted so far on the effects of post-harvest UV-B treatments on fruit metabolomics. The present research, aimed to evaluate the impact of UV-B on peach metabolites profile through non-targeted metabolomics (UHPLC-ESI/QTOF-MS) coupled with multivariate chemometrics, provided evidence that 10 and 60 min of post-harvest UV-B irradiation influenced several classes of metabolites. Most phenolics were down-accumulated 24 h after both UV-B treatments, though, after 36 h, anthocyanins, flavones and dihydroflavonols increased (2.06-, 1.92-, 1.68-fold with 10 min UV-B; 6.65-, 2.53-, 2.05-fold with 60 min UV-B, respectively). UV-B reduced carotenoids and most lipids and increased some biosynthetic intermediates and degradation products, some of them known for their positive role in human health. Among alkaloids, some pteridines accumulated, likely derived from folates degradation, while indole alkaloids decreased. Despite the decrease of some bioprotective metabolites as carotenoids, the UV-B-induced up-accumulation of many antioxidant phenolics after 36 h from the exposure suggests an improvement of the healthy properties of peach fruit and reinforces the potential of UV-B controlled irradiation as a nutraceuticals-increasing tool in fruit.

Keywords: /Phenolics/ /Peach fruit/ /Prunus persica L/ /Metabolomics/ /Terpenoids/ /UV-B radiation/

PEANUT

Korani, W., Chu, Y., Holbrook, C.C. and Ozias-Akins, P. (2018). Insight into genes regulating postharvest aflatoxin contamination of tetraploid peanut from transcriptional profiling. *Genetics*, 209: 143-156.

Abstract

Postharvest aflatoxin contamination is a challenging issue that affects peanut quality. Aflatoxin is produced by fungi belonging to the Aspergilli group, and is known as an acutely toxic, carcinogenic, and immune-suppressing class of mycotoxins. Evidence for several host genetic factors that may impact aflatoxin contamination has been reported, e.g., genes for lipoxygenase (PnLOX1 and PnLOX2/PnLOX3 that showed either positive or negative regulation with *Aspergillus* infection), reactive oxygen species, and WRKY (highly associated with or differentially expressed upon infection of maize with *Aspergillus flavus*); however, their roles remain unclear. Therefore, we conducted an RNA-sequencing experiment to differentiate gene response to the infection by *A. flavus* between resistant (ICG 1471) and susceptible (Florida-07) cultivated peanut genotypes. The gene expression profiling analysis was designed to reveal differentially expressed genes in response to the infection (infected vs. mock-treated seeds). In addition, the differential expression of the fungal genes was profiled. The study revealed the complexity of the interaction between the fungus and peanut seeds as the expression of a large number of genes was altered, including some in the process of plant defense to aflatoxin accumulation. Analysis of the experimental data with “keggseq,” a novel designed tool for Kyoto Encyclopedia of Genes and Genomes enrichment analysis, showed the importance of α -linolenic acid metabolism, protein processing in the endoplasmic reticulum, spliceosome, and carbon fixation and metabolism pathways in conditioning resistance to aflatoxin accumulation. In addition, coexpression network analysis was carried out to reveal the correlation of gene expression among peanut and fungal genes. The results showed the importance of WRKY, toll/Interleukin1 receptor–nucleotide binding site leucine-rich repeat (TIR-NBS-LRR), ethylene, and heat shock proteins in the resistance mechanism.

Keywords: /Peanut/ /Aflatoxin/ /Aspergilli/ /*Aspergillus flavus*/ /keggseq/ /KEGG enrichment analysis/

PEARS

Wang, J., Jiang, Y., Li, G., Lv, M., Zhou, X., Zhou, Q., Fu, W., Zhang, L., Chen, Y., Ji, S. (2018). Effect of low temperature storage on energy and lipid metabolisms accompanying peel browning of 'Nanguo' pears during shelf life. *Postharvest Biology & Technology*, 139: 75-81.

Abstract

Low temperature storage is an effective technology which is widely used in prolonging the postharvest storage of 'Nanguo' pears (*Pyrus ussuriensis* Maxim). However, the peel of pears gradually turned brown during shelf life at 20 °C after the long period of cold storage. In this study, peel browning (PB) particularly appeared during shelf life in the pears which were stored for 120 d and 180 d. Increased concentration of malondialdehyde (MDA) and electrolyte leakage were found during shelf life with the extension of refrigeration. ATP concentration and energy charge (EC) were lower in fruit stored for 180 d compared to those stored for 60 d and 120 d. Meanwhile, decreased enzymes activities and genes expression of transcripts for ATP synthase (ATPase), NADH dehydrogenase (NDA), and vacuolar proton-inorganic pyrophosphatase (VPP), which were associated with energy metabolism, were detected along with the prolonging of storage period. Moreover, the activity and gene expression of phospholipase D (PLD) were remarkably increased in fruit after long period of cold storage. The results indicated that the appearance of PB in 'Nanguo' pears was closely related to the extension of refrigeration, and energy deficiency and membrane damage in cells play pivotal roles on the incident of PB. The possible mechanisms are discussed.

