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As of November 2019

APPLE

Weber, A., Thewes, F. R., Sellwig, M., Brackmann, A., Wünsche, J. N., Kittemann, D., & Neuwald, D. A. (2019). Dynamic controlled atmosphere: Impact of elevated storage temperature on anaerobic metabolism and quality of 'Nicoter' apples. Food Chemistry, 298, 125017. doi: 10.1016/j.foodchem.2019.125017

Abstract

The aim of the study was to evaluate an elevated (3.0 °C) and low (1.0 °C) storage temperature combined with dynamic controlled atmosphere monitored by respiratory quotient (DCA–RQ) and chlorophyll fluorescence (DCA–CF) on anaerobic metabolism, physiological storage disorders and overall quality of 'Nicoter' ('Kanzi®') apples after 5.5 and 8.0 months of storage plus 7d shelf-life. Fruit stored under DCA–RQ 2.0 accumulated the highest amounts of anaerobic metabolites (acetaldehyde, ethanol and ethyl acetate), regardless of storage temperature and timing of storage outturn evaluation, but it did not result in higher electrolyte leakage. Flesh breakdown, core breakdown and cavity formation were reduced at 3 °C. Storage at 3 °C combined with DCA maintained higher flesh firmness after 8.0 months storage plus 7d shelf-life. 'Nicoter' apples can be stored at 3 °C using a DCA system, based either on CF or on RQ, to save electrical energy.

Keywords: /Malus domestica/ /Apple Fruit/ /Respiratory Quotient/ /Chlorophyll Fluorescence/ /Pyruvate decarboxylase/ /Alcohol dehydrogenase/ /Physiological Disorders/

Zhang, W., Shu, C., Chen, Q., Cao, J., & Jiang, W. (2019). The multi-layer film system improved the release and retention properties of cinnamon essential oil and its application as coating in inhibition to penicillium expansion of apple fruit. Food Chemistry, 299, 125109. doi: 10.1016/j.foodchem.2019.125109

Abstract

The aim of this research is to develop, characterize and utilize a multi-layer antibacterial film using chitosan (CS) and sodium alginate (SA) as biopolymers and cinnamon essential oil (CEO) as main antibacterial ingredients. The dense cross-section of SA layer in the scanning electron microscopy (SEM) analysis verified that layer-by-layer method improved physical and mechanical properties of CS-CEO single layer film. The thermogravimetric (TGA) and fourier transform infrared (FT-IR) analysis indicated that the layer-by-layer method changed the intermolecular interaction and the thermal stability. Importantly, the multi-layer film exhibited more sustained release and higher retention rate of CEO compared CS-CEO single layer film. The multi-layer coating showed a more significant and lasting inhibition of penicillium expansion which further demonstrated that the layer-by-layer method improved the release and retention of CEO in the multiphased system. To summarize, the multilayer film system is a promising controllable release system for loading essential oils.

Keywords: /Multi-Layer Film/ /Layer-by-Layer/ /Chitosan/ /Sodium alginate/ /Cinnamon Essential Oi/

Kokalj, D., Zlatić, E., Cigić, B., Kobav, M. B., & Vidrih, R. (2019). Postharvest flavonol and anthocyanin accumulation in three apple cultivars in response to blue-light-emitting diode light. Scientia Horticulturae, 257, 108711. doi: 10.1016/j.scienta.2019.108711

Abstract

The effects of postharvest blue-light irradiation on the accumulation of anthocyanins and other phenolic compounds, and on phenylalanine ammonia-lyase activities and color development in the skin was investigated in fruit of three apple cultivars (Malus domestica Borkh.). 'Idared', 'Fuji', and 'Carjevič' apples were harvested at the commercial maturity stage and irradiated or not with blue LEDs (peak wavelength 444 nm) at 8 °C for 7 days. Response to the irradiation was cultivar dependent. Anthocyanin accumulation was greatest in 'Idared' apples; however, the anthocyanins profile differed from that in the naturally colored apples. Twelve phenolic compounds were evaluated. Among these, chlorogenic acid and total flavonols increased in all cultivars after blue-light irradiation. Structure-specific responses of quercetin glycosides were detected in terms of the sugar moieties. Three out of six evaluated quercetin glycosides increased after irradiation, with the highest relative increase seen for quercetin 3-O-arabinopyranoside, followed by quercetin 3-O-galactoside and quercetin 3-O-glucoside. Contents of quercetin 3-O-arabinofuranoside, quercetin 3-O-rhamnoside and quercetin 3-O-xyloside were not affected by irradiation. The highest phenylalanine ammonia-lyase activity was seen for 'Fuji' apples after blue-light irradiation. Therefore, blue-light irradiation appears to be promising to enhance color and nutritional quality of apples.

Keywords: /Malus domestica/ /Borkh/ /Light Irradiation/ /Color/ /Phenolics/ /Treatment/

BROCCOLI

Duarte-Sierra, A., Nadeau, F., Angers, P., Michaud, D., & Arul, J. (2019). UV-C hormesis in broccoli florets: Preservation, phyto-compounds and gene expression. Postharvest Biology and Technology, 157, 110965. doi: 10.1016/j.postharvbio.2019.110965

Abstract

The effect of pre-storage exposure to ultra-violet radiation (UV-C) on preservation of broccoli (Brassica oleraceae var. Italica) florets and glucosinolates, phenolic acids and their precursor amino acids as well the expression of genes related to the biosynthetic pathways of glucosinolates and phenolic compounds in broccoli stored at 4 °C and 90–95% HR was investigated. The UV-C dose of 1.2 kJ m−2 was found to be hormetic in delaying the yellowing and in lowering the weight loss of broccoli florets during storage. The time-averages over the storage period of both ascorbic acid titer and ORAC (oxygen radical absorbance capacity) value of the tissue exposed to hormetic dose of 1.2 kJ m−2 or a high dose of 3.0 kJ m−2 were lower. The overexpression of genes (phenylalanine N-hydroxylase, tryptophan N-hydroxylase, dihomo-methionine N-hydroxylase and flavonoid monooxygenase) in UV-C exposed broccoli, hours after exposure (0 d), and that of chalcone synthase and coumarate ligase was observed on day 0, 2 and 4. The titers of glucosinolate-precursor amino acids, methionine, tryptophan and phenylalanine in tissue were dose-dependent, where the doses of 1.2 and 3.0 kJ m−2 UV-C caused a decrease in their concentrations compared to the control. Hormetic dose of UV-C significantly increased the concentration of total glucobrassicins and 4-hydroxyglucobrassicin. In addition, UV-C treated florets with the dose of 1.2 or 3.0 kJ m−2 contained a higher level of hydroxycinnamic acids in broccoli compared to the control during the storage. The results suggest that the application of hormetic dose of UV-C can be beneficial in maintaining not only the quality of broccoli florets, but also in enhancing the phyto-compounds during the low-temperature storage.

Keywords: /UV-C Radiation/ /Broccoli/ /Preservation/ /Amino Acids/ /Glucosinolates/ /Phenolic Compounds/ /Phytochemicals/

CASHEW

Souza, K. O., Silveira, A. G., Lopes, M. M., Moura, C. F., Silva, E. O., Ayala-Zavala, J. F., … Miranda, M. R. A. (2019). AVG and GA3 prevent preharvest fruit drop and enhance postharvest quality of BRS 189 cashew. Scientia Horticulturae, 257, 108771. doi: 10.1016/j.scienta.2019.108771

Abstract

The study investigated the effects of individual and combined preharvest applications of gibberellic acid (GA3, 180 mg L−1) and aminoethoxyvinylglycine (AVG, 180 mg L−1) at 34, 40 and 45 days after anthesis (DAA) on preharvest fruit drop, postharvest quality and antioxidant metabolism of 'BRS 189' cashew. AVG treatment at 45 DAA reduced significantly preharvest cashew drop to 26% while control presented 90% of fruit drop, moreover, without detrimental effects on peduncle and nut physical and physicochemical quality, except for 60% reduction in total antioxidant activity due to 50% reduction in total vitamin C content. GA3 treatments did not reduce cashew drop significantly when compared to control, although they incremented significantly total cashew weight (27%) due to increases in peduncle weight (29%) and length (14%), especially GA3 treatment at 40 DAA that also promoted significant increases in peduncle SS/TA ratio (23%) and firmness (33%) due to inhibition of PME cell wall hydrolytic activity. Peduncles treated with GA3 at 40 DAA also presented statically higher total carotenoid (16%) and polyphenol (59%) contents, despite the reduction in total vitamin C (25%) and total antioxidant activity (70%). Thus, AVG at 45 DAA was effective in reducing fruit drop, while GA3 treatment at 40 DAA promoted cashew quality with increases in peduncle weight and size, in SS/TA ratio, in firmness and in total carotenoid and polyphenol contents.

