

**SELECTIVE DISSEMINATION OF INFORMATION (SDI)
PDF REPRINTS AS OF JANUARY – FEBRUARY 2017**

GENERAL

ACTIVE FOOD PACKAGING

Ribeiro-Santos, R., et.al. 2017. Use of essential oils in **active food packaging**: Recent advances and future trends. Trends in Food Sci. Technol. 61: 132-140.

Abstract

The use of bio control agents (BCA) for controlling plant diseases is an alternative to reduce the use of pesticides. Their performance can be improved when applied in combination with coatings. Films and coatings formulated from different biopolymers were characterized as to their barrier and optical properties to analyse their impact on fruit when applied as carriers of the BCA *Candida sake* CPA-1. The properties of the film-forming dispersions were more affected by the type of polymer than by the incorporation of surfactants. Sodium caseinate formed the thickest coatings, but these were very thin in every case, which led to there being no predicted relevant effect on the gas exchanges of the fruit. The cell viability in the films was good during film drying, especially in the case of protein films; however, it decreased after storage.

Keywords: /Active Food Packaging/ /Edible Coating/ /Edible Film/ /Food Safety/

EDIBLE FILM

Marin, A., et.al. 2017. Properties of biopolymer dispersions and **films** used as carriers of the biocontrol agent *Candida sake* CPA-1. LWT - FoodSci.& Technol. 79: 60 - 69.

Abstract

The use of biocontrol agents (BCA) for controlling plant diseases is an alternative to reduce the use of pesticides. Their performance can be improved when applied in combination with coatings. Films and coatings formulated from different biopolymers were characterized as to their barrier and optical properties to analyse their impact on fruit when applied as carriers of the BCA *Candida sake* CPA-1. The properties of the film-forming dispersions were more affected by the type of polymer than by the incorporation of surfactants. Sodium caseinate formed the thickest coatings, but these were very thin in every case, which led to there being no predicted relevant effect on the gas exchanges of the fruit. The cell viability in the films was good during film drying, especially in the case of protein films; however, it decreased after storage.

Keywords: /Edible Film/ /Edible Coating/

FRESH CUT

Amodio, M.L., et.l. 2016. A QUAFETY approach to quality monitoring and prediction for **fresh cut** produce. Acta Hort. 1141: 1 – 12.

Abstract

'Quafety' is a neologism that pertains to a global approach in considering quality and safety of a food product as a composite strategy. It leads to a sole, all-inclusive objective, consisting of full consumer satisfaction in terms of sensorial and nutritional expectations, with no harmful effects associated with consumption. QUAFETY is the short name for a collaborative 3-year R&D project co-funded by the European Commission (Comprehensive Approach to Enhance Quality & Safety of Ready-to-eat Fresh Products) aimed at improving safety and quality of ready-to-eat fresh produce throughout the whole chain. QUAFETY included 14 partners, including public research institutions and small and medium enterprises, from seven countries (Italy, UK, Portugal, Poland, Netherlands, Greece and Israel), and was diverse in terms of scientific and technological expertise. Objectives of the project were reached by developing diagnostic kits to predict quality and safety of raw material and final product, process control aids based on non-destructive and rapid evaluation methods, decision support tools aimed at critical points in the processing chain and investigation of innovative processes. Monitoring and prediction are part of the "quafety approach" both in terms of early detection and for estimating the fate of the main quality attributes. Among others, results are described using antibody arrays for the identification of molecular markers to predict quality and microbial contaminants, using non-destructive monitoring of quality through volatile organic compound collection and analysis and predicting nutritional quality based on external attribute degradation kinetics. The QUAFETY project ended on 31 March 2015.

Keywords: /Fresh-Cut/ /Ready-to-eat/ Postharvest/

Brown, W., et.al. 2016. Temperatures experienced by **fresh-cut** leafy greens during retail storage and display. *Acta Hort.* 1141: 103 – 108.

Abstract

There has been limited published work in the United States on temperature profiling of fresh-cut, bagged leafy greens during their transport, retail storage, and retail display. This study utilized temperature monitors placed in backrooms and display cases at nine supermarkets located in southern California: the Central Coast (Santa Barbara to Los Osos), Greater Los Angeles (Burbank area), and Greater Palm Desert. Sensors were installed midway along each 8-foot display case section containing fresh-cut leafy greens. Monitors were placed at the front and back of shelves and in the lower bin. In storage rooms, sensors were placed 4 feet from the floor in each corner. High and low temperature abuse occurred in retail display cases, with slightly more than 40% of the sensors indicating temperatures $>7.22^{\circ}\text{C}$, and 17% of the sensors indicating temperatures $<-0.17^{\circ}\text{C}$, for at least 5% of the time. Temperatures in storage rooms were rarely too low, but were often too high: slightly more than 58% of the sensors indicated temperatures $>7.22^{\circ}\text{C}$ more than 5% of the time, and five sensors measured continuous temperatures $>7.22^{\circ}\text{C}$ for nearly a year. Overall, most temperature abuse of pre-cut leafy greens at the retail level occurred during backroom storage. This study should be expanded to include major grocery chains in cities across the United States in order to verify these results.

Keywords: /Fresh-cut/ /Storage/ /Leafy greens/

Forney, C.F. 2016. Physiology and biochemistry of aroma and off-odors in **fresh-cut** products. *Acta Hort.* 1141: 35 – 46.

Abstract

The aroma of fresh-cut produce contributes to product quality and consumer acceptability. Aroma is determined by the composition of volatile compounds released by the product, which is dependent on the product type, genetics, maturity, and postharvest handling. The great diversity of fruits and vegetables provides a wide array of volatile chemistries that contribute to the unique aroma of each commodity. The aroma volatile content of the product at the time of cutting has a major impact on product aroma. Therefore, product maturity, or ripeness in the case of fruit, should be optimized to provide desirable aroma. In addition to volatile compounds produced by the intact commodity, secondary volatile compounds may be produced when products are cut or processed. Postharvest handling, including packaging and temperature management, also impact aroma. The aroma of fresh-cut produce changes as a result of diffusional and metabolic processes during marketing. Cutting removes natural diffusional barriers, and interaction of volatiles with packaging materials can preserve aroma or hasten its loss. Atmosphere modification within packages also alters volatile metabolism. Atmosphere compositions low in oxygen and/or high in carbon dioxide can induce anaerobic metabolism, which may result in off-odor production. The dynamic nature of aroma presents a challenge to design postharvest systems to optimize product aroma and flavor.

Keywords: /Fresh Cut/ /Packaging/

Latifah, M. N., et.al. 2016. Processing and handling of **fresh-cut** tropical fruits. Acta Hort. 1141: 91 – 102.

Abstract

Consumer demand for healthful and convenient food began to merge with advances in industrial processing and handling of fresh-cut fruit. The needs for tropical fruits such as durian, jackfruit and pineapple to be marketed in fresh cut/ ready-to-eat forms is greater compared with temperate fruits because of their large size, high price, particularly early in the season, risk of obtaining poor-quality pulp, difficulty in peeling/cutting and weight problems during transportation. Fresh cut processing allows cut pieces to be carefully examined right to the centre of the fruit. Thus it can be used to mitigate the need for quarantine treatment to enhance market access. The disruption of tissues and cell integrity during fresh-cut processing often increases respiration rate, ethylene synthesis, enzymatic browning and development of physiological disorders, which, associated with increases in rates of other biochemical reactions, are responsible for changes in colour, flavour, texture, and nutritional quality (sugar, acid, and vitamin contents). The damaged plant tissues also provide a nourishing medium for microbial growth. In view of the above, the Malaysian Agricultural Research and Development Institute (MARDI) has undertaken intensive research in developing suitable fresh-cut processing techniques to cater to the needs of both local and export markets. Due to the inherent nature of tropical fruits (especially the skin and size), suitable mechanization inputs have also been developed to facilitate and speed up processing. New approaches in evaluating suitable postharvest treatments and improving packing systems and storage requirements became a main focus of the research and development activities. Pre treatments to reduce microbial spoilage, excessive tissue softening and tissue browning are needed to improve the quality of fresh-cut pineapple. Modified atmosphere packaging by using seal or shrink wrapping has been shown to be effective for retail packing systems. Temperature abuse occurs during distribution and display, and some microorganisms of concern may grow at low temperatures and in modified atmospheres. Because of these potential hazards, the microbiological quality and safety of fresh-cut fruits is of great concern. An effective sanitation program and strict adherence to good personal and process hygiene need to be employed during handling and market distribution to ensure safe and

quality products are delivered to consumers. The beneficial outputs of the new approaches were observed during commercial trials of selected tropical fruits in Hong Kong (2008 and 2014), Singapore (2009), Dubai (2010), Perth (2011) and Sydney (2013).

Keywords: /Fresh Cut/ /MAP/ /Pre-Treatments/ /Quality/ /Safety/ /Pineapple/ /Durian/ /Jackfruit/

MINIMALLY PROCESSED

Plotto, A., et.al. 2016. Sensory testing tips and procedures to evaluate quality of stored and **minimally processed** fruits and vegetables processed fruits and vegetables. ActaHortic. 1141: 47 – 56.

Abstract

Sensory evaluation is primarily used by food companies in product development and prior to marketing. It has been adopted by the horticultural research community as an additional measure of produce quality upon pre- and postharvest treatments. A review of well-accepted sensory evaluation techniques is given, with examples using whole and fresh-cut fruits. Specifically, strawberries from the University of Florida breeding program were evaluated by a consumer panel as well as by a trained panel, over a 5-month season. Consumers preferred fruit that were qualified by the trained panel as sweet and with strong strawberry flavor, which were associated with high levels of soluble solids content (SSC), volatile esters and lactones.

Keywords: /Minimally Processed/ /Strawberry/

PACKAGING

Cevoli, Chiara and Fabbri, Angelo. 2017. Heat transfer finite element model of fresh fruit salad insulating packages in non-refrigerated conditions. Biosystem Eng. 153: 89 - 98.

Abstract

The quality of many foods is significantly affected by temperature fluctuations that can occur during distribution and transport. Packaging materials can help to shield the product from temperature variation by increasing the heat transfer resistance. Thermal insulation power is influenced by several factors, such as material, geometry, and degree of contact between materials. To maintain the cool chain of fruit salad with syrup during the transportation (temperature less than 5 °C), thermal insulation effect of different packaging materials was investigated. A parametric analysis using a finite element model able to describe the heat transfer inside the containers, on varying packaging material (expanded polystyrene: EPS, and air), geometry, dimension, and boundary conditions, was developed and validated. Good agreement was obtained between numerical and experimental results (R^2 up to 0.98). The effectiveness of the insulation configurations was evaluated by determining the time taken for the temperature to rise the critical value of 5 °C. Results showed that insulating performance of the air is better than EPS. This is realistic only taking into account insulation layer less than 0.013 m. From a practical point of view, an EPS packaging could result stronger compared to a packaging characterised by an insulating air layer. For the same EPS insulation thickness, product temperature exponentially decreases with the volumetric capacity ($R^2= 0.99$).

Keywords: /Packaging/ /Non-Refrigerated/ /Cool Chain/

Zhang, Hai, et.al. 2017. ZnO-PLA nanocomposite coated paper for antimicrobial **packaging** application. LWT - Food Sci. & Technol. 78: 250 - 257.

Abstract

In this study, ZnO nanoparticles were incorporated in PLA (Polylactic Acid) coating layer for antimicrobial packaging application. The SEM images show that the nanoparticles were homogeneously distributed across the surface thanks to its surface modification. The antimicrobial assay indicates that the active material was effective in inactivating *E. coli* and *S. aureus*. Furthermore, *E. coli* was found to be more susceptible to this type of agent, showing 3.14 log reduction for 0.5 wt% agent loading in the PLA coating layer. This result was compared across the publications using the same type of agent for treating both Gram-positive and Gram-negative microorganisms. The discrepancy between the results can be explained by an important fact that ZnO nanoparticle has multiple action mechanisms, and different antimicrobial testing methods may activate only part of the action mechanisms. In addition, nano-enabled packaging material for food contact application and its market prospect were analysed.

Keywords: /Packaging/ /Packaging/ /Antimicrobial Packaging/

POSTHARVEST

Mditshwa, Asanda, et.al. 2017. **Postharvest** quality and composition of organically and conventionally produced fruits: A review. Scientia Hort. 216: 148 – 159.