Keywords: /'Nanguo' pear/ /Peel browning/ /Energy and lipid metabolisms/ /Enzyme activity/ /Gene expression /

Zhai, R., Liu, J., Liu, F., Zhao, Y., Liu, L., Fang, C., Wang, H., Li, X., Wang, Z., Ma, F., and Xu, L. (2018). Melatonin limited ethylene production, softening and reduced physiology disorder in pear (*Pyrus communis* L.) fruit during senescence. *Postharvest Biology and Technology*, 139: 38-46.

Abstract

Some pear (*Pyrus communis* L.) fruit show a certain resistance to ripening. Thus, postharvest cold storage is commonly used to accelerate their ripening process by promoting ethylene production. However, the enhanced ethylene biosynthesis also accelerates pear fruit senescence. Here, the effects of melatonin on the senescence process in pear fruit was investigated. In a rapidly softening pear 'Starkrimson', melatonin delayed the ethylene burst. In 'Abbé Fetel' and 'Red Anjou', normally softening pears, melatonin inhibited ethylene production during the entire senescence process. The limited ethylene production resulted in a lower loss of firmness in melatonin treated fruit than in water treated fruit. PcPG, a major cell wall degradation-related gene, was inhibited by melatonin in all three cultivars. The expressions of

ethylene biosynthesis genes PcACS1 and PcACO1 are correlated with the senescence process. The former was inhibited by melatonin in 'Starkrimson', both were inhibited in 'Red Anjou', but neither was inhibited in 'Abbé Fetel'. Moreover, the antioxidant systems in 'Starkrimson' and 'Abbé Fetel' were enhanced by melatonin and their fruit did not undergo water soaking or core browning. Thus, melatonin has the potential to retain the commercial value of postharvest pear fruit and delay senescence by limiting ethylene production and the reactive oxygen burst.

Keyword: /Melatonin/ /Ripening/ /Ethylene reducing/ /Programmed cell death/

PLUMS

Farcuh, M., Rivero, R.M., Sadka, A., and Blumwald, E. (2018). Ethylene regulation of sugar metabolism in climacteric and nonclimacteric plums. *Postharvest Biology and Technology*, 139: 20-30.

Abstract

We studied the effect of ethylene regulation on sugar metabolism in fruit of two Japanese plum (*Prunus salicina* Lindl.) cultivars, the climacteric Santa Rosa and its non-climacteric bud mutant Sweet Miriam, throughout ripening in postharvest storage. These cultivars share the same genetic background but due to bud mutations differ in their ripening behavior. We examined the responses to ethylene (propylene) and 1-methylcyclopropane (1- MCP) treatments on 11 key sugar metabolism-associated genes by integrating gene expression profiling and their associated sugar contents. Our results demonstrated that ethylene was a crucial factor affecting overall sugar metabolism in both ripening types. More specifically, ethylene reduced sucrose catabolism and induced sucrose biosynthesis but inversely, stimulated sorbitol breakdown and decrease sorbitol biosynthesis. Our analyses indicated that glucose and fructose contents result from sorbitol and sucrose breakdown in climacteric and nonclimacteric fruit, respectively. In addition, a positive interaction was observed between ethylene and galactose metabolism; while a negative effect of ethylene was reported on galactinol, raffinose, myo-inositol and trehalose, which were higher in non-climacteric Sweet Miriam fruit and could contribute to increased fruit tolerance towards the stress imposed by the ripening process per se and to withstand postharvest storage.

Keywords: /Japanese plums/ /Sugar metabolism/ /Ethylene/ / Fruit Non-climacteric/ /Ripening/

POMEGRANATE

Candir, E., Ozdemir, A.E., and Aksoy, M.C. (2018). Effects of chitosan coating and modified atmosphere packaging on postharvest quality and bioactive compounds of pomegranate fruit cv. 'Hicaznar'. *Scientia Horticulturae*, 235: 235-243.

