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APPLE

Gong, D., Bi, Y., Jiang, H., Xue, S., Wang, Z., Li, Y., … Prusky, D. (2019). A comparison of postharvest physiology, quality and volatile compounds of 'Fuji' and 'Delicious' apples inoculated with Penicillium expansum. Postharvest Biology and Technology, 150, 95–104. DOI: 10.1016/j.postharvbio.2018.12.018

Abstract

Blue mold caused by *Penicillium expansum* is a major postharvest disease of apple fruit, which leads to fruit loss and patulin accumulation. In this study, 'Delicious' and 'Fuji' apples were inoculated with *P. expansum* to investigate effects of infection on physiology, quality and release of volatile compounds. The results showed that *P. expansum* significantly promoted ethylene production, increased respiration rate, and induced higher peaks of ethylene and respiration in fruit. The fungus also caused a lower of membrane integrity, firmness, and the content of total soluble solid and titratable acid. Moreover, *P. expansum* increased the content of volatile compounds in two cultivars of apple. C6 alcohol and aldehyde contents were significantly improved by inoculation in the earlier storage stage, and ester contents were improved in the middle and later storage stage. According to PLS-DA analysis, hexanoic acid and hexanal were the most important factors to distinguish the inoculated 'Delicious' and 'Fuji' from their controls. Interestingly, among specific volatile compounds detected in the two inoculated cultivars, 3 volatile compounds, including phenethyl acetate, methyl 2-methylbutanoate and ethyl benzeneacetate, were common in both of inoculated fruit. Although wounding increased ethylene production and respiration rate, decreased quality of the two cultivars and affected volatiles release, the effects were less than *P. expansum*. Compared with 'Fuji', the inoculated 'Delicious' had a higher of lesion diameter, ethylene production and respiration rate and content of total soluble solid, and a lower of membrane integrity, firmness and content of titratable acid. The inoculated 'Delicious' also released more volatile compounds, especially C6 volatiles. In general, *P. expansum*inoculation promoted ripening and quality loss, leading to change of volatile compounds during storage and release of specific volatiles. Moreover, 'Delicious' was more susceptible to *P. expansum* than 'Fuji'.

Keywords: /Apple cultivars/ /*Penicillium expansum*/ /Physiology/ /Quality/ /Volatile compounds/

Ma, Y., Ban, Q., Shi, J., Dong, T., Jiang, C.-Z., & Wang, Q. (2019). 1-Methylcyclopropene (1-MCP), storage time, and shelf life and temperature affect phenolic compounds and antioxidant activity of 'Jonagold' apple. Postharvest Biology and Technology, 150, 71–79. DOI: 0.1016/j.postharvbio.2018.12.015

Abstract

The effects of 1-methylcyclopropene (1-MCP) treatment, storage time, and shelf life and temperature on phenolic concentrations and antioxidant activity in apple peel and flesh of

‘Jonagold’ apple (*Malus domestica* Borkh) have been investigated. Hyperoside and chlorogenic acid were the most abundant phenolic compounds in the peel and flesh, respectively. The flesh had lower concentrations of individual phenolics, total phenolics, flavonoids and lower antioxidant activity (determined by 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay) than the peel. In addition, the profiles of phenolics as well as the changing patterns of individual phenolics also differed between the peel and the flesh. After long-time storage (180 d), the greatest decrease of concentrations was the concentrations of hyperoside (27 %) in the peel and total phenolics (35 %) in the flesh. Also, during the 90–180 d storage period, hyperoside and rutin in the peel, chlorogenic acid in the flesh, and flavonoids and antioxidant activity decreased in both peel and flesh tissues. Individual phenolics exhibited different stabilities during the early stages after harvest. 1-MCP reduced the reduction in the concentrations of hyperoside in the peel, chlorogenic acid in the flesh, and total phenolics, flavonoids and antioxidant activity in both the peel and flesh tissues during storage and shelf life. However, for quercetin and rutin, the protective effect of 1-MCP was only observed during the shelf life period. Overall, phenolic compounds responded variously to storage, shelf life, shelf temperature and 1-MCP treatment.

Keywords: /Apple/ /1-Methylcyclopropene/ /Phenolic compounds/ / Shelf life/

ALMOND

Cheng, T., & Wang, S. (2019). Modified atmosphere packaging pre-storage treatment for thermal control of E. coli ATCC 25922 in almond kernels assisted by radio frequency energy. Journal of Food Engineering, 246, 253–260. DOI: 0.1016/j.jfoodeng.2018.11.011

Abstract

The purposes of this study were to validate modified atmosphere packaging (MAP) pre-storage for reducing surviving populations and thermal resistance of *E. coli*ATCC 25922 in almond kernels. A 6 kW, 27.12 MHz radio frequency (RF) assisted hot air heating system was used to conduct thermal treatments of 1.5 kg MAP pre-storage samples. Surviving populations of *E. coli* ATCC 25922 in almond kernels with 8.0% wet basis were determined weekly for 12-week pre-storage and samples were removed at five different time intervals during thermal treatments to achieve at least 4-log reduction. The results showed that reduction levels of *E. coli* for MAP and regular atmosphere packaging (RAP) were 1.47 ± 0.08 and 0.61 ± 0.05 log CFU/g after 12-week pre-storage. The 4-log reduction time of *E. coli* in MAP was 18 ± 1 min holding after RF assisted heating to 75 ± 2 °C, reducing 40% pasteurization time as compared with RAP pre-storage. Fatty acid and peroxide values remained within acceptable range (FA < 0.6% and PV < 1.0 meq/kg), and color values of treated samples were not significantly ($p > 0.05$) different from those of untreated ones. MAP pre-storage assisted thermal treatments induced by RF energy may hold potential as an effective and environmentally friendly method to control *E. coli* ATCC 25922 in almond kernels.

Keywords: /Almond/ /Pre-storage/ /Radio frequency/ /*S. Enteritidis* PT 30/ /Survival/ /Thermal inactivation/

APRICOT

Liu, B., Jiao, W., Wang, B., Shen, J., Zhao, H., & Jiang, W. (2019). Near freezing point storage compared with conventional low temperature storage on apricot fruit flavor quality (volatile, sugar, organic acid) promotion during storage and related shelf life. Scientia Horticulturae, 249, 100–109. https://doi.org/10.1016/j.scienta.2019.01.048

Abstract

Sugars, acids, and aroma volatiles are essential flavor components of fruit; the fatty acid metabolic pathway is regarded as key to formation of fruit aroma compounds. In this study, we investigated the comparative influence of different storage temperatures on apricot flavor compounds during shelf storage using the Shushanggan apricot (Prunus armeniaca L. 'Shushanggan'), which is rich in sugars, acids, and aroma volatiles. Three low temperature storage conditions, namely 10 °C, 5 °C, and near freezing point storage (NFPT), were compared and ethylene production and the content of three sugars, two acids, four "green" aroma volatiles, and six "fruity" aroma volatiles were determined; in addition, the activity of aroma related enzymes in the fatty acid metabolic pathway were investigated. In general, the content of the three sugars (fructose, glucose and sucrose) and the two acids (citric acid and malic acid) were not significantly affected by temperature. In contrast, compared with the control, the "green" and "fruity" aroma volatiles were reduced to varying degrees at the three low temperature storage conditions. However, at the medium storage stage, the "green" and "fruity" aroma volatiles could recover to normal levels, whereas at the terminal stage of storage the volatile recovery showed an unresponsive result. In fruit stored at near freezing point, aroma volatiles recovered in content; however, irreversible reduction in the nine aroma volatiles occurred at 5 °C storage. With regard to activities of enzymes in the fatty acid pathway, lipoxygenase activity was not affected by temperature but hydroperoxide lyase, alcohol dehydrogenase, and alcohol acyltransferase showed clear inhibition at 5 °C storage. The changes in volatile compounds were closely related to apricot fruit maturation manifested in color changes and production of ethylene. The results presented here indicate that after prolonged storage at low temperature, flavor loss was mostly related to effects on aroma volatiles rather than on sugars or acids. NFPT storage was found to be the most effective way to maintain the flavor and shelf storage of apricot fruit after storage.