Abstract

The rapidly growing organic food market has prompted many researchers to compare numerous aspects of organically and conventionally grown foods. This review of literature provides an overview of empirical studies comparing postharvest quality of organically and conventionally produced fruits. The emphasis is on key postharvest quality parameters including physicochemical properties, postharvest storage performance, microbiological, sensory and nutritional quality. The study showed that physicochemical and nutritional properties relating to the contents of vitamins, phenolics and antioxidants are higher in organically produced fruits. It is also showed that production system has little effect on sensory quality. The better taste of organic produce as perceived by consumers is only due to the 'halo effect' of the organic label. The differences identified could be largely attributed to the different fertilization systems between organically and conventionally managed soils. The microbial contamination due to improper use of manure and compost in organically managed soils is a major concern in organic fruits. High levels of pesticide residues and nitrates in conventionally grown fruits are also a cause of concern. Several important problems in organic fruits are yet to be addressed; bacterial and fungal contamination of organic fruits warrants more intensive research. Future research should also investigate the effect of production system on storage potential.

Keywords: /Postharvest/ /Shelf-life/ /Fruits/ /Quality/

PRECOOLING

O'Sullivan, Justin L., et.al. 2017. Forced-air **cooling** of polylined horticultural produce: Optimal cooling conditions and package design. Postharvest Biol. & Technol. 126: 67 – 75.

Abstract

A 3-D computational fluid dynamics (CFD) model of palletised polylined kiwifruit packages undergoing forced-air cooling was used to determine an optimal operating point. Two operating conditions (pressure drop and flowrate across the pallet) were tested and the results evaluated based on cooling rate, uniformity, energy requirement and pallet throughput per week. An optimal operating point of 100 Pa ($0.25 \text{ L kg}^{-1} \text{ s}^{-1}$) ensured relatively rapid cooling of the produce, without incurring excessive operational costs due to the energy requirements. Based on the results an alternative package was designed with the aim of redistributing the incoming refrigerated airflow to channel cool air through the pallet layers before directing it towards the slowest cooling packages, located at the back of the pallet. Evaluating the new design at the optimal conditions for the current package showed that at constant flow rate both pressure drop and energy requirement to achieve half-cooling time (HCT) were reduced by 24%, while improving cooling uniformity and pallet throughput per week. Alternatively, keeping the pressure drop constant required a similar energy input, while further increasing the cooling uniformity and pallet throughput.

Keywords: /Precooling/ /Horticulture/ /Package Design/

FRUITS

APRICOT

Ayoub, Jamal, et al. 2017. Evolution of some fruit quality criteria during ripening of twelve new Moroccan **apricot** clones (*Prunus armeniaca* L.). *Scientia Hort.* 215: 72 – 79.

Abstract

Apricot (*Prunus armeniaca* L.) is one of the most widely spread *Prunus* species cultivated in the temperate zones and it is an important source of vitamins, sugars, and organic acids. Apricots also contain some phytochemicals that have beneficial effects on human metabolism. However, a little is known about the quality characteristics of important Moroccan local clones. The objective of this study is to evaluate the quality of twelve local clones and, therefore, to identify those that presenting important and interesting quality traits. Some quality parameters such as Soluble Solids content (SS), pH value, Total Acidity (TA) and the ratio (SS/TA) were evaluated and major carboxylic acid components of apricot fruits were detected and quantified. Principal component analysis (PCA) was performed to study correlation between fruit quality parameters and to evaluate maturity stage and clone effects which are considered as decisive factors in the quality of apricots fruits. The clones were analyzed during three maturity stages: semi-ripe (M1), commercially ripe (M2), and tree ripe (M3). The results showed that malic and citric acids were the predominant organic acids in all apricots. Among different maturity stages, it is found that malic acid ranged from 7.02 to 22.86 g/kg of fresh weights (FW) while citric acid varied from 6.36 to 23.28 g/kgFW. Quinic, fumaric, and ascorbic acids were also quantified in the apricot fruits. Significant levels of vitamin C ranged from 0.001 to 0.150 g/kg FW were detected in the analyzed apricots and a remarkable variation was observed in all quality parameters. Moreover, significant correlations were found between the variables pH, SS, SS/TA ratio and organic acids mainly citric and malic acids. A genetic diversity was found between apricots clones according to their quality characteristics. This variability can be an asset in the apricots sector development in the region of Marrakesh either for fresh consumption or their processing into different products.

Keywords: /Apricot/ /Maturity/ /Quality/

Liu, Hui, et.al. 2017. Effects of calcium treatment and low temperature storage on cell wall polysaccharide nanostructures and quality of postharvest apricot (*Prunus armeniaca*). Food Chem. 225: 87 – 97.

Abstract

Cell wall polysaccharides play an important role in postharvest fruit texture softening. Effects of calcium treatment combined with cold storage on the physical properties, polysaccharide content and nanostructure of apricots were investigated. Apricots were immersed in distilled water, 1% or 3% w/v calcium chloride, then stored at 5 °C or 10 °C. Storage at 5 °C significantly improved apricot quality and shelf life. Significant changes in the concentration and nanostructure of cell wall pectins and hemicelluloses revealed their disassembly and degradation during apricot storage. These modifications could be retarded by 1% w/v calcium chloride treatment. Meanwhile, the basic width units of apricot cell wall polysaccharide chains were 11.7, 31.2 and 39.1 nm for water-soluble pectin, 11.7, 17.6 and 19.5 nm for chelate-soluble pectin, and 15.6 and 23.4 nm for hemicellulose. The results suggest that texture of apricots can be effectively maintained by 1% calcium chloride treatment and storage at 5 °C.

Keywords: /Apricot/ /Postharvest/ /Softening/ /Calcium chloride/ /Pectin/

AVOCADO

Rivera, Sebastian A., et.al. 2017. Identification of preharvest factors determining postharvest ripening behaviors in ‘Hass’ avocado under long term storage. Scientia Hort. 216: 29 – 37.

Abstract

A major challenge for the global avocado industry is to provide a homogenous product in terms of fruit ripening behavior, especially considering the significant variability in quality that can be found within a box or pallet of the fruit. The broad range of conditions under which trees are grown, particularly with regard to climate, soil and agronomical management, can influence this ripening variability. The aims of this study were (i) to determine the variability in fruit ripening among ‘Hass’ avocado grown under different conditions in Chile and (ii) to understand the postharvest fruit-ripening behavior of ‘Hass’ avocado due to the combined effect of several preharvest variables. Preharvest variables were evaluated at 42 experimental sites in Chile during three consecutive seasons. In addition, avocados with over 21% dry matter were collected at each site during each season and stored for 35 d at 5 °C under normal atmospheric conditions before being ripened at 20 °C. Indicators of ripening behavior, such as the softening rate (SOFTRATE), change in peel color (COLOR35) and days at 20 °C necessary to reach the ready-to-eat stage (RTE35), were evaluated. As expected, high fruit variability in terms of ripening behavior was observed among the experimental sites and seasons. Multivariate analysis showed that the seasonal mean minimum air temperature, seasonal degree-days, trunk diameter and fruit firmness at harvest had a proportional relationship with postharvest SOFTRATE and COLOR35 during storage and a significant inverse relationship with RTE35. Conversely, the leaf area index, number of plants per hectare, and irrigation management at the bloom stage had a proportional relationship with RTE35 and an inverse relationship with SOFTRATE and COLOR35. Moreover, all of the three postharvest ripening behavior indicators were significantly ($p < 0.05$) estimated by predictive

models considering preharvest variables. Therefore, attempting to predict postharvest behavior by considering only a single preharvest variable could be a misleading simplification of reality because several factors, including climate/environmental, agronomic management and physiological variables, influence the ripening behavior of 'Hass' avocado fruit.

Keywords: /Avocado/ /Fruit Quality/

Tesfay, S.Z. and L.S. Magwaza. 2017. Evaluating the efficacy of moringa leaf extract, chitosan and carboxymethyl cellulose as edible coatings for enhancing quality and extending postharvest life of avocado (*Persea americana* Mill.) fruit. Food Packag. & Shelf Life. 11: 40–48.

Abstract

This experiment was conducted to investigate a novel moringa leaf extract, together with commercially available edible coatings, namely, chitosan and carboxymethylcellulose (CMC), as postharvest treatments to enhance shelf-life and improve the quality of 'Fuerte' and 'Hass' avocado fruit. Postharvest treatment included a 2% moringa extract with an emulsifier, two levels of chitosan (0.5, 1%), and CMC (0.5,1%). Moringa extract with emulsifier and moringa containing chitosan and CMC significantly improved fruit quality of both cultivars. 'Fuerte' fruit treated with the combination of CMC (1%) and 2% moringa had significantly lower mass loss ($1.78 \pm 0.08\%$), electrical conductivity ($192.0 \pm 3.0 \mu\text{m}$) and respiration rate ($167.4 \pm 40.8 \text{ mg/kg/h}$) compared to the untreated control with respective values of $4.7 \pm 0.7\%$, $290.0 \pm 5.0 \mu\text{m}$ and $290.0 \pm 62.0 \text{ mg/kg/h}$. The same treatment had higher values for firmness ($50.0 \pm 4.25 \text{ N}$) and phytochemical characteristics, mainly mannoheptulose ($5.7 \pm 0.6 \text{ g/kg}$), and lower polyphenol oxidase ($0.6 \pm 0.06 *1000 \text{ U/kg}$) and lipid peroxidation ($0.89 \pm 0.06 \text{ nmol/g}$) in 'Fuerte' fruit. For 'Hass', similar results were also observed, where a combination of 2% moringa leaf extract with 1% of CMC reduced mass loss almost by 50%, while mannoheptulose was maintained by 8-folds. The results observed in this study showed that investigated edible coatings containing moringa leaf extract improve fruit quality and shelf-life. It could therefore potentially be commercialized as a new edible coating for future industry application.

Keywords: /Avocado/ /Edible Coatings/ /Antimicrobial/ /Antioxidant/

BANANA

Siriwardana, Harshani, et.al. 2017. Basil oil plus aluminium sulfate and modified atmosphere packaging controls crown rot disease in Embul banana (*Musa acuminata*, AAB) during cold storage. Scientia Hort. 217: 84 – 91.

Abstract

Effect of basil oil spray treatment in combination with modified atmosphere packaging was investigated in controlling crown rot and extending the shelf life of Embul banana (*Musa acuminata*, AAB) at 12–14 °C. Embul banana fruits were treated with 1% aluminium sulfate, 1% aluminium sulfate + 0.4% basil oil and distilled water (control). Treated banana samples were packed in Low Density Polyethylene bags and stored at 12–14 °C. In-package gases were analysed after 14 days of cold storage. Physicochemical properties, nutritional properties, sensory properties and crown rot disease severity as well as residues in treated banana peel were determined in ripening induced fruits. Test marketing trials were conducted in fruit outlets in Dambulla and Kiribathgoda, Sri Lanka where treatments were provided

to consumers and staff to obtain feedback on the quality of treated banana. At the end of 14 days, O₂ in packages remained between 3.1–3.7% while CO₂ varied from 4.2 to 4.7%. 1% aluminium sulfate + oil treatment significantly controlled crown rot disease compared to others. Most of the physicochemical, sensory properties of aluminium sulfate + basil oil treated banana were not significantly different compared to control whereas nutritional properties of treated samples showed no drastic changes compared to control. Treated samples scored higher for peel colour and taste over control samples, by staff and consumers of fruit outlets. Consumers preferred basil oil treated banana over untreated due to their sweet and pleasant taste. Insignificant amount of residues persisted in treated banana. This current safe, eco-friendly treatment strategy could be recommended in preparing Embul as well as other banana varieties belonging to *Musa acuminata*, AAB group for commercial scale export to various destinations which require a transit time of two weeks.

Keywords: /Banana/ /Crown Rot Disease/

BLUEBERRIES

Liato, V., Hammami, R. and Aider, M. 2017. Influence of electro-activated solutions of weak organic acid salts on microbial quality and overall appearance of **blueberries** during storage. Food Microbiol. 64: 56 - 64.

Abstract

The aim of this work was to study the potential of diluted electro-activated solutions of weak organic acid salts (potassium acetate, potassium citrate and calcium lactate) to extend the shelf life of blueberries during post-harvest storage. The sanitizing capacity of these solutions was studied against pathogenic bacteria *Listeria monocytogenes* and *E. coli* O157:H7 as well as phytopathogenic fungi *A. alternata*, *F. oxysporum* and *B. cinerea*. The results showed that a 5-min treatment of inoculated blueberries with electro-activated solutions resulted in a 4 log CFU/g reduction in *Listeria monocytogenes* for all solutions. For *E. coli* O157:H7, the electro-activated potassium acetate and potassium citrate solutions achieved a decrease of 3.5 log CFU/g after 5 min of berry washing. The most important fungus reduction was found when blueberries were washed with an electro-activated solution of potassium acetate and a NaOCl solution. After 5 min of blueberry washing with an electro-activated potassium acetate solution, a very high reduction effect was observed for *A. alternata*, *F. oxysporum* and *B. cinerea*, which showed survival levels of only 2.2 ± 0.16 , 0.34 ± 0.15 and 0.21 ± 0.16 log CFU/g, respectively. Regarding the effect of the washing on the organoleptic quality of blueberries, the obtained results showed no negative effect on the product color or textural profile. Finally, this work suggests that washing with electro-activated solutions of weak organic acid salts can be used to enhance the shelf-life of blueberries during post-harvest storage.