Abstract

The objective of this study is to determine effects of chitosan (CH) coating and modified atmosphere packaging (MAP) on postharvest quality and bioactive compounds of 'Hicaznar' pomegranate fruit. Pomegranates were subjected to CH treatment (0% or 1%) and packaged with or without MAP bags. Following treatments, pomegranates were kept at 6 ± 0.5 °C and $90 \pm 5\%$ relative humidity for 6 months. After 2, 4 or 6 months of storage, fruit were removed from cold storage and kept at 20 °C for 7 days to simulate a shelf life period. The untreated fruit was served as a control treatment. CH, MAP and CH + MAP treatments maintained better husk color, titratable acidity (TA) and ascorbic acid (AsA) content, compared to control treatment. CH + MAP and MAP treatments significantly reduced weight loss and husk scald. CH coating alone was the most effective treatment to control fungal decay during cold storage and its effect continued during the shelf life period. The arils of CH-coated fruit were deep red and had highest antioxidant activity, total monomeric anthocyanin (TMA) and total phenolic (TP) content. After 6 months of storage plus shelf life period, control and CH coated fruit became unmarketable while MAP and CH + MAP treated fruit were still marketable. The best results were obtained from CH + MAP treatment for controlling husk scald, decay and weight loss of 'Hicaznar' pomegranate fruits with maintaining visual quality and initial red aril color intensity for 6 months of cold storage plus shelf life.

Keywords: /Pomegranate/ /MAP/ /Chitosan/ /Quality/ /Bioactive compounds/ /Storage/ /Shelf life/

Kahramanoglu, I., Aktas, M., Gunduz, S. (2018). Effects of fludioxonil, propolis and black seed oil application on the postharvest quality of "wonderful" pomegranate. *PLOS ONE* 13 (5): 1-14.

Abstract

Pomegranate fruit consumption has increased rapidly throughout the world, mainly because of its medical and nutritive attributes. Thus, considerable commercial and scientific interest exists in prolonging its postharvest life with non-chemical applications as much as possible to meet the year-round demand for this fruit. The present work aimed to study the effects of black seed oil (0.1% and 0.5%), propolis (0.01% and 0.1%) and fludioxonil (0.06%), with and without modified atmosphere packaging (MAP), on the postharvest quality of pomegranate cv. Wonderful. Treated fruits were stored at 6.5 ± 1 °C and 90–95% relative humidity for 150 days. The results indicated that both black seed oil and propolis treatments significantly influenced the

maintenance of fruit weight and quality. At 150 days after storage, the fruit weight loss of the samples treated with MAP + 0.5% black seed oil, MAP + 0.1% propolis and MAP alone were found to be 5.5%, 6.3%, and 9.1%, respectively, whereas the weight loss of the untreated control fruits was 19.8%. Application of either 0.5% black seed oil or 0.1% propolis, especially when combined with MAP, was also effective in controlling gray mold development and slowing the occurrence of chilling injury.

Keywords: /Pomegranate/ /Postharvest quality/ /Fludioxonil/ / Propolis/ /Black seed oil/

PUMPKIN

Song, J., Wei, W., Wang, X., Li, D., Liu, C., Zhang, M., Meng, L. (2018). Degradation of carotenoids in dehydrated pumpkins as affected by different storage conditions. *Food Research International*, 107: 130-136

Abstract

The degradation kinetics of carotenoids in dehydrated pumpkins, stored at 4, 25, and 40 °C under air or controlled atmosphere conditions (N₂), was evaluated using reversed-phase high performance liquid chromatography coupled with diode array and mass spectrometry detectors. The degradations of predominant carotenoids including β -carotene, α -carotene and lutein depended on the storage temperature, the storage duration as well as the presence of oxygen, which was following the first-order kinetics. The temperature dependence of reaction constants were well explained by the Arrhenius relationship. The activation energy (E_a) for carotenoids degradation ranged from 23.69 kJ/mol for lutein in N₂-packaged dehydrated pumpkins to 13.82 kJ/mol for β - carotene in air-packaged samples. Lutein was less degradable than α -carotene and β -carotene in dehydrated pumpkins during storage. Higher all-E-carotenoid degradation in N₂-packaged dehydrated pumpkins stored at 40 °C occurred than that stored at lower temperature under N₂ or air storage, and those storage conditions were beneficial to the formation of Z-isomers (e.g., 15-Z- β -carotene and 13-Z- β -carotene). Storage under N₂ at 4 °C enhanced the retention of all-E-carotenoids in dehydrated pumpkins. Thus, package atmosphere should be paid more attention during long-term storage.