Keywords: /Cold storage/ /Shelf-life/ /Flavor compounds/ /Aroma compounds/ /Apricot/

BANANA

Khademi, O., Ashtari, M., & Razavi, F. (2019). Effects of salicylic acid and ultrasound treatments on chilling injury control and quality preservation in banana fruit during cold storage. Scientia Horticulturae. https://doi.org/10.1016/j.scienta.2019.02.018

Abstract

In this research, in order to reduce the chilling injury and preserve the quality of bananas during the cold storage, the fruits were treated with ultrasound (US; 40 kHz) and Salicylic acid (SA; 1 mM) separately or in combination as well as water in control and then, they were stored at

5 °C and 90% RH for 10 days. After storage and shelf-life period, fruits were analyzed. Results indicated that the samples treated with US, SA and combination treatments were of less chilling injury severity, electrolyte leakage and thiobarbituric acid reactive substances as compared to the control. Also, US, SA and combination treatments, in comparison to the control, led to better preservation of firmness, phenol content, antioxidant capacity, more weight loss control, and inhibition of polyphenol oxidase enzyme activity in banana fruits. No significant differences were observed among the SA, US and combination treatments in the experiment. Therefore, using US and SA treatments might control the chilling in the bananas and preserve their quality effectively during the cold storage.

Keywords: /Antioxidant/ /Banana/ /Browning/ /Firmness/ /Membrane integrity/

CHERRY LAUREL

Ozturk, Burhan, Orhan Karakaya, Kenan Yıldız, and Onur Saracoglu. 2019. "Effects of Aloe Vera Gel and MAP on Bioactive Compounds and Quality Attributes of Cherry Laurel Fruit during Cold Storage." Scientia Horticulturae 249 (April): 31–37. doi:10.1016/j.scienta.2019.01.030.

Abstract

This study was conducted to determine the effects of Aloe vera (AV) and modified atmosphere packaging (MAP) on physiological and chemical quality attributes of cherry laurel (Prunus laurocerasus L.) fruit during the cold storage at 0 ± 0.5 °C and 90 ± 5% RH. Throughout the storage, fruit weight and firmness losses were delayed with AV and MAP treatments. At the end of storage, the respiration rate of fruit treated with MAP was lower than the control and AV-treated fruit. Similarly, ethylene production of MAP and AV-treated fruit was lower than the control. At the end of storage, the highest hue angle was obtained from the control, whereas the lowest hue angle was measured in AV + MAP. Decay rate of AV and MAP-treated fruit was lower than the control. Vitamin C, total flavonoids, total monomeric anthocyanin and antioxidant activity of fruit treated with AV and MAP was higher than the control. The astringency of AV and AV + MAP-treated fruit was higher than the control at the end of storage. This study revealed that AV gel and MAP treatments were effective in maintaining quality and bioactive compounds of cherry laurel fruit.

Keywords: /Anthocyanin/ /Antioxidant/ /Decay/ /Ethylene/ /Respiration rate/

CALCOTS

Zudaire Villanueva, L., Viñas Almenar, I., Simó Cruanyes, J., Sans, S., Abadias i Sero, M. I., & Aguiló-Aguayo, I. (2019). Effect of pre-harvest conditions and postharvest storage time on the quality of whole and fresh-cut calçots (Allium cepa L.). Scientia Horticulturae, 249: 110-119 Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edsbas&AN=edsbas.663F15EE&site=eds-live

Abstract

Pre-harvest conditions such as cultivar, cultivation site and planting time could affect the storability, quality and shelf-life of fruit and vegetables. The influence of onion cultivar, cultivation site and planting time on the storability and quality of whole fresh and roasted calçots (Allium cepa L.) was investigated. Moreover, the suitability for fresh-cut processing of four different calçots was studied. Samples from 'Montferri' onion cultivar presented the best storability. Overall, postharvest storage time had no remarkable effect on the quality of whole calçots but produced an increase on the antioxidant properties of all samples. In relation to the aptitude to minimal processing, 'Montferri' onion cultivar cultivated at Viladecans in August showed the best results in terms of quality throughout their postharvest storage time. Therefore, cultivar and postharvest storage time could have more effect than cultivation site and planting time on the quality of whole and fresh-cut calçots.

Keywords: /Allium/ /Storage/ /Cultivation/ /Planting/ /Fresh-cut/ /Quality/

CITRUS

Papoutsis, K., Mathioudakis, M. M., Hasperué, J. H., & Ziogas, V. (2019). Non-chemical treatments for preventing the postharvest fungal rotting of citrus caused by Penicillium digitatum (green mold) and Penicillium italicum (blue mold). Trends in Food Science & Technology, 86, 479–491. DOI: 10.1016/j.tifs.2019.02.053

Abstract

Background Citrus is one of the most economically important horticultural crops in the world. Citrus are vulnerable to the postharvest decay caused by Penicillium digitatum and P. italicum, which are both wound pathogens. To date, several non-chemical postharvest treatments have been investigated for the control of both pathogens, trying to provide an alternative solution to the synthetic fungicides (imazalil, thiabendazole, pyrimethanil, and fludioxonil), which are mainly employed and may have harmful effects on human health and environment. Key findings and conclusions In vivo and in vitro experiments in a laboratory scale have shown that the control of green and blue molds can be accomplished by the application of non-chemical treatments. The mechanisms of action of the non-chemical techniques have not been clearly elucidated. Several studies have mentioned that the application of non-chemical treatments results in the synthesis of secondary metabolites with antifungal activities (i.e. polyphenols, phytoalexins) in fruit surface. Moreover, non-chemical treatments may exert direct effects on fungal growth, such as disruption of cell walls, inhibition of metabolic respiration, and disruption of energy production related enzymes. Non-chemical treatments for green and blue mold control. Essential oils can control the germination of blue and green molds. Irradiations may effectively control the decay caused by Penicillium spp. Yeasts and bacteria can been used as biocontrol agents against green and blue molds.

Keywords: /Green mold/ /Blue mold/ /Oranges/ /Postharvest/ /Sustainable treatments/

CUT FLOWER

Menegaes, J., Lidório, H., Bellé, R., Lopes, S., Backes, F., & Nunes, U. (2019). Post-harvest of safflower flower stems harvested at different times and submitted to different preservative solutions. Ornamental Horticulture, 25(1), 87-96. DOI: https://doi.org/10.14295/oh.v25i1.1989

Abstract

The conservation of the cut flower stems aims to prolong durability, maintain the quality and reduce the losses after harvest, providing a greater period of lifespan and commercialization. Thus, the objective of this work was to evaluate the quality and durability in post-harvest of fresh safflower (Carthamus tinctorius L.) flower stems harvested in different times and submitted to different preservative solutions. The experiment was conducted in entirely randomized design and, organized in 4x8 (four preservative solutions and eight harvest seasons) factorial scheme, with four repetitions, and each experimental unit consisting of five floral stems. The cultivation of floral stems of safflower occurred at Floriculture Sector and the harvest seasons of them were carried out in the beginning of flowering from the sowing performed in the first seasonal half: in winter, spring and summer of 2016, autumn, winter, spring and summer of 2017 and autumn of 2018. And, the preservative solutions were: distilled water (control); distilled water + sucrose 2%; distilled water + sodium hypochlorite 2% and distilled water + sucrose 2% + sodium hypochlorite 2%. The floral stems were evaluated in relation to quality notes, dehydration and absorption of preservative solutions. We observed that the floral stems of safflower presented shelf life in average of nine days, with absorption of solution in average of 0.021 mL day-1 g-1 of fresh mass and that the use of preservatives was not beneficial to conservation in post-harvest.