Keywords: /Blueberries/ /Post-harvest/ /Storage/ /Food borne Pathogens/ /Quality/

CANTALOUPE

Fu, Yezhi, et.al. 2017. Pathogen biofilm formation on **cantaloupe** surface and its impact on the antibacterial effect of lauroylarginate ethyl. Food Microbiol. 64: 139 - 144.

Abstract

Pathogen biofilm at fruit surface may pose a particular risk to food safety. In this study, the biofilms of *Listeria monocytogenes* V7 and *Salmonella enterica* serovar Typhimurium ATCC 13311 on cantaloupe fruit surface were visualized, and the resistance of biofilms against lauroylarginate ethyl (LAE, an antibacterial compound) was evaluated. Each bacterium was inoculated on isolated cantaloupe rind surfaces at 10^5 – 10^6 CFU/cm² and after incubation for 2, 12, 24, and 48 h, the surfaces were imaged using cryo-scanning electron microscopy (Cryo-SEM). The images showed that both pathogens formed biofilms on rind surfaces, with *S. Typhimurium* forming biofilm in 12 h and *L. monocytogenes* cells starting to aggregate in 2 h. For the inoculated rind surfaces treated with LAE, the cell counts were affected by both the incubation time and LAE concentration. For rind surface with 2 h incubation of *S. Typhimurium*, 400 and 800 µg/mL LAE was able to achieve >2.00 log reduction; however, 12 h incubation required 1600 and 2000 µg/mL LAE for >2.00 log reduction. In contrast, even the highest LAE concentration (2000 µg/mL) was unable to cause 1.00 log reduction for *L. monocytogenes* regardless the incubation time applied. The results showed that the biofilms of both bacteria substantially reduced LAE efficacy, and that the biofilm of *L. monocytogenes* was more resistant than that of *S. Typhimurium*.

Keywords: /Cantaloupe/ /Biofilm/

Jung, Yangjin, et.al. 2017. Sanitizer efficacy in preventing cross-contamination during retail preparation of whole and fresh-cut cantaloupe. Food Control. 75: 228 - 235.

Abstract

The objective of this study was to evaluate the efficacy of tap water (TW), commercial electrolyzed water (EW), and a commercial acid-based sanitizer (AS) in preventing cross-contamination of cantaloupe during processing in retail settings. A whole cantaloupe was dip-inoculated with a cocktail of *Salmonella* or *L. monocytogenes* to achieve approximately 5 log CFU/cm². One inoculated and two non-inoculated whole cantaloupes were treated in 76 L of TW, EW (free chlorine: 50-60 ppm), or AS (pH 2.8, combination of lactic acid and phosphoric acid) for 5 min. Subsequently, fresh-cut cantaloupe flesh from the inoculated and non-inoculated cantaloupes were soaked together in 76 L of TW, EW, or AS for 90 s. EW treatment resulted in an approximately 1.5 log reduction in both *Salmonella* and *L. monocytogenes* on the rind of whole cantaloupe, which was significantly greater than with the TW treatment (0.5 log reduction) ($P < 0.05$). Cross-contamination of non-inoculated whole cantaloupes occurred when washed with inoculated whole cantaloupe in TW (four of four cantaloupes positive for *Salmonella* and *L. monocytogenes*) or AS (four of four cantaloupes positive for *Salmonella* and two of four positive for *L. monocytogenes*). Cross-contamination did not occur when whole cantaloupes were washed in EW. Additional washing of mixed fresh-cut cantaloupe flesh from the inoculated and non-inoculated cantaloupes prepared after washing of whole cantaloupes demonstrated that the EW treatment reduced the likelihood of cross-contamination compared with TW and AS. No viable *Salmonella* or *L. Monocytogenes* were detected from 100 mL sample of EW processing water, but were detected in TW and AS (*L. monocytogenes* only). The addition of a sanitizing agent to water used for the processing of whole and fresh-cut cantaloupe in a retail setting is recommended to prevent cross-contamination and reduce microbial load.

Keywords: /Cantaloupe/ / Fresh- Cut/

Ukuku, dike O, et.al. 2017. Effect of hydrogen peroxide in combination with minimal thermal treatment for treatment for reducing bacterial populations on cantaloupe rind surfaces and transfer to fresh-cut pieces. J. Food Prot. 79(8): 1316 – 1324.

Abstract

Surface structure and biochemical characteristics of bacteria and produce play a major role in how and where bacteria attach, complicating decontamination treatments. Whole cantaloupe rind surfaces were inoculated with Salmonella, Escherichia coli O157:H7, and Listeria monocytogenes at 10⁷ CFU/ml. Average population size of Salmonella, Escherichia coli O157:H7, and L. monocytogenes recovered after surface inoculation was 4.8 ± 0.12, 5.1 ± 0.14, and 3.6 ± 0.13 log CFU/cm², respectively. Inoculated melons were stored at 5 and 22 °C for 7 days before washing treatment interventions. Intervention treatments used were (i) water (H₂O) at 22 °C, (ii) H₂O at 80 °C, (iii) 3% hydrogen peroxide (H₂O₂) at 22 °C, and (iv) a combination of 3% H₂O₂ and H₂O at 80 °C for 300 s. The strength of pathogen attachment (SR value) at days 0, 3, and 7 of storage was determined, and then the efficacy of the intervention treatments to detach, kill, and reduce transfer of bacteria to fresh-cut pieces during fresh-cut preparation was investigated. Populations of E. coli O157:H7 attached to the rind surface at significantly higher levels (P, 0.05) than Salmonella and L. monocytogenes, but Salmonella exhibited the strongest attachment (SR value) at all days tested. Washing with 3% H₂O₂ alone led to significant reduction (P, 0.05) of bacteria and caused some changes in bacterial cell morphology. A combination treatment with H₂O and 3% H₂O₂ at 80 °C led to an average 4-log reduction of bacterial pathogens, and no bacterial pathogens were detected in fresh-cut pieces prepared from this combination treatment, including enriched fresh-cut samples. The results of this study indicate that the microbial safety of fresh-cut pieces from treated cantaloupes was improved at day 6 of storage at 5 °C and day 3 of storage at 10 °C.

Keywords: /Cantaloupe/ /Fresh-Cut/ /Decontamination/

CHERRY

Gotor-Vila, A., et al. 2017. Antifungal effect of volatile organic compounds produced by *Bacillus amyloliquefaciens* CPA-8 against fruit pathogen decays of **cherry**. *Food Microbiol.* 64: 219 – 225.

Abstract

The present work focuses on the antifungal effect of volatile organic compounds (VOCs) produced by *Bacillus amyloliquefaciens* CPA-8 against *Monilinia laxa*, *M. fructicola* and *Botrytis cinerea*, three postharvest fruit pathogens of sweet cherry fruit. VOCs were evaluated with a double petri dish assay against mycelial and colony growth of target pathogens. For this purpose, CPA-8 was grown on different media and cultured for 24 and 48 h at 30 °C before assays. Data showed that mycelial growth inhibition was higher when CPA-8 was grown on Tryptone Soya Agar (TSA) while no differences were generally observed when CPA-8 was cultured for either, 24 and 48 h. Moreover, no effects were observed on colony growth. The main volatile compounds emitted by CPA-8 were identified by solid-phase micro extraction (SPME)-gas chromatography as 1,3-pentadiene, acetoin (3-hydroxy-2-butanone) and thiophene. Pure compounds were also tested in vitro on mycelial growth inhibition and their EC50 values against the three pathogens were estimated. Thiophene was the most effective VOC, showing more than 82% suppression of mycelial growth at the highest concentration (1.35 mL/mL headspace) and EC50 values ranging from 0.06 to 6.67 mL/mL headspace. Finally, the effectiveness of thiophene and CPA-8 VOCs was evaluated against artificially inoculated cherry fruits. Among the target pathogens, *M. fructicola* was clearly controlled by CPA-8 with less than 25% of rotten fruits compared to the control (65% disease incidence) and for all pathogens, less than 37.5% of CPA-8 treated decayed fruits produced

spores (disease sporulation). Otherwise, pure thiophene showed no effect against any pathogen on disease incidence and disease sporulation. The results indicated that VOCs produced by *B. amyloliquefaciens* CPA-8 could develop an additive antifungal effect against postharvest fruit pathogens on stone fruit.

Keywords: /Cherry/ /Biocontrol/

CITRUS

De Ancos, B., et.al. 2017. Influence of orange cultivar and mandarin postharvest storage on polyphenols, ascorbic acid and antioxidant activity during gastrointestinal digestion. Food Chem. 225: 114 – 124.

Abstract

Polyphenols, ascorbic acid content and antioxidant activity of two sweet oranges (Navel-N and Cara Cara-CC) and mandarin (Clementine-M) as well as their bio accessibilities were evaluated in pulps and compared to those in fresh juice. Thus, pulps of oranges and mandarins displayed higher hesperidin (HES), narirutin (NAR), total flavonoids (TF), total phenols (TP) and antioxidant activity (AAC) than their corresponding juices. Also, CC products presented higher bioactive compounds content than N ones. Bio accessibility of bioactive compounds and AAC were higher in pulps of both oranges and mandarin than in their corresponding juices. Oranges (N and CC) pulps and juices presented higher bio accessibilities than mandarin ones. The postharvest storage of mandarin at 12 °C during 5 weeks not only produced a significant increase of the bioactive compounds but also an increase of their bio accessibility. The bio accessibility of *Citrus* bioactive compounds is necessary for calculating more accurately their daily intake amount.

Keywords: /Orange/ /Mandarin/ /Postharvest / /Storage/

Izumi, H. , Y. Nakata, A. Inoue and Y. Ozaki. 2016. Quality and shelf-life of enzymatically peeled and segmented citrus fruits in Japan. Acta Hort. 1141: 246 – 250.

Abstract

Several Japanese citrus fruits, Hassaku, Sweet spring, May pummelo, and Satsuma mandarin, were either peeled by vacuum infusion of a pectinase solution or by hand and then the sections were separated by hand. The citrus segments were then submerged in a cellulase solution to eliminate the segment membranes. There were no significant differences in the microflora, nutrient value (ascorbic acid content and β -carotene equivalent), physiology (respiration and ethylene production rates), and physicochemical properties (texture, juice leakage, color index, and pH) between enzyme-peeled and hand-peeled segments of Hassaku, Sweet spring, and May pummelo. When enzyme-peeled Satsuma mandarin segments were compared with segments chemically peeled using HCl and NaOH solutions in preparation for a conventional canned product, no differences were found in quality, except that the microbial diversity and color index were less in enzyme-peeled segments, and the respiration rate was less in chemically peeled segments. Enzyme-peeled citrus segments were preferable to hand- or chemically peeled segments for their visual appearance. Enzyme-peeled Satsuma mandarin segments were stored in three types of package films with different O₂ permeability to estimate the shelf-life in a modified atmosphere package (MAP) at 10°C. CO₂ approached equilibrium concentrations of 3, 5, and

8% in films of OTR 7000, 1000 and 500 mL m⁻² d⁻¹ atm⁻¹, respectively, after 4 d of storage. Microbiological, nutritional, and physicochemical quality of the segments was maintained throughout 6 d of storage regardless of the film package, suggesting that the shelf-life of enzymatically peeled Satsuma mandarin segments as a fresh-cut produce is 6 d in a MAP at 10°C.

Keywords: /Citrus/ /Shelf Life/ /Modified Atmosphere Packaging/

FIGS

Hong, G., C. Crisosto and M.I. Cantwell. 2016. Quality and physiology of two cultivars of fresh-cut **figs** in relation to ripeness, storage temperature and controlled atmosphere. *Acta Hort.* 1141: 213– 220.