Keywords: /Dehydrated pumpkin carotenoids/ /Kinetics of carotenoids degradation/ /Carotenoid isomers/ /Storage condition/

SAFFRON

Nehvi, F.A., Dhar, J.K., Sheikh, S.S., Iqbal, A.M. and John, A.A. (2018). Conventional postharvest practices and their impact on saffron quality- a study. *Acta Horticulturae*, 1200: 139-144.

Abstract

Traditional postharvest practices being followed in Kashmir is main reason for quality deterioration and recovery loss. Picking of 2-day-old flowers in loose baskets with pistil separation time of 10-12h after flower picking improves saffron recovery to 37.5 g kg⁻¹ of fresh saffron flowers. Drying of saffron in vacuum, solar or hot air scientific dryers not only reduces drying time but improves colour by 97.3%, bitterness by 80% and flavor by 71.11%.

Keywords: /flower age/ /collection material/ / pistil separation time/ / drying system quality/ /recovery/ /saffron/

STRAWBERRY

Liu, C., Zheng, H., Sheng, K., Liu, S., Liu, W., and Zheng, Lei. (2018). Effects of melatonin treatment on the postharvest quality of strawberry fruit. *Postharvest Biology and Technology*, 139: 47-55.

Abstract

The effects of exogenous melatonin on postharvest life and quality in strawberry fruit after harvest were evaluated. To explore the optimum concentration of melatonin treatment, strawberry fruit were treated with 0, 0.01, 0.1, 1 and 10 $\mu\text{mol L}^{-1}$ melatonin for 5 min and then stored at 4 $^{\circ}\text{C}$ and 90% RH for 12 d. The results showed that application of melatonin at 0.1 or 1 $\mu\text{mol L}^{-1}$ was notably effective in reducing decay and weight loss of fruit. Senescence of strawberry fruit was clearly delayed by the 0.1 or 1 $\mu\text{mol L}^{-1}$ melatonin treatment, as disclosed by the color, firmness, the total soluble solids content and titratable acidity of the fruit. Melatonin treatment at 0.1 or 1 $\mu\text{mol L}^{-1}$ significantly reduced the accumulation of hydrogen peroxide (H₂O₂) and malondialdehyde (MDA), but increased the total phenolics and flavonoid contents, resulting in the higher antioxidant capacity. Nevertheless, melatonin treatment had a negative impact on the ascorbic acid content. The optimum concentration of melatonin for extending the postharvest life and improving the quality of strawberry fruit was 0.1 or 1 $\mu\text{mol L}^{-1}$. Moreover, melatonin treatment at 0.1 $\mu\text{mol L}^{-1}$ enhanced the expression of melatonin biosynthetic genes including *FaTDC*, *FaT5H*, *FaSNAT*, and *FaASMT* and consequently increased the content of endogenous melatonin. These findings suggested that melatonin treatment may be a useful technique to extend the postharvest life and improve quality in strawberry fruit.

Keywords: /Melatonin/ /Strawberry fruit/ /Postharvest life/ /Quality/ / Gene expression/

SWEETPOTATO

Xie, Z., Zhou, Z., Li, H., Yu, J., Jiang, J., Tang, Z., Ma, D., Zhang, B., Han, Y., and Li, Z. (2018). High throughput sequencing identifies chilling responsive genes in sweetpotato (*Ipomoea Batatas Lam*) during storage. *Genomics*, 1-12.

Abstract

Sweetpotato (*Ipomoea batatas* L.) is a globally important economic food crop. It belongs to Convolvulaceae family and origins in the tropics; however, sweetpotato is sensitive to cold stress during storage. In this study, we performed transcriptome sequencing to investigate the sweetpotato response to chilling stress during storage. A total of 110,110 unigenes were generated via high-throughput sequencing. Differentially expressed genes (DEGs) analysis showed that 18,681 genes were up-regulated and 21,983 genes were down-regulated in low temperature condition. Many DEGs were related to the cell membrane system, antioxidant enzymes, carbohydrate metabolism, and hormone metabolism, which are potentially associated with sweetpotato resistance to low temperature. The existence of DEGs suggests a molecular basis for the biochemical and physiological consequences of sweetpotato in low temperature storage conditions. Our analysis will provide a new target for enhancement of sweetpotato cold stress tolerance in postharvest storage through genetic manipulation.

Keywords: /Sweetpotato/ /Transcriptome/ /RNA-seq/ /Storage/ /Chilling/

TOMATO

Macheka, L., Spelt, E., Bakker, E.J., van der Vorst, J., and Luning, P.A. (2018). Identification of determinants of postharvest losses in Zimbabwean tomato supply chains as basis for dedicated interventions. *Food Control*, 87: 135-144.