Keywords: /Carthamus tinctorius L./ /Cut flower/ /Vase life

GERBERA FLOWER

Maia, R., Silva, E., Alves, R., Morais, M., Vieira, M., da Silva, L., Simões, R., Fonseca, K., & Simões, A. (2019). Ethanol and citric acid improve longevity in Gerbera cv. Mistique.*Ornamental Horticulture, 25*(2), 109-118. DOI: https://doi.org/10.14295/oh.v25i2.2009

Abstract

Ethanol and citric acid can increase longevity in some cut flowers. However, its use must be extremely careful, with application methods and specific concentrations for each type of cut flower. Thus, the objective was to examine the physico-chemical and
physiological changes in Gerbera cv. Mistique cut flowers treated with ethanol (Et) and/or citric acid (CA). Stem were selected and standardized to a length of 35 cm and maintained at 20 ± 2 ºC and RH 65 ± 2%, under continuous lighting. The flowers were subjected to two application methods (pulsing for 48 h and maintenance), using different concentrations of Et (4%, 6%, and 8%) and/or CA (100 and 200 mg L-1) and distilled water (control). A visual assessment and analyses of longevity, stem bending, fresh mass, relative water content, electrolyte leakage, and peroxidase and polyphenol oxidase enzyme activities were performed at every two days. The Et

(4%) + CA (100 mg L-1) solution provided the greatest longevity, regardless of the application method. These results were the basis for a third experiment, in which the stems were immersed in pulsing solutions of Et (4%) and/or CA (100 mg L-1) and distilled water (control). The Gerbera flowers under Et + CA solution showed lower fresh mass loss and electrolyte leakage, higher relative water content and a slower increase in polyphenol oxidase and peroxidase activities. This allowed for delayed stem bending and better appearance, resulting in greater longevity compared to the other solutions.

Keywords: /Gerbera jamesonii, flowers/ /Postharvest preservation/ /Pulsing and maintenance/

GRAPES

dos Santos Costa, D., Oliveros Mesa, N. F., Santos Freire, M., Pereira Ramos, R., & Teruel Mederos, B. J. (2019). Development of predictive models for quality and maturation stage attributes of wine grapes using vis-nir reflectance spectroscopy. Postharvest Biology and Technology, 150, 166–178. DOI: 10.1016/j.postharvbio.2018.12.010

Abstract

VIS-NIR spectroscopy is a useful tool for non-destructive evaluation in wine grape.•The best prediction results achieved R2pred > 0.90 for sugars and anthocyanins.•Spectral signatures were found for sugars, anthocyanins, and yellow flavonoids.•Classification algorithms discriminated ripening grape stages with high accuracy. The viticulture business has an increasing demand for high quality products directly impacting on their market acceptance. Hence, the constant monitoring activities of vineyards, specially quality and maturation stageattributes, are important to assure the production of special wines, justified by their high value-added characteristic. Therefore, optical technologies appear as promising techniques for non-destructive analysis of wine grapes in view of reducing agricultural inputs and analysis duration. The main objective of the present work was to develop predictive models for quality and maturation stage attributes of wine grapes usingvisible/near infrared (VIS-NIR) reflectance spectroscopy. A total of 432 ‘Syrah’ and 576 ‘Cabernet Sauvignon’ berries were collected and their reflectance spectra were acquired using FieldSpec® 3 spectroradiometer for a spectral range from 450 to 1800 nm. In a posterior step, total soluble solids, total anthocyanins and yellow flavonoids were determined as the reference standards. Before elaborating mathematical models, the spectral data were submitted to several pretreatments, such as smoothing, derivate and corrections. Principal Component Regression (PCR) and Partial Least Squares Regression (PLSR) were utilized as predictive models using both the complete spectrum data (450–1800 nm) and a smaller set of spectral samples selected by the Jack-Knife method. Other predictive models were also developed utilizing Multiple Linear Regression (MLR) with spectral signatures from quality attributes. Maturation stages were discriminated using Principal Component Analysis – Linear Discriminant Analysis (PCA-LDA), Principal Component Analysis – Quadratic Discriminant Analysis (PCA-QDA), Principal Component Analysis – Linear Discriminant Analysis using Mahalanobis distance (PCA-LDA Mahalanobis), and Partial Least Squares Discriminant Analysis (PLS-DA) classification techniques. The construction of the PCR, PLSR and MLR regression models has provided robust predictions for total soluble solids and anthocyanins contents (R2 ≥ 0.90), as well as flavonoids contents with a certain degree of precision (R2 ≥ 0.70). Moreover, it was possible to differentiate distinct maturation stages of

vines with 93.15% of accuracy using PLS-DA. Therefore, VIS-NIRreflectance spectroscopy is a powerful tool for non-destructive evaluation of quality and maturation stageattributes of intact grapes from ‘Syrah’ and ‘Cabernet Sauvignon’ grapes.

Keywords: /Phenolic compounds/ /Non-destructive methods/ /Chemometrics/ /Total soluble solids/ /São Francisco Valley/ /Viticulture/

Lo, ay, A. A., Taha, N. A., & EL-Khateeb, Y. A. (2019). Storability of ‘Thompson Seedless’ grapes: Using biopolymer coating chitosan and polyvinyl alcohol blending with salicylic acid and antioxidant enzymes activities during cold storage. Scientia Horticulturae, 249, 314–321. https://doi.org/10.1016/j.scienta.2019.02.014

Abstract

Storage ability of 'Thompson seedless' bunches stored at 4 °C for 70 days, in related the effect of coating treatment (CS/PVA) blending with salicylic acid (SA) at different concentration (0, 1, and 2 mM). The storage experiment was conducted in two seasons (2017–2018). The obtained results proved that the presence SA with biopolymers CS/PVA at 2 mM increased antioxidant enzymes ascorbate peroxidase (APX), catalase (CAT), superoxide dismutase (SOD), and peroxidase (POD) activities. Therefore, it delayed the malondialdehyde (MDA), protein carbonyl group (PCG) accumulation and cell membrane leakage. Accompanying, it protected phenolic substances such as total phenol (TP) and flavonoid (FL) due to inhibited polyphenol oxidase (PPO), so less browning symptoms in rachis through cold storage. Also, the CS/PVA-SA 2mM decreased the accumulation of O2- and H2O2. These results suggested that the CS/PVP-SA 2 mM coating treatments can be applied as a beneficial technique for increasing the storage ability of 'Thompson seedless' grapes by enhancing antioxidant system activity leading to higher membrane integrity showed by lower electrolyte leakage, MDA, and PCG content coincide with less browning symptoms in rachis.

Keywords: /Thompson seedless/ /Cold storage/ /Antioxidant enzymes/

HELICONIA

Carrasco Alvarado, G., Arévalo Galarza, M.L., Velasco Velasco, J., Baltazar Bernal, O. and Salinas Ruíz, J. (2019). Effect of waxing, cold storage and salicylic acid on the quality and vase life of Heliconia wagneriana. Acta Hortic. 1237, 221-226. DOI: 10.17660/ActaHortic.2019.1237.29

Abstract

The species of Heliconia that are most commercialized in Mexico are H. stricta, H. bihai, H. caribea, H. psittacorum and H. wagneriana, among others. The bracts of Heliconias can be hanging and erect. The growing demand for these floral stems is attributed to their exotic beauty and longevity of the floral stem. Although the use of preservative solutions and storage at low temperature, improve vase life for most flowers of temperate climate, these do not have the same effectiveness in tropical flowers. For example, while temperate climate flowers are stored

at temperatures above the freezing point, for Heliconia species, the recommended temperature for transport and storage is around 10°C, as they are sensitive to chilling injury. Therefore, in this work we evaluated the quality changes in H. wagneriana with the application of wax in the bracts and the use of salicylic acid (SA at 1 mM) in preservative solution at room temperature and under cold storage (10°C/10 days). The variables evaluated were: vase life, water absorption, membrane integrity, enzymatic activity and stomatal functionality. The results showed a low consumption of solution (less than 6% w/v). In Heliconias, there are no vascular connections between the floral peduncle and the leaves, which contributes to low water absorption after harvest. The transpiration evaluation had a non-typical circadian rhythm, which suggests that the stomata located in the bracts are not functional and do not respond to environmental factors. The control stems stored at room temperature had 9 d of vase life, while the waxed ones 12 d; the control stems stored under refrigeration had an additional 4.3 d of vase life and the waxed ones 6.2 d. The use of SA solution did not improve the quality of Heliconia stems. The activity of polyphenol oxidase and peroxidase was lower in the waxed stems as well as the chilling injury damage.