Keywords: /Anacardium occidentale L./ /Growth Regulators/ /Fruit Drop/ /Postharvest/ /Antioxidant/

CHERRY TOMATO

Liu, H., Meng, F., Chen, S., Yin, T., Hu, S., Shao, Z., … Wang, Q. (2019). Ethanol treatment improves the sensory quality of cherry tomatoes stored at room temperature. Food Chemistry, 298, 125069. doi: 10.1016/j.foodchem.2019.125069

Abstract

The effects of ethanol treatment on quality characteristics of cherry tomatoes were investigated over 11 days of storage at room temperature (25 °C). Results showed that sensory quality was improved after ethanol treatment, with redder, softer fruits at the edible stage (11 days) compared with control fruit. In addition, the contents of ascorbic acid, sucrose and fructose were elevated after ethanol treatment as well as the concentration of 6-methyl-5-hepten-2-one. Conversely, decreased levels of methyl salicylate (MeSA), guaiacol, (Z)-3-hexenal and (E)-2-hexenal were observed. Selected consumers showed a preference for ethanol-treated cherry tomato fruits compared with controls. Taken together, 0.1% ethanol application has the potential to improve the quality characteristics of cherry tomatoes stored at room temperature.

Keywords: /Ethanol Treatment/ /Ascorbic Acid/ /Flavor Quality/ /Cherry Tomato/

Li, S., Xu, Y., Bi, Y., Zhang, B., Shen, S., Jiang, T., & Zheng, X. (2019). Melatonin treatment inhibits gray mold and induces disease resistance in cherry tomato fruit during postharvest. Postharvest Biology and Technology, 157, 110962. doi: 10.1016/j.postharvbio.2019.110962

Abstract

Melatonin, an indolic compound, is a ubiquitous molecule with pleiotropic roles in plant. The effects of melatonin treatment on the development of gray mold, disease resistance signals and phenylpropanoid pathway in cherry tomato were investigated after the mature-green fruit were dipped in 0.1 mM melatonin for 60 min and subsequently stored at 22 ± 1 °C. The results showed that melatonin did not have antifungal activity against Botrytis cinerea in vitro, but significantly inhibited gray mold development caused by B. cinerea in tomato. The melatonin treatment induced a reactive oxygen species (ROS) burst, increased endogenous melatonin and salicylic acid (SA), and enhanced activities of chitinase (CHI) and β-1,3-glucanase (GLU) in tomato. Moreover, the treatment regulated the phenylpropanoid pathway by increasing activities of phenylalanine ammonia-lyase (PAL), 4-coumarate-coenzyme A ligase (4CL), and peroxidase (POD) accompanied by higher contents of total phenols, flavonoids and lignin in tomato. It was suggested that melatonin treatment would induce signaling molecules via the phenylpropanoid pathway that might contribute to enhancing resistance in tomato against fungi such as B. cinerea during postharvest storage.

Keywords: /Cherry Tomato Fruit/ /Gray Mold/ /Induced Resistance/ /Melatonin/ /Postharvest/

CHINESE CABBAGE

Meng, J., Zhou, Q., Zhou, X., Fang, H.-X., & Ji, S.-J. (2019). Ethylene and 1-MCP treatments affect leaf abscission and associated metabolism of Chinese cabbage. Postharvest Biology and Technology, 157, 110963. doi: 10.1016/j.postharvbio.2019.110963

Abstract

Leaf abscission during storage of Chinese cabbage (Brassica rapa, subspecies pekinensis and chinensis) can result in serious losses. To uncover the effects of the plant hormone ethylene on leaf abscission, harvested cabbages were treated with ethylene and its competitive inhibitor, 1-methylcyclopropene (1-MCP), and with 1-MCP followed by ethylene. Ethylene treatment accelerated leaf abscission, altered cell structure of the abscission zones, and increased activity and gene expression of cell wall-degrading enzymes. Expression of genes related to ethylene receptors and signaling pathways including BcERS1, BcERS2, BcETR2, BcCTR1, BcEIL1, BcEIL2, and BcEIL3 were also up-regulated. In 1-MCP-treated samples, leaf breakstrength was higher, and the increase of cell wall-degrading enzyme activity and the expression of enzyme-related genes were reduced. Notably, ethylene sensitivity recovered upon subsequent ethylene treatment following 1-MCP treatment. These results indicated that ethylene may constitute an important factor in leaf abscission of Chinese cabbage.

Keywords: /Chinese Cabbage/ /Leaf Abscission/ /Ethylene/ /Cell Wal/ /IMetabolism/

COCONUT

Meethaworn, K., Luckanatinwong, V., Zhang, B., Chen, K., & Siriphanich, J. (2019). Off-flavor caused by cold storage is related to induced activity of LOX and HPL in young coconut fruit. Lwt, 114, 108329. doi: 10.1016/j.lwt.2019.108329

Abstract

Off-flavor after cold storage is the major consumer complaint relating to consumption of young coconut fruit. To understand its chemical basis, young coconut fruit were stored for up to 4 weeks at either 4 or 25 °C, followed by volatile analysis. Off-flavor was detected at 4 °C in both water and kernel tissue after one week of storage and then increased quickly thereafter. PatternHunter analysis showed that volatiles from the lipid oxidation pathway, heptanal, octanal, nonanal and heptanol, were positively correlated with the development of fruit off-flavor during cold storage. Lipoxygenase (LOX) and hydroperoxide lyase (HPL) were related to the formation of lipid-derived volatiles and activities of both of these enzymes were high in fruit during cold storage. Fruit wrapped with polyethylene (PE) film reduced LOX and HPL activities, reduced the concentrations of heptanal, octanal, nonanal and heptanol and inhibited off-flavor development relative to fruit wrapped with polyvinyl chloride (PVC) film.

Keywords: /Cocos nucifera/ /Lipid Oxidation/ /MAP/ /Volatiles/

FIG

Ertan, B., Şenkayas, H., & Tuncay, Ö. (2019). Postharvest logistics performance of fresh fig varieties in Turkey. Scientia Horticulturae, 257, 108769. doi: 10.1016/j.scienta.2019.108769

Abstract

Demand for fresh food is increasing day by day as people want to consume healthy, quality and fresh vegetables and fruits. So, the main mission of supply chains is to deliver secure and fresh food overcoming postharvest losses. Fresh fig is a kind of perishable fruit with is very short durability period. Diversification of fresh fig market and its trade will strengthen the status of fresh fig in domestic and international markets. Post harvest storage and transport (logistics) conditions cause various damage and quality losses in fresh figs that continue to ripen. Therefore, factors such as storage temperature, humidity, transport containers, water losses due to mechanical damage and vibration of vehicles are important. This project was conducted in order to determine the most appropriate fresh fig varieties as an exportation alternative to “Bursa Siyahı” and to demonstrate changes in quality during storage and shelf-life periods after storage. “Siyah Orak”, “Goklop” and “1100” fig varieties at the Fig Research Institution in Aydın were used as materials. During harvest fruit were directly placed into their storage packages (into nespacks) and stored at 3 ± 1 °C for 20 days in cold storage condition. In addition, the samples taken from cold storage were kept for two days at 20 °C to determine their shelf-life periods. During the studies in 2012, 2013 and 2014 the following data was collected: weight loss during storage and shelf-life periods, firmness by texture analysis, total soluble solids, titratable acidity, maturity rate, pH, L, a, and b skin and flesh color values. During the studies on storage and shell-life period, it was shown that the fruit harvested at their coloring stages of 2/3 and 1/3 of hard-ripe fig variety was more durable than other varieties. It was also concluded that since the fruit harvested during the ripening period when 1/3 of their skin get colored are so small, they can be commercialized with different packaging materials.

Keywords: /Fresh Fig/ /Postharvest Losses/ /Fig Storage/ /Resistance To Transportation/

GARLIC

He, Y., Fan, G.-J., Wu, C.-E., Kou, X., Li, T.-T., Tian, F., & Gong, H. (2019). Influence of packaging materials on postharvest physiology and texture of garlic cloves during refrigeration storage. Food Chemistry, 298, 125019. doi: 10.1016/j.foodchem.2019.125019

Abstract

This study aims to investigate the postharvest physiology and texture of garlic cloves packaged in polyethylene terephthalate (PET), polyethylene (PE), aluminized kraft paper (AKP), single kraft paper (SKP), and mesh bag. Germination rate, electrical conductivity, respiration intensity, water content, and texture were determined during 180 d storage at −2 °C. Results showed that the germination of garlic cloves packaged in PET, PE, and AKP was effectively inhibited during storage. PE effectively reduced the degree of damage to the cell membranes of the garlic cloves. PE and SKP significantly inhibited respiratory intensity during storage. Garlic cloves water content did not change significantly in 90 d storage which packaged in PE and SKP. PE exhibited better effect on the texture and freshness of garlic cloves than the other materials. In conclusion, PE is the best packaging material for maintaining the quality attributes and extending the shelf lives of garlic cloves.

Keywords: /Garlic Cloves/ /Storage/ /Packaging Materials/ /Postharvest Physiology/ /Texture/

Chen, J., Yan, R., Hu, Y., Zhang, N., & Hu, H. (2019). Compositional shifts in the fungal diversity of garlic scapes during postharvest transportation and cold storage. Lwt, 115, 108453. doi: 10.1016/j.lwt.2019.108453

Abstract

The aim of this study was to elucidate the dynamics, diversity and succession of fungal communities on garlic scapes during postharvest short-term transportation and long-term cold storage using the high-throughput sequencing of ITS1 regions. During short-term transportation, samples transported at 0 °C harbored 75 operational taxonomic units, which was more than in either of the higher temperature groups. The beta-diversity analysis revealed significant fungal compositional differences between the sample transported at 0 °C and those transported at the higher temperatures. These differences indicated that higher temperatures can result in significant changes in the fungal community composition by causing short-term competition among fungi. So, lower transportation temperature is beneficial to inhibit the growth-related metabolism of fungi and maintenance microflora on garlic scapes. During long-term cold storage, Botrytis gradually became the main fungus on garlic scapes. Thus, long-term cold-stored garlic scapes have a greater risk of undergoing postharvest deterioration caused by Botrytis. Additionally, purified Botrytis was inoculated into garlic scapes. The deterioration in the storage quality of garlic scapes was accelerated by the growth of Botrytis. Therefore, control measures should focus on gray mold diseases caused by Botrytis during long-term cold-stored garlic scapes after low temperature transportation.

Keywords: /Garlic Scape/ /Postharvest/ /Fungal Diversity/ /High-Throughput Sequencing/

GRAPES

Pedrotti, C., Ribeiro, R. T. D. S., & Schwambach, J. (2019). Control of postharvest fungal rots in grapes through the use of Baccharis trimera and Baccharis dracunculifolia essential oils. Crop Protection, 125, 104912. doi: 10.1016/j.cropro.2019.104912

Abstract

Postharvest diseases cause considerable losses during transportation and storage. Synthetic fungicides are primarily used to control postharvest disease loss, however the development of new and alternative agrochemicals is necessary. In this study, the effect of Baccharis trimera and Baccharis dracunculifolia essential oils (EOs) to control of postharvest fungal rots in grapes was evaluated. The chemical composition and the antifungal activity of B. trimera and B. dracunculifolia EOs and the effect of EOs against Botrytis cinerea and Colletotrichum acutatum was determinate in vitro by mycelial growth (contact and volatile phase) and conidia germination. The in vivo efficacy study consisted of spraying the EO in harvested grapes of Vitis labrusca × Vitis vinifera cv. “Isabela” followed by inoculation with the fungus. The major compound found in B. trimera essential oil (BtEO) was carquejyl acetate and in B. dracunculifolia essencial oil (BdEO) were β-pinene, ledol, spathulenol and limonene. For in vitro tests, BdEO showed a fungistatic action, whereas as BtEO showed fungicidal action. For this reason, the later was selected for in vivo testing. For in vivo test, the all concentrations of EO (200, 400 and 600 ppm) (μL mL−1) were efficient, reducing the incidence and severity of disease caused by B. cinerea and C. acutatum, both as preventive and curative treatments. These results are promising and indicate that the BtEO might be further investigated as natural alternative to synthetic fungicides for the control of rots on grapes diseases.

Keywords: /Alternative Control/ /Essential Oil/ /Grape/ /Botrytis cinerea/ /Colletotrichum acutatum/

KELP (Alaria esculenta)

Perry, J. J., Brodt, A., & Skonberg, D. I. (2019). Influence of dry salting on quality attributes of farmed kelp (Alaria esculenta) during long-term refrigerated storage. Lwt, 114, 108362. doi: 10.1016/j.lwt.2019.108362

Abstract

Fresh, farmed Alaria esculenta was subjected to dry salting at a range of salt concentrations (0–200 g/kg). The quality of salted, refrigerated product was assessed over a 90 day shelf life. Microbial quality was unchanged during storage, with aerobic mesophile, lactic acid bacteria and coliform counts all remaining below 3.5 log CFU/g regardless of salt level. No textural differences due to treatment or storage time were detected. Instrumental color differences including significant decreases in Hunter a* and b* values indicate that the kelp became less yellow during storage, with increasing salt concentrations imparting a greener color to the product. Sensory analysis of seaweed salad prepared with salted product demonstrated a consumer preference for products produced with a higher (180 vs. 50 g/kg) level of salt. Dry salting is a low input process for preservation of fresh kelp that yields an acceptable product with up to 90 days of refrigerated shelf life.

Keywords: /Seaweed/ /Macroalgae/ /Shelf Life/ /Acceptability/

KIWI

Ciccoritti, R., Paliotta, M., Amoriello, T., & Carbone, K. (2019). FT-NIR spectroscopy and multivariate classification strategies for the postharvest quality of green-fleshed kiwifruit varieties. Scientia Horticulturae, 257, 108622. doi: 10.1016/j.scienta.2019.108622

Abstract

In the present study, combining near-infrared spectroscopy (NIRs) and chemometric analysis was tested for the characterization and commercial classification of green-fleshed kiwifruit (A. deliciosa, Hayward and Bo-Erica® cvs). Two approaches were studied: 1) development of PLS models using both spectral and reference data to assess the fruit quality and nutraceutical levels and 2) supervised classification methods (LDA and SIMCA) using only spectral data in order to sort fruit on the basis of their ripening time and consumer's acceptability. Several traditional quality indexes (i.e. soluble solids, firmness, titratable acidity, dry matter), as well as nutritional ones such as total phenols, carotenoids and antioxidant potential were evaluated. Very good prediction of the internal quality attributes, using partial least squares regressions (PLS), was observed, especially for both soluble solid content and dry matter (R2: 0.993, RMSEP: 0.40 and R2: 0.983, RMSEP: 0.33, respectively). An accurate predictive performance of PLS model was also obtained for the total titratable acidity (R2: 0.933, RMSEP: 6.65). Good model performances were obtained for the prediction of the main nutraceutical traits of the samples, developed herein for the first time on kiwifruit. However, fairly good prediction performances were obtained for both total flavans and vitamin C (R2: 0.813, RMSEP: 0.07 and R2: 0.870, RMSEP: 6.04, respectively). Linear Discriminant Analysis (LDA) and Soft Indipendent Modelling by Class Analogy (SIMCA) models provided good results with rates of 92% and 99% of correctly classified samples. This study highlights that FT-NIRs can be used successfully to improve the quality control of kiwifruit at harvest and during storage as well as to identify and segregate samples prior to distribution in order to reduce fruit loss.

Keywords: /FT-NIR/ /Green-Fleshed Kiwifruit/ /Postharvest Physiology/ /Cold Storage/ /Classification Methods/

LEMON

Lo'Ay, A., & Dawood, H. (2019). Chilling injury, fruit color maturity stages, and antioxidant enzyme activities of lemon baladi CV fruits under cold storage stress. Scientia Horticulturae, 257, 108676. doi: 10.1016/j.scienta.2019.108676

Abstract

Lemon 'Baladi' is often harvested at different color stages (HFCS) for logistic support to market and customers. So, the evaluation of lemon fruit was harvested at three color stages (Green, G; Yellow-green, YG; Yellow, Y-stage) to determine an effect on enzymatic antioxidant activities (AEAs) and chilling injury (CI). Lemon fruits were stored at low temperature (4 ± 1 °C and relative humidity 95 ± 2%) for 60-days. The outcomes of this study provide that the G-stage fruits presented more resistance to low storage temperature stress for the long term, therefore less CI-symptoms incidence compared to other maturities (YG and Y-stage). Throughout cold storage, fruits were estimated the physical and chemical analyses every 15-days intervals. The G-stage promoted the highest activation in antioxidant enzyme activities. Consequently, the scavengers of radicals such as DPPH and ABTs test presented more quenching radicals. So, less CI symptoms incidence during 60 days of cold storage. Also, less malondialdehyde and ion leakage percentage related to other fruit color stages. These were significant impacts on CI and fruit color hue angle during storage.The G-stage revealed to be a good stage of lemon to store at low temperature due to it is tolerant to chilled temperature for long term.

Keywords: /Lemon/ /Chilling Injury/ /Antioxidant Enzymes/ /Cold Storage/

LITCHI

Ali, S., Khan, A. S., Nawaz, A., Anjum, M. A., Naz, S., Ejaz, S., & Hussain, S. (2019). Aloe vera gel coating delays postharvest browning and maintains quality of harvested litchi fruit. Postharvest Biology and Technology, 157, 110960. doi: 10.1016/j.postharvbio.2019.110960

Abstract

Postharvest surface browning is the leading constraint for extension of shelf life and marketing of litchi fruit. In the present work, litchi fruit were treated with Aloe vera (ALV) gel coating [50% (v/v)] and kept at 20 ± 1 °C for 8 d to investigate its effect on browning and postharvest quality. ALV gel coated fruit showed reduced browning index, weight loss, superoxide anion, relative electrolyte leakage, hydrogen peroxide and malondialdehyde content, compared to control. ALV coated fruit had higher total anthocyanin content and reduced peroxidase and polyphenol oxidase activities. ALV treatment had higher ascorbic acid content and total phenolic concentration, compared to control. In addition, ALV coated fruit maintained higher catalase, superoxide dismutase and ascorbate peroxidase activities along with higher total soluble solids and titratable acidity, than control. In conclusion, ALV gel coating could be considered an eco-friendly non-chemical alternative treatment for postharvest quality management of litchi fruit.

Keywords: /Antioxidant Activity/ /Edible Coating/ /Oxidative Stress/ /Postharvest Quality/ /Skin Browning/

Su, Z., Hu, M., Gao, Z., Li, M., Yun, Z., Pan, Y., … Jiang, Y. (2019). Apple polyphenols delay senescence and maintain edible quality in litchi fruit during storage. Postharvest Biology and Technology, 157, 110976. doi: 10.1016/j.postharvbio.2019.110976

Abstract

The present study evaluated the impacts of exogenous apple polyphenols (AP) treatment on senescence-related physiological characteristics and edible qualities in ‘Dingxiang’ litchi fruit during storage at ambient temperature (25°C). The results exhibited that 5 g L−1 AP treatment effectively delayed the development of litchi pericarp browning, and browning indices from 4 to 8 in AP-treated fruit averaged 40% lower than those in control fruit. AP treatment reduced the respiration rate and weight loss in litchi fruit during storage. AP application to litchi fruit slowed the changes in glucose and fructose contents while inhibiting the decline in sucrose. AP treatment also resulted in higher contents of organic acids (malic acid, citric acid, succinic acid, and tartaric acid), phenolic compounds (caffeic acid, chlorogenic acid, (+)-catechin, (-)-epicatechin, rutin and total phenolics), ascorbic acid and glutathione, consequently contributing to maintenance of flavor and nutritional quality in litchi fruit., Moreover, compared to control fruit, AP treatment improved antioxidant capacity in litchi fruit, as indicated by higher DPPH radical-scavenging activity and ferric ion reducing antioxidant power (FRAP). The findings suggest that AP application could be a promising postharvest strategy to delay senescence and maintain edible quality of litchi fruit.

Keywords: /Apple Polyphenols/ /Browning/ /Litchi/ /Postharvest Quality/ /Senescence/

LONGAN

Lin, Y., Lin, H., Chen, Y., Wang, H., Ritenour, M. A., & Lin, Y. (2019). Hydrogen peroxide-induced changes in activities of membrane lipids-degrading enzymes and contents of membrane lipids composition in relation to pulp breakdown of longan fruit during storage. Food Chemistry, 297, 124955. doi: 10.1016/j.foodchem.2019.124955

Abstract

This study aimed to investigate the effect of hydrogen peroxide (H2O2) on membrane lipids metabolism and its relation to pulp breakdown development of longan fruit during postharvest storage. Compared to the control longans, H2O2-treated longans showed higher pulp breakdown index, cell membrane permeability, and activities of phospholipase D (PLD), lipase and lipoxygenase (LOX). Moreover, H2O2-treated longans maintained higher levels of pulp phosphatidic acid (PA) and saturated fatty acids (SFA). However, H2O2-treated longans exhibited lower levels of pulp phosphatidylcholine (PC), phosphatidylinositol (PI) and unsaturated fatty acids (USFA), lower index of unsaturated fatty acids (IUFA), and lower ratio of USFA to SFA (U/S). These findings demonstrated that H2O2 caused the increased activities of enzymes involving in membrane lipids degradation and the accelerated decompositions of membrane USFA and phospholipids in longan pulp, which eventually triggered the destruction of the pulp cell membrane structure and the development of pulp breakdown in longans during storage.

Keywords: /Longan Fruit/ /Pulp Breakdown/ /Membrane Lipids Metabolism/ /Membrane Lipids-Degrading Enzymes/ /Membrane Lipids Composition/ /Hydrogen Peroxide/ /Storage/

LOQUAT

Huang, W., Zhu, N., Zhu, C., Wu, D., & Chen, K. (2019). Morphology and cell wall composition changes in lignified cells from loquat fruit during postharvest storage. Postharvest Biology and Technology, 157, 110975. doi: 10.1016/j.postharvbio.2019.110975

Abstract

Loquat, as a cold-sensitive fruit, exhibits typical lignification symptoms, such as increased firmness and lignin content, decreased juice yield and loss of fruit flavor when stored at inappropriately low temperatures. Loquat fruit with lignification symptoms contains lignified cells. This work studied the development mechanism of these cells in postharvest loquat fruit. It was found that both the staining area ratios of lignin and the densities of lignified cells had a significant correlation with the firmness and the lignin content of the bulk flesh. These results indicate that the increase of lignified cells might be an important factor in the quality deterioration of postharvest loquat fruit. To understand the mechanism of lignified cell development at the single-cell level, the distribution of lignin, cellulose, and pectin in the cell walls of lignified cells with different morphologies was visualized in a label-free way. In general, the development of the lignified cell was proposed as the thickening of cell walls until the entire intracellular cavity was filled and the cell became total solid. The results of confocal Raman microspectroscopy showed that lignin and cellulose gradually filled the lignified cells during cell development, while pectin was mainly concentrated in the cell wall corner and the middle lamella. The accumulation of lignin and cellulose in the lignified cells was the main cause of the morphological changes in lignified cells during development. The abundant chemical bond information provided by Raman spectra led to further independent distribution imaging of the functional groups of lignin during the development of lignified cells. Besides, in loquat flesh, some lignified cells in the process of development were found alone and surrounded by parenchymal cells; in other cases, some cells around the lignified cells also accumulated lignin and later became lignified cells, eventually forming several clusters of lignified cells. By analyzing the size of lignified cells and their clusters, they might not be the main reason for the rough taste of the

loquat flesh with lignification. The results of this work can be an important complement to the study of the lignification process of loquat fruit during postharvest storage that is mainly carried out at the physicochemical and molecular levels.

Keywords: /CRM/ /Raman Imaging/ /Lignification/ /Cell Wall/ /Lignin/ /Loquat/

MELON

Wu, Z., Tu, M., Yang, X., Xu, J., & Yu, Z. (2019). Effect of cutting on the reactive oxygen species accumulation and energy change in postharvest melon fruit during storage. Scientia Horticulturae, 257, 108752. doi: 10.1016/j.scienta.2019.108752

Abstract

The effect of cutting on the accumulation of reactive oxygen species (ROS) and energy change in melon fruit (cv. Xizhoumi-17, stored at 15 °C) during storage was explored. The key metabolites, enzymes, and genes involved in ROS accumulation and energy metabolism were investigated. Cutting melon fruit changed the respiratory metabolism pathway, increased the respiration rate, and maintained higher activities of H+-adenosine triphosphatase and Ca2+-adenosine triphosphatase. This led to the large generation of adenosine triphosphate, adenosine diphosphate, NADPH, and NADH in fresh-cut melon fruit. Furthermore, cutting enhanced the NADPH oxidase activity, which induced a higher ROS level and further resulted in higher malondialdehyde content and electrolyte leakage. However, only the activities of peroxidase (POD) and glutathione peroxidase (GPX) were enhanced in fresh-cut melon during the early stage of storage. In addition, lower antioxidant system activity was observed in fresh-cut melon at the late stage of storage. This was indicated by the lower levels of ascorbic acid, glutathione, POD, GPX, ascorbate peroxidase, and glutathione reductase. These lower levels were related to changes of genes related to ROS accumulation and energy metabolism in fresh-cut melon. These findings demonstrate that cut-wounding stress changed the respiratory metabolism pathway in melon fruit and led to a higher energy status, accompanied by increased ROS accumulation.

Keywords: /Melon Fruit/ /Postharvest/ /Cutting/ /Reactive Oxygen Species/ /Energy/

PAPAYA

Terao, D., Nechet, K. D. L., Frighetto, R. T. S., & Sasaki, F. F. C. (2019). Ozonated water combined with heat treatment to control the stem-end rot of papaya. Scientia Horticulturae, 257, 108722. doi: 10.1016/j.scienta.2019.108722

Abstract

Stem-end rot is the major postharvest disease of papaya in Brazil, causing significant losses, specially, during long-term transportation and storage. The infection occurs mainly during the flowering period and remains quiescent, without showing any symptom, until the fruit ripening stage begins. The current method of control, using fungicides, has not been effective, besides contaminating the fruit. The aim of the present research was to evaluate the combined treatment using hot water followed by ozonated water to control the disease. The results showed that, as stand-alone treatment, heat and ozone treatment significantly reduced the stem-end rot, controlling around 50% of the severity, and delaying the onset of the symptoms in 3 and 4 days, respectively. A synergistic effect was observed when the treatments were applied combined. The efficacy of the control increased to over 90% and the symptoms onset delayed 7 days. Moreover, the combined treatment delayed the maturation process, increased the PPO activity, and preserved the overall fruit quality, thus extending the shelf life. The integrated approach, combining heat treatment by immersion of peduncle of papaya in hot water at 70 °C followed by immersion in ozonated

water (3 mg L−1), controlled efficiently the stem-end rot, therefore being a safe and sustainable alternative for the use of chemicals in postharvest treatment of papaya.

Keywords: /Physical Treatment/ /Resistance Induction/ /Postharvest Decay/ /Fruit Quality/ /Shelf-Life/

Mendy, T., Misran, A., Mahmud, T., & Ismail, S. (2019). Antifungal properties of Aloe vera through in vitro and in vivo screening against postharvest pathogens of papaya fruit. Scientia Horticulturae, 257, 108767. doi: 10.1016/j.scienta.2019.108767

Abstract

Postharvest fruit disease in papaya (Carica papaya L.) caused by fungus is one of the major problems in the fruit industry. The aim of the study is to determine the major postharvest fungal pathogen isolated from papaya fruit and to investigate the antifungal effects of Aloe vera on those pathogens. In this study, the fungi were isolated and identified through molecular identification as Fusarium sp., Lasiodiplodia theobromae, Aspergillus niger, and Colletotrichum gloeosporioides which are believed to responsible for postharvest decay in papaya fruits. Two types of Aloe vera extract (Aloe barbadensis Miller); fresh Aloe vera and food grade were used to evaluate their efficacy in inhibiting fungal growth thereby slowing down fruit decay. Both Aloe vera with different concentrations (0, 15%, 25%, and 50% (v/v)) were tested against mycelium growth of four pathogenic fungi of papaya fruit. Mycelial growth of fungi was inhibited by both fresh filtered and food grade Aloe vera amended with PDA media in a dose-response manner. Both fresh and food grade Aloe vera gel were able to prevent wound infection on papaya fruit inoculated with Fusarium sp., Aspergillus niger, Colletotrichum gloeosporioides, and Lasiodiplodia theobromae for 72 h after inoculation of the fungi. In summary, the study paves the way of Aloe vera as a potential edible coating for controlling the postharvest fungus of papaya fruit.

Keywords: /Aloe vera/ /Postharvest/ /Papaya/ /Antifungal/ /Inhibition/

PARSLEY

Cătunescu, G. M., Muntean, M., Marian, O., David, A. P., & Rotar, A. M. (2019). Comparative effect of gamma irradiation, drying and freezing on sensory, and hygienic quality of parsley leaves. Lwt, 115, 108448. doi: 10.1016/j.lwt.2019.108448

Abstract

Processing of herbs damages tissues, and the products deteriorate faster. Post-harvest treatments reduce alteration but lower sensory quality. Research showed the effects of drying, freezing, and irradiation, but omitted comparing them. The aim of this study was to determine their effect on the quality of parsley by correlating consumers' preference with biochemical and microbiological parameters. Gamma irradiation (0.7–2.7 kGy), drying, and freezing were evaluated for their effect on color, texture and aroma. The results were correlated with chlorophyll, water content, and microbial load. Principal component analysis generated a consumer preference map that showed the preference for 0.7–1.4 kGy irradiated parsley. Drying significantly decreased the content of chlorophyll. Freezing preserved aroma and color; however, assessors preferred the minimally processed samples. Doses of 0.7–1.4 kGy increased by 1 week the shelf-life of parsley by reducing the contamination flora. A dose of 2.7 kGy decreased the total plate count by 5 log CFU g−1; however, the microflora recovered during storage proportionally with the employed dose. Thus, irradiation can be applied to minimally processed parsley leaves to significantly extend shelf-life: doses of up to 1.4 kGy could help to achieve a shelf-life of 30 d at 4 °C.

Keywords: /Chlorophyll/ /Dried/ /Frozen/ /Irradiated/ /Microflora/

PEACH

Li, X.-Y., Du, X.-L., Liu, Y., Tong, L.-J., Wang, Q., & Li, J.-L. (2019). Rhubarb extract incorporated into an alginate-based edible coating for peach preservation. Scientia Horticulturae, 257, 108685. doi: 10.1016/j.scienta.2019.108685

Abstract

Peaches (Prunus persica) are known for their palatable favor and abundant nutrients. However, peaches tend to rapidly decay during the harvest period in summer. To preserve the postharvest quality and extend the shelf life, an edible coating composed by 1.0% sodium alginate (SA) with and without rhubarb (Rheum rhaponticum L.) extract was applied to peach fruits. Variations in weight loss, firmness, soluble solids content (SSC), respiration rate, maleic dialdehyde (MDA) content, polyphenol oxidase (PPO) activity and sensory attributes were evaluated at room temperature (28 ± 1 °C). The effectiveness of rhubarb-SA coating to control postharvest decay of peach fruits was also investigated. The results showed that the weight loss, respiration rate, MDA content, and PPO activity were much lower, whereas the firmness and the SSC were much higher in the rhubarb-SA coated samples than in the 1.0% SA coated samples and control group. At the end of storage, peach fruits treated with rhubarb-SA coating maintained good sensory quality. Furthermore, the rhubarb-SA coating treatment had quite a beneficial effect on the decay inhibition caused by Penicillium expansum. Our study proves that the alginate coating entrapped with rhubarb extract has the potential to improve postharvest quality and prolong the shelf life of peach fruits.

Keywords: /Peach/ /Edible Coating/ /Sodium alginate/ /Rhubarb Extract/ /Postharvest Quality/

PEAR

Li, J., Zhou, X., Wei, B., Cheng, S., Zhou, Q., & Ji, S. (2019). GABA application improves the mitochondrial antioxidant system and reduces peel browning in 'Nanguo' pears after removal from cold storage. Food Chemistry, 297, 124903. doi: 10.1016/j.foodchem.2019.05.177

Abstract

Although refrigeration is commonly used in the storage of 'Nanguo' pears (Pyrus ussuriensis Maxim.), long-term refrigeration can result in browning of the pericarp. In this study, we aimed to determine how γ-aminobutyrate (GABA) affects the mitochondrial oxidation defense system in 'Nanguo' pears and how it might be used to prevent post-refrigeration peel browning. We found that fruit treated with GABA browned slower, and had lower browning indices and reactive oxygen and malondialdehyde content; increased peroxidase, superoxide dismutase, alternating oxidase, and catalase enzyme activities; and heightened enzyme-related gene expression. The mitochondria of GABA-treated fruit also showed less damage following cold storage, and there were decreases in mitochondrial membrane permeability transition pore concentrations. Furthermore, we detected an increase in the endogenous GABA content of fruits following GABA treatment. These observations indicate that, by regulating the mitochondrial oxidative defense system and maintaining mitochondrial structure, GABA is effective in terms of reducing peel browning.

Keywords: /'Nanguo' Pear/ /GABA/ /Mitochondria/ /Antioxidant Defense/ /Peel Browning/

Zheng, H., Liu, W., Liu, S., Liu, C., & Zheng, L. (2019). Effects of melatonin treatment on the enzymatic browning and nutritional quality of fresh-cut pear fruit. Food Chemistry, 299, 125116. doi: 10.1016/j.foodchem.2019.125116

Abstract

The effects of exogenous melatonin treatment on the enzymatic browning and nutritional quality of fresh-cut pear fruit were investigated. Fresh-cut fruit soaked with 0, 0.05, 0.1 and 0.5 mM melatonin were stored at 4 °C. Our results showed that 0.1 mM melatonin treatment was optimal for reducing the surface browning and maintaining the titratable acidity of the fresh-cut fruit, which significantly decreased MDA and H2O2 contents and the growth of microorganism, enhanced total phenolic content and antioxidant capacity, and delayed the reduction of ascorbic acid. Furthermore, melatonin treatment at 0.1 mM decreased the expression of genes involving in enzymatic browning pathway including POD, PPO1, PPO5 and LOX1, and reduced PPO activity. Moreover, this treatment increased the expression of PAL and CHS, and enhanced PAL and CHS activities. These results showed that melatonin treatment might be a promising strategy to alleviate browning and improve the nutritional quality of fresh-cut pear fruit.

Keywords: /Melatonin/ /Enzymatic Browning/ /Nutritional Quality/ /Antioxidant Capacity/ /Fresh-Cut Pear Fruit/

Wei, C., Ma, L., Cheng, Y., Guan, Y., & Guan, J. (2019). Exogenous ethylene alleviates chilling injury of 'Huangguan' pear by enhancing the proline content and antioxidant activity. Scientia Horticulturae, 257, 108671. doi: 10.1016/j.scienta.2019.108671

Abstract

Peel browning spots (PBS) is a chilling injury (CI) symptom in cold-stored 'Huangguan' pear. In the present study, the effect of exogenous ethylene on CI and its correlation to proline and reactive oxygen species (ROS) metabolism was investigated. The results showed that ethylene treatment (100 μL L−1 for 24 h) could completely inhibit PBS appearance without significantly affecting fruit firmness, soluble solids content (SSC) and titratable acidity (TA), enhance ethylene production rate at the initiate stage of storage, and promote proline accumulation by increasing activities of pyrroline-5-carboxylate synthetase (P5CS), ornithine-delta-aminotransferase (OAT) and up-regulating expression of P5CS1 and OAT1 genes, decreasing proline dehydrogenase (PDH) activity and the expression of PDH1 gene in peel. Moreover, the ethylene treatment suppressed the accumulation of H2O2, O2- and malondialdehyde (MDA), maintained higher levels of ascorbic acid (AsA) and glutathione (GSH), and meanwhile enhanced activities of superoxide dismutase (SOD), catalase (CAT) and ascorbate peroxidase (APX), as well as expression of the genes such as SOD1, CAT1, and APX1 which could encode these enzymes in peel. These results suggested that ethylene alleviated the CI of 'Huangguan' pear by promoting the proline accumulation and antioxidant activity of peel.

Keywords: /Peel Browning Spots/ /Chilling Injury/ /Ethylene/ /Proline/ /Reactive Oxygen Species/

PERSIAN LIME

Raddatz-Mota, D., Franco-Mora, O., Mendoza-Espinoza, J. A., Rodríguez-Verástegui, L. L., León-Sánchez, F. D. D., & Rivera-Cabrera, F. (2019). Effect of different rootstocks on Persian lime (Citrus latifolia T.) postharvest quality. Scientia Horticulturae, 257, 108716. doi: 10.1016/j.scienta.2019.108716

Abstract

Mexico is the world's leading Persian lime (Citrus latifolia T.) fruit producer and exporter. The use of rootstocks in citrus may increase fruit quality; however, the most used rootstock in Mexico is Sour orange, which is susceptible to the citrus tristeza virus. The objective of this work was to evaluate the effect of rootstock (Sour orange, Volkamerian lemon, Flying dragon, Swingle citrumelo and C-35 citrange) on Persian lime fruit quality parameters. Peel thickness, juice content, pH, total titratable acidity (TA), total soluble solids (TSS), weight loss, pectin content, organic acids, sugars and characterization of essential oil components were evaluated. The use of rootstocks had no effect on juice content, pH, TA, organic acids (oxalic, malic and ascorbic) and sugars content (fructose, glucose and sucrose). Fruits from trees grafted on Sour orange and Volkamerian lemon showed the highest pectin yield, while Volkamerian lemon and Flying dragon showed the highest content of citric acid. The aromatic profile of Persian lime essential oil was affected by rootstock type. Fruits from trees grafted on Flying dragon showed a darker and more intense green color, the highest values of TSS and lower percentage of weight loss.

Keywords: /Acid Limes/ /Quality Parameters/ /Flying Dragon Rootstock/ /Chemical Composition/ /Essential Oil/

PERSIMMON FRUIT

Tessmer, M. A., Appezzato-Da-Glória, B., & Kluge, R. A. (2019). Evaluation of storage temperatures to astringency 'Giombo' persimmon: Storage at 1 °C combined with 1-MCP is recommended to alleviate chilling injury. Scientia Horticulturae, 257, 108675. doi: 10.1016/j.scienta.2019.108675

Abstract

Persimmon fruit 'Giombo' is an astringent cultivar due to its high soluble tannins content and requires treatment of deastringency for its consumption. Storage at low temperatures is used to increase the commercialization period. However, recent studies indicate that this cultivar is sensitive to chilling injury. The objective of this study was to determine the effect of storage at 1, 5 and 10 °C on the development of chilling injury in 'Giombo' persimmon treated with ethanol and 1-MCP. Fruits control, treatment with 1.70 mL ethanol Kg–1/12 h, and 1.70 mL ethanol Kg–1/12 h +1000 nL 1-MCP L–1/12 h were stored at 1, 5 and 10 °C with 90 ± 5% RH, removed from cold storage after 15, 25 and 35 days, and shelf-life period of 5 days at 22 °C. The results showed that storage temperature of 5 °C induced chilling injury, and 10 °C allowed only a short storage period due to acceleration of maturation. The symptoms manifested in response to chilling injury in this cultivar are a drastic reduction of pulp firmness, especially after removal of the cold temperatures and during the shelf life at 22 °C, followed by gelling and structural alteration of the cell mesocarp. It was not possible to associate the color index with the incidence of chilling injury. Soluble solids were not affected by temperature, but were reduced by deastringency treatment. 1-MCP decreases the symptoms of chilling injury in deastringency fruits with ethanol and stored at 5 °C and 10 °C. To avoid chilling injury and to extend the conservation period of 'Giombo' persimmon, storage at 1 °C is recommended.

Keywords: /Anatomy/ /Chilling Injury/ /Firmness/ /Persimmon/ /Temperatures/

PITAYA (Hylocereus undatus)

Li, X., Li, M., Ji, N., Jin, P., Zhang, J., Zheng, Y., … Li, F. (2019). Cold plasma treatment induces phenolic accumulation and enhances antioxidant activity in fresh-cut pitaya (Hylocereus undatus) fruit. Lwt, 115, 108447. doi: 10.1016/j.lwt.2019.108447

Abstract

Non-thermal cold plasma as a novel method for maintaining safety and inducing phenolic accumulation in fresh-cut pitaya (Hylocereus undatus) fruit and the possible mechanisms were investigated. Results showed that cold plasma treatment (60 kV for 5 min) significantly inhibited the growth of total aerobic bacterial counts, increased the cutting-induced phenolic accumulation and enhanced antioxidant activity in fresh-cut pitaya fruit. Moreover, cold plasma treatment promoted the consumption of main sugars, enhanced the level of energy status, accelerated the generation of reactive oxygen species (ROS) at earlier storage, increased gene expression and activity of crucial enzymes in phenylpropanoid pathway. The present research provides convincing evidence regarding the beneficial effects of cold plasma treatment for inducing phenolic accumulation and enhancing antioxidant activity of fresh-cut pitaya fruit and offers potential opportunity for the processing and preservation of fresh-cut fruits and vegetables.

Keywords: /Cold Plasma/ /Fresh-Cut Pitaya Fruit/ /Phenolic Compounds/ /Reactive Oxygen Species/ /Energy Status/

Li, G., Meng, F., Wei, X., & Lin, M. (2019). Postharvest dipping treatment with BABA induced resistance against rot caused by Gilbertella persicaria in red pitaya fruit. Scientia Horticulturae, 257, 108713. doi: 10.1016/j.scienta.2019.108713

Abstract

β-Aminobutyric acid (BABA) is an elicitor that is capable of inducing disease resistance in many plants. The effect of postharvest BABA treatment on rot caused by Gilbertella persicaria and the underlying mechanisms of action of BABA in pitaya fruit (Hylocereus undatus cv. Zihonglong) were investigated. Fruits were dipped in 10 mM BABA for 15 min and then stored at ambient temperature (25 ± 2 °C, RH 70˜75%). The results showed that 10 mM BABA had no obvious inhibitory effects on G. persicaria in vitro. However, BABA significantly reduced lesion diameter in pitaya inoculated with G. persicaria relative to the control. Furthermore, BABA increased the activities of phenylalanine ammonia lyase (PAL), 4-coumarate/coenzyme A ligase (4CL), peroxidase (POD) and polyphenol oxidase (PPO) and promoted the accumulation of lignin, flavonoids and phenolic compounds in the fruit. These results suggested that postharvest application of BABA via immersion induced resistance in pitaya fruit by activating defense-related enzymes, and BABA treatment may be an alternative method for the control of postharvest diseases in fruits.

Keywords: /Pitaya Fruit/ /β-Aminobutyric acid/ /Gilbertella persicaria/ /Induced Resistance/

POTATO

Lin, Q., Xie, Y., Guan, W., Duan, Y., Wang, Z., & Sun, C. (2019). Combined transcriptomic and proteomic analysis of cold stress induced sugar accumulation and heat shock proteins expression during postharvest potato tuber storage. Food Chemistry, 297, 124991. doi: 10.1016/j.foodchem.2019.124991

Abstract

Plant species differ greatly in their ability to acclimatise to and survive, cold stress. Normally, potato tubers are stored at low temperatures (below 10 °C) to delay sprouting. In this research, combined transcriptomic and proteomic analysis was conducted on potato tubers stored at 15 °C, 4 °C and 0 °C to investigate the mechanism of cold responses during postharvest storage. Results showed that soluble sugars were accumulated under low temperatures, regulating by granule-bound starch synthase 1, beta-amylase, invertase inhibitor and fructokinase. In addition, fifteen heat shock proteins (Hsps), including three Hsp70s, two Hsp80s, one Hsp90, one Hsp100 and eight small Hsps, were induced by low temperatures, which may act individually or synergistically to prevent physiological or cellular damage from cold stress in postharvest potato tubers. This research provided general information of sugar accumulation and defense response in potato tuber under cold storage.

Keywords: /Potato/ /Postharvest Storage/ /Sugar Accumulation/ /Heat Shock Protein/ /Cold Stress/

Zhou, F., Jiang, A., Feng, K., Gu, S., Xu, D., & Hu, W. (2019). Effect of methyl jasmonate on wound healing and resistance in fresh-cut potato cubes. Postharvest Biology and Technology, 157, 110958. doi: 10.1016/j.postharvbio.2019.110958

Abstract

The aim of this study was to investigate the effects of methyl jasmonate (MeJA) treatment on physiology and quality attributes of fresh-cut potato cubes during storage. The fresh-cut potato cubes treated with MeJA showed occurrence of enzymatic browning, with higher total phenol and flavonoid content than the control cubes during 144 h of storage at room temperature (23 ± 1 °C). The activity of polyphenol oxidase (PPO), peroxidase (POD) and catalase (CAT) in fresh-cut potato cubes have also been increased significantly by MeJA treatment. MeJA induced an increase of activity in phenylalnine ammonialyase (PAL), cinnamate-4-hydroxylase (C4H) and 4-coumarate-CoA ligase (4CL) of fresh-cut potato cubes, compared to the control. RT-qPCR showed that the gene expression of PAL, C4H, 4CL, PPO, POD and CAT was significantly higher in MeJA-treated cube parenchyma tissues than that in control. Our experiments also showed that MeJA treatment could maintain firmness but enhanced the browning of the fresh-cut cubes. In addition, the parenchyma tissues of MeJA-treated fresh-cut cubes also showed higher suberin polyphenolic (SPP) and thicker cell wall than that in the control.

Keywords: /Wound-Healing/ /Fresh-Cut Potato Cubes/ /Phenylpropane Metabolism/ /Gene Expression/ /RT-qPCR/

RASPBERRY

Piechowiak, T., & Balawejder, M. (2019). Impact of ozonation process on the level of selected oxidative stress markers in raspberries stored at room temperature. Food Chemistry, 298, 125093. doi: 10.1016/j.foodchem.2019.125093

Abstract

The purpose of this study was to investigate the impact of ozonation process on the level of oxidative stress markers in raspberries stored at room temperature. Raspberry fruit was ozonated with an ozone concentration of 8–10 ppm for 30 min, every 12 h, for 72 h of storage at room temperature. Research showed that ozonated raspberries were characterized by higher activity of superoxide dismutase, ascorbate peroxidase and phenylalanine ammonia-lyase. In turn, the ability to generate superoxide anion radical and hydrogen peroxide by ozone-treated fruit was significantly lower than in the control sample due to higher activities of ROS detoxification systems.