Abstract

Postharvest losses (PHL) are a major problem in tomato supply chains, especially in tropical climates, as up to 40% of harvested fruits are estimated to decay along the chain. The study aimed at identifying which farmers' context characteristics, logistics and quality control activities relate with the generation of PHL in tomato supply chains, particularly in Zimbabwe. Commercial and subsistence tomato farmers (n 1/4 197) from five major tomato-growing areas were analysed using a diagnostic tool to assess the status of logistics and quality control activities, the vulnerability of farmers' context, and the actual PHL. Hierarchical cluster analysis resulted in

three clusters of farmers grouped based on similarities on context vulnerability and status of logistics and quality control activities. Spearman's rank correlation analysis and multiple linear regression analyses revealed that more advanced logistics and control activities, and context characteristics with a lower vulnerability to PHL are associated with less postharvest losses. The context characteristics, features of storage facilities, features of cropping system, and market price stability were significant determinants ($p < .05$) and explained 29% (Adjusted $R^2 = 0.287$) of the variation in the PHL. The logistics control activity, determining processing volumes was identified as a possible determinant ($p < .05$) and explained 21% (Adjusted $R^2 = 0.205$) of the variation in the observed PHL. The quality control activities, deciding on maturity to harvest, deciding on moment to harvest, and storage practices were the identified determinants ($p < .05$), which explained 23% (Adjusted $R^2 = 0.230$) of the variability in the observed postharvest losses. A framework of intervention strategies tailored to tomato farmers' development stage is proposed to support them in a stepwise improvement of logistics and quality control practices to reduce PHL and advance towards more advanced supply chains.

Keywords: /Postharvest losses/ /Logistics control/ /Quality control/ /Diagnostic tool/ /Subsistence/ /farmers/ /Commercial farmers/ /Interventions/

TULSI

Ria, H.K., Rai, D., and Saloni. (2018). The study the shelf life of Tulsi (*Ocimum tenuiflorum*) enriched herbal Shrikhand. *The Pharma Innovation Journal*, 7 (5): 611-615.

Abstract

At the time of rapid urbanization, everyone has less time for health related activity, so they are in immediate need of some product which not only satisfied their appetite but also affect their health in positive way. The present study was carried out to estimate the fitness of blending Tulsi leaves extract into Shrikhand keeping in mind the need of burgeoning middle class. Tulsi leaves extract @ 0.7%, 0.9% and 1.1% with 40% cane sugar (by weight of Chakka), was mixed for production of Shrikhand. The samples were stored at 10 oC and sensory and microbial qualities judged at regular interval. Shrikhand prepared by addition of 0.9% Tulsi leaves extract (T2) was superior in organoleptic parameter followed by T3, T1 and T0 respectively. The treated product was acceptable up to 50 days of storage under refrigerated temperature. From present study we can conclude that addition of Tulsi not only improves the keeping quality of the product but also its medicinal properties. That make the optimize product healthy with better keeping quality.

Keywords: /Shrikhand/ /Tulsi/ /Chakka/ /Organoleptic/ /Burgeoning/

WALNUTS

Chatrabnous, N., Yazdani, N., Tavallali, V., Vahdati, K. (2018). Preserving quality of fresh walnuts using plant extracts. *LWT-Food Science and Technology*, 91: 1-7.

Abstract

Fresh walnut kernel is considered as a way of walnut consumption, particularly in Asia, even though its market is less commercial than the dried kernel. There is a little knowledge about the storage of this commodity. Postharvest treatments including plant extracts either of *Thymus vulgaris* (ET) or walnut green husk (EWGH) in four concentrations (25, 50, 75 and 100 mg/L) and distilled water (as control) were assayed to increase fresh walnut kernel's shelf life at ambient temperature in the aqueous environment. Compared with untreated walnuts, the content of saturated fatty acids and linolenic was almost constant. Oleic acid concentration did not change considerably during storage in treated samples, while it was decreased in untreated kernels. The level of linoleic acid also decreased except for samples treated with the three higher EWGH concentrations. All treatments delayed lipid peroxidation and increment of acid value (AV). In addition, total antioxidant activity (TAA) and total phenolics (TPs) losses were observed by advanced time. After 28 days, the greatest losses of TAA and TPs were observed in untreated kernels. These results illustrate that ET and EWGH have potential to maintain fresh walnut quality during storage at 25 °C in the aqueous environment for 28 d.

Keywords: /Antioxidants/ /Fatty acids/ /Phenolic compounds/ /*Thymus vulgaris*/ /Walnut green husk/