Abstract

The performance of fresh-cut figs was evaluated for two cultivars at two stages of ripeness (commercial and full ripe). Texture, but not external color, was a consistent indicator of ripeness. Fresh-cut figs (maroon-skin 'Brown Turkey' and yellow-green skin 'Sierra' cultivars) were prepared from sanitized fruit halved with a stainless steel knife, and stored in plastic clamshells in air at 0 or 5°C or controlled atmospheres (3% O₂ + 6, 12 or 18% CO₂) at 5°C. Cut pieces retained excellent quality for 6 days under all conditions. After 9 and 12 days, best quality was obtained in air at 0°C and in CA at 5°C with 12 or 18% CO₂, but these atmospheres did result in increased ethanol and acetaldehyde concentrations. Sugars decreased during storage in 'Brown Turkey' but not in 'Sierra' fruit and were different between ripeness stages. Respiration rates of fresh-cut figs were similar to those of intact fruits (4-7 and 8-10 μL CO₂ g⁻¹ h⁻¹ at 0 and 5°C, respectively). Ethylene production was similar between ripeness stages, but different between cultivars. Loss of visual quality was not associated with discoloration but with microbial growth on the cut surfaces similar to that on the external surface of intact fruits. This was due mostly to molds and CO₂ atmospheres retarded fungal growth. Temperature control was much more important than controlled atmospheres for fresh-cut fig shelf-life. Shelf-life was little affected by ripeness stage but full ripe fruit had higher sugar content. Figs performed well as fresh-cut fruit and could add flavor and diversity to cut fruit trays.

Keywords: /Figs/ /Firmness/ /Ethylene/

GRAPES

Griesser, Michaela, et.al. 2017. Challenging the potassium deficiency hypothesis for induction of the ripening disorder **berry** shrivel in grapevine. *Scientia Hort.* Hort. 216: 141 – 147.

Abstract

Berry shrivel (BS) is a ripening dysfunction resulting in grapes with low sugar content, high acidity, reduced anthocyanins and flaccid berries. In this study we challenge the K⁺-deficiency hypothesis as underlying cause for BS in grapevine. The hypothesis is based on empirical vineyard studies and proposes that K⁺-deficiency or a disbalance of K⁺/Mg²⁺ in plant content cause of BS. Recent studies on more grapevine varieties and further geographical locations lack supporting evidence for the K⁺ hypothesis. Here we review existing evidence from the field and apply physiological analyses to study processes involved in K⁺ and nutrients transport in BS and non-symptomatic clusters. For the first time the molecular background of K⁺ transportation is being studied over the course of BS disorder.

Our objectives were (1) to determine the distribution of nutrients in BS vines and clusters and (2) to evaluate the role of selected potassium transport proteins and channels during grape berry development and BS induction in pedicels and berries. Our results with ICP-MS show a strong and significant reduction of K⁺ concentration in rachis and pedicels of BS grapes, whereas boron, zinc, copper and aluminium were increased. Concentration of nutrients in BS berries were either not changed or increased compared to non-symptomatic clusters. Expression analyses with qPCR in pedicels revealed no pre-symptomatic differences of genes involved in potassium transport (VviKUP1, VviKUP2 and VviK1.2), but later during ripening reduced expression was observed. In BS berries the expression of VviK1.2 was reduced before veraison. We show significant K⁺ deficiency in BS rachis and pedicels along with partial reduced expression of K⁺ transporter genes. Consequently K⁺ phloem transport is involved in BS induction, however our study did not provide conclusive evidence to support the K⁺ deficiency hypothesis as a single factor for BS induction. Instead the idea that a combination of further stress factors influences K⁺ and assimilates translocation towards sink organs before veraison is proposed.

Keywords: /Berry/ /Grapevine/ /Ripening/

Jin,Xiaoduo, et.al. 2017. Varietal heterogeneity of textural characteristics and their relationship with phenolic ripeness of wine grapes. *Scientia Hort.* 216: 205 – 214.

Abstract

The phenolic ripeness of grapes at harvest imparts important functions for high-quality red wine and might be highly related to the textural properties of berries. The textural characteristics of 20 wine grape cultivars were detected by puncture test and textural profile analysis (TPA); and their relationship with phenolic ripeness were determined in this study. Varietal heterogeneity in textural characteristics was clearly observed among the colored and white grapes. Thirteen colored varieties showed marked differences in phenol extractability indices. The cellular maturity index, related to anthocyanin extractability, was highly dependent upon berry skin thickness with a good equation of regression. The multiple correlation coefficient was 0.940. No significant difference in skin mechanical properties and TPA was found between colored and white cultivars. Grape variety showed a significant interaction with puncture position in terms of berry skin hardness for both colored and white berries. Principal component analysis demonstrated differences in textural properties among the wine grape cultivars. Three clear clusters of 20 varieties were differentiated based on the skin hardness at the side of the berry. The results of this study indicated that there are relationships between the textural characteristics of wine grapes, cellular maturity index, and seed maturity index at harvest.

Keywords: /Grapes/ /Ripening/

Yang,Qiya, et.al. 2017. Effect of *Yarrowia lipolytica* on postharvest decay of grapes caused by *Talaromyces rugulosus* and the protein expression profile of *T. rugulosus*. *Postharvest Biol. & Technol.* 126: 15 – 22.

Abstract

Biological control of pathogens using biocontrol agents has been document to be an effective and safe method for managing postharvest diseases. A better understanding of the mode of action of postharvest biocontrol agents on fruit surfaces, is critical for the advancement of successful

implementation of postharvest biocontrol products. We investigated the biocontrol efficacy of *Yarrowialipolytica* against the postharvest decay of table grapes caused by *Talaromycesrugulosus* and the possible mechanisms involved. *Y. lipolytica* significantly decreased the decay incidence of the treated grape berries compared to the untreated control. The response of *T. rugulosus* to different components of *Y. lipolytica* indicated that only the yeast cells exhibited inhibitory effect on fungal mycelium, while extracellular metabolites did not show any significant effect on *T. rugulosus*. The in vitro experiment showed that *Y. Lipolytica* significantly inhibited spores germination and lesion diameter caused by *T. rugulosus*. We observed that the grape wounds were rapidly colonized by the antagonistic yeast at 25 °C and 4 °C. Thirty-five differential proteins were identified in *T. rugulosus* out of which 31 were down-regulated. Majority of the down-regulated proteins were related to basic metabolism, which suggested that the basic metabolism of *T. rugulosus* was suppressed.

Keywords: /Table grapes/ /Postharvest Decay/

GUAVA

Inam-ur-Raheem, M., et. al. 2016. 2016. Firming and anti-browning agents affect the quality characteristics of fresh-cut guava stored at 5°C. Acta Hort. 1141: 237 – 244.

Abstract

The present study was conducted in three phases to evaluate the effectiveness of anti-browning agents and firming agents individually and in combination on overall quality of fresh-cut guava slices. Uniform guavas were picked, washed, sliced, treated and subjected to different analyses after 0, 6, 12, 18 and 24 d at 5°C. In Phase I and II, guava slices were treated with different concentrations of firming agents (calcium lactate and calcium chloride) and anti-browning agents (L-ascorbic acid and cysteine). For Phase III, guava slices were treated with combinations of the best treatments selected from Phase I and II. For the combination treatments, slices were analyzed for various physico-chemical characteristics (firmness, browning, weight loss, pH and total soluble solids), microbial counts and sensory characteristics. In Phase I, 2.7% calcium chloride and 3.6% calcium lactate maintained firmness while, in Phase II, 1.8% ascorbic acid and 0.8% cysteine delayed browning longer at 5°C. In Phase III, the combination of 2.7% calcium chloride and 1.8% ascorbic acid gave the best results overall among all treatments in relation to physico-chemical, microbiological and sensory quality for up to 12 d at 5°C. Keywords: fresh-cut technology, calcium chloride, calcium lactate, ascorbic acid, cysteine Murmu, SanchitaBiswas and HariNiwas Mishra. 2017. Engineering evaluation of thickness and type of packaging materials based on the modified atmosphere packaging requirements of guava (Cv. Baruipur).

Keywords: /Guava/ /Fresh-Cut/ /Anti-Browning/

Murmu, Biswas Sanchita, Hari Niwas Misra. 2017. Engineering evaluation of thickness and type of and type of packaging materials based on the modified atmosphere packaging requirements of guava. (Cv. Baruipur). LWT – Food Sci. & Technol. 78: 273 – 280.

Abstract

The feasibility of using three commonly available packaging films viz. low-density polyethylene (50 and 70 µm thickness), polypropylene (25 and 50 µm thickness), and polyvinyl chloride (PVC) (40 and 50 µm thickness) at 5 and 10 °C were studied for optimum storage of guava. At each temperature, the

oxygen, carbon dioxide, and water vapor transmission rates (OTR, CTR, and WVTR) requirement of guava were compared with those of the selected films. The storage life, peel color and pulp firmness of guava at the end of the storage in each packaging film were analyzed. The OTR and CTR required for designing the modified atmosphere packaging of guava were relatively close to that available with the PVC films but, the required WVTR was higher than that available with the studied films. Highest storage-life (25 and 20 days at 5 and 10 °C, respectively) were observed in PVC 40 film, and at the end of the storage the samples showed brighter color, lower firmness and were perceived as mature and highly acceptable by the judges. The available WVTR of PVC 40 film was highest. Hence, it may be used for storage of guava with estimated mass of moisture scrubber to prevent in-package condensation.

Keywords: /Guava/ /Modified Atmosphere Packaging/ /Storage life/

LITCHI

Xu, Cong, et.al. 2016. Effect of composite biological preservative containing *Lactobacillus plantarum* on postharvest **litchi** quality. *Food Sci. & Biotechnol.* 25 (6):1639 – 1643.

Abstract

Biological preservatives containing live microorganisms are environmentally friendly and non-toxic substances used to preserve the quality of fresh fruits. This study investigated whether a composite biological preservative containing live *Lactobacillus plantarum* (designated as DN003) could preserve the quality of postharvest litchi fruits at high temperature and in humid environment. Postharvest litchi fruits were briefly soaked in DN003, then dried and stored at 29–33 °C with 95–98% relative humidity; prochloraz treatment was included as positive control and non-treatment as negative control. In comparison with negative control group, litchi fruits in both DN003-treated and positive control groups better retained their appearance with lower polyphenol oxidase and peroxidase activities and showed higher concentrations of vitamin C, titratable acids, and total sugar content. These data demonstrated that the new composite biological preservative containing *L. plantarum* is promising to be used in the preservation of postharvest litchi fruit, particularly in high-temperature and humid environment.

Keywords: /Litchi/ /Postharvest/ /Quality/

LONGAN

Lin, Yifen, et.al. 2017. Hydrogen peroxide-induced pericarp browning of harvested **longan** fruit in association with energy metabolism. *Food Chem.* 225: 31–36.

Abstract

Energy metabolism of “Fuyan” longan fruit treated with hydrogen peroxide (H_2O_2), the most stable of their active oxygen, and its relationship to pericarp browning were investigated in this work. The results displayed that H_2O_2 significantly decreased contents of adenosine triphosphate (ATP) and adenosine diphosphate (ADP). It also inhibited activities of H^+ -ATPase, Ca^{2+} -ATPase and Mg^{2+} -ATPase in membranes of plasma, vacuole and mitochondria during the early-storage and mid-storage (except for mitochondrial membrane Mg^{2+} -ATPase). These results gave convincing evidence that the treatment of H_2O_2 accelerating pericarp browning in harvested longan was due to a decrease of ATPase activity and

available ATP content. This might break the ion homeostasis and the integrity of mitochondria, which might reduce energy charge and destroy the function and compartmentalization of cell membrane. These together aggravated browning incidence in pericarp of harvested longan fruit.

Keywords: /Longan/ /Browning/

LOQUAT

Alos, E., et.al. 2017. Ethylene biosynthesis and perception during ripening of loquat fruit (*Eriobotryajaponica* Lindl.). J. Plant Physiol. 210: 64 – 71.

Abstract

In order to gain insights into the controversial ripening behavior of loquat fruits, in the present study we have analyzed the expression of three genes related to ethylene biosynthesis (*ACS1*, *ACO1* and *ACO2*), two ethylene receptors (*ERS1a* and *ERS1b*), one signal transduction component (*CTR1*) and one transcription factor (*EIL1*) in peel and pulp of loquat fruit during natural ripening and also in fruits treated with ethylene ($10 \mu\text{L L}^{-1}$) and 1-MCP ($10 \mu\text{L L}^{-1}$), an ethylene action inhibitor. In fruits attached to or detached from the tree, a slight increase in ethylene production was detected at the yellow stage, but the respiration rate declined progressively during ripening. Accumulation of transcripts of ethylene biosynthetic genes did not correlate with changes in ethylene production, since the maximum accumulation of *ACS1* and *ACO1* mRNA was detected in fully coloured fruits. Expression of ethylene receptor and signalling genes followed a different pattern in peel and pulp tissues. After fruit detachment and incubation at 20 °C for up to 6 days, *ACS1* mRNA slightly increased, *ACO1* experienced a substantial increment and *ACO2* declined. In the peel, these changes were advanced by exogenous ethylene and partially inhibited by 1-MCP. In the pulp, 1-MCP repressed most of the changes in the expression of biosynthetic genes, while ethylene had almost no effects. Expression of ethylene perception and signalling genes was barely affected by ethylene or 1-MCP. Collectively, a differential transcriptional regulation of ethylene biosynthetic genes operates in peel and pulp, and support the notion of non-climacteric ripening in loquat fruits. Ethylene action, however, appears to be required to sustain or maintain the expression of specific genes.

Keywords: /Loquat/ /Ethylene/ /1-MCP/ /Postharvest/ /Ripening/

MANGO

Awad, Mohamed A., et.al. 2017. Quality and biochemical changes of Hindi-Besennara mangoes during shelf life as affected by chitosan, trans-resveratrol and glycine betaine postharvest dipping. Scientia Hort. 217: 156 – 163.

Abstract

Effects of chitosan (1%), trans-resveratrol (resveratrol) (1.6×10^{-5} M, 1.6×10^{-4} M and 1.6×10^{-3} M) and glycine betaine (GB) (10, 15 and 20 mM) dipping on quality and biochemical changes of 'Hindi-Besennara' mangoes during ripening at shelf life (SL) (18 ± 2 °C, 60–70% RH) were studied. Resveratrol, especially at low rate followed by GB, especially at high rate, decreased decay percentage after one and two weeks of SL compared to other treatments. Both compounds at all rates retained higher fruit firmness during SL and higher titratable acidity (TA) (only after one week of SL). Both GB and

resveratrol at all rates retained higher vitamin C level than control with no effect on total soluble solids (TSS) after two weeks of SL. These compounds had no effect on weight loss after one week, but increased it after two weeks of SL compared to control. Chitosan showed higher weight loss during SL but, retained higher TA and vitamin C, and lower pH with no significant impact on firmness, TSS and decay compared to control. Chitosan, low and medium resveratrol rates, and low and high GB rates maintained higher membrane stability of peel after two weeks of SL compared to control. All treatments showed lower α -amylase but, higher peroxidase (POD) activities in peel than control after two weeks of SL. High resveratrol rate retained higher total phenols level than control, in contrast to chitosan after two weeks of SL while, total flavonoids was not affected. Compared to initial, peel free radical scavenging capacity (FRSC) decreased after one week followed by a sharp increase after two weeks of SL. Chitosan, medium and high resveratrol rates, and medium GB rate showed higher FRSC than control after one week of SL but, with no differences after two weeks of SL. In conclusion, both trans-resveratrol and GB treatments retained quality of 'Hindi-Besennara' mangoes during SL and being suggested as natural alternatives to synthetic chemicals.

Keywords: /Mango/ /Chitosan/ /Antioxidants/ /Ripening/ /Softening/

De Sousa, Aline Ellen D., et.al. 2017. Control of browning of minimally processed mangoes subjected to ultraviolet radiation pulses. J. Food Sci. Technol. 54(1): 253 – 299.

Abstract

The pulsed ultraviolet radiation (UVP) has been used as an alternative strategy for the control of microorganisms in food. However, its application causes the browning of minimally processed fruits and vegetables. In order to control the browning of the 'Tommy Atkins' minimally processed mango and treated with UVP (5.7 J cm⁻²) it was used 1-methylcyclopropene (1-MCP) (0.5 l L⁻¹), an ethylene action blocker in separate stages, comprising five treatments: control, UVP (U), 1-MCP ?UVP (M ?U), UVP ?1-MCP (U ?M) e 1-MCP ? UVP ?1-MCP (M ?U ?M). At the 1st, 7th and 14th days of storage at 12 °C, we evaluated the color (L* and b*), electrolyte leakage, polyphenol oxidase, total extractable polyphenols, vitamin C and total antioxidant activity. The 1-MCP, when applied before UVP, prevented the loss of vitamin C and when applied in a double dose, retained the yellow color (b*) of the cubes. However, the 1-MCP reduced lightness (L*) of independent mango cubes whatever applied before and/or after the UVP. Thus, the application of 1-MCP did not control, but intensified the browning of minimally processed mangoes irradiated with UVP.

Keywords: /Mango/ /Fresh-Cut/ /1-methylcyclopropene/ /Browning/

Nordey, Thibault, et.al. 2017. Robust NIRS models for non-destructive prediction of mango internal quality. Scientia Hort. 216: 51–57.

Abstract

Near infrared spectroscopy (NIRS) is increasingly being used with success in fruit supply chains for the non-destructive assessment of internal fruit quality. However, the prediction performance of NIRS was reported to be sensitive to changes in the pre- and post-harvest factors involved in fruit quality variations. This study attempted to establish robust NIRS models to predict mango internal quality, regardless of the conditions encountered by fruits on the tree and after harvest.

A database involving mangoes ($n = 250$) from different production years and orchards and which were harvested at different maturity stages and stored at different temperatures for various periods was used to characterize mango quality using NIRS. The large variations measured in mango total soluble solid (TSS) content, dry matter, flesh color and acidity ensured that the dataset considered in this study covered differences in quality levels that can be encountered for the mango cultivar studied. Variable selection procedures and pre-processing techniques were used to improve the performance of the Partial Least Squares Regression (PLSR) models that accurately predicted the mango quality traits studied, regardless of the origins and storage conditions. The root mean square errors in prediction (RMSEP) were 0.6°Brix, 1.4%, 5.9 meq 100 g FM⁻¹ and 3.16°Brix for the TSS content, dry matter content, titratable acidity and the hue angle of flesh color, respectively.

The results presented in this study confirmed that robust NIRS models can be developed to predict mango quality by considering the pre- and post-harvest factors involved in fruit quality. Further studies should assess the use of NIR spectra on fruits to address internal quality variation issues, as well as the ability of NIRS to predict fruit shelf life and eating quality at harvest.

Keywords: /Mango/ /Fruit Quality/

MELON

BasharatYousuf, Bashrat, Abhaya Kumar Srivastava. 2017. A novel approach for quality maintenance and shelf life extension offresh-cut Kajari **melon**: effect of treatments with honey and soyprotein isolate. LWT – Food Sci. & Technol. 79: 568 – 578.

Abstract

Effect of treatments with different concentrations of honey (0 mL/L of water, 50 mL/L of water, 100 mL/L of water, 150 mL/L of water) followed by coating with soy protein isolate (50 g/L of water) on fresh-cutKajari melons was investigated. Effect of honey separately without soy protein isolate coating was alsoinvestigated. The treatments were given prior to packing the samples in polypropylene trays and storedat 4 °C for sensory and overall shelf life studies. A total of eight combinations of samples with threereplicates each were analyzed for various quality attributes throughout the storage life. Highest weightloss occurred in untreated melon samples. Sample treated with 150 mL honey/L of water p50 g SPI/L ofwater maintained highest total soluble solids throughout the storage. Sensory scores below 5 were givento control sample after day 8 of storage. Samples treated with honey (150 mL/L of water) showed betterresults in terms of most of the sensory characteristics. Ripening index decreased remarkably over thestorage period with control sample reaching lowest values in comparison to treated samples. Total platecount of 9.63 log colony forming units per gram (CFU/g) for control sample and counts of less than 5 logCFU/g for treated samples were observed at the end of the storage.

Keywords: /Melon/ /Fresh-Cut/ /Shelf Life/

Zhang, Ting, et.al. 2017. 1Effect of nitric oxide treatment on chilling injury, antioxidant enzymes and expression of the CmCBF1 and CmCBF3 genes in cold-stored Hami **melon** (Cucumis meloL.) fruit.Postharvest Biol. & Technol. 127: 88 – 98.

Abstract

Short-term exposure to a low concentration of nitric oxide (NO) treatment can prevent or alleviate chilling injury (CI), and extend the postharvest life of various fresh fruits and vegetables. However no research on this topic has been reported for Hami melon fruit. In this study, Hami melon fruit were pre-treated with 60 mL/L NO for 3 h at 25 °C, and then stored at 1 ±0.5 °C with a relative humidity (RH) of 75– 80% for 49 d. The results showed that NO treatment effectively decreased the CI index and CI incidence, reduced the increases in membrane permeability and malondialdehyde (MDA) content, inhibited superoxide anion (O₂⁻) production rates, reduced H₂O₂ content, and sustained higher activity of superoxide dismutase (SOD), peroxidase (POD), catalase (CAT) and ascorbate peroxidase (APX) in the rind of Hami melon fruit during storage at 1 ±0.5 °C. C-repeat/dehydration responsive element (CRT/DRE) - binding factors (CBFs) are the best-characterized transcription factors controlling cold-responsive gene expression and cold acclimation. To investigate the molecular regulation of cold resistance by NO treatment in Hami melon fruit, a 639-bp CmCBF1 gene and a 615-bp CmCBF3 gene were identified, and the effect NO on the expression of CmCBF1 and CmCBF3 was measured by RT-qPCR. The results showed that the expression of CmCBF1 and CmCBF3 were induced, the expression of the CmCBF1 and CmCBF3 in NO treated fruit was significantly higher than in control fruit during storage at 1 ±0.5 °C. These results indicate that NO treatment can alleviate and delay CI in cold-stored Hami melon fruit via enhancing the activities of antioxidant enzymes and up-regulating the expression of CmCBF1 and CmCBF3.

Keywords: /Melon/ /Chilling Injury/

ORANGE

Castro-Garcia, S., et.al. 2017. Frequency response of late-season 'Valencia' orange to selective harvesting by vibration for juice industry. *Biosystem Eng.* 155: 77 – 83.

Abstract

Citrus mechanical harvesting has been investigated since the 1960's. Even though mechanical harvesting could significantly lower production costs, the implementation by the private sector has been slow. The current harvesting technologies detach the fruits with trunk, canopy or branch vibration. For late-season sweet orange varieties which simultaneously bear mature fruit, immature fruitlets and flowers, shaker harvesting decreases the subsequent year's yield. This study, investigated the frequency response of mature fruits and immature fruitlets to determine the optimum frequency range for an efficient and selective harvest. Laboratory vibration transmission tests were conducted with 14 branches bearing 76 mature fruits and 151 immature 'Valencia' fruitlets. The fruit and branch response to the forced vibration was measured by several sets of five triaxial accelerometers with a dynamic signal analyser. Three frequency ranges with the highest vibration transmission values were identified for mechanical harvesting lower than 10 Hz. The first frequency range (1.5e2.5 Hz) corresponded best with the most efficient vibration transmission, involving more than 90% of fruit. The second frequency range (4.5e5 Hz) successfully discriminated between mature fruit and immature fruitlets. In this frequency range, 53.4% of mature fruit amplified the acceleration a mean value of 2.2 times, while only 7.3% of immature fruitlets amplified the acceleration with a mean value of 4.4 times. The third frequency range (7e8 Hz) had the lowest vibration transmission value. The frequency response of mature citrus fruits, and their markedly higher fruit mass, was significant factors in efficient selective mechanical harvesting.

Keywords: /Orange/ /Harvesting/ /Mechanical Harvesting/

Fariborz Habibi, Asghar Ramezani . 2017. Vacuum infiltration of putrescine enhances bioactive compounds and maintains quality of blood orange during cold storage. Food Chem. 227: 1 – 8.

Abstract

The effects of putrescine (Put) treatment on anthocyanin concentrations and other bioactive compounds of two blood orange ('Moro' and 'Tarocco') cultivars during cold storage have been investigated. Put at 0, 1 and 2 mM were applied to fruit by vacuum infiltration at 26.665 kPa for 8 min and then stored at 5 ° C, and 90% RH for 60 days, plus a simulated shelf life of 2 days at 20 ° C. Put treatment maintained higher fruit firmness and reduced weight loss during storage. Anthocyanin, total phenolic content (TPC), ascorbic acid content, and antioxidant activity were also higher in treated fruit than the control during storage. pH and titratable acidity (TA) were highest in treated fruit, while soluble solids concentration (SSC) and SSC/ TA ratios were highest in untreated fruit. Overall, the quality of blood oranges maintained by Put treatment during cold storage.

Keywords: /Orange/ /Postharvest/ /Quality/ /Anthocyanin/

Sajadiye, Seyed Majid and Maryam Zolfaghari. 2017. Simulation of in-line versus staggered arrays of vented pallet boxes for assessing cooling performance of orange in cool storage. Appl. Therm. Eng. 115: 337 – 349.

Abstract

The cooling performance of fruits and vegetables including transient heat removal, temperature homogeneity and moisture loss inside the cool storages is affected by pallet boxes arrangement. In this paper, the effect of two different types of vented pallet boxes arrangement including in-line and staggered on cooling performance were compared while longitudinal gaps between the pallet boxes and cooling airflow varied at three commonly applied levels. Validated computational fluid dynamics (CFD) models of airflow, heat and mass transfer were applied as an alternative for the experiments. Results showed that staggered array increased the surface heat transfer coefficient at the pallet boxes wall from 18% to 53%, which caused 28% to 38% reduction in $\frac{3}{4}$ cooling time compared to in-line. The most effectiveness of staggered array on heat transfer coefficient occurred for 0.25 m longitudinal gap between the pallet boxes. Staggered array did not improve temperature homogeneity and moisture loss. Results also showed that, an increment of longitudinal gaps from 0.1 to 0.25 m caused 10% reduction in $\frac{3}{4}$ cooling time. Increasing more than 0.25 m, did not showed reasonable improvement in cooling performance.

Keywords: /Orange/ /Cool Storage/

PEACH

Denoya, Gabriela I., et.al. 2017. Suitability of different varieties of peaches for producing minimally processed peaches preserved by high hydrostatic pressure and selection of process parameters. LWT - Food Sci. & Technol. 78: 367 - 372.

Abstract

Fresh-cut products represent an easy way to include fruits in everyday meals. The aim of this work was to evaluate the suitability of two cultivars for high pressure processing (HPP), and to establish the principal parameters leading to a better quality preservation of minimally processed peaches. *Prunus persicae* cv. Flavorcrest and cv. Romea were subjected to different HPP-treatments according to a factorial design. The factors were: pressure level (500, 600 and 700 MPa) and holding time (1 and 5 min), applied at room temperature. Several determinations were carried out over the samples: texture parameters, ascorbic acid content, total phenols, and polyphenoloxidase and alcohol dehydrogenase activity. Results showed that only the 700 MPa treatments, for both holding time evaluated, provoked a significant decrease in the hardness of the HPP-product. Romea had lower polyphenoloxidase activity and higher ascorbic acid and total phenols content than Flavorcrest. The application of 600 MPa-5 min to Romea peaches successfully prevented enzymatic browning, with the additional advantage of rendering higher concentrations of ascorbic acid and phenols. This last aspect would be an asset either for the development of high-quality products or, as a pre-treatment, for increasing the yield of polyphenols to be recovered from fruit products waste.

Keywords: /Peaches/ /Minimally Processed/

Huan, C., et.al. 2017. Postharvest hot air and hot water treatments affect the antioxidant system in peach fruit during refrigerated storage. *Postharvest Biol. & Technol.* 126: 1–14.

Abstract

Peach fruit are susceptible to chilling injury (CI) during low temperature storage. In this study, the effect of hot air (HA, 38 °C for 3 h) and hot water (HW, 48 °C for 10 min) treatments on CI, fruit quality, reactive oxygen species (ROS) and antioxidants in peach fruit during storage at 4 °C was investigated. The results indicated that HA or HW treatments maintained fruit quality, decreased Reactive oxygen species (ROS) and enhanced antioxidants activity of fruit. However, HW was more effective than HA in alleviating internal browning (IB) symptoms in fruit. HW treatment may be easier to affect the antioxidant system in peach fruit due to the higher heat transmission in water. HA treatment had no effect on either AsA metabolism or GSH metabolism. However, HW enhanced the AsA metabolism in the early stage of storage and the GSH metabolism in the late stage of storage. Enhanced AsA-GSH metabolism and up-regulated expressions of *PpaSOD5*, *PpaCAT1* and *PpaAPX2* in the HW treated fruit might play an important role in maintaining the lower ROS level and IB index during refrigerated storage.

Keywords: /Peach / /Heat Treatment/ /Chilling Injury/

Li, Jinjin, et.al. 2017. Characteristics and regulatory pathway of the PrupeSEP1 SEPALLATA gene during ripening and softening in peach fruits. *Plant Sci.* 257: 63 – 73.

Abstract

SEPALLATA genes are members of a subfamily of MADS-box transcription factors, and have essential roles in floral organ development and fruit ripening. In this study, the PrupeSEP1 gene was cloned from peach flesh. Its deduced amino acid sequence was very similar to that of MdMADS8 and MdMADS9 in apple and MADS-RIN-like in strawberry. During storage of melting flesh (MF) peach, the pattern of SEP1 expression was similar to that of ethylene biosynthesis and ethylene signal transduction-related gene expression (EIN2 and ETR2). The SEP1 expression level was correlated with that of EIN2 and

ETR2. Furthermore, inMF, cell wall modification-related genes (Endo-PG3, EXP2 and PME3), N-glycan processing genes (α -Hex2 and β -Man) and Lox1 exhibited similar expression patterns to that of SEP1. However, in non-melting flesh (NMF) peach, the SEP1 expression pattern was different from that of MF peach. Moreover, in NMF, only EXP2, LOX1, and β -Man expression patterns were similar to that of SEP1. After SEP1 expression was inhibited by virus-induced gene silencing technique (VIGS) in MF peach, compared with the control, the fruit remained firm and fruit softening was delayed. While expression levels of the ripening and softening related genes, ACS2, EIN2, PME1, Endo-PG3, ACO1, ETR2, α -Hex2 and Lox1, were significantly decreased in SEP1-silenced peach, the transcription of EXP2 and PME3 were significantly enhanced except at the harvest stage. Yeast one-hybrid verification showed SEP1 can interact with promoter of target genes PGs. Our results indicate SEP1 may regulate fruit ripening and softening of MF peaches, while this regulation may be lost in the NMF peaches.

Keywords: /Peach/ /Ripening/ /Softening/

Saba, Mahmoud Koushesh and Samira Moradi. 2017. Sodium nitroprusside (SNP) spray to maintain fruit quality and alleviate postharvest chilling injury of peach fruit. *Scientia Hort.* 216: 193 – 199.

Abstract

Peaches, cultivar 'G.H. Hill', from trees that were sprayed with 0, 25, 50 and 100 $\mu\text{mol L}^{-1}$ sodium nitroprusside (SNP) 14 days before harvest were stored at 4 °C for 4 weeks. Chilling injury (CI), ethylene production, weight loss, firmness, malondialdehyde, hydrogen peroxide and vitamin C concentrations, antioxidant capacity (AC), and superoxide dismutase, peroxidase and polyphenol oxidase activities in the fruit were measured during storage. SNP treatments reduced ethylene production and maintained firmness, AC and vitamin C of the fruit. Treatment with 25 and 50 $\mu\text{mol L}^{-1}$ SNP reduced CI but 100 $\mu\text{mol L}^{-1}$ SNP increased it. SNP at 100 $\mu\text{mol L}^{-1}$ promoted the accumulation of reactive oxygen species, decreased the activity of antioxidant enzymes and accelerated peroxidation in fruit during storage. These results indicated that preharvest SNP (25 and 50 $\mu\text{mol L}^{-1}$) treatment increased chilling tolerance of peach fruit through suppressing ethylene production, maintaining firmness, AC and vitamin C and enhancing anti-oxidative enzyme activity.

Keywords: /Peach/ /Preharvest Treatment/ /Chilling injury/

PEAR

Escribano, Sandra, et.al. 2017. Efficacy of liquid 1-methylcyclopropene to delay ripening of 'Bartlett' pears. *Postharvest Biol. & Technol.* 126: 57 – 66.

Abstract

1-Methylcyclopropene (1-MCP) has been a useful tool to extend the postharvest life of 'Bartlett' pears, but fruit response can be highly variable due to competition with ethylene. Application of liquid 1-MCP after harvest was tested to determine its efficacy as compared with gaseous 1-MCP. Fruit harvested from Sacramento and Lakeport, California at early-, mid- and late- commercial harvest maturity were treated with 0.6 $\mu\text{L L}^{-1}$ gaseous 1-MCP at 0 °C for 24 h or dipped for 0, 15, 30, 45 or 60 s in 250, 500, 750 or 1000 $\mu\text{g L}^{-1}$ 1-MCP in four experiments across three years of study. After treatment, pears were exposed to ethylene or kept in cold storage at 1 °C for 5 weeks before ripening at 20 °C. Treatment with liquid 1-MCP delayed pear ripening as evidenced by delayed softening for a minimum

of 6 d compared to the control fruit, delayed the increase in respiration and ethylene production rates, and reduced respiration and ethylene production rates. Treatment was effective in a concentration- and dip time-dependent manner. Overall, dipping in 1000 µg L⁻¹ liquid 1-MCP for 60 s was the most consistent treatment among years and locations; however, the resulting time to ripen at 20 °C could be too long for some commercial applications. Treatment at 500 µg L⁻¹ liquid 1-MCP is recommended for 'Bartlett' pears as this dose controls the ripening process, and provides consistent response for mid- and late-maturity fruit. A postharvest evaluation of a liquid formulation of 1-MCP provided a more consistently effective treatment for 'Bartlett' pears (*Pyruscommunis*) than the current gaseous treatments.

Keywords: /Pear/ /Ethylene/ /Firmness/ /1-MCP/ /Respiration/

Nandane, A.S., Rudri, K. Dave, T.V. Ramana Rao. 2017. Optimization of edible coating formulations for improving postharvest quality and shelf life of **pear** fruit using response surface methodology. J. Food Sci. Technol. 54(1): 1 – 8.

Abstract

The effect of composite edible films containing soy protein isolate (SPI) in combination with additives like hydroxypropyl methylcellulose (HPMC) and olive oil on 'Babughosha' pear (*Pyruscommunis* L.) stored at ambient temperature (28 ± 5 ° C and 60 ± 10% RH) was evaluated using Response surface methodology (RSM). A total of 30 edible coating formulations comprising of SPI (2–6%,w/v), olive oil (0.7–1.1%, v/v), HPMC (0.1–0.5%, w/v) and potassium sorbate (0–0.4% w/v) were evaluated for optimizing the most suitable combination. Quality parameters like weight loss%, TSS, pH and titrable acidity of the stored pears were selected as response variables for optimization. The optimization procedure was carried out using RSM. It was observed that the response variables were mainly effected by concentration of SPI and olive oil in the formulation. Edible coating comprising of SPI 5%, HPMC 0.40%, olive oil 1% and potassium sorbate 0.22% was found to be most suitable combination for pear fruit with predicted values of response variables indicated as weight loss% 3.50, pH 3.41, TSS 11.13 and TA% 0.513.

Keywords: /Pear/ /Edible Coatings/

Wei, Shuwei, et.al. 2017. Calcium treatments promote the aroma volatiles emission of **pear** (*Pyrusussuriensis* 'Nanguoli') fruit during post-harvest ripening process. Scientia Hort. 215: 102 - 111.

Abstract

Aroma is an important factor affecting pear fruit quality. This study was undertaken to assess whether pre-harvest calcium sprays (15 d before harvest, applications at 4%, w/v, 120 d after full bloom) could improve aroma of *Pyrusussuriensis* 'Nanguoli' pear fruit at harvest and post-harvest, and analyse the mechanism of metabolic regulation.

Most compounds contributing to overall flavor in ripe 'Nanguoli' fruit at harvest and post-harvest were enhanced in response to pre-harvest calcium applications. Ester, especially acetyl ester, content was enhanced by calcium treatment; however, contents of alcohols, aldehydes and hydrocarbons were little affected. These effects were consistent with higher pyruvate decarboxylase and alcohol dehydrogenase activities in treated fruit, suggesting that calcium treatment increased

supply of alcohols and acyl CoAs for ester biosynthesis. We also found that activities of β -glucosidases (involved in the emission of bound volatile compounds) were improved and the contents of bound volatiles were reduced by calcium treatment. At the same time, relative contents of linoleic and linolenic acids were improved by calcium treatment, expression of genes encoding fatty acid desaturase involved in the biosynthesis of unsaturated fatty acid precursors (linoleic and linolenic acids) for volatile aroma were improved. Calcium treatment increased content of volatile aromatic substances, both because calcium promoted the decomposition of bound aroma substances to free aromatic forms, and also promoted the synthesis of volatile aromatic substances in pear fruit.

Keywords: /Pear/ /Calcium/ /Postharvest/ /Ripening/

Yu, Jinfeng, Yan Wanga. 2017. The combination of ethoxyquin, 1-methylcyclopropene and ethylene treatments controls superficial scald of 'd'Anjou' pears with recovery of ripening capacity after long-term controlled atmosphere storage. *Postharvest Biol. & Technol.* 127: 53 – 59.

Abstract

Superficial scald is the most devastating storage disorder of 'd'Anjou' pears (*Pyrus communis* L.) and the current commercial controlling method of ethoxyquin (Etq) + controlled atmosphere (CA) storage is not adequate for the fruit produced in hot seasons. In the hot years of 2014 and 2015, 'd'Anjou' pears were harvested at commercial maturity and treated with Etq at 2700 mg L⁻¹, 1-methylcyclopropene (1-MCP) at 0.3 μ L L⁻¹ along or in combination with ethylene at 0.3, 0.6, or 1.5 μ L L⁻¹ (M+E: 1:0, 1:1, 1:2, and 1:5, respectively), and the combination of Etq plus M+E (1:1), and then stored in CA (1.5 kPa O₂, <0.5 kPa CO₂) at -1.1 °C for 8 months. The non-treated control fruit developed 82% and 100% scald after 4 and 6 months storage, respectively. Etq-treated fruit developed unacceptable level of scald (>10%) after 6 months. M+E (1:0) treatment inhibited ethylene production, prevented scald through decreasing the syntheses of α -farnesene and conjugated trienols, maintained fruit firmness and green color, and reduced decay; however, inhibited ripening capacity following 8 months storage. Compared with M+E (1:0), M+E (1:1 or 1:2) treatments allowed fruit recovering ripening capacity but decreased efficacy on controlling scald; Etq plus M+E (1:1) could control scald <5% for 8 months. M+E (1:5) largely offset the 1-MCP efficacy. In summary, the combination of Etq plus M+E (1:1=2) controls scald, extends storage quality, reduces decay, and allows recovering of ripening capacity of 'd'Anjou' pears after long-term CA storage.

Keywords: /Pears/ / Superficial Scald/ /Ripening/ /1-MCP/ /Ethylene/

Zhou, Shuo, Yudou Cheng and Junfeng Guan. 2017. The molecular basis of superficial scald development related to ethylene perception and α -farnesene metabolism in 'Wujiuxiang' pear. *Scientia Hort.* 216: 76 – 82.

Abstract

Superficial scald is a major disorder that may occur in pear fruits following long-term cold storage. In this study, harvested 'Wujiuxiang' pears (*Pyrus communis* L.) were treated with 1.0 μ L/L 1-methylcyclopropene (1-MCP), stored at 0 °C for 120 days, and transferred to 25 \pm 2 °C for seven days to simulate shelf life. The effects of 1-MCP on scald development, the expression of ethylene perception genes, and α -farnesene metabolism and the expression of its associated genes were investigated. Compared with the control, 1-MCP reduced the scald index after 120 days of cold storage and during

shelf life, suppressed the accumulation of α -farnesene and conjugated trienols (CTols), inhibited the expression of *PcETR2*, *PcERS1*, *PcHMGR2*, *PcAFS1*, *PcGPX5*, *PcGSTU7*, and *PcGSTU17*, and delayed the maximum expression of *PcETR1*, *PcERS2*, *PcHMGR1*, and *PcGPX6*. These results indicate that 1-MCP regulates the expression of target genes to inhibit ethylene action and α -farnesene metabolism, which contributes to slower scald development. These findings suggest that *PcGPX5*, *PcGPX6*, *PcGSTU7*, and *PcGSTU17* are involved in CTol accumulation and scald development in 'Wujiuxiang' pear fruit.

Keywords: /Pear/ /Superficial Scald/ /Ethylene/ /1-Methylcyclopropene/

PERSIMMON

Elena Sanchís, Elena, et al. 2017. Integration of antimicrobial pectin-based edible coating and active modified atmosphere packaging to preserve the quality and microbial safety of fresh-cut **persimmon** (*Diospyros kaki* Thunb. Cv. Rojo Brillante). J. Sci. Food Agric. 97 (1): 252 – 260.

Abstract

BACKGROUND: The greatest hurdle to the commercial marketing of fresh-cut fruits is related to their higher susceptibility to enzymatic browning, tissue softening, and microbial growth. The aim of this study was to test the efficacy of a pectin-based edible coating and low oxygen modified atmosphere packaging (MAP) to control enzymatic browning and reduce microbial growth of fresh-cut 'Rojo Brillante' persimmon. The survival of *Escherichia coli*, *Salmonella enteritidis* and *Listeria monocytogenes* artificially inoculated on fresh-cut fruit was also assessed. The pectin coating was amended with 500 IU mL⁻¹ nisin (NI) as antimicrobial agent and 10 g kg⁻¹ citric acid and 10 g kg⁻¹ calcium chloride as anti-browning and firming agents, respectively. Persimmon slices were dipped in the coating or in water (control) and packed under 5 kPa O₂ (MAP) or in ambient atmosphere for up to 9 days at 5 °C. Microbial growth, package gas composition, colour, firmness, polyphenol oxidase activity, visual quality and overall sensory flavour of persimmon slices were measured during storage. **RESULTS:** Coating application combined with active MAP significantly reduced the CO₂ emission and O₂ consumption in the package. The coating was effective in reducing browning and also inhibited the growth of mesophilic aerobic bacteria. Coating also reduced the populations of *E. coli*, *S. Enteritidis* and *L. monocytogenes*. **CONCLUSION:** The combination of the pectin-based edible coating and active MAP proved to be the most effective treatment to maintain the sensory and microbiological quality of persimmon slices for more than 9 days of storage.

Keywords: /Persimmon/ /Minimally Processed/ /Anti Browning/ /Shelf-Life/

PINEAPPLE

Amodio, M.L., et al. 2016. The use of multivariate analysis as a method for obtaining a more reliable shelf-life estimation of fresh cut produce: a study on **pineapple**. Acta Hort. 1141: 131 – 136.

Abstract

For fresh-cut products, the definition of a representative target attribute for shelf-life estimation is very hard to assess because, during storage, a large number of chemical, sensorial and physical attributes degrade at the same time. The aim of this study was to obtain a more reliable

shelf-life estimation of fresh-cut pineapple by applying multivariate accelerated shelf-life testing (MASLT). This approach is based on principal component analysis (PCA) and allows an estimate of shelf-life considering several degradation reactions. Fresh-cut pineapple pieces were packaged in PP-PE bags (45 μ m, 17.5×15.5 cm in size; OTR=940 cm³ m² d⁻¹, β =3.3) in a passive modified atmosphere and stored at 0, 5, and 15°C. A total variance of 90.7% was explained by three principal components (PC). The PC scores were used to build a multivariate kinetic chart that summarized the degradation information from all studied quality attributes. Changes of PC1 as a function of time were well described by a first-order kinetic for samples stored at 0°C and by a zero-order kinetic for those at 5 and 15°C, showing correlation coefficients ranging between 0.88 and 0.95. The results showed that texture, color score, and appearance score were the most important variables affecting the PC model. Then, establishing a shelf-life limit for each of the attributes included in the model, a cut-off criterion of -1.33 was calculated, defining a shelf-life of ~3, ~7.9, and >11 days for fresh-cut fruit stored at 15, 5, and 0°C, respectively.

Keywords: /Pineapple/ /Shelf Life/

PUMMELO

Jain, A., et.al. 2017. Effect of phytosanitary irradiation on the quality of two varieties of pummelos(*Citrus maxima* (Burm.) Merr.). Scientia. Hort. 217: 36 – 47.

Abstract

Phytosanitary treatments prevent the introduction of pests such as fruit flies into pest free zones, and are often required for international trade. Irradiation is increasingly being considered as an alternative to cold and chemical phytosanitary treatments, such as methyl bromide. In this study, the effect of low dose gamma irradiation on the post-harvest quality of two varieties of pummelos (*Citrus maxima* (Burm.)Merr.), an emerging crop of interest in the US was evaluated. Two varieties of pummelos grown in California were irradiated at the phytosanitary target dose of 150 Gy and a higher dose of 1000 Gy to exaggerate and hence confirm the effects of treatment. The fruit was stored at 12 °C for 3 weeks and at 20 °C for the 4th week to reflect three weeks of sea shipment at the ideal temperature for storage of pummelos and an additional week of retail under ambient conditions. Neither irradiation nor storage affected juice content, organic acids, sugars, peel or pulp color and consumer sensory preference, although numerous volatiles increased in concentration as a result of irradiation treatment. Irradiation caused an immediate reduction in whole fruit and pulp firmness in 'Chandler' but not 'Sarawak' pummelos at both 150 Gy and 1000 Gy. The quality of irradiated pummelos stored at refrigerated temperature for 3 weeks was similar to untreated pummelos, however, physical handling and exposure to higher temperature resulted in increased peel pitting of irradiated fruit compared to non-treated fruit. The results suggest that irradiation could serve as a potential phytosanitary treatment for Chandler and Sarawak pummelos, provided that the fruit is subjected to minimal handling and not temperature abused.

Keywords: /Pummelo/ / Citrus/ /Postharvest/ /Quality/ /Peel damage/

STONE FRUIT

Bernat, M. et.al. 2017. Influence of temperature on decay, mycelium development and sporodochia production caused by *Moniliniafructicola* and *M. laxa* on stone fruits. Food Microbiol. 64: 112-118.

Abstract

For fresh-cut products, the definition of a representative target attribute for shelf-life estimation is very hard to assess because, during storage, a large number of chemical, sensorial and physical attributes degrade at the same time. The aim of this study was to obtain a more reliable shelf-life estimation of fresh-cut pineapple by applying multivariate accelerated shelf-life testing (MASLT). This approach is based on principal component analysis (PCA) and allows an estimate of shelf-life considering several degradation reactions. Fresh-cut pineapple pieces were packaged in PP-PE bags (45 μ m, 17.5×15.5 cm in size; OTR=940 cm³ m² d⁻¹, β =3.3) in a passive modified atmosphere and stored at 0, 5, and 15°C. A total variance of 90.7% was explained by three principal components (PC). The PC scores were used to build a multivariate kinetic chart that summarized the degradation information from all studied quality attributes. Changes of PC1 as a function of time were well described by a first-order kinetic for samples stored at 0°C and by a zero-order kinetic for those at 5 and 15°C, showing correlation coefficients ranging between 0.88 and 0.95. The results showed that texture, color score, and appearance score were the most important variables affecting the PC model. Then, establishing a shelf-life limit for each of the attributes included in the model, a cut-off criterion of -1.33 was calculated, defining a shelf-life of ~3, ~7.9, and >11 days for fresh-cut fruit stored at 15, 5, and 0°C, respectively.

Keywords: /Pineapple/ /Shelf Life/ /Fresh-Cut/

STRAWBERRY

Zhao, Cheng, et. al. 2017. Sucrose synthase *FaSS1* plays an important role in the regulation of strawberry fruit ripening. Plant Growth Regul. 81: 175 – 181.

Abstract

Sugar content and composition are critical to fruit development. Sucrose, a photosynthate unloaded to the fruit, is metabolized by sucrose synthase, which might play a dominant role in sucrose accumulation during strawberry fruit ripening. However, substantial evidence regarding the molecular mechanism underlying sucrose accumulation in strawberry fruit development is lacking. Here, a strawberry sucrose synthase gene, *FaSS1*, was cloned and identified. Its 2421-bp cDNA includes an intact open reading frame and encodes an 806 amino acid protein, in which sucrose synthase-related conserved domains were predicted by a homology analysis. Using tobacco rattle virus-induced gene silencing, the down regulation of *FaSS1* transcripts significantly delayed fruit ripening, as evidenced by the changes of firmness, and soluble sugar and anthocyanin contents, as well as the transcripts of several ripening-related genes, including *PE1*, *PL1*, *XYL2*, *CHS*, *CHI*, and *DFR*. Furthermore, the mRNA expression level of *FaSS1* was inhibited by abscisic acid or sucrose, but not by glucose after fruit disc incubation in vitro. In conclusion, *FaSS1* plays an important role in the regulation of strawberry fruit ripening, and its expression could be inhibited by abscisic acid and sucrose.

Keywords: /Strawberry/ /Ripening/

VEGETABLES

BROCCOLI

Baenas, Nieves, et.al. 2016. **Broccoli** and radish sprouts are safe and rich in bioactive phytochemicals. *Postharvest Biol. & Technol.* 127: 60 – 67.

Abstract

Cruciferous sprouts (e.g. broccoli and red radish) are rich source of health-promoting phytochemicals that are more concentrated than in the adult plant edible organs; however, these tiny microgreens need cold storage conditions to preserve their quality to reach the consumers in microbiologically safe conditions, maintaining their composition and acceptability. In this work, the microbiological status and phytochemical composition of broccoli and radish sprouts were evaluated at harvest (Day 0), and after seven and fourteen days of storage at 5 and 10 °C. Pathogenic microorganisms were absent during shelf-life; nevertheless, the slight growth of Enterobacteriaceae organisms, aerobic mesophilic and psychotropic bacteria, molds and yeasts was assessed. The storage temperature influenced the quality and content of bioactives in the sprouts, and for practical applications, storage at 5 °C is the most suitable option. Moreover, these fresh crucifers remain acceptable for consumers after 14 d storage period, being an interesting option for consuming fresh and naturally-functional foods.

Keywords: /Broccoli/ /Phytochemicals/

Cefola, M., M.L. Amodio and G. Colelli. 2016. Design of the correct modified atmosphere packaging for fresh-cut **broccoli** raab. *Acta Hortic.* 1141: 122.