Keywords: /Antioxidant Enzymes/ /Ozone/ /Raspberries/ /Storage/

STRAWBERRY

Xu, Y., Charles, M. T., Luo, Z., Mimee, B., Tong, Z., Roussel, D., … Véronneau, P.-Y. (2019). Preharvest UV-C treatment affected postharvest senescence and phytochemicals alternation of strawberry fruit with the possible involvement of abscisic acid regulation. Food Chemistry, 299, 125138. doi: 10.1016/j.foodchem.2019.125138

Abstract

As an environmentally friendly approach for fruit quality improvement, the effect of preharvest UV-C on the physiology of strawberry fruit during postharvest storage remains to be assessed. Strawberry fruit developed with supplementary UV-C were stored at room temperature for 2 weeks. Preharvest UV-C attenuated fruit postharvest senescence and altered phytochemicals composition. Higher ester titer was found in the treated fruit at harvest, whereas higher terpene and furanone contents were detected after 72 h of storage. At harvest, polyphenolics accumulated to a higher level in UV-C group, but the difference disappeared after 24 h of storage. Meanwhile, the intrinsic level of abscisic acid and the expressions of FaPYR1, SnRK2, and FaASR in the UV-C-treated fruit was enhanced at harvest but returned to a lower level as storage proceeded. This study highlights the time-dependent effect of preharvest UV-C on strawberry fruit postharvest biochemical indexes and the possible involvement of abscisic acid signaling factors.

Keywords: /ABA/ /Fruit Quality/ /Postharvest Biochemical Indexes/ /UV-C Hormesis/

Li, X., Xie, X., Xing, F., Xu, L., Zhang, J., & Wang, Z. (2019). Glucose oxidase as a control agent against the fungal pathogen Botrytis cinerea in postharvest strawberry. Food Control, 105, 277–284. doi: 10.1016/j.foodcont.2019.05.037

Abstract

Botrytis cinerea is an economically devastating necrotrophic fungus with many host species, and the fungicides commonly used to control it cause serious food and environmental safety problems. It is therefore urgent to develop alternative control measures for these pathogen fungicides. The glucose oxidase enzyme (GOX) is an oxido-reductase that catalyzes the oxidation of glucose to hydrogen peroxide (H2O2) and gluconic acid. GOX has been widely used as a food additive because of its safety

and oxidation properties, but little is known about its antifungal effects against B. cinerea, and there have been no reports of its application for pathogen control of postharvest fruit. Here, we examined the antimicrobial activity of GOX against B. cinerea spores and developed a GOX-glucose (10 g/L) system that can significantly restrict fungal growth on postharvest strawberry fruit. A variety of optical and electron microscopy investigations revealed that GOX inhibits B. cinerea growth by altering the morphology of mycelial membranes, among other deleterious effects. Biochemical analyses supported the observation that GOX-mediated growth inhibitory effects result from its competition of carbon and enzymatic production of H2O2 and from the acidifying influence of gluconic acid. Our demonstration of this GOX-glucose system as a control agent to protect postharvest fruit opens the door for the application of this technology to other crops and for further investigation of the mechanisms that can interrupt B. cinerea growth.

Keywords: /Glucose oxidase/ /Botrytis cinerea/ /Postharvest Fruit/ /Antibacterial Activity/

SWEET PEPPER

Endo, H., Miyazaki, K., Ose, K., & Imahori, Y. (2019). Hot water treatment to alleviate chilling injury and enhance ascorbate-glutathione cycle in sweet pepper fruit during postharvest cold storage. Scientia Horticulturae, 257, 108715. doi: 10.1016/j.scienta.2019.108715

Abstract

Sweet pepper (Capsicum annuum L.) fruit is highly perishable vegetable and have a short storage life at ambient temperature. The current handling and storage temperatures, below 7 °C, extend the storage life, but chilling injury (CI) occurs after a longer storage. A pre-storage hot water treatment, dipping sweet pepper 'Miogi' fruit in 45 °C hot water for 15 min, substantially induced tolerance of fruit to CI at 6 °C storage, and extended storage life for long duration. This research was conducted to reveal the antioxidantive responses of fruit to pre-heat treatment and chilling storage. The purpose of the present study was to understand the effect of hot water treatment on the alleviation of chilling injury and ascorbate-glutathione cycle involved in sweet pepper fruit. Hot water treatment inhibited the increases in malondialdehyde and hydrogen peroxide levels, and enhanced the increases in ascorbate and glutathione contents compared with the control fruit during storage. The activities of ascorbate-glutathione cycle related enzymes including ascorbate peroxidase, monodehydroascorbate reductase, dehydroascorbate reductase and glutathione reductase were higher in hot water treated fruit than in the control fruit during cold storage. These results indicate that the alleviation of CI in sweet pepper fruit by hot water treatment in 45 °C hot water for 15 min might be due to the enhancement of the ascorbate-glutathione cycle by increased activity of related enzymes.

Keywords: /Sweet Pepper Fruit/ /Chilling Injury/ /Hot Water Treatment/ /Ascorbate-Glutathione Cycle/ /Ascorbate/ /Glutathione/

TAHITI LIME

Botina, B. L., M, Garcia, M. C., Romero, B. Y. (2019). Pre- and post-harvest factors that affect the quality and commercialization of the Tahiti lime. Scientia Horticulturae, 257, 108737. doi: 10.1016/j.scienta.2019.108737

Abstract

Colombia has an important Tahiti lime production, but despite the adequate edaphoclimatic and seasonal advantages for its production, its competitiveness is limited by appearance affectations and the short useful post-harvest life caused by inadequate handling. Different symptomatology can be identified in the

external appearance of the fruit that can be triggered by either preharvest, or postharvest factors. In the current study, the effect of the location (Lebrija and Villavicencio), the rootstocks (Citromelo, Kryder and Volkameriana), the crop season (dry and rainy seasons) and the storage conditions (temperature and disinfection) on fruit quality were assessed. The relationship between the damage affecting the appearance and the evaluation factors were identified using a Pearson Chi-square statistical analysis. The best quality was observed in fruit from Lebrija, harvested in the dry season, disinfected, and stored at 10 °C. In the identification of the biological factors that affect the appearance of the Tahiti lime fruit, fungi developed during pre- and post-harvest phase were isolated, and strains of the genera Colletotrichum spp., Fusarium spp., Alternaria spp., Penicillium spp., Acremonium spp., Trichoderma spp., Curvularia spp., Phoma spp., Stachybotrys spp., and Ulocladium spp.,were identified.

Keywords: /Rootstock/ /Surface Damage/ /Diseases/ /Storage/ /Postharvest Injuries/ /Postharvest Losses/ /Environmental Conditions/

Toona sinensis

Zhao, H., Feng, S., Zhou, W., & Kai, G. (2019). Transcriptomic analysis of postharvest toon buds and key enzymes involved in terpenoid biosynthesis during cold storage. Scientia Horticulturae, 257, 108747. doi: 10.1016/j.scienta.2019.108747

Abstract

Toon buds have been used in China as an important woody vegetable for its unique flavor. However, the changes of volatile terpenoids related to flavor and their biosynthesis in postharvest toon buds after cold storage remain largely unknown. Therefore, a transcriptomic database must be constructed to analyze the molecular mechanism of terpenoid biosynthesis in toon buds during cold storage. The chemical profiles of volatile terpenoids over postharvest storage periods were comparatively analyzed by gas chromatography–mass spectrometry. Results showed that the total content of volatile terpenoids and their oxidates, except for monoterpenes and a small portion of sesquiterpenes, increased significantly after cold storage. The transcriptome database derived from different cold storage times was established using BGIseq500 technology. Approximately 6.5 g of clean nucleotides were obtained and de novo assembled into 152 127 non-redundant unigenes, approximately 72.36% of which could be aligned to public databases. Many candidate genes involved in terpenoid biosynthesis were identified. Furthermore, 29 513 unigenes were demonstrated to be differentially expressed under different cold storage times. These differentially expressed genes were functionally annotated by gene ontology enrichment and Kyoto Encyclopedia of Genes and Genomes enrichment analyses. The expression of 20 putative unigenes involved in terpenoid pathways was confirmed by qRT-PCR, the results of which were consistent with the RNA-seq data. These genes with different expression patterns correlated well with the changes in the volatile terpenoids in the toon buds during low-temperature storage. In summary, our results showed that the high expression levels of terpenoid backbone biosynthesis pathways contributed to sesquiterpene biosynthesis after cold storage, which led to high sesquiterpene accumulation in toon buds during low-temperature storage.

Keywords: /Transcriptome/ /Volatile Terpenoids/ /Terpene Synthase/ /Cold Storage/ /Toona sinensis/