Keywords: /Vase life/ /Tropical flowers/ /Water consumption/ /Chilling injury/

Silva, C.G., Krause, S., Botini, A.F., França, R.A., Silva, C.A. (2019) Postharvest durability of Heliconiaceae evaluated in a controlled environment in Mato Grosso state, Brazil. Ornamental Horticulture, 25:1, 80-86. DOI: https://doi.org/10.14295/oh.v25i1.1229

Abstract

Postharvest preservation is essential to maintain the peculiar features, beauty and longevity of flower stalks. The purpose of this study was to evaluate the postharvest durability, based on the visual quality and fresh weight of flower stalks of Heliconia psittacorum (with three-color variations) and of H. densiflora, in a cold chamber at three temperatures (14 ºC, 18 ºC and 22 ºC) and in the laboratory (control treatment at 26 ºC). A completely randomized design with four replications and five stems per plot was used. In flower stalks of H. densiflora under laboratory conditions, first signs of senescence were observed after six days of evaluation. For H. psittacorum, first signs of senescence were observed between 6 and 12 days of evaluation. For flower stalks of H. psittacorum (inflorescence color 5R 4/10), storage at 14 °C is recommended for up to nine days. At 14 ºC or 22 ºC, H. psittacorum (inflorescence color 2.5Y 7/10) at 18 ºC or 22 ºC for up to six days, and H. psittacorum (inflorescence of 7.7 YR 7/10) at 14 ºC or 22 ºC for up to six days. For H. densiflora, storage at 18 °C is recommended for up to six days. For both species and bract color variations, the reductions of fresh weight were greatest in the refrigerated environments.

Keywords: /Fresh weight/ /Flower senescence/ /Tropical flowers/ /Vase life/

LEMON FRUIT

Sun, Y., Singh, Z., Tokala, V. Y., & Heather, B. (2019). Harvest maturity stage and cold storage period influence lemon fruit quality. Scientia Horticulturae, 249, 322–328. https://doi.org/10.1016/j.scienta.2019.01.056

Abstract

Lemon fruit is usually harvested at different maturity stages to suit the market requirements. The harvest maturity stage influence the postharvest quality of different fruits during storage. Therefore, the effects of three different maturity stages (green, green-yellow and yellow stages) and cold storage periods (30, 60 and 90 days) at 10 °C on Eureka lemon fruit quality were investigated. The quality parameters such as fruit weight loss, fruit colour parameters i.e., L*, a*, b*, C* (chroma) and h° (hue angle), soluble solids content (SSC), titratable acidity (TA), individual organic acids, vitamin C and total antioxidant capacity in the fruit juice were estimated. Mean fruit weight loss, SSC and TA in the juice of the cold stored fruit decreased significantly from green stage to yellow stage and increased significantly with the extension of cold storage periods. Mean L*, a*, b*, C* values in the cold stored fruit increased significantly from green stage to yellow stage and also with the extension of cold storage periods. However, mean h° in cold stored fruit decreased significantly from green stage to yellow stage or with the extension of cold storage periods. Citric acid was recorded to be a prominent individual organic acid in the juice of the lemon fruit. Means levels of citric acid, malic acid and fumaric acid in the juice of cold stored fruit decreased significantly from green to yellow stage. Whilst with the extension of cold storage period the mean citric acid and succinic acid levels in the fruit juice increased significantly and malic acid and fumaric acid levels decreased significantly. Vitamin C content in the juice of cold stored fruit was not significantly affected by the harvest maturity stages and cold storage periods. Mean total antioxidant capacity in the juice of cold stored fruit decreased significantly with the extension of storage period. In conclusion, the harvest maturity of Eureka lemon affects the cold storage life and fruit quality. Considering different fruit quality parameters, the lemon fruit harvested at yellow stage are suitable to store for 30 days and the fruit harvested at green stage can be stored up to 90 days at 10 °C.

Keywords: /Lemon/ /Harvest maturity/ /Cold storage/ /Fruit colour/ /Postharvest quality/

LETTUCE

Kongwong, P., Boonyakiat, D., & Poonlarp, P. (2019). Extending the shelf life and qualities of baby cos lettuce using commercial precooling systems. Postharvest Biology and Technology, 150, 60–70. DOI: 10.1016/j.postharvbio.2018.12.012

Abstract

Due to a limited shelf life, baby cos lettuce lasts for only a few days after arriving at a market destination. At the present time, no research is conducted on what impacts of commercial precooling systems have on physico-chemical qualities and ultrastructure of this crop. The study provides understanding of the cellular senescence, especially associated with chloroplast and vacuole which directly affect the produce's greenness and freshness. This research was conducted to investigate the optimum parameters for vacuum cooling, and the effects of different commercial precooling systems (room cooling, forced-air cooling, and vacuum cooling) on the physico-chemical qualities, bioactive compounds and ultrastructure of baby cos lettuce during storage at 4 °C. Overall, vacuum cooling at 0.6 kPa holding pressure and 25 min holding time maintained significantly ($P \leq 0.05$) better produce qualities than forced-air cooling

at 1.4 m s−1 air velocity or room cooling at 0.65 m s−1. A significant increase in total phenolics content was detected in all samples, with antioxidant activity also increasing significantly until seven days of storage for samples precooled by vacuum cooling, and until nine days of storage for samples precooled by forced-air cooling, room cooling, and in the non-precooled sample, decreasing thereafter. However, both antioxidant activity and phenolics content were better retained during storage in samples precooled by vacuum cooling. Although gradual declines in ascorbic acid and total chlorophyll content were observed across all treatments, cells of baby cos lettuce precooled via forced-air or room cooling and those in the control sample exhibited chlorophyll degradation (according to TEM), resulting in a diminished green colour. This study thus demonstrates that vacuum cooling is effective in prolonging the shelf life of baby cos lettuce grown in Chiang Mai, Thailand from nine to sixteen days at 4 °C and 85% RH, increasing the produce market window.

Keywords: /Precooling/ /Baby cos lettuce/ /Shelf life/ /Quality/ /TEM/

LITCHI

Li, T., Shi, D., Wu, Q., Zhang, Z., Qu, H., & Jiang, Y. (2019). Sodium para-aminosalicylate delays pericarp browning of litchi fruit by inhibiting ROS-mediated senescence during postharvest storage. Food Chemistry, 278, 552–559. DOI: 10.1016/j.foodchem.2018.11.099

Abstract

The effect of sodium *para*-aminosalicylate (PAS-Na) on litchi pericarp browning and the potential regulating mechanism was investigated in this study. Results showed that 0.3 g L−1 PAS-Na significantly inhibited the development of pericarp browning and reduced respiration rate of litchi fruit. PAS-Na inhibited the production of reactive oxygen species (ROS) and decreased the expression level of senescence-related genes. Additionally, PAS-Na treatment enhanced the activities of superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX), which might contribute to the scavenging of ROS. Meanwhile, PAS-Na treatment maintained membrane integrity as indicated by reduced relative membrane leakage rate and malondialdehyde (MDA) content, as well as lower activities of membrane lipids-degrading enzymes: lipase and lipoxygenase (LOX). Amino acids, especially GABA, Glu, Met contents were also significantly affected by PAS-Na treatment. Taken together, we postulated that PAS-Na treatment might be a promising method for controlling postharvest browning and prolonging shelf-life of harvested litchi fruit.

Keywords: /Litchi fruit/ /ROS/ /Senescence/ /Sodium *para*-aminosalicylate/ /Pericarp browning/

MANGO

Montecalvo, M.P., Opina, O.S., Dalisay, T.U., & Esguerra, E.B. (2019). Efficacy of Postharvest Treatments in Reducing Stem End Rot of 'Carabao' Mango (Mangifera indica L.) Fruit. Philippine Journal of Crop Science, 44:1, 36-43.

Abstract

The efficacy of postharvest water treatment (HWT, fungicide dips, and modified atmosphere packaging (MAP), and their combinations in reducing stem end rot (SER) incidence of Carabao mango fruits was determined. Among the postharvest treatments, HWT (55 C for 10 min) effectively reduced SER incidence by 61-70%. Fungicide dips at their recommend rates (azoxystrobin at 175 ppm and tebuconazole at 156 ppm for 5 min) provided similar degree of disease control (<18%). HWT plus fungicide dip enhanced control efficacy by 80%. The disease incidence increased by 15% with prolonged storage at 13 C from 21 to 28 d after treatment (DAT). Different combinations of postharvest treatments remarkably reduced the disease up to 98% in mango fruits stored at 13 C for 21 DAT. HWT plus azoxystrobin dip and HWT plus tebuconazole dip and MAP decreased the disease incidence up to 93% in mango fruits stored at 13 C for 28 DAT. Due to the significant reduction in diseases incidence, the shelf life of the treated mango fruits was prolonged for more than 4 days. Peel color development was delayed when fruit was packed in MAP while HWT enhanced ripening. However, MAP appeared to favor SER infection. Physico-chemical attributes such as firmness, total soluble solids, titratable acidity, and pH were slightly influenced by the postharvest treatments. Findings of this research suggest that the integration of postharvest treatments will ensure effective suppression of SER and prolonged marketable period.

Keywords: /Fungicides/ /Hot water treatment/ /Mango/ /Stem end rot/

Ntsoane, M. L., Zude-Sasse, M., Mahajan, P., & Sivakumar, D. (2019). Quality assesment and postharvest technology of mango: A review of its current status and future perspectives. Scientia Horticulturae, 249, 77–85. https://doi.org/10.1016/j.scienta.2019.01.033

Abstract

Mango (Mangifera indica L.) is a commercial fruit crop produced in tropical, subtropical regions in the world. It is widely consumed due to the delicious flavour, pleasant aroma, and rich source of nutrients and phytochemicals (vitamin C, Vitamin E, β- carotene, lutein, quercetin, mangiferin, omega 3 and 6 polyunsaturated fatty acids etc.). Deficiency of β- carotene which is a precursor for the biosynthesis of vitamin A is a major challenge faced by Sub-Saharan African countries. Therefore, mango consumption could relatively be an affordable strategy to supply β- carotene to alleviate the vitamin A deficiency in the Sub Saharan Africa. However, fruit shelf life is limited due to high respiration rate, ethylene production and excessive ripening, pests, diseases cumulatively resulting in postharvest loss of valuable nutrients and decline in market value. Furthermore, rejection by consumer of fresh mangoes is attributed to improper fruit maturity, mechanical damage caused during harvesting or field handling. The fruit marketability is closely linked with the development of suitable technology which reduces the losses at different stages of harvesting and storage conditions. Instruments for monitoring and predicting the fruit quality have been introduced recently. This review presents an overview of fruit physiological changes, postharvest quality and non-destructive assessment criteria during mango supply chain. Furthermore, the application of current postharvest technologies, capturing (low cost storage structures, low temperature, modified atmosphere storage, anti-ripening treatments and hot water treatment) and its implications on mango fruit nutritional quality are pointed out.

Keywords: /Mango fruit/ /Quality/ /Postharvest technologies/ /Storage/ /Quality assessment/

Shamili, M. (2019). The estimation of mango fruit total soluble solids using image processing technique. Scientia Horticulturae, 249, 383–389. https://doi.org/10.1016/j.scienta.2019.02.013

Abstract

Appearance and color, as the most important factors selected by consumers for the agricultural products, are related to the chemical and sensory properties. The present study aimed to evaluate the efficiency of image processing as a simple, rapid and non-destructive alternate for estimating mango quality indices. Thus, mango fruits were kept under different temperature conditions, and accordingly the fruits were evaluated several times by using image processing. The results indicated that the value of a* reached from −12.4 to −2.5 at 24 °C, while it increased from −10.09 to −2.43 at 15°C. The b* values of fruits in ambient temperature was higher than those in chilling conditions. Furthermore, differences among L* value of three storage conditions was found during seven-step evaluation periods. The fruits kept at cold conditions could display the internal browning area after the second and third observation period at 5°C and 15°C, respectively. Based on the results, the linear regression (R2 = 0.83) and polynomial (R2 = 0.84) models between Normalized a* and TSS is related to keeping fruit at 24 °C, while an obvious polynomial relationship was observed at 15°C (R2 = 0.78) and 5°C (R2 = 0.98).

Keywords: /Image processing/ /Laboratory analysis/ /Visual assessment/ /Total soluble solids/ /Linear regression/ /Polynomial-linear regression/

MELON

Nguyen, L. P. L., Zsom, T., Dam, M. S., Baranyai, L., & Hitka, G. (2019). Evaluation of the 1-MCP microbubbles treatment for shelf-life extension for melons. Postharvest Biology and Technology, 150, 89–94. DOI: 10.1016/j.postharvbio.2018.12.017

Abstract

The objective of this study was to evaluate the efficacy of 1-methylcyclopropenemicrobubbles (1-MCP MB) treatment in prolonging the postharvest life of melon (*Cucumis melo*. var. *reticulates* L. Naud). Harvested melons were immersed in 1-MCP MB for 10, 20 and 30 min at 16 °C with concentration of 650 nL L−1. A reference group was exposed to 650 nL L−1 gaseous 1-MCP at 10 °C for 24 h. Untreated controls were kept at 10 °C for 24 h. Fruit were stored at 20 °C for 9 d. Both MB and gaseous 1-MCP application delayed ripening of melons compared with the untreated fruit. Melons treated with 1-MCP MB for 20 and 30 min had reduced ethylene and CO2 production and slower softening that was similar to that of gaseous application. 1-MCP MB could offer a promising method to delay ripening and maintain the overall quality of melons and other product types.

Keywords: /1-MCP/ /Microbubbles/ /Muskmelon/ /Shelf-life/

MUSHROOM

Zhu, D., Guo, R., Li, W., Song, J., & Cheng, F. (2019). Improved Postharvest Preservation Effects of Pholiota nameko Mushroom by Sodium Alginate--Based Edible Composite Coating. Food and Bioprocess Technology, 4, 587-598. DOI: 10.1007/s11947-019-2235-5

Abstract

The mushroom Pholiota nameko is extensively cultivated for its nutritional and health benefits in many countries. However, senescence and decay in fruiting bodies occur instantly after harvest, reducing their nutritional value and edible nature. In this study, edible composite coating materials were prepared using sodium alginate, enriched with 1% (v/v) thyme essential oil, 0.3 g/L L-cysteine, and 0.4 g/L nisin. The effects of these coatings on the postharvest quality of P. nameko were compared with that of low temperature (4 [degrees]C). It was shown that the edible coatings significantly inhibited the weight loss, cap opening percentage, degree of browning, malondialdehyde content, polyphenol oxygenase (PPO), peroxidase (POD), and cellulase activity of P. nameko. In addition, edible coatings effectively preserved the soluble sugar, ascorbic acid, and soluble protein contents. The peaks of superoxide dismutase, catalase, POD, and PPO activities were delayed by edible coatings. Moreover, edible composite coatings exerted better antibacterial efficiency compared with low-temperature treatment. Our study suggests that the edible coatings might be a promising candidate for maintaining the postharvest quality of P. nameko.

Keywords: /Pholiota nameko/ /Edible composite coating/ /Postharvest quality/ /Sodium alginate/ /Thyme essential oil/ / L-cysteine/

PAPRIKA

Go, S.-M., Park, M.-R., Kim, H.-S., Choi, W. S., & Jeong, R.-D. (2019). Antifungal effect of non-thermal atmospheric plasma and its application for control of postharvest Fusarium oxysporum decay of paprika. Food Control, 98: 245-252. DOI: 10.1016/j.foodcont.2018.11.028

Abstract

Non-thermal atmospheric plasma (NTAP) has been shown to be effective for controlling postharvest fungi *in vitro*, but little is known regarding its mode of action, fungal response to NTAP, and the effect of its application on fresh produce. NTAP was evaluated for its *in vitro* and *in vivo* antifungal activity against *Fusarium*oxysporum on paprika. NTAP treatment resulted in complete inhibition of mycelial growth and spore germination of *F. oxysporum*, particularly at 1000 W for 90 s. To further investigate the mechanisms by which NTAP inhibits fungal growth, the membrane integrity and the expression of a membrane-related gene (*SHO1*) were tested, which indicated that NTAP treatment results in the loss of plasma membrane integrity and up-regulation *SHO1*. *In vivo* assays demonstrated that NTAP treatment for 90 s inhibited the growth of this fungal pathogens by approximately 50%. Color and hardness parameters had no

significant changes during 14 days of storage after NTAP treatment. The mechanisms by which NTAP treatment decreased fungal growth on paprika were directly associated with the disruption of the fungal cell membrane. These findings suggest that application of NTAP as an antifungal is an effective approach for preserving paprika.

Keywords: /*Fusarium oxysporum*/ /Non-thermal atmospheric plasma/ /Inhibition/ /Paprika/

PEACHES

Du, X., Li, X., Liu, Y., Zhou, W., & Li, J. (2019). Genetic algorithm optimized non-destructive prediction on property of mechanically injured peaches during postharvest storage by portable visible/shortwave near-infrared spectroscopy. Scientia Horticulturae, 249, 240–249. https://doi.org/10.1016/j.scienta.2019.01.057

Abstract

The melting-flesh peach (Prunus persica, cv. 'Baihua') tends to rapidly decay after harvest in summer with a short after-ripening period. Although the use of preservatives can inhibit the growth of microorganisms, collisions during transportation greatly affect the shelf life for subsequent sales. To build a high-accuracy model to predict the inner physiological status of mechanically injured peaches during postharvest storage, visible/shortwave near-infrared (Vis/SWNIR) diffuse reflection spectra (300–1150 nm) were acquired for analysis. With 840 samples, two drop heights (30 cm and 60 cm) were applied to study the variations in total soluble solids (TSS) polyphenol oxidase (PPO), malondialdehyde (MDA) and relative electrolyte leakage (REL) by percussive tests. After multiplicative scatter correction and Savitzky-Golay smoothing pretreatments, optimal feature selections from a total of 1024 wavelengths were determined using genetic algorithm (GA) in PLS modeling. For TSS, the best correlation (rp) is 0.89, root mean square error of prediction (RMSEP) is 0.40 and relative percent deviation (RPD) is 2.94. For PPO, the best rp is 0.71, RMSEP is 20.34 and RPD is 2.75. For MDA, the best rp is 0.83, RMSEP is 0.17 and RPD is 1.90. For REL, the best rp is 0.92, RMSEP is 1.42 and RPD is 2.44. Through several verifications, the GA-PLS models showed good imitative effects and high precisions. They could predict the condition of peaches with minor injury, which are difficult to detect with the naked eye, to reduce loss in practical production.

Keywords: /Peach/ /Non-destructive detection/ /Vis/SWNIR/ /Total soluble solids/ /Polyphenol oxidase/ /Malondialdehyde/ /Relative electrolyte leakage/

PEAR

Cruz-Bravo, R. K., Guzmán-Maldonado, S. H., Araiza-Herrera, H. A., & Zegbe, J. A. (2019). Storage alters physicochemical characteristics, bioactive compounds and antioxidant capacity of cactus pear fruit. Postharvest Biology and Technology, 150, 105–111. DOI: 10.1016/j.postharvbio.2019.01.001

Abstract

Fruit of *Opuntia* spp. are flavorful with high bioactive composition, but the effects of pre-marketing storage time and conditions on the primary functional properties of the fruit have been not explored. The objective of this study was to evaluate the effects of storage temperature over time on physicochemical characteristics and bioactive components of fruit from two pigmented cactus pear cultivars. Fruit from each cultivar were assessed at harvest (H) and after storage at room temperature (RT; 24 °C ± 1 °C and 37 ± 8% relative humidity (RH) for 35 d), or in a cold room (10 °C and 95% RH) for 77 d for 'Amarilla Olorosa' fruit or 112 d for 'Roja Lisa' fruit. Fruit mass loss (FML) was calculated and juice from each fruit was used to determine of total phenolic content (TPC), phenolic acids contents (PA; gallic, protocatechuic, benzoic, and hydroxybenzoic), antioxidant activity, betalains and vitamin C. 'Roja Lisa' fruit had the least FML under both storage conditions. TPC, PA, betalains, vitamin C, and antioxidant capacity were highest in fruit stored in cold stored fruit of both cultivars. In contrast, dehydroascorbic acid was detected only in 'Roja Lisa' fruit at H or in cold storage. Our results suggest that cactus pear fruit stored at RT or at cold storage for 5 weeks, or more than 11 weeks, respectively, with maintenance and enhancement of some nutraceutical properties.

Keywords: /*Opuntia* spp./ /Phenolic compounds/ /Antioxidant activity/ /Betalains/

Duan, B., Ge, Y., Li, C., Gao, X., Tang, Q., Li, X., … Chen, Y. (2019). Effect of exogenous ATP treatment on sucrose metabolism and quality of Nanguo pear fruit. Scientia Horticulturae, 249, 71–76. https://doi.org/10.1016/j.scienta.2019.01.047

Abstract

Nanguo pear fruits were used as materials to investigate the effect of exogenous ATP treatment on the quality and sucrose metabolism during storage at room temperature (20 ± 1 °C, RH 45 ± 2%). The changes of weight loss, respiratory intensity, total soluble solids (TSS) content, flesh firmness and the activity of enzymes in sucrose metabolism were studied. The results indicated that ATP at 0.8 mM effectively inhibited respiratory intensity, suppressed the decrease of TSS content and flesh firmness of Nanguo pear fruit. ATP treatment also enhanced the activity of acid invertase (AI), neutral invertase (NI), sucrose synthase-cleavage (SS-synthesis), and sucrose synthase-synthesis (SS-cleavage) in Nanguo pear fruit. These results suggest that ATP treatment can maintain the quality of Nanguo pear fruit by modulating the activity of enzyme in sucrose metabolism.

Keywords: /adenosine-5′-triphosphate/ /Sucrose metabolism/ /Pyrus ussuriensis maxim/ /Quality/

PERSIMMON

Park, D. S., Tilahun, S., Park, K. C., Choi, I. Y., & Jeong, C. S. (2019). Transcriptome analysis of astringent 'Cheongdo-Bansi' persimmon fruit treated with ethylene for removal of astringency. Postharvest Biology and Technology, 150, 52–59. DOI: 0.1016/j.postharvbio.2018.12.014

Abstract

Astringent type persimmon fruit was treated with ethylene for astringency removal. Transcriptome Sequencing analysis was done and compared with the control. Genes showing significantly different expression were identified.Information was provided on astringency removal and ripening related changes. This research was conducted to study the gene expression related to the removal of astringency and ripening in astringent ‘Cheongdo-Bansi’ persimmon. Fruit treated with ethylene were used to compare the differentially expressed genes against fruit ripened naturally without ethylene treatment (control). We sequenced total mRNAs using Illumina high-throughput sequencing platform and constructed the transcriptome gene set by de novo assembly. We identified 93,601 unigenes with an average length of 643.2 bp in transcriptome contigs. Differential gene expression analysis was performed and a total of 12,374 unigenes were differentially expressed in the ethylene vs. control. Of these 12,374 unigenes, 6072 were up-regulated and 6302 were down-regulated in the treated fruit. Compared with the control, the number of genes that induced more than 2 fold expression were 2647 and the number of genes whose expression was inhibited more than 2 fold were 2804. We also identified 38 genes showing significantly different expression, 26 of which were up-regulated and the rest 12 genes were down-regulated. The identified genes were categorized as genes related to astringency removal, softening and other ripening-related changes. The present study will add the information on the effect of ethylene treatment for astringency removal, softening and other ripening-related changes of persimmon fruit at genomic level. This study will also contribute important resources for further study of the genes related to astringent substance for persimmon breeding and improvement.