Abstract

A low-oxygen controlled atmosphere has been reported to be useful in maintaining freshness and qualitative traits of fresh-cut broccoli raab during cold storage, while excessive accumulation of CO₂ (10-15%) should be avoided. Starting from these previous findings, the aim of this work was to select the correct modified atmosphere packaging (MAP) for fresh-cut broccoli raab in order to reach, at equilibrium, the target low-oxygen (3%) atmosphere during cold storage. Broccoli raab harvested from a commercial farm was sorted to remove defects and cut from the stalks, obtaining the ready-to-use product. After washing, the product was packaged in plastic trays sealed in bags of different plastic materials. Two commercially available polymeric laminated films [polypropylene/polyethylene terephthalate (PP/PET) and micro perforated polypropylene/polyamide (PP/PA)] were used with or without the inclusion of a CO₂ absorber (5-g sachet). For each package type, a passive atmosphere (P-MAP) and an active atmosphere achieved by flushing with 5% O₂ in nitrogen (A-MAP) were used. Unpackaged samples were used as controls and stored with all packages at 5°C. Quality attributes (overall appearance, odor, color, and weight loss) were evaluated initially and after 3 and 8 days. Gas concentrations (O₂ and CO₂) inside packages were also monitored. Among the packaging treatments tested, the combination using PP/PA in A-MAP with the use of CO₂-absorbing sachets reached an equilibrium condition very close to optimal for broccoli raab (5% O₂ and ≤5% CO₂). Fresh-cut broccoli raab stored under these conditions for 8 days showed negligible reduction of appearance and odor scores, and product was comparable to the fresh samples.

Keywords: /Broccoli/ /Controlled Atmosphere/ /Modified Atmosphere Packaging/ /Fresh-Cut/

Schafer, J., et.al. 2017. Storage related changes of cell wall based dietary fiber components of **broccoli** (*Brassica oleracea* var. *italica*) stems. Food Res. Int'l. . 93: 43 – 51.

Abstract

Storage related changes in the cell wall composition potentially affect the texture of plant-based foods and the physiological effects of cell wall based dietary fiber components. Therefore, a detailed characterization of cell wall polysaccharides and lignins from broccoli stems was performed. Freshly harvested broccoli and broccoli stored at 20 °C and 1 °C for different periods of time were analyzed. Effects on dietary fiber contents, polysaccharide composition, and on lignin contents/composition were much more pronounced during storage at 20 °C than at 1 °C. During storage, insoluble dietary fiber contents of broccoli stems increased up to 13%. Storage related polysaccharide modifications include an increase of the portions of cellulose, xylans, and homogalacturonans and a decrease of the neutral pectic side-chains arabinans and galactans. Broccoli stem lignins are generally rich in guaiacyl units. Lignins from freshly harvested broccoli stems contain slightly larger amounts of *p*-hydroxyphenyl units than syringyl units. Syringyl units are predominantly incorporated into the lignin polymers during storage, resulting in increased acetyl bromide soluble lignin contents. NMR-based analysis of the inter unit linkage types of broccoli stem lignins revealed comparably large portions of resinol structures for a guaiacyl rich lignin. Incorporation of syringyl units into the polymers over storage predominantly occurs through β -O-4-linkages.

Keywords: /Broccoli/ /Texture/ /Postharvest/

CABBAGE

da Silva Felix, Katia Cliene, et. al. 2017. Calcium-mediated reduction of soft rot disease in Chinese **cabbage**. Eur. J. Plant Pathol. 147: 73 - 84.

Abstract

Soft rot of Chinese cabbage is a disease of great economic importance to the State of Pernambuco, Brazil. The present study aimed to evaluate the effect of two calcium sources in different concentrations (calcium nitrate [Ca(NO₃)₂] at 0, 0.15 and 0.3 g l⁻¹ and calcium chloride (CaCl₂) at 0, 1 and 5 g l⁻¹) that were applied through two methods (leaf spraying and soil drenching) on the control of soft rot. Further, it aimed to analyze calcium absorption by the plant and to determine calcium's role in leaf and cell structure using microscopy. Ca(NO₃)₂ applied by both methods was effective in controlling soft rot caused by *Pectobacterium carotovorum* subsp. *carotovorum*, as it reduced the disease by up to 48.5 % when sprayed onto the leaves (0.15 g l⁻¹). A significant increase in the leaf calcium content was observed only in the plants that were sprayed with higher doses of Ca (NO₃)₂ and CaCl₂. In all of the calcium treatments, light microscopy analyses revealed an increased number of chloroplasts and improved structuring of the palisade parenchyma, while transmission electron microscopy analyses revealed an increased cell wall thickness that was especially evident for the 0.15 g l⁻¹ Ca(NO₃)₂ treatment applied by leaf spraying and soil drenching.

Keywords: /Cabbage/ /Chinese Cabbage/ /Soft Rot/

CARROT

Carolina Formica-Oliveira, Anna Carolina. 2017. Effects of UV-B and UV-C combination on phenolic compounds biosynthesis in fresh-cut carrots. *Postharvest Biol. & Technol.* 127: 9 – 104.

Abstract

The single and combined effects of UV-B (1.5 kJ m⁻²) and UV-C (4.0 kJ m⁻²) radiation treatments were studied on the phenylalanine ammonia-lyase (PAL) activity, phenolic content and antioxidant capacity (TAC) of shredded fresh-cut carrots during 72 h at 15 °C. Non-irradiated samples were used as control (CTRL). PAL activity of UV-B and CTRL samples was increased by approximately 760% after 72 h while increases of 120–140% in the remaining radiation treatments were found. Chlorogenic acid represented 70% of the sum of phenolic compounds of initial samples. UV-B treatment showed the highest phenolic accumulation with 498% after 72 h, regarding its initial value, while single and combined UV-C treatments achieved an accumulation of 440%, which was similar to CTRL samples. Such phenolics data were highly correlated (R² = 0.82) to total antioxidant capacity throughout storage. Conclusively, UV-B treatment achieved the highest phenolic compounds accumulation and related antioxidant capacity in shredded carrot during 3 days at 15 °C. Furthermore, the use of UV-C treatment with sanitizing purposes combined with UV-B radiation did not negatively affect the accumulation of bioactive compounds, achieving similar enhancements to CTRL samples.

Keywords: /Carrots/ / Fresh Cut/ /UV Radiation/

Song, Zunyang, et.al. 2017. Combination of nisin and ε-polylysine with chitosan coating inhibits the white blush of fresh-cut carrots. *Food Control.* 74: 34 - 44.

Abstract

Effects of the combination of nisin and ε-polylysine with chitosan coating on quality maintenance and white blush inhibition were investigated in fresh-cut carrots. Fresh-cut carrots were treated with 1% lactic acid solution (v/v), 1% chitosan solution (w/v), or 1% chitosan solution containing 64 µg/mL nisin and 250 µg/mL ε-polylysine (LA + CH +Nisin+ ε-PL). The samples were packed in polyethylene plastic bags and stored at 4 °C for 9 days. Changes in sensory attributes, physicochemical indices, respiration rate, microbiological counts and white blush were measured. Results showed that LA + CH + Nisin + ε-PL significantly (P < 0.05) inhibited respiration rate, decline of ascorbic acid and growth of microorganism (yeast and mold, total viable counts, total coliforms counts, *Staphylococcus aureus* and *Pseudomonas* spp.), and increased total phenol content and phenylalanine ammonia-lyase (PAL) activity compared with the control after 9-day storage. It was also strongly effective in inhibiting the white blush of fresh-cut carrots. Furthermore, LA + CH +Nisin+ ε-PL significantly (P < 0.05) reduced the lignin synthesis in fresh-cut carrots by inhibiting the cinnamate-4-hydroxylase (C4H) and 4-coumarate-CoA ligase (4CL) activity, as well as *Dc4CL* and *DcC4H* gene expression. Our results may provide some basis for the use of the combination of nisin and ε-polylysine with chitosan coating as an alternative preservation method for fresh-cut carrots.

Keywords: /Carrots/ /Fresh-Cut/ /Chitosan/

GARLIC

Tanamati, F., G. Hong and M.I. Cantwell. 2016. Impact of storage temperatures and modified atmosphere on quality of fresh-peeled **garlic** cloves. Acta Hort. 1141: 221 – 228.

Abstract

Fresh-peeled garlic is an increasingly important product for foodservice and retail markets. Two storage tests were conducted using garlic cloves ('California Late') that were peeled and packaged commercially. In Test #1 (MAP bags of 454 g), O₂ concentrations averaged 15, 10 and 5% at 0, 5 and 10°C, respectively; the corresponding CO₂ concentrations averaged 8, 15 and 23%. In Test #2 with small vacuum packed bags (30 g) inside larger master packages (170 g), atmospheres in the former averaged 1.5-3% O₂ and 20-30% CO₂ at all storage temperatures (0, 2.5, 5 and 7.5°C), while the master bags averaged 20-21% O₂ and 0.5-0.8% CO₂. In both tests, discoloration occurred in areas damaged during mechanical peeling, and was associated with lower L* and increased chroma values. In Test #1, decay was a significant contributor to loss of quality. In Test #1 excellent visual quality was maintained during 21 and 16 d at 0 and 5°C, respectively, and acceptable quality was maintained for about 10 d at 10°C. In Test #2, very good visual quality was maintained up to 28 d at 0 and 2.5°C, and acceptable quality was maintained for 21 d at 5 and 7.5°C. No important changes in texture were observed due to temperature or storage time. Pungency (thiosulfinate and pyruvate concentrations) decreased with time and the decrease was greater at higher storage temperatures. A reasonable expected storage-life of commercially peeled and modified atmosphere packaged garlic is 3-4 weeks at 0°C, 2-3 weeks at 5°C and 1-2 weeks at 10°C.

Keywords: /Garlic/ Pungency/ /Storage Life/

KALE

Albornoz, K. and M.I. Cantwell. 2016. Fresh-cut **kale** quality and shelf-life in relation to leaf maturity and storage temperature. Acta Hort. 1141: 109 – 116.

Abstract

Kale (*Brassica oleraceavar. acephala*) is a very nutritious leafy vegetable and its consumption in fresh-cut salads has increased in recent years. Kale leaves may be harvested at different stages of maturity, resulting in a heterogeneity that may be detrimental to fresh-cut salad quality and shelf-life. Changes in composition and visual parameters were investigated in fresh-cut kale leaves ('Lacinato') harvested at three maturity stages used commercially based on leaf position and size (immature, mature, over mature), two temperatures (0 and 5°C) and five periods of storage (0, 14, 21, and 28 days; up to 42 days at 0°C). Product was cut manually into 2 cm strips, washed in chlorinated water, manually centrifuged, and packaged in unsealed LDPE bags. Total chlorophyll content decreased during storage, with the lowest concentrations found in pieces from over mature leaves at 5°C, while the total carotenoid content did not vary among the conditions studied. Ammonia content, an indicator of protein breakdown and senescence, remained low for pieces from all maturity stages stored at 0°C up to 42 days, was intermediate in immature cut leaves at 5°C, and increased dramatically in pieces from mature and over mature leaves at 5°C between 21 and 28 days. Objective color values as well as marketability indicators (off-odors, overall visual quality, yellowing, decay, cut-end browning) exhibited

significant differences in response to the postharvest conditions studied. In general, the loss of composition and visual quality of fresh-cut kale leaves increased with increasing temperature, days of storage, and leaf maturity.

Keywords: /Kale/ /Visual Appearance/ /Senescence/

LETTUCE

Cantwell, M.I., et.al. 2016. Impact of modified atmospheres on the vitamin C content of salad-cut romaine and other lettuces. Acta Hort. 1141: 167 – 174.

Abstract

Modified atmosphere packaging (MAP) is a key technology for maintaining salad-cut lettuce quality, mainly by reducing cut-edge discoloration. However, the use of MAP may have detrimental consequences, and here we studied the impact of low-O₂ atmospheres (0.2 to 1%) alone or in combination with high-CO₂ atmospheres (3, 6, 9- 10%) on vitamin C concentrations. Iceberg and Romaine lettuces were trimmed, cut manually into salad-size pieces, rinsed in chlorinated water (50 ppm sodium hypochlorite, pH 7 for 20 s), spun in a manual spinner, packaged in perforated plastic bags, and stored in the dark in containers with flows of humidified air or controlled atmospheres for up to 12 days at 5°C. Green leaf lettuce was prepared as whole washed leaves and also stored under the same conditions. Pieces or leaves were evaluated for appearance (overall visual quality, discoloration, and decay) and composition (ascorbic acid and dehydroascorbic acid by HPLC). Initial total vitamin C concentrations in cut iceberg, cut romaine, and green leaf lettuce leaves were 10, 25-40, and 55 mg 100 g⁻¹ fw, respectively. The rate of vitamin C loss varied, but, in all experiments, total ascorbic acid concentrations decreