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BANANA

Xu, F., Liu, Y., Xu, J., & Fu, L. (2019). Influence of 1-methylcyclopropene (1-MCP) combined with salicylic acid (SA) treatment on the postharvest physiology and quality of bananas. Journal of Food Processing & Preservation, (3). DOI: 10.1111/jfpp.13880

Abstract

The objective of the study was to investigate the effect of 1-methylcyclopropene (1-MCP) combined with salicylic acid (SA) on the postharvest physiology and quality of bananas. Respiration rate, ethylene production, firmness, decay incidence, soluble sugar, soluble solid, color change, malondialdehyde (MDA), peroxidase (POD), super- oxide dismutase (SOD), and catalase (CAT) activities of bananas were examined. The results showed that 1-MCP combined with SA treatment inhibited respiration rate, ethylene production, decay incidence, MDA content, soluble sugar, and soluble solids content. The combined treatment also delayed softness and color change of bananas compared to the untreated bananas. The efficiency of the combined treatment was better than that of 1-MCP or SA alone. Furthermore, combination of 1-MCP plus SA effectively enhanced SOD and CAT activities, and inhibited the increasing of POD activity in bananas. Therefore, our results suggested that 1-MCP plus SA treatment may be an effective technology in extending the shelf life of bananas. Practical applications So far, there have been no reports on the influence of 1-MCP combined with SA treatment on the postharvest physiology and quality of bananas during storage. The objective of this work is to investigate the efficiency of 1-MCP plus SA treatment for improving postharvest physiological and quality and extending storage life, which provides theoretical guidance for the preservation of stored bananas.

Keywords: /Banana/ /1-methylcyclopropene (1-MCP)/ /Salicylic Acid (SA)/ /Postharvest physiology and quality/

BELL PEPPER

González-Saucedo, A., Barrera-Necha, L. L., Ventura-Aguilar, R. I., Correa-Pacheco, Z. N., Bautista-Baños, S., & Hernández-López, M. (2019). Extension of the postharvest quality of bell pepper by applying nanostructured coatings of chitosan with Byrsonima crassifolia extract (L.) Kunth. Postharvest Biology and Technology, 149, 74–82. DOI: 10.1016/j.postharvbio.2018.11.019

Abstract

The extract of *Byrsonima crassifolia* increased the stability of nanoparticles. However, extract also decreased the *in vitro* antifungal activity of chitosan. Preharvest edible coatings preserved physical quality of bell pepper till storage. Both edible coatings increased secondary metabolites in fruits. Preharvest edible coatings enhance the antioxidant capacity of bell pepper. The aim of this work was to evaluate the structure, chemical composition and biological activity of nanoparticles composed of chitosan (CNPs) and chitosan with *Byrsonima crassifolia* extract (CENPs), with which two EC, edible nanochitosan coatings (ENC) and edible nanochitosan extract coatings (ENEC) were elaborated, respectively. These coatings were sprayed on bell pepper during the pre-harvest stage and microbiological activity was determined. After harvesting the quality of bell pepper was evaluated for the following variables: weight loss, firmness, color change, respiration, ethylene production, total carotenoids, phenolic content, antioxidant capacity, and microbiological activity. The result indicated that the volatile fraction of *Byrsonima crassifolia* extract is 94% composed of α pinene, camphene, and eucalyptol. The CNPs had a higher size distribution 420 nm than the CENPs 312 nm and a potential Zeta of −40 mV. The CNPs and CENPs decreased the *in vitro* growth of *Alternaria alternata* up to 100%. During the cultivation of the fruit, both EC reduced the microbiological activity by 80%. In the postharvest stage some changes were observed in the fruit treated with the EC, for instance: 1) the fruit showed a 30% the weight loss and 15% the change of color after 21 d of storage, 2) the phenolic content, carotenoids and reducing capacity were increased by 18% and 3) the microbiological activity was reduced by 85%. In conclusion, the application of ENC and ENEC during the cultivation and postharvest storage of bell pepper preserved the physicochemical quality, improved microbiological quality and increased their antioxidant content.

Keywords: / Greenhouse cultivation/ /Antimicrobial activity/ /Antioxidant activity/ /Nanostructured chitosan/ /*Alternaria alterna/*

Patel, N., Gantait, S., and Panighari, J. (2019)Extension of postharvest shelf-life in green bell pepper (Capsicum annuum L.) using exogenous application of polyamines (spermidine and putrescine). Food Chemistry, 275 (2019), 681-687. DOI: 10.1016/j.foodchem.2018.09.154

Abstract

To extend the postharvest shelf-life of green bell pepper (*Capsicum annuum* L.), an exogenous application of two polyamines, Spermidine and Putrescine (SPD-PUT), was tested in multiple combinations (10 μM plus 10 μM, 20 μM plus 20 μM, and 30 μM plus 30 μM) at 4 ± 1 °C for 40 days. The titratable acidity, protein content, activities of catalase and peroxidase, chlorophyll and capsaicin content gradually decreased for all the treated and untreated fruits throughout the storage period. On the other hand, proline content and antioxidant 1,1-diphenyl-2-picryl-hydrazyl (DPPH) radical scavenging activity continuously increased with the extension of time-span

under storage. Among the three treatment combinations, the combination of 20 μM SPD and 20 μM PUT was found to be the optimum, based on the response of all the morphological and physicochemical traits assessed. The same combination was effective in sustaining the quality of green bell pepper following its harvest, for a period of at least 40 days.

Keywords: /Antioxidant activity/ /Bell pepper/ /DPPH/ /Postharvest/ /Sensory evaluation/ /Storage/

CITRUS

Cao, J., Wang, C., Xu, S., Chen, Y., Wang, Y., Li, X., & Sun, C. (2019). The effects of transportation temperature on the decay rate and quality of postharvest Ponkan (Citrus reticulata Blanco) fruit in different storage periods. Scientia Horticulturae, 247, 42–48. DOI: 10.1016/j.scienta.2018.12.009

Abstract

Ponkan (*Citrus reticulata* Blanco cv. Ponkan) is one of the widely grown and economically important citrus fruit species in China. Present study investigated the dynamic changes of Ponkan fruit' storability in different storage period and under alternating temperature during the postharvest transportation and shelf life, aiming to find out an efficient and energy-saving transportation scheme for Ponkan fruit at different storage stage. The results showed that, the elongation of storage time and the higher transport temperature led to the increase of decay rate. The juice yield continued to decrease, without affecting by the transportation temperatures. The rind color turn yellow rapidly (with the citrus color index (CCI) increased from 3.61 to 9.25) during the first two months, and remained stable during the following period. The higher transportation temperature accelerated the rind color development. The total soluble solids (TSS) increased during the first month (from 11.21% to 13.25%), remained stable in the second and third months, and then decreased slightly in the fourth month, which was not evidently influenced by the transportation temperature. The titratable acidity (TA) showed a continuous decline which was accelerated by the high transportation temperature. The ethanol and aldehyde contents continue to increase and were not significantly affected by the transportation temperature. The total flavonoids content decreased during the transportation and shelf life of the newly harvested Ponkan fruit, while remained stable and was not significantly affected by the transportation temperature in the four months of storage. The alternating temperature of transportation affected the storability of Ponkan fruit at different storage periods. These finding provided a theoretical basis for the selection of transportation temperature from economic perspective.

Keywords: /Ponkan/ /*Citrus reticulate* Blanco cv. Ponkan/ /Postharvest/ /Transportation/ /Temperature/ /Fruit quality/

COLD PLASMA

Gavahian, M., & Khaneghah, A. M. (2019). Cold plasma as a tool for the elimination of food contaminants: Recent advances and future trends. Critical Reviews In Food Science And Nutrition, 1–12. https://doi.org/10.1080/10408398.2019.1584600

Abstract

Food contaminants are challenging the food industry due to the inefficiency of conventional decontamination techniques. Cold plasma as an emerging technique for the degradation of food contaminants attracted notable attention. The current study overviews the plasma-induced degradation of food contaminants, discusses the mechanisms involved, points its benefits and drawbacks out, highlights the research needed in this area, and explores future trends. According to the literature, cold plasma efficiently degraded many common pesticides (e.g. parathion, paraoxon, omethoate, dichlorvos, malathion, azoxystrobin, cyprodinil, fludioxonil, cypermethrin, and chlorpyrifos) and food allergens (e.g. tropomyosin, b-conglycinin, glycinin, trypsin inhibitor, and Kunitztype trypsin inhibitor). These degradations occurred primarily due to the presence of reactive oxygen species (ROS) and reactive nitrogen species (RNS) in the plasma that attack the chemical bonds of food contaminants. The type of pesticide degrades are highly dependent on the concentrations of plasma-generated ROS and RNS. Research showed that several parameters, such as plasma generation device, plasma exposure time, plasma power, and the carrier gas composition, influence the type and concentration of reactive species (e.g. ROS and RNS) and the overall efficiency of cold plasma degradation for a specific pesticide or allergen.

Keywords: Cold plasma/ /Pesticide/ /Allergen, non-thermal, emerging technologies

Han, Y., Cheng, J.-H., & Sun, D.-W. (2019). Activities and conformation changes of food enzymes induced by cold plasma: A review. Critical Reviews In Food Science And Nutrition, 1–18. https://doi.org/10.1080/10408398.2018.1555131

Abstract

Food endogenous enzymes have impacts on color, texture and flavor of foods during food processing or preservation. Cold plasma is a novel non-thermal food processing technology, which has been extensively studied for contamination elimination and shelf life extension of foods. Particularly, much work has been reported about the effects of cold plasma on enzyme activities and alterations about enzymes conformational structures. It is thus necessary to understand the mechanisms of actions and applications of cold plasma technology in the conformation of food endogenous enzymes. This review focuses on the applications of cold

plasma for the inactivation of various endogenous enzymes, including peroxidase, polyphenol oxidase, lysozyme, α-chymotrypsin, alkaline phosphatase, and pectin methylesterase. The activations of several enzymes, such as superoxide dismutase, catalase, and lipase, by cold plasma are also discussed. In addition, this review highlights the transformation of conformational structures including primary and spatial structures induced by chemical reactive species during cold plasma treatments, such as reactive oxygen species and reactive nitrogen species, especially, active sites consisting of prosthetic group and specific amino acids are demonstrated. Both extrinsic and intrinsic factors affecting cold plasma treatments are also described. In general, cold plasma exhibits the ability to activate or inactivate enzymes activities with affecting the conformational structures of enzyme. Further studies should be focused on exploration at molecular level for providing more insight on the interaction mechanism. In addition, equipment and process parameters of cold plasma operation for different fresh food products should be optimized for achieving appropriate control on enzyme variation and obtaining maximum efficiency.

Keywords: Cold plasma/ /Endogenous enzymes/ /Non-thermal processing/ /Enzymes inactivation

COLD STORAGE

Aiello, D., Restuccia, C., Stefani, E., Vitale, A., & Cirvilleri, G. (2019). Postharvest biocontrol ability of Pseudomonas synxantha against Monilinia fructicola and Monilinia fructigena on stone fruit. Postharvest Biology and Technology, 149, 83–89. https://doi.org/10.1016/j.postharvbio.2018.11.020

Abstract

The biocontrol properties of the endophyte Pseudomonas synxantha DLS65 were tested in vitro and in vivo against Monilinia fructicola and Monilinia fructigena, causal agents of postharvest brown rot of stone fruit. P. synxantha cells significantly reduced the mycelial growth of both pathogens on Potato Dextrose Agar (PDA), and strongly inhibited the Monilinia fructicola growth on Peach Extract Agar (PEA). Cell-free culture filtrates inhibited the pathogens on PDA and PEA to lesser extent. The production of volatile organic compounds (VOCs), with in vitro inhibitory effects on mycelial growth, was also observed. P. synxantha significantly reduced brown rot incidence and severity on peach fruit artificially inoculated with M. fructicola after 5 d at 25 °C. Moreover, P. synxantha more significantly reduced incidence and severity after 10 d at 10 °C and after 20 d in cold storage at 0 °C in comparison to control fruit, even if its activity was never comparable to that of the synthetic fungicide Scholar® (fludioxonil). Similarly, P. synxantha exhibited an excellent antagonistic activity against M. fructigena on fruit at 10 and at 0 °C, and a weak biocontrol activity at 25 °C. Competition for nutrients and space, production of diffusible toxic metabolites and VOCs may play a role in the antagonism of P. synxantha toward M. fructicola and M. fructigena, especially at the lowest temperatures of storage. For that

reason, this strain of P. synxantha could be suggested as active ingredient for the setting up of bioformulates against Monilinia species representing a limiting factor for stone fruit production.

Keywords: Volatile organic compounds/ /Cold storage/ /Diffusible toxic metabolites/ /Fludioxonil/

Zahedipour, P., Asghari, M., Abdollahi, B., Alizadeh, M., & Danesh, Y. R. (2019). A comparative study on quality attributes and physiological responses of organic and conventionally grown table grapes during cold storage. Scientia Horticulturae, 247, 86–95. https://doi.org/10.1016/j.scienta.2018.11.077

Abstract

Grape berry quality and shelf life is generally associated with sensory attributes and antioxidant capacity, which are under the control of complex interactions among genotypes, environmental factors and viticulture practices. This study investigated the effect of organic and conventional management systems on quality parameters and shelf life of grape berries (Vitis vinifera cv. Thompson seedless) during storage. Table grapes from the two different growing systems showed different postharvest behaviors. Grape berries from organic orchard was sweeter and softer, had more desirable color parameters, higher antioxidant capacity and phytochemical compounds content than berries harvested from conventional growing orchard. Organic berries showed desirable color parameters and lower browning index, higher antioxidant enzymes activity and better edible quality than conventional ones. While lower moisture loss and decay index and higher firmness was observed in conventional berries. The findings of this study indicate that the shelf life and market value of grape berries during storage are highly related to vineyard management systems.

Keywords: Antioxidant capacity/ /Edible quality/ /Physiological indices/ /Phytochemical compounds/ /Senescence/

DATE FRUIT

Zarbakhsh, S., & Rastegar, S. (2019). Influence of postharvest gamma irradiation on the antioxidant system, microbial and shelf life quality of three cultivars of date fruits (Phoenix dactylifera L.). Scientia Horticulturae, 247, 275–286. DOI: 10.1016/j.scienta.2018.12.035

Abstract

The effect of Gamma irradiation on extending the shelf life of date fruits was type cultivar, doses, and time storage-dependents. The higher dose (5kG) of gamma was played a protective role to TPC decrease, moisture loss, pH and TSS decrease more than other doses during

storage. Gamma doses enhanced the ATC capacity, peroxidase activity and the score of sensory quality especially to Piarom cultivar at end storage. The 5kG dose of Gamma displayed an effective dose for microbial decontamination and the maintenance of date fruit from fungal contamination. Applying gamma irradiation in appropriate dose suggested for increasing the shelf life of mentioned three date cultivars. The aim of this study was to evaluate the effects of gamma irradiation on the physicochemical properties, microbial load and storage life of three date fruit cultivars. Gamma irradiation was directed at semi-dry date fruits of the 'Piarom' cultivar and also at the dry date fruits of the 'Zahedi' and 'Deiri' cultivars. The irradiation treatment was carried out at three doses, i.e. 1, 3 and 5 kG, in a 60Co chamber. Then, the date fruits were stored at 25 ± 2 °C for 4 months. At the end of the storage, the treated samples showed a higher total soluble solid compared to the control. Over time, the moisture content of the samples decreased. However, among all cultivars, the 'Zahedi' cultivar had a higher moisture content than the control. Through the storage time, the total phenolic content was reduced, but irradiation had a significant effect on maintaining the total phenolic content of the samples. Comparing the three cultivars, the highest flavonoid content was observed in 'Piarom' samples (26.82 mg CEQ/g FW). Furthermore, the 'Piarom' cultivar exhibited higher levels of antioxidant capacity, peroxidase enzyme, ascorbate peroxidase, sensory attributes (color, flavor, texture, smell and overall acceptability) and fungal load, compared to the other two cultivars. The irradiation treatment caused the retention of the total antioxidant content, fungal load, sensory attributes, pH value and peroxidase enzyme. In addition, the irradiation dose of 5 kG appeared to be an optimal dose for decontamination and the maintenance of date fruit quality. In general, the present study indicated that the efficiency of gamma irradiation can be substantial for the postharvest maintenance of quality among dates. The treatments can assist horticulturists in preventing the deterioration of nutritional contents and the hygienic condition of fruits. This opens opportunities for future methods of disinfection that can reduce the occurrence of contamination.

Keywords: /Dates/ /Disinfection/ /Gamma irradiation/ /Quality/ /Storage life/

DEEP FREEZING

Zhan, X., Zhu, Z., & Sun, D.-W. (2018). Effects of pretreatments on quality attributes of long-term deep frozen storage of vegetables: a review. Critical Reviews In Food Science And Nutrition, 1–15. https://doi.org/10.1080/10408398.2018.1496900

Abstract

As one of the essential parts in human diet, vegetables are important in health keeping and their consumption increases continuously. Due to their highly perishable nature, the shelf life of fresh vegetables is considerably short, due to cellular respiration, microorganism, enzyme reaction, oxidation and so on. Therefore, short- and long-term storages of vegetables are required and various methods and technologies are applied for different commercial goals. For long-term

storage, deep frozen storage is one of the most widespread used preservation methods for vegetables, as under temperatures low enough, the rate of most deteriorative reactions and microbial activities are significantly reduced. This review provides a critical comprehensive summary of long-term storage (≥6 months) vegetables under low temperatures (≤ −18 °C), and effects of the storage methods on various quality attributes of vegetables, such as texture, colour, contents of ascorbic acid, chlorophyll and carotenoids. Besides, the impacts of common pretreatments prior to freezing on the subsequent frozen storage are also briefly discussed. The current review shows that although some important biochemical attributes are more or less deteriorated and the quality loss of them is inevitable, a substantial portion of quality attributes appear to be stable during long-term deep frozen storage especially the physical parameters. Meanwhile, pretreatments prior to freezing, such as blanching process, also show significant influence on quality preservation in subsequent storage. Therefore long-term deep frozen storage can be applied as an effective storage method under proper conditions of pretreatments and storage.

Keywords: /Vegetable/ /Long-term storage/ /Deep freezing/ /Pretreatments/ /Preservation

ETHYLENE

Palonena, Pauliina and Courtney Weberb. 2019. Fruit color stability, anthocyanin content, and shelf life were not correlated with ethylene production rate in five primocane raspberry genotypes. Scientia Horticulturae, 247, 9-16. https://doi.org/10.1016/j.scienta.2018.11.088.

Abstract

In order to determine the role of ethylene in post-harvest darkening of berries among raspberry genotypes the relationship between ethylene production, color stability, anthocyanin content, postharvest quality, and shelf life was examined in five raspberry genotypes during storage at + 1 °C and + 7 °C. The genotypes differed significantly in regard to fruit ethylene production, which ranged from 0.5 to 2.3 ng kg−1 s−1 after harvest. A negligible increase in ethylene production during storage was observed in ‘Heritage’ and ‘Nantahala’, while a pronounced increase occurred in ‘Crimson Treasure’ and breeding selection NY 10–24. Shelf life was, however, not correlated with the ethylene production rate in the genotypes. Fruit surface color at harvest did not predict darkening in storage. NY 10–24 was darker than the other genotypes at harvest. During storage especially ‘Heritage’ but also NY 10–24 darkened significantly resulting in darker fruit surface color than in the other genotypes. ‘Heritage’ had the highest total anthocyanin content at harvest. Anthocyanin concentration increased during storage with the mean increase across all genotypes after 8 d being 45% at + 1 °C, and 80% at + 7 °C, while an increase of 128% was observed in ‘Heritage’ at + 7 °C. Optical density of fruit juice was highly correlated with the concentration of anthocyanins in the whole fruit samples. Both berry sugar and titratable acidity content differed significantly between the

genotypes. The highest sugar to acid ratio was found in ‘BP1’, being about two times higher than in ‘Heritage’ or’ Crimson Treasure’. While sugar content did not change, titratable acidity decreased during storage. This study demonstrated that genotypic differences in fruit ethylene production rate did not explain differences in color change (darkening) during storage or in shelf life of primocane raspberry genotypes, nor was color stability in storage directly correlated to anthocyanin content or fruit color at harvest.

Keywords: /Anthocyanins/ /Ethylene/ /Fruit color/ /Optical density/ /Raspberry/ /Rubus idaeus L.

FOOD PACKAGING

Rodríguez-Rojas, A., Arango Ospina, A., Rodríguez-Vélez, P., & Arana-Florez, R. (2019). Review: What is the new about food packaging material? A bibliometric review during 1996–2016. Trends in Food Science & Technology, 85, 252–261. https://doi.org/10.1016/j.tifs.2019.01.016

Abstract

The first contact that every customer has when buying a food is the packaging, this is responsible for the handling, security, aesthetics and even advertising of the product. Over the years, the food industry has always shown great interest in developing packaging with different materials, some toxic for humans and others not. This article presents a bibliometric review to identify during the last 20 years, what types of materials have been used to develop food packaging for human consumption, also identifies who are the most focused researchers in this topic, which countries are most interested in the field and how an entire academic social network has been created to identify the future of food packaging. The results show that the future of food packaging materials includes not only an advanced use of technology, but also a great concern for the care of health and the environment.

Keywords: /Food packaging materials/ /Bibliometric analysis/ /Social network analysis/ /Academic influence/

Zhou, H., & Wang, Z.-W. (2019). Comparison study on simulation effect of improved simulation methods for packaging random vibration test. Packaging Technology and Science, (3), 119. https://doi.org/10.1002/pts.2421

Abstract

In general, existing testing methods for packaging design employ Gaussian distributions to represent vibration induced by road profiles. However, the actual road vehicle vibration is non-Gaussian. The key limitation is that the simulated Gaussian vibration cannot reconstruct the

shock events buried in the vibration, which will result in inaccurate reliability evaluation of cushion packaging. A new simulation technique called shock extraction has been proposed and validated in our earlier study. This article is a further study of our previous research. The shock extraction method has been compared with other three representative simulation methods including the single-level PSD, three-way split spectral, and wavelet decomposition in terms of simulation effect. Signal simulated by the shock extraction method possesses the same vibration intensity, duration, approximate statistical characteristics, and PSD plots with the original signal. The results show that the simulation effect of the shock extraction method is the best, and the worst is the single-level PSD. The wavelet decomposition and three-way split spectral are somewhere in the middle.

Keywords: /Packaging random vibration test/ /Shock extraction/ /Single-level PSD,/ /Three-way split spectral/ /Wavelet decomposition/

FRESH PRODUCE

De Corato, U. (2019). Improving the shelf-life and quality of fresh and minimally-processed fruits and vegetables for a modern food industry: A comprehensive critical review from the traditional technologies into the most promising advancements. Critical Reviews In Food Science And Nutrition, 1–36. https://doi.org/10.1080/10408398.2018.1553025

Abstract

The market size of fresh and minimally-processed fruits and vegetables (MPFVs) have grown rapidly in the last years as a result of consumer attitudes change due to their increasing use in prepared mixed salad for fresh, healthy and convenient food. Handling and mechanical operations of cutting and peeling induce injures and release of on-site cellular contents which promote the growth of harmful microbes. Chlorine has been widely adopted in fresh and MPFVs disinfection in washing due to its low cost and high efficacy against a broad spectrum of microorganisms; but, continuous replenishment of chlorine into high organic wash water can promote the formation of suspected carcinogenic compounds. There is a real need to find new alternatives to chlorine to preserve MPFVs quality for longer time. Although several methods and chemicals can be used to achieve similar reduction of microorganism counts without the production of harmful compounds, nor compromising the quality of MPFVs produce, fewer amount of them have gained widespread acceptance by the food industry. The challenge of this work was to give an upgraded level of understanding for producers and retailers to underpin future research directions for a modern food industry in order to resolve existing issues that limit fresh-cut quality and shelf-life. This paper covers a comprehensive review to improve shelf-life and quality of MPFVs, from the traditional technologies toward the most promising advancements.

Keywords: /Chlorine alternative/ /Foodborne bacteria/ /Fresh produce/ /Spoilage microorganism

GERBERA

Shabanian, S., Nasr Esfahani, M., Karamian, R., & Tran, L.-S. P. (2019). Salicylic acid modulates cutting-induced physiological and biochemical responses to delay senescence in two gerbera cultivars. Plant Growth Regulation, 87(2), 245. DOI: 10.1007/s10725-018-0466-5

Abstract

The postharvest longevity of gerbera (Gerbera jamesonii) flowers has a critical importance in determining their commercial value; and therefore, there is a commercial demand for prolonging their vase life (VL). Here, we tested the efficacy of salicylic acid (SA, 150 μM) preservative in extending longevity of cut flower of two gerbera cultivars, namely the 'Sunway' and 'Bayadère', of which water-held 'Bayadère' has longer VL than water-held 'Sunway'. The results indicated that exogenous SA could significantly prolong the VL of cut flowers of both 'Sunway' and 'Bayadère' cultivars, with better preservative effect being observed on 'Sunway'. SA preservative was more effective in ameliorating relative water uptake and relative fresh weight in 'Sunway' than in 'Bayadère', which was accompanied by a greater decrease in proline accumulation. Application of SA prolonged the VL of two cut gerbera flower cultivars by inhibiting the activity of polyphenol oxidase involved in browning reaction, and decreasing oxidative stress through improving reactive oxygen species-scavenging antioxidant capacity, which included accumulation of total phenolic compounds and total flavonoids, and enhancement of enzymatic antioxidant activities. As a result, membrane lipid peroxidation levels were reduced in cut flowers of both cultivars, with higher reduction level being observed in 'Sunway' than in 'Bayadère'. Additionally, SA preservative was more efficient in maintaining a greater content of total soluble proteins in 'Sunway' than in 'Bayadère'. These findings clearly demonstrated that SA has higher preservative effects on extending VL of 'Sunway' than that of 'Bayadère'. Taken together, SA can be recommended to farmers for postharvest treatments to maintain quality and delay senescence of gerbera flowers.

Keywords: /Cut flower quality/ /Gerbera/ /Lipid peroxidation/ /Postharvest longevity/ /Salicylic acid/ /Water uptake/

GRAPE

Wang, M., Zhao, L., Zhang, X., Dhanasekaran, S., Abdelhai, M. H., Yang, Q., Zhang, H. (2019). Study on biocontrol of postharvest decay of table grapes caused by Penicillium rubens and the possible resistance mechanisms by Yarrowia lipolytica. Biological Control, 130, 110–117. DOI: 10.1016/j.biocontrol.2018.11.004

Abstract

Table grapes are one of the most common fruits throughout the world. Decay of grapes caused by pathogenic fungal infections results in tremendous economic losses. The aim of this study was to evaluate the effect of Yarrowia lipolytica on the control of postharvest decay of grapes caused by Penicillium rubens and the possible mechanisms involved. The results showed that Y. lipolytica provided significant inhibition of the postharvest decay of grapes by P. rubens compared with the control. When the concentration of Y. lipolytica was 1 × 109 cells/mL, decay incidence and decay diameter of grapes were 12.45% and 6.19 mm, respectively. Y. lipolytica reduced spore germination and germ tube length of P. rubens. Moreover, the results also showed that the activities of defense-related enzymes, including polyphenoloxidase (PPO), peroxidase (POD), catalase (CAT), phenylalanine ammonialyase (PAL), ascorbate peroxidase (APX) and β-1,3 glucanase (GLU),were significantly enhanced in grapes treated with Y. lipolytica. Similarly, the expression levels of these genes were also increased in grape fruits treated with Y. lipolytica. The results suggested that the possible resistance mechanism of Y. lipolytica was to enhance the defense-related enzymes and genes, ultimately reduce postharvest decay caused by P. rubens in grapes. Altogether, the research work confirmed that Y. lipolytica has potential biocontrol efficacy and could be used as a biocontrol agent to prevent the postharvest decay of grape fruits.

Keywords: /Table grapes/ /Yarrowia lipolytica/ /Penicillium rubens/ /Biocontrol/ /Enzyme activity/ /Gene expression

GUAVA

Germano, T. A., Aguiar, R. P., Bastos, M. S. R., Moreira, R. A., Ayala-Zavala, J. F., & de Miranda, M. R. A. (2019). Galactomannan-carnauba wax coating improves the antioxidant status and reduces chilling injury of 'Paluma' guava. Postharvest Biology and Technology, 149, 9–17. https://doi.org/10.1016/j.postharvbio.2018.11.013

Abstract

Physiologically mature 'Paluma' guava were treated with galactomannan (0.75%) and carnauba wax (0.9%) coating, stored at ambient (25 °C) and refrigerated (11 °C), and evaluated every 3rd day for postharvest quality and physiology. Ambient uncoated fruit were apt for consumption for only nine days; meanwhile, coated guavas were acceptable for 15 d with climacteric respiratory peak of 168.6 mg kg−1 h-1 at day 12, and firmness of 14.3 N attributed to lower lipid peroxidation and cell wall hydrolysis. Coating increased antioxidant enzymes SOD and CAT activities that led to 35% lower hydrogen peroxide content, when compared to uncoated control. Coating prevented guava degreening by inhibiting chlorophyll degradation with content of 45.05 mg kg-1, lower carotenoid content with 27.8 mg kg-1 and PPO activity, under refrigeration for 15 d. Refrigerated uncoated fruit exhibited as symptoms of chilling injury

inhibition of softening and respiratory peak. Principal component analysis showed that coating and refrigeration treatment maintains guava quality for 15 d of storage similar to observed for control, at day zero. In conclusion, galactomannan-carnauba wax coating improved guava postharvest quality through maintenance of firmness and color, besides preventing chilling symptoms under refrigeration.

Keywords: /Galactomannan/ /Antioxidant/ /Respiration/ /Ripening/ /Carnauba/

JUJUBE

Yuan, S., Ding, X., Zhang, Y., Cao, J., & Jiang, W. (2019). Characterization of defense responses in the ‘green ring’ and ‘red ring’ on jujube fruit upon postharvest infection by Alternaria alternata and the activation by the elicitor treatment. Postharvest Biology and Technology, 149, 166–176. https://doi.org/10.1016/j.postharvbio.2018.12.003

Abstract

Alternaria alternata is the major threat to postharvest storage of jujube (Ziziphus jujuba Mill.) fruit. A typical phenotype that a ‘red ring’ circling an enclosed ‘green ring’ area surrounding the spot of Alternaria rot on the jujube peel was first found and investigated in this study. Results indicated that the pathogenic infection is essential for the onset and development of the phenotype on jujubes, with high inoculum concentration and low incubation temperature leading to the enlarged ‘green ring’. The boundary line between the two rings seemed to be pre-fixed on the A. alternata-infected jujubes once the phenotype appeared. The ‘green ring’ was invaded gradually and ‘eaten-up’ eventually by the expansion of the surrounded rot spot. Biochemical measurements showed that such successful infection on jujubes might attribute to the great loss of individual phenolic compounds, including (+)-catechin, chlorogenic acid, (−)-epicatechin and p-coumaric acid, in the peel tissue of the ‘green ring’ and ‘red ring’, while some antifungal compounds increased in the flesh beneath the peel tissue in response to the infection. The elicitor salicylic acid (SA) triggered the early and rapid occurrence of the ‘green ring’ and ‘red ring’ on the A. alternata-infected jujubes. The SA treatment activated the phenylpropanoid pathway and elevated the accumulation of total phenolic compounds in the ‘green ring’ to combat the fungal attack and thereby restrict the expansion of disease lesion. Characterization of defense responses in the ‘green ring’ and ‘red ring’ on jujubes against Alternaria infection is helpful for unravelling the underlying mechanisms of the formation of defense resistance in fruit upon postharvest infection.

Keywords: /Jujube fruit/ /Alternaria alternata‘/ /Green ring’‘/ /Red ring’/ /Salicylic acid/ /Phenylpropanoids/

LETTUCE

Karadžić, KovaAevic, S. Z., Jevric, L. R., Podunavac-Kuzmanovic, S. O., Tepic Horecki, A. N., Vidovic, S. S., … Kuljanin, T. A. (2019). Artificial neural network modeling of the antioxidant activity of lettuce submitted to different postharvest conditions. Journal of Food Processing & Preservation, (3) (1-9). DOI: 10.1111/jfpp.13878

Abstract

Using novel ebb and flow hydroponic system lettuce (Lactuca sativa L.) samples were grown and then stored under different postharvest conditions (greenhouse with a cube, refrigerator with a cube, and refrigerator without a cube). The effect of the postharvest conditions on bioactive compounds profile and antioxidant activity was studied. All samples were subjected to the bioactive compounds composition analy- sis as well as to the antioxidant activity determination in order to reveal how the postharvest conditions affect them. The experimental data were used for the anti- oxidant activity modeling by artificial neural network (ANN) approach. The antioxi- dant activity was determined by DPPH assay and expressed as IC50. According to the standard statistical parameters, comparison of the experimentally observed and pre- dicted data, and residuals analysis, generated ANNs could be used for the prediction of the antioxidant activity.

Keywords: /Lettuce/ /Antioxidant activity/ /ANN analysis/

LOQUAT FRUIT

Alos, E., Martinez-Fuentes, A., Reig, C., Mesejo, C., Zacarías, L., Agustí, M., & Rodrigo, M. J. (2019). Involvement of ethylene in color changes and carotenoid biosynthesis in loquat fruit (Eriobotrya japonica Lindl. cv. Algerie). Postharvest Biology and Technology, 149, 129–138. DOI: 10.1016/j.postharvbio.2018.11.022

Abstract

In loquat (*Eriobotrya japonica* Lindl cv. Algerie) fruit, despite the non-climacteric ripening behaviour, evidence suggest that ethylene may participate in the regulation of several ripening- and postharvest-related processes. Color changes and carotenoid profile were analyzed in fruit at three developmental stages (breaker, yellow and colored fruits). At early stages, the fruit peel contained phytoene, phytofluene and other typical chloroplastic carotenoids that decreased during ripening, to accumulate β-carotene, violaxanthin and β-cryptoxanthin in mature fruits. In the pulp, carotenoid concentration increased during ripening to become predominant phytoene, followed by β-carotene and β-cryptoxanthin. Expression of the carotenoid biosynthetic genes (*PSY*, *PDS*, *ZDS*, *CYCB* and *BCH*) was downregulated in the peel during maturation, but increased in the pulp with the exception of *BCH*. The involvement of ethylene in the regulation

of pigmentation was further evaluated by treating fruits at the three ripening stages with ethylene or its action inhibitor 1-MCP. At breaker fruit, ethylene accelerated and 1-MCP delayed fruit coloration, but the effect was progressively lost as fruit matured. Ethylene and 1-MCP produced different changes in carotenoids content and gene expression in peel and pulp. Application of ethylene enhanced β-carotene content in both tissues whereas β-cryptoxanthin was only stimulated in the pulp. 1-MCP suppressed these changes in carotenoid composition in the pulp but had little effect in the peel. A differential transcriptional level the pulp was more responsive to down regulated gene expression than the peel. Collectively, results indicate that: 1) ethylene is involved in the regulation of pigmentation and carotenoid biosynthesis in loquat fruits, 2) a differential regulation of carotenoid biosynthesis and response to ethylene appear to operate in the peel and the pulp, and 3) β-carotene hydroxylase (*BCH*) is a key step in the regulation of carotenoid content and composition in both tissues of loquat fruit.

Keywords: /Carotenoids / /Ethylene/ /Fruit/ /Loquat/ /Physiology/ /Postharvest 1-MCP/

MANDARIN

Obenland, D., & Arpaia, M. L. (2019). Effect of harvest date on off-flavor development in mandarins following postharvest wax application. Postharvest Biology and Technology, 149, 1–8. https://doi.org/10.1016/j.postharvbio.2018.11.010

Abstract

Mandarins (Citrus reticulata Blanco) are very prone to off-flavor formation following the postharvest application of wax and it had been previously observed that off-flavor also increases with advanced fruit maturity. To more fully evaluate the maturity effect on off-flavor and to determine potential causal mechanisms for it, ‘Owari’ and ‘China S-9’, two Satsuma varieties, were harvested at three to four dates within the harvest season, waxed and placed into storage for either 2 weeks at 5 °C or 1 week at 5 °C + 1 week 20 °C, the latter treatment being expected to develop off-flavor. The testing was conducted over three seasons with ‘W. Murcott’, a non-Satsuma variety, being included in the third season. In all three seasons analyses were conducted for various parameters related to fruit internal atmosphere composition. At the end of the storage period, in the first two seasons, the fruit were evaluated for flavor using a semi-expert sensory panel. Consistently, in seasons 1 and 2 where flavor was evaluated, both Satsuma varieties did not develop off-flavor or a loss in acceptability in the initial harvest. In subsequent harvests, however, off-flavor became increasingly noticeable and was correlated with the decline in flavor acceptability. There were occasional impacts on other flavor attributes, but the results were inconsistent. Advancing maturity in all three seasons was associated with a decrease in internal oxygen and an increase in internal carbon dioxide, except in the case of ‘W. Murcott’ where there was little or no change in internal oxygen and an increase in carbon dioxide. Enhanced fermentative metabolism was indicated in the later harvests in the form of higher ethanol in the Satsuma varieties. Peel gas permeance measurements performed in

season 3 showed no meaningful relationship with the internal gas concentrations measured during the season. Respiration rate, however, strongly increased during the season in the Satsuma varieties and decreased in 'W. Murcott, both changes being associated with the internal gas composition. It is concluded that maturity influences the propensity for off-flavor development in mandarins, but it does not occur in every instance and is influenced by year, storage and temperature. The potential mechanism modulating the change in the three varieties examined in this study appeared to be changes in the rate of respiration, since when respiration is sufficiently high, oxygen levels decline to a level where fermentation occurs, and off-flavor becomes apparent.

Keywords: /Sensory/ /Respiration/ /Peel permeance/ /Internal oxygen/ /Citrus reticulate/ /Blanco/

MANGO

Ntsoane, M. L., Jalali, A., Römer, J., Duewel, K., Göller, C., Kühn, R., … Mahajan, P. V. (2019). Performance evaluation of silica gel-water adsorption based cooling system for mango fruit storage in Sub-Saharan Africa. Postharvest Biology and Technology, 149, 195–199. https://doi.org/10.1016/j.postharvbio.2018.12.004

Abstract

Refrigeration is generally recognised as a key tool for successful marketing of fresh produce. However, such sophisticated cooling systems are unavailable or non-existent for African smallholder farmers due to financial constraints and lack of electricity supply. The application of low cost silica gel-water adsorption based cooling systems has attracted attention for on-farm storage. However, the drawback till now was low cooling performance. Therefore, this work focused on evaluating the cooling performance of adsorption based cooling refrigerator (prototype) at different cooling cycle times of 30, 60, 90 and 120 min with regeneration cycles fixed to 30 min and various hot water regeneration temperatures of 60, 70 and 80 °C. The study reveals that the cooling cycle time influences the reduction in storage temperature most, while both increasing hot water temperature and cooling cycle time enhance the cooling capacity of the prototype. Additionally, the adsorption based cooling system prototype was examined on its capability of storing fresh mangoes which resulted in 3% mass loss of fruits at average inside air temperature of 15 °C and relative humidity of 90%. These results suggest that the new energy saving storage technology, can be adopted for storage of fresh commodities in Sub-Saharan African countries.

Keywords: /Adsorption cooling system/ /Refrigerator/ /Silica gel-water/ /Mango fruit/ /Fresh produce/ /Evaporative cooling/ /African smallholder farmers/ /Solar energy/

MANGOSTEEN

Sripong, K., Jitareerat, P., & Uthairatanakij, A. (2019). UV irradiation induces resistance against fruit rot disease and improves the quality of harvested mangosteen. Postharvest Biology and Technology, 149, 187–194. DOI: 10.1016/j.postharvbio.2018.12.001

Abstract

UV-C treatment exhibited higher fungicidal potential in preventing fruit rot disease than UV-B.UV-C treatment induced resistance against fruit rot disease in mangosteen fruits.UV-C treatment increased activities of PAL, POD, β-1,3-glucanase and chitinase.UV-C treatment maintained the postharvest quality of mangosteen fruits. Fruit rot disease and short shelf life are the limiting factors of mangosteen fruit. This study focused on investigating the effect of ultraviolet (UV) irradiation in controlling fruit rot disease and on quality improvement in harvested mangosteen. Mangosteen fruit artificially inoculated with *L. theobromae* were treated with UV-B or UV-C irradiation at dosages of 0 (control), 6, 13, 26, and 40 kJ m−2 and stored at 25 °C for 7 d. The results indicate that UV-C treatment exhibited higher fungicidal potential in preventing fruit rot disease than UV-B treatment. UV-C treatment at a dose of 13 kJ m-2 was the most effective in reducing disease incidence and lesion diameter, followed by UV-C at a dose of 26 kJ m−2, whereas the effects of UV-C at a higher dosage (40 kJ m−2) and a lower dosage (6 kJ m−2) showed no significant difference from the untreated fruit. Therefore, UV-C irradiation at doses of 13 kJ m−2 was selected to investigate the induction of disease resistance and improvement of mangosteen quality. Naturally infected mangosteen fruit were exposed to UV-C irradiation at a dose of 13 kJ m−2 and untreated fruit served as the control. All fruit samples were kept at 13 °C for 21 d. The results showed that UV-C treatment reduced fruit rot disease and induced the activity of key plant defense-related enzymes, including phenylalanine ammonia lyase (PAL), peroxidase (POD), chitinase and β-1,3-glucanase, besides increasing the content of total phenolics and hydrogen peroxide (H2O2). In addition, the fruit treated with UV-C could delay weight loss, respiration rate, color changes of peel and calyx and maintain total chlorophyll in the calyx of mangosteen. The results suggest that UV-C application is an alternative approach to suppress fruit rot disease and improve the postharvest quality of mangosteen.

Keywords: /Defense related enzymes/ /Fruit rot disease/ /Mangosteen fruit/ /UV irradiation/

NANOTECHNOLOGY

Liu, W., Zhang, M., & Bhandari, B. (2019). Nanotechnology - A shelf life extension strategy for fruits and vegetables. Critical Reviews In Food Science And Nutrition, 1–16. https://doi.org/10.1080/10408398.2019.1589415

Abstract

Most harvested fruits and vegetables cannot be stored in natural conditions for a satisfactory shelf life duration due to their perishable nature. There are conventional preservation methods but have the limitations of high production cost and/or unsatisfactory shelf-life and/or undesirable residue, etc. Because of a number of unique properties, nanotechnology-related shelf life extension strategies have the potential to compensate the shortcomings of traditional preservation methods. In this review article, basic principles and recent highly efficient applications of nanotechnology-related shelf life extension strategies in fruits and vegetables are described. Data analysis of these strategies are carried out to make readers more intuitive to the research status. Finally, the recommendations for future research of nanotechnology in fruits and vegetables shelf life extension are discussed. According to statistical data, nano-zinc dioxide is the most mentioned nanomaterials in the references, followed by silver nano particles. Nanotechnology-related combined preservation strategies and nanotechnology-related intelligent labeling system are considered as valuable areas for future researches. In addition, modeling studies, legal aspects, safety concerns, cost-benefit analyses and technical optimization need to be taken into account in future researches.

Keywords: Fruits and vegetables/ /Nanotechnology/ /Strategies/ /Shelf life extension/

ONION

Ohanenye, I. C., Alamar, M. C., Thompson, A. ., & Terry, L. A. (2019). Fructans redistribution prior to sprouting in stored onion bulbs is a potential marker for dormancy break. Postharvest Biology and Technology, 149, 221–234. DOI: 10.1016/j.postharvbio.2018.12.002

Abstract

Deficit irrigation neither influenced sprouting nor the accumulation of fructans.Top-to-bottom redistribution of fructans occurred in onion bulb prior to sprouting.Fructans redistribution could be a predictive marker for onion dormancy-break.Ethylene and 1-MCP may regulate eco-dormancy; but not endo-dormancy. Continuous supply of high quality onion bulbs to meet year-round demand is dependent on maintaining dormancy and bulb quality during storage. Sprouting impacts negatively on the storage quality of onion bulbs. Ethylene supplementation has previously been revealed to inhibit sprout growth in stored onion bulbs. Fructans content, especially those at higher degree of polymerisation (DP), are reported to positively correlate with delayed sprouting. However, little is known about the impact of pre-harvest irrigation regimes on fructans accumulation and redistribution in relation to onion bulb dormancy and quality in store. Across two seasons, onion plants of cultivars ‘Red Baron’ and ‘Sherpa’ were subjected to full irrigation (FI) (100% replenishment of crop evapotranspiration) or deficit irrigation (DI) (50% of FI treatment) from bulb initiation to harvest. Bulbs were harvested at full

maturity and stored at 1 °C for five months. Bulbs were treated with or without 1-MCP (1 μL L−1) for 24 h before storage under continuous ethylene supplementation (10 μL L−1) or air. DI had no effect on dormancy-break, sprout emergence, total fructans content and total sugar content. In contrast, ethylene delayed sprout emergence and suppressed sprout growth; added 1-MCP enhanced this effect. The concentration of DP3-8 fructans were higher in top and bottom sections compared to the baseplate. Before sprout emergence, fructans of DPs 7–8 were no longer present in the top and bottom wedges, while they accumulated in the baseplate; irrespective of pre- or postharvest treatments. This redistribution of fructans within the bulb suggested a transition in dormancy state and could be used as a predictive marker for sprouting in stored onion bulbs.

Keywords: /Allium cepa/ /Sprouting/ /Deficit irrigation/ /Fructans/

PEACH

Pan, Y., Li, X., Jia, X., Zhao, Y., Li, H., & Zhang, L. (2019). Storage temperature without fluctuation enhances shelf-life and improves postharvest quality of peach. Journal of Food Processing & Preservation, (3). DOI: 10.1111/jfpp.13881

Abstract

Peaches (Prunus persica) were packaged in two kinds of gas environments: the steady- state controlled atmosphere (CA) of 10% O2 and the modified atmosphere (MA) of polyethylene bag. Based on 1ºC, storage temperature was set four fluctuation val- ues: 1 ± 0ºC, 1 ± 0.5ºC, 1 ± 1ºC and 1 ± 2ºC. Results indicate that postharvest qual- ity of peach under temperature without any fluctuation (1 ± 0ºC) was effectively maintained by reducing respiration rate and polyphenol oxidase activity. The total soluble solid content and superoxide dismutase activity were considerable high at constant temperature. Temperature fluctuations were not conducive to quality main- tenance of peach during storage. The combination of constant temperature and MA significantly hold the pulp firmness and overall sensory quality. Peaches were suita- ble for MA storage of polyethylene (PE) bag, in comparison to CA storage of 10% O2. The present study provided a theoretical basis for peach during cold storage (CS).

Keywords: /Oxidases Analysis/ /Superoxide analysis/ /Polyethylene quality management/ /Polyethylene analysis/

PLUM

Louw, J. P., & Korsten, L. (2019). Impact of ripeness on the infection and colonisation of Penicillium digitatum and P. expansum on plum. Postharvest Biology and Technology, 149, 148–158. https://doi.org/10.1016/j.postharvbio.2018.11.024

Abstract

Penicillium digitatum was recently identified as a postharvest pathogen of plum. Little is known of this host-pathogen association. Disease occurrence and severity was higher on older fruit. This study aimed to determine the effect of ripening on the infection and colonisation of P. digitatum and P. expansum on plum at a physical (disease incidence/severity, pH and firmness) and molecular (gene expression) level. Storage conditions and inoculum loads were also considered. Disease incidence and severity of P. digitatum was significantly affected by ripeness, cold storage and inoculum load. Both species acidified tissue and advanced host ripening. Host ripening had a small effect on gene expression (P. digitatum: ACCD decreased; P. expansum: pacC and creA increased). A dual mechanism of pH modulation was discussed; higher pH at and beyond lesion borders will facilitate invasion, maceration and colonisation (nutrient uptake and growth) by/during acidification. The pH of lesions was comparable to that of controls. Alkalinisation via accumulation of ammonium/ammonia can be linked to the pathogen's nitrogen metabolism. Host ripening directly (elicited) or indirectly (ethylene stress) caused by pathogen attack can increase the pH of uncolonised tissue. P. digitatum can be considered an important pathogen of riper fruit often found in long or ill-managed distribution chains. It is still unclear what stimulates (molecular) the opportunistic lifestyle expressed by P. digitatum on plum. There was little to no correlation between gene expression and the increase in disease incidence and severity on riper fruit. Future work should consider the decline of host resistance during ripening.

Keywords: /Host-pathogen interaction/ /pH modulation/ /ddPCR/ /qPCR/ /Cold storage/ /Stone fruit/

POMEGRANATE

Koushesh Saba, M., & Zarei, L. (2019). Preharvest methyl jasmonate's impact on postharvest chilling sensitivity, antioxidant activity, and pomegranate fruit quality. Journal of Food Biochemistry, (3). DOI: 10.1111/jfbc.12763

Abstract

The fruit of pomegranate is bioactive compound source but is sensitive to low stor- age temperature. Methyl jasmonate (MeJA) spray on pomegranate trees was used in an attempt to evaluate its possible effect on fruit bioactive constituent changes and chilling injury (CI) incidence. Pomegranates trees were treated 15 days before har- vest with distilled water or 1 and 2 mM MeJA, and then harvested fruit was stored at 4°C about 80 days. It was found that preharvest MeJA treatments improved arils color at harvest and reduced the postharvest CI index. Electrolyte leakage increased over storage, however, it was significantly higher in control rather than those treated. In addition, MeJA treatments significantly increased flavonoids, total

antioxidant ac- tivity (TAA), total phenolics (TP), and total anthocyanins in comparison with un-treated control.

Keywords: /Pomegranate/ /Anthocyanin analysis/ /Isoflavones analysis/ /Antioxidants analysis/

POTATO

Grubben, N. L. M., Witte, S. C. M., & Keesman, K. J. (2019). Postharvest quality development of frying potatoes in a large-scale bulk storage facility. Postharvest Biology and Technology, 149, 90 - 100. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edsbas&AN=edsbas.3A754563&site=eds-live

Abstract

During long-term storage, the quality in terms of moisture content and frying colour of frying potatoes declines and losses occur. This paper introduces a dynamic 1-D mathematical model that contains relevant quality indicators for frying potatoes and climate-related factors. The relevant quality indicators are temperature, moisture content and reducing sugar content of the potato, the climate-related factors are temperature, moisture content and carbon dioxide of the air. Parameter estimation and validation was performed with data from two large-scale storage facilities for the storage season 2016/2017, with good results. The validated model was subsequently used in a scenario study to investigate how the cooling trajectory of stored frying potatoes can be improved. For the Ramos variety, faster cooling leads to a decrease in weight loss and an increase in sugar content, but still within acceptable levels for industrial application.

Keywords: /Potato storage/ /Postharvest quality development/ /Food storage modelling/

Shen, X., Zhang, M., Devahastin, S., & Guo, Z. (2019). Effects of pressurized argon and nitrogen treatments in combination with modified atmosphere on quality characteristics of fresh-cut potatoes. Postharvest Biology and Technology, 149, 159–165. https://doi.org/10.1016/j.postharvbio.2018.11.023

Abstract

The effects of pressurized argon and nitrogen treatments in combination with modified atmosphere on the quality characteristics of fresh-cut potatoes during cold storage were studied. Fresh-cut potatoes were pressurized with argon, nitrogen or their mixture (concentration ratio of 1:1) at 4 MPa for 60 min; treated potatoes were then sealed in bags filled with 4% O2, 2% CO2, 94% N2 and stored at 4 °C. Water loss, color, firmness, ascorbic acid and malondialdehyde (MDA) contents, respiration rate and aerobic plate count were

measured every 3 d. Results showed that argon treatment successfully delayed the losses of moisture, ascorbic acid, color and firmness Such a treatment also significantly inhibited respiration rate and membrane oxidation as measured via MDA content. The number of microbes in treated fresh-cut potatoes was significantly reduced. Pressurized mixed argon-nitrogen treatment had a better effect on maintaining the quality of fresh-cut potatoes than nitrogen treatment. These results indicate that the combination of pressurized argon or mixed gas treatment with modified atmosphere is an effective method to maintain the quality of fresh-cut potatoes during refrigerated storage.

Keywords: /Argon/ /Clathrate hydrates/ /MAP storage/ /Nitrogen/ /Potato/ /Shelf life/

QUALITY CONTROL

Cortés, V., Blasco, J., Aleixos, N., Cubero, S., & Talens, P. (2019). Review: Monitoring strategies for quality control of agricultural products using visible and near-infrared spectroscopy: A review. Trends in Food Science & Technology, 85, 138–148. https://doi.org/10.1016/j.tifs.2019.01.015

Abstract

The increasing demand for quality assurance in agro-food production requires sophisticated analytical methods for in-line quality control. One of these techniques is visible and near-infrared (VIS-NIR) spectroscopy, which has low running costs, does not need sample preparation, and is non-destructive, environmentally friendly, and fast. Despite these advantages, only a limited amount of research has been conducted on VIS-NIR in-line applications to measure, control, and predict quality in fruits and vegetables. The applicability of VIS-NIR spectroscopy for the off-line and in-line monitoring of quality in postharvest products has been addressed in this review. The document focuses on the comparison between the two processes for the same agro-food product, highlighting the main advantages and disadvantages, problems, solutions, and differences. VIS-NIR techniques, combined with chemometric methods, have shown great potential due to their fast detection speed, and the possibility of simultaneously predicting multiple quality parameters or distinguishing between products according to the objectives. Being able to automate processes is a great advantage compared to routine off-line analyses, mainly due to the savings achieved in time, material, and personnel. However, in numerous cases, in-line implementation has not been accomplished in the corresponding studies, hence the scarcity of real in-line applications. Recent demands, together with the advances being made in the technology and a reduction in the price of equipment, makes VIS-NIR technology an analytical alternative for continuous real-time food quality controls, which will become predominant in the next few years.

Keywords: /vis-NIR spectroscopy/ /In-line/ /Off-line/ /Chemometrics/ /Quantification/ /Qualification/

RASPBERRIES

Giuffrè, A. M., Louadj, L., Rizzo, P., Poiana, M., & Sicari, V. (2019). Packaging and storage condition affect the physicochemical properties of red raspberries (Rubus idaeus L., cv. Erika). Food Control, 97, 105–113. DOI: 10.1016/j.foodcont.2018.10.027

Abstract

Packaging material and the storage temperature on red raspberries (*Rubus idaeus* L.) were studied in this paper. Raspberries were stored following their harvesting in different conditions: in the fridge at 1 °C and in the freezer at −20 °C, using different packaging materials: two Nanoactive films, Nanoactive A (NA) and Nanoactive B (NB), a biaxially oriented polyethylene terephthalate (PET) film and some other fruits were stored without any film (WF). Biometrics, color, titratable acidity, soluble solid content and moisture, were determined during storage. A loss of weight (24.87%) was found during storage at room temperature from 5.02 g to 4.02 g in two days. During the freezer storage was found a significant average higher Solid Soluble Content (9.44 °Brix) in PET, a significant higher Titratable acidity (2.08%) in WF, and no significant differences between different packaging for Moisture content. The O2 and CO2 concentrations were measured daily in the refrigerated fruits and the O2 concentration on the 7th day was 5.0% (NA), 19.8% (NB) and 17.1 (PET). CO2 percentage increased significantly during storage in the NA package from 9.6 (1st day) to 20.3 (14th day), whereas an inverse trend was found in the NB package from 4.4 (1st day) to 1.0 (4th day). Red raspberries without refrigeration show a very short shelf-life, maximum one day. Nanoactive films maintain valuable physical-chemical characteristics during storage in the fridge. Nanoactive A have shown the highest shelf-life (14 days). Freezing maintain valuable physical-chemical characteristics of raspberry.

Keywords: /Syndiotactic polystyrene/ /Polyethylene terephthalate/ /Post-harvest/ /Raspberry/ /Rubus/ /Shelf life/ /Small fruits/ /Nanoporous crystalline phases/

ROSES

Deng, Y., Wang, C., Huo, J., Hu, W., & Liao, W. (2019). The involvement of NO in ABA-delayed the senescence of cut roses by maintaining water content and antioxidant enzymes activity. Scientia Horticulturae, 247, 35–41. DOI: 10.1016/j.scienta.2018.12.006

Abstract

Abscisic acid (ABA) coordinates plant growth and development as internal signals. Nitric oxide (NO) as an essential endogenous signal molecule may prolong the vase life of cut flowers. However, the interaction of between ABA and NO during postharvest life of perishable horticultural products was not clear. Here, cut roses were used to investigate the interaction between NO and ABA during the senescence of cut flowers. The results showed that ABA increased the vase life and flower diameter of cut roses in a dose-dependent manner, with maximal biological responses at 0.5 μ M. Sodium tungstate, an NO biosynthesis inhibitor, significantly suppressed the vase life and diameter enhanced by ABA, indicating that endogenous NO might be involved in ABA-regulated cut flower senescence. ABA and a NO donor sodium nitroprusside (SNP) effectively increased leaf relative water content and reduced the rate of water loss via inducing stomatal closure. ABA and NO treatments significantly increased the activity of superoxide dismutase, peroxidase and ascorbate peroxidase and the content of leaf chlorophyll. Sodium tungstate also prevented the effects of ABA mentioned above. Altogether, NO may play a crucial role in ABA-delayed the senescence of cut roses by retarding water loss, stimulating enzyme activity and maintaining leaf chlorophyll content.

Keywords: /Vase life/ /Stomatal opening/ /Leaf chlorophyll content/ /Crosstalk/

Singh, P., Singh, A. P., & Sane, A. P. (2019). Differential and reciprocal regulation of ethylene pathway genes regulates petal abscission in fragrant and non-fragrant roses. Plant Science, 280, 330–339. DOI: 10.1016/j.plantsci.2018.12.013

Abstract

The fragrant rose, *Rosa bourboniana,* is highly sensitive to ethylene and shows rapid petal abscission (within 16–18 h) while the non-fragrant hybrid rose, *R. hybrida,*shows delayed abscission (50–52 h) due to reduced ethylene sensitivity. To understand the molecular basis governing these differences, all components of the ethylene pathway (biosynthesis/ receptor/signalling) were studied for expression during abscission. Transcript accumulation of most ethylene biosynthesis genes (ACS/ACO families) increased rapidly in petal abscission zones of *R. bourboniana*within 4–8 h of ethylene treatment. The expression of most receptor and signalling genes encoding CTRs, EIN2 and EIN3/EIL homologues also followed similar kinetics. Under natural field conditions where abscission takes longer, there was a temporal delay in transcript accumulation of most ethylene pathway genes while some biosynthesis genes (showing reduced ethylene sensitivity) were more strongly up-regulated by abscission cues. In contrast, in *R. hybrida* where even ethylene-induced abscission is considerably delayed, transcript accumulation of most ethylene biosynthesis and signalling genes was, surprisingly, reduced by ethylene and showed an opposite regulation compared to *R. bourboniana*. The results suggest that differential and reciprocal regulation of ethylene pathway is one of the major reasons for differences in petal abscission and vase-life between *Rosa bourboniana*and *R. hybrida*.

Keywords: /Ethylene signalling/ /Petal/ /Senescence/ /Cell separation/ /Flower/ /Vase-life/

Zeng, L., Wang, X., Dong, F., Watanabe, N., & Yang, Z. (2019). Increasing postharvest high-temperatures lead to increased volatile phenylpropanoidsbenzenoids accumulation in cut rose (*Rosa Hybrida*) flowers. Postharvest Biology and Technology, 148 (2019) 68–75. DOI: 10.1016/j.postharvbio.2018.10.012

Abstract

Fragrance is an important quality index of horticultural flowers. Floral volatile formation in flowers during plant growth has been widely studied, but less is known about floral volatile formation in cut flowers and its responses to postharvest conditions. In this study, cut rose (Rosa hybrida cv. Tineke) flowers subjected to 5, 15 and 30 °C for 36 h showed increased concentrations of volatile phenylpropanoids/benzenoids (VPBs) including 2-phenylethanol (2PE), phenylacetaldehyde, benzyl alcohol, benzaldehyde, and phenethyl acetate, but a reduced 3,5- dimethoxytoluene concentration, as temperatures increased. L-[2H8]Phenylalanine (Phe) tracing in vivo suggested that phenylpyruvic acid (PPA) was involved in the increase in 2PE in response to increasing temperature. Genes for two aromatic amino acid aminotransferases (AAATs) were isolated and functionally characterized. Transient expression analyses in Nicotiana benthamiana plants provided in vivo evidence that RhAAAT2 was able to convert L-Phe into PPA, and that it was localized in the cytoplasm. These results advance our understanding of floral aroma formation in flowers after harvest.

Keywords: /Aroma/ /Biosynthesis/ /Phenylpyruvic acid/ /Rose flower/ /Temperature/ /Volatile/

STRAWBERRY

Lafarga, T., Colás-Medà, P., Abadías, M., Aguiló-Aguayo, I., Bobo, G., & Viñas, I. (2019). Strategies to reduce microbial risk and improve quality of fresh and processed strawberries: A review. Innovative Food Science and Emerging Technologies, 52, 197–212. DOI: 10.1016/j.ifset.2018.12.012

Abstract

Strawberries are one of the most important fruits in the Mediterranean diet and have been widely investigated for their nutritional and nutraceutical properties. Concern about the safety of fresh and processed strawberries has increased in recent years due to the emergence of several outbreaks of foodborne pathogens linked to their consumption. The use of chlorine as a disinfectant has been identified as a concern due to public health issues and limited efficacy at removing contamination, and preventing cross-contamination. This has led to the development of novel alternatives to chlorine disinfection and thermal treatments, which include, among others, the use of organic acids, high pressure processing, intense pulsed light, or pulsed

electric fields. These technologies do not generally affect the nutritional and organoleptic properties of the product and some of these have been reported to stimulate the production of valuable compounds in strawberries and to improve their overall quality. The use of chlorine has been identified as a concern. Viruses (NoV and HAV) are the most relevant pathogens associated with strawberries. Alternative chemical strategies proved to be excellent alternatives. Novel non-thermal technologies generally result in better quality retention. Microwave and ohmic heating show potential as substituents of conventional thermal treatments.

Keywords: /Thermal processing/ /Microbial decontamination/ /Non-thermal processing/ /Chemical decontamination/ /Strawberry/ /Processed fruits/

TOMATO

Patanè, C., Malvuccio, A., Saita, A., Rizzarelli, P., Siracusa, L., Rizzo, V., & Muratore, G. (2019). Nutritional changes during storage in fresh-cut long storage tomato as affected by biocompostable polylactide and cellulose based packaging. LWT, 101, 618–624. DOI: 10.1016/j.lwt.2018.11.069

Abstract

The effects of storage at 4 °C on some quality and nutritional traits were assessed in fresh-cut fruits of a long storage tomato landrace packaged in biocompostable materials (BIO) or in conventional plastics (CP). Fruits were produced both in greenhouse and open field. Total solids-TS, total soluble solids-TSS, sugar content, titratable acidity, phenols, lycopene, vitamin C, antioxidant activity (DPPH and FRAP) were measured at 0, 4, 7 and 12 days of storage. TS, TSS and sugars overall increased during storage. Phenols did not change (fruits from greenhouse) or declined over time (fruits from open field). Lycopene content dropped after 4 d, keeping unaltered afterwards. Vitamin C decreased during storage. DPPH was reduced whilst FRAP kept constant over time, matching the pattern of phenols. Fresh-cut fruits in BIO retained greater TS (+10–11%), TSS (+4–10%) and sugars (+5–12%) than those in CP. Packaging had minor (on vitamin C) or no effects (on phenols and lycopene). Antioxidant activity was higher in BIO. Fresh-cut tomatoes from open field fruits exhibited better quality than those from greenhouse fruits. Nonetheless, these last attained high quality levels that may encourage long-storage tomato producers, taking into account the commercial benefits deriving from an extended production season.The effects of packaging were assessed in fresh-cut fruits of long storage tomato.•Fresh-cut fruits from greenhouse and open field produced tomatoes were assessed. Fresh-cut fruits kept better quality in biocompostable than in conventional package. Fresh-cut fruits retained higher antioxidant activity in biocompostable package.•Fresh-cut tomatoes from open field fruits had overall better quality.

Keywords: /Antioxidant activity/ /Bio-based packaging/ /Long-storage tomato/ /Minimal processing/ /Phenols/

Puccinelli, M., Malorgio, F., Terry, L. A., Tosetti, R., Rosellini, I., & Pezzarossa, B. (2019). Effect of selenium enrichment on metabolism of tomato (Solanum lycopersicum) fruit during postharvest ripening. Journal of the Science of Food and Agriculture, (5), 2463. DOI: 10.1002/jsfa.9455

Abstract

Selenium (Se) enrichment of plants seems effective in enhancing the health related properties of produce, and in delaying plant senescence and fruit ripening. The current study investigated the effects of Se on tomato fruit ripening. Tomato (Solanum lycopersicum L.) plants were grown in hydroponics with different Se-enriched nutrient solutions. Se, as sodium selenate, was added at rate of 0 mg L-1 (control), 1 mg L-1 , and 1.5 mg L-1 . RESULTS: Selenium was absorbed by roots and translocated to leaves and fruit. Se enrichment did not significantly affect the qualitative parameters of fruit at commercial harvest, instead it delayed ripening by affecting specific ripening-related processes (respiration, ethylene production, color evolution) during postharvest. In the current experiment 100 g of tomato hydroponically grown with a 1.5 mg Se L-1 enriched solution provided a total of 23.7 µg Se. Selenium recommended daily intake is 60 µg for women and 70 µg for men, thus the daily consumption of 100 g of enriched tomato would not lead to Se toxicity, but would provide a good Se diet supplementation. CONCLUSIONS: The cultivation of tomato plants in a Se-enriched solution appeared effective in producing tomato fruit with improved performances during storage and postharvest shelf life, and also with greater potential health-promoting properties.

Keywords: /hydroponics/ /Se-enriched fruit/ /storage/ /shelf-life/

Yu, W., Sheng, J., Zhao, R., Wang, Q., Ma, P., & Shen, L. (2019). Ethylene biosynthesis is involved in regulating chilling tolerance and SlCBF1 gene expression in tomato fruit. Postharvest Biology and Technology, 149, 139–147. https://doi.org/10.1016/j.postharvbio.2018.11.012

Abstract

Ethylene plays positive role in cold response of tomato fruit. CBFs (C-repeat/dehydration-responsive element binding factors) have been proved important in regulating plant chilling tolerance. Till now, the role that ethylene biosynthesis played in chilling response of tomato fruit is still unclear. In this study, we used antisense SlACS2 and wild-type Lichun tomato fruit as inhibited- and normal- ethylene biosynthesis models, in order to investigate whether inhibiting ethylene biosynthesis could affect chilling tolerance and SlCBF1 relative expression in tomato fruit. Results showed that antisense SlACS2 tomato fruit suffered more chilling injury, accompanied by higher malondialdehyde content and ion leakage, less proline and soluble protein content, as well as lower antioxidant enzymes activities, suggesting

that inhibiting ethylene biosynthesis reduced tomato fruit chilling tolerance. Furthermore, SlCBF1 expression in transgenic fruit was lower than in WT, the second peak of SlCBF1 expression was coincidence with the peaks of both endogenous ethylene production and ACS activity, and there was significant correlation between ACC content and SlCBF1 relative expression, which implied that endogenous ethylene biosynthesis could contribute to upregulate SlCBF1 expression under cold stress. These results revealed that ethylene biosynthesis played important roles in regulating tomato fruit chilling tolerance and SlCBF1 relative expression in tomato fruit.

Keywords: Ethylene biosynthesis/ /SlACS2/ /Cold tolerance/ /SlCBF1/ /Tomato fruit/

ZUCCHINI

Palma, F., Carvajal, F., Jiménez-Muñoz, R., Pulido, A., Jamilena, M., & Garrido, D. (2019). Research article: Exogenous γ-aminobutyric acid treatment improves the cold tolerance of zucchini fruit during postharvest storage. Plant Physiology and Biochemistry, 136, 188–195. DOI: 10.1016/j.plaphy.2019.01.023

Abstract

This work examines the effect of a treatment with 1 mM of γ-aminobutyric acid (GABA) on zucchini fruit during postharvest cold storage. Specifically, the effect of GABA on postharvest quality was measured, as well as its implication in the GABA shunt and other related metabolic pathways. The treatments were performed in Sinatra, a variety of zucchini highly sensitive to low-temperature storage. The application of GABA improved the quality of zucchini fruit stored at 4 °C, with a reduction of chilling-injury index, weight loss, and cell death, as well as a lower rate of electrolyte leakage. GABA content was significantly higher in the treated fruit than in the control fruit at all times analyzed. At the end of the storage period, GABA-treated fruit had higher contents of both proline and putrescine. The catabolism of this polyamine was not affected by exogenous GABA. Also, over the long term, the treatment induced the GABA shunt by increasing the activities of the enzymes GABA transaminase (GABA-T) and glutamate decarboxylase (GAD). GABA-treated fruit contained higher levels of fumarate and malate than did non-treated fruit, as well as higher ATP and NADH contents. These results imply that the GABA shunt is involved in providing metabolites to produce energy, reduce power, and help the fruit to cope with cold stress over the long term.

Keywords: Chilling/ /Zucchini/ /γ-aminobutyric acid/ /Putrescine/ /GABA shunt/ /ATP/ /NADH/