Keywords: /Transcriptome/ /Astringency/ /Persimmon/ /Soluble tannin/ /Softening/

POSTHARVEST QUALITY

Li, M., Landahl, S., East, A. R., Verboven, P., & Terry, L. A. (2019). Optical coherence tomography—A review of the opportunities and challenges for postharvest quality evaluation. Postharvest Biology and Technology, 150, 9–18. DOI: 10.1016/j.postharvbio.2018.12.005

Abstract

Optical Coherence Tomography (OCT) is an established non-destructive and contactless photonic technique which has now been shown to be suitable for monitoring the near-surface internal structure of tissues in stored fruit and vegetables. Such real-time cross-sectional imaging allows for better visualisation and understanding of the temporal changes in internal structure. However, despite these advantages, problems persist around the trade-off between imaging resolution and penetration depth, image analysis and data processing, and the applicability of *in situ* studies outside of the laboratory setting. This review summarises previous postharvest OCT research and assesses resulting mechanistic outcomes, and future potential.

Keywords: /Imaging/ /Microstructure/ /Photonics/ /Non-destructive/ /Fresh produce/

POSTHARVEST TECHNOLOGY

Mikyska, A., Krofta, K., Houska, M. and Cermak, P. (2019). Pascalization, alternative way of postharvest hops processing. Acta Hortic. 1236, 23-30. DOI: 10.17660/ActaHortic.2019.1236.4 https://doi.org/10.17660/ActaHortic.2019.1236.4

Abstract

Pascalization is an innovative technology used in the food industry. It comprises a high pressure treatment of foods. This technology is also known under the acronym HPP (high pressure processing) since the 19th century. Even with careful drying of hop cones, a part of labile compounds, with demonstrated or potential health effects, is lost. Therefore, a patented process for the preservation of fresh hop under high pressure was developed and 3-year tests on three cultivars of hops, including storage, were made. The homogenate of non-dried hop cones treated with high pressure has in comparison with dried hops higher content of beta acids, essential oils, total polyphenols, xanthohumol and shows a higher antiradical activity. Shelf life of homogenate packaged in barrier packaging is comparable to identically packaged dried hops. High pressure treatment ensures microbiological purity and stability of the homogenate. In the pilot brewing trials (200 L) of pale lager, the homogenate was applied in whirlpool or as the last kettle dose. Compared with dried hops, beer had a higher content of alpha acids, iso-alpha acids and prenylflavonoids, presumably due to the faster release of undried matrix and a different composition of essential oils. Beers had slightly higher astringency and slower bitterness decay. The homogenate was applied in the development of a low-alcoholic beer and unfermented hopped wort beverage. Relatively high content of prenylflavonoids with acceptable sensorial quality of beverages was achieved. The homogenate was tested for antimicrobial activity against the causative agent of gastric ulcer disease, Helicobacter pylori. Laboratory tests demonstrated reliable inhibitory effect considerably higher than the effect of the beta or alpha acids. Homogenates of fresh hops may find application in manufacturing of special, e.g., dry hopped beers and food supplements. Based on a license, chocolate and jelly confectionery containing hop homogenates are being produced by two companies.

Keywords: /Hop secondary metabolites/ /Drying, hop oils/ /Alpha acids/ /Food supplements/

POTATO

Niu, S., Li, X.-Q., Tang, R., Zhang, G., Li, X., Cui, B., … Haroon, M. (2019). Starch granule sizes and degradation in sweet potatoes during storage. Postharvest Biology and Technology, 150, 137–147. DOI: 10.1016/j.postharvbio.2019.01.004

Abstract

Starch granule sizes can greatly influence the quality of both table and processed products of sweet potato (*Ipomoea batatas* (L.) Lam), an important food, feed and industrial crop. Sweet potatoes require storage under suitable temperatures for year around supply, but there is very

little research on starch granule size variation during storage. We characterized dry matter content (DMC), starch content, soluble carbohydrate (SoluCarb), and starch granule length before and after storage at 13 °C for 60 d in the cultivars, SP3388, SP3391, 'Beauregard', and 'Covington'. Tuberous roots with higher DMC tended to have greater DMC, starch content, SoluCarb, and starch granule length after storage. Starch granule sizes ranged nearly continuously from small to large, without frequency peaks of small granules or large granules. Smaller starch granules degraded faster than larger ones during storage. The findings provided insights into starch degradation in plants, can help predict the processing quality of sweet potatoes during storage, and may also assist in their dry matter and starch-related breeding.

Keywords: /Sweet potato/ /Post-harvest storage/ /Dry matter/ /Starch content/ /Starch granule size/

STRAWBERRY

Han, Y., Chen, C., Yan, Z., Li, J., & Wang, Y. (2019). The methyl jasmonate accelerates the strawberry fruits ripening process. Scientia Horticulturae, 249, 250–256. https://doi.org/10.1016/j.scienta.2019.01.061

Abstract

In this study we analyzed changes in jasmonic acid (JA) content during the development of the octoploid strawberry cultivar (Fragaria × ananassa Duch. "Benihoppe"). Here, strawberry fruits were treated with different concentrations of methyl jasmonic acid (MeJA, 50 μM, 100μM, 230 μM, 400 μM), respectively, to identify the optimal concentration of MeJA in promotion fruit maturation. We also examined the expression of genes linked to fruit ripening, as well as physiological changes that occurred after MeJA treatment. Using transient gene expression analyses, we performed that key genes in the jasmonic acid biosynthesis pathway, including FaAOC and FaAOS, were overexpressed in fruit, and we further studied their effects on fruit maturation. The results showed that endogenous JA content in the strawberry fruit increased sharply from the small fruit stage to the white fruit stage, but declined after the fruit had ripened, reaching a minimum when fully ripened. MeJA treatment can promote the development and maturation of strawberry fruit, and we found that the optimal concentration to promote maturation was 230 μM. MeJA treatment was associated with increased expression of genes involved in pigment metabolism, sugar metabolism, fruit softening, and hormone metabolism, as well as increases in JA, anthocyanin, and sugar content. Moreover, MeJA treatment was associated with decreased fruit hardness. Overexpression of FaAOC and FaAOS were also found to accelerate strawberry fruit maturation.

Keywords: /Strawberry/ /Methyl jasmonic acid (MeJA)/ /Gene expression/ /Gene overexpression/ /Fruit ripening/

TOMATO

Feng, L., Zhang, M., Adhikari, B., & Guo, Z. (2019). Nondestructive Detection of Postharvest Quality of Cherry Tomatoes Using a Portable NIR Spectrometer and Chemometric Algorithms. Food Analytical Methods, 4, 914-925. DOI: 10.1007/s12161-018-01429-9'

Abstract

The aim of this study was to assess the applicability of a portable NIR spectroscopy system and chemometric algorithms in intelligently detecting postharvest quality of cherry tomatoes. The postharvest quality of cherry tomatoes was evaluated in terms of firmness, soluble solids content (SSC), and pH, and a portable NIR spectrometer (950--1650 nm) was used to obtain the spectra of cherry tomatoes. Partial least square (PLS), support vector machine (SVM), and extreme learning machine (ELM) were applied to predict the postharvest quality of cherry tomatoes from their spectra. The effects of different preprocessing techniques, including Savitzky--Golay (S-G), multiplicative scattering correction (MSC), and standard normal variate (SNV) on prediction performance were also evaluated. Firmness, SSC and pH values of cherry tomatoes decreased during storage period, based on which the tomato samples could be classified into two distinct clusters. Similarly, cherry tomatoes with different storage time could also be separated by the NIR spectroscopic characteristics. The best prediction accuracy was obtained from ELM algorithms using the raw spectra with R .sub.p .sup.2, RMSEP, and RPD values of 0.9666, 0.3141 N, and 5.6118 for firmness 0.9179, 0.1485%, and 3.6249 for SSC and 0.8519, 0.0164, and 2.7407 for pH, respectively. Excellent predictions for firmness and SSC (RPD value greater than 3.0), good prediction for pH (RPD value between 2.5 and 3.0) were obtained using ELM model. NIR spectroscopy is capable of intelligently detecting postharvest quality of cherry tomatoes during storage.

Keywords: /Cherry tomato/ /Near infrared spectroscopy/ /Partial least square/ /Support vector machine/ /Extreme learning machine/

Inestroza-Lizardo, C., Mattiuz, B.-H., da Silva, J. P., Voigt, V., Muniz, A. C., & Pinsetta, J. J. S. (2019). Effect of hyperbaric pressure on the activity of antioxidant enzymes and bioactive compounds of cv. 'Débora' tomatoes. Scientia Horticulturae, 249, 340–346. https://doi.org/10.1016/j.scienta.2019.02.011

Abstract

The objective of this work was to evaluate the effects of the application of hyperbaric pressures 100 (control), 200, 400, 600 and 800 kPa at ambient temperature (23 ± 1 °C) for 2, 4 or 6 d, followed by 2 d at under ambient conditions (23 °C, 50% RH and 100 kPa), on the activity of antioxidant enzymes and the concentrations of bioactive compounds in cv. 'Débora' tomatoes. Between the 2nd and 6th day of hyperbaric pressure application, there was an average increase of 37%, 33% and 27% in the content of malondialdehyde MDA, total polyphenols and ascorbic acid in tomatoes, respectively, which is related to accelerated maturation of the tomatoes. Consequently, at the end of storage (6 + 2), the fruits, on average, showed 86% higher antioxidant activity than that of the initial content (412.78 μmol TEAC kg−1 FW). However,

hyperbaric pressures between 400 kPa and 800 kPa induced an increase in enzymatic activity of CAT and the reduction of POD activity due to the reduction of oxidative stress and the delayed senescence of tomatoes. The results of this research indicate that hyperbaric pressure did not stimulate the accumulation of bioactive compounds but did stimulate the activity of CAT and a reduction of POD activity.

Keywords: /Solanum lycopersicum/ /LAbiotic stress/ /Antioxidant activity/ /Shelf life/ /Post-harvest/

Salas-Méndez, E. de J., Vicente, A., Pinheiro, A. C., Ballesteros, L. F., Silva, P., Rodríguez-García, R., … Jasso de Rodríguez, D. (2019). Application of edible nanolaminate coatings with antimicrobial extract of Flourensia cernua to extend the shelf-life of tomato (Solanum lycopersicum L.) fruit. Postharvest Biology and Technology, 150, 19–27. DOI: 10.1016/j.postharvbio.2018.12.008

Abstract

Edible nanolaminate coatings with alginate, chitosan and *F. cernua* were developed. Nanolaminatecoatings with *F. cernua* improved WVP and O2 permeabilities. Nanolaminate coatings with *F. cernua*extended the shelf-life of tomato. Nanolaminate coatings with *F. cernua* inhibited microorganism growth. Nanolaminate coatings with *F. cernua* decreased the weight loss of tomato. Edible coatings have potential to reduce postharvest losses of fruit such as tomato. In this study, the effects of nanolaminate coatings incorporated with extracts of *Flourensia cernua*, an endemic plant of the arid and semi-arid regions of Mexico, has been investigated. Ethanol extracts of *F. cernua* (FcE) were prepared and incorporated into polyelectrolyte solutions of alginate and chitosan. The nanolaminates were characterized by determining the zeta potential, contact angle and water vapor and oxygen permeabilities. Shelf-life analyses (20 °C for 15 d) were carried out with uncoated fruit (UCF), nanolaminate coating (NL) and nanolaminatecoating with FcE (NL + FcE). Physicochemical analyses, gas exchange rates of O2 and CO2 and ethylene production, as well as microbiological analyses of treated fruit were measured. Zeta potential and contact angle measurements confirmed the successful assembly of successive nanolayers of alginate and chitosan, as well as those with *F. cernua*. The nanolaminate coatings resulted in decreased permeabilities to water and O2. The best treatment of NL + FcE, extended the shelf-life of fruit by reducing weight loss and microbial growth, reducing gas exchange and ethylene production, and maintaining firmness and color. The NL + FcE treatment are an alternative to extend the shelf-life of tomato fruit.

Keywords: /Flourensia cernua/ /Nanolaminate coatings/ /Shelf-life/ /Chitosan/ /Alginate/ /Tomato/

TURMERIC

Zuniega, J.S. & Esguerra, E.B. (2019) Extending the storage life turmeric (Curcuma longa L.) rhizomes through light and temperature manipulation. Philippine Journal of Crop Science. 44:1, 18-24.

Abstract

Turmeric (Curcuma longa L.) is becoming an important underutilized crop because of its use as a natural food colorant and its varied pharmacological properties. It is subject to dehydration, sprouting, and chemical degradation of curcuminoids, the major antioxidant, when exposed to light and high temperature. The study was conducted to determine the storage life of fresh turmeric rhizomes at 12-14 degrees Celcius and at ambient condition of 27-30 degrees Celcius either continuously exposed to light or covered with jute sack (without light). Regardless of light exposure, storage at 12-14 degrees Celcius reduced weight loss hence none to very slight shriveling, prevented sprouting thus the high visual quality rating of the rhizomes for 20 wk, retarded the decline in the intensity of yellow-orange color of the flesh, and maintained the acceptability of the extract (juice) to the sensory panelists. On the other hand, turmeric stored at 27-30 degrees Celcius resulted in high weight loss manifested as shriveling and early onset of sprouting on the 8th week of storage. Firmness of the rhizomes however, did not change markedly during storage even when sprouting had occurred. Likewise, respiration rate and ethylene production of the rhizomes did not vary between storage temperature and light exposure. Total phenolic content and antioxidant activity did not change markedly during storage regardless of the treatment. The study showed that turmeric rhizomes can be stored for 20 wk at 12-14 degrees Celcius without significantly affecting the quality and antioxidant property of the rhizomes.

Keywords: /Antioxidant activity/ /Curcuma longa/ /Storage/ /Total phenolic content/ /Turmeric/

ZUCCHINI FRUIT

Zhang, M., Liu, W., Li, C., Shao, T., Jiang, X., Zhao, H., & Ai, W. (2019). Postharvest hot water dipping and hot water forced convection treatments alleviate chilling injury for zucchini fruit during cold storage. Scientia Horticulturae, 249, 219–227. https://doi.org/10.1016/j.scienta.2019.01.058

Abstract

The effects of hot water dipping (HWD) and hot water forced convection (HWFC) treatments on the quality and membrane integrity of zucchini fruit were investigated during cold storage at 4 °C. Zucchini fruit were treated with hot water dipping at 40 °C for 25 min or hot water forced convection at 40 °C at a water flow rate of 2 m/s for 20 min, each of which produced the same heat absorption inside the fruit. Then, all fruit were placed into refrigerated storage at 4 ± 0.5 °C with 85–90 % humidity for 15 d. The results indicated that treatment with HWD or HWFC alleviated chilling injury (CI) in zucchini fruit compared with an untreated group (CK). Nevertheless, the HWFC treatment was more effective in reducing CI, maintaining quality and alleviating membrane injury than was HWD, which decreased the decline in fruit firmness, Total soluble solids (TSS) content and ascorbic acid (AsA) content and reduced relative electrolyte leakage (EL), malondialdehyde (MDA) content and weight loss in zucchini fruit during cold storage. In addition, analysis of heat transfer progress characteristics indicated that the effect of heat treatment on the quality and membrane integrity of zucchini fruit during cold storage was related not only to heat temperature and time but also to heat transfer modes, including forced

convection and natural convection. Yielding the same heat absorption inside the zucchini fruit during hot water treatment, the HWFC treatment with a forced convection heat transfer mode could shorten the heating time and provided more advantages in zucchini fruit preservation during cold storage than did the HWD treatment under a natural convection heat transfer mode.

Keywords: /Zucchini fruit/ /Hot water dipping treatment/ /Hot water forced convection treatment/ /Chilling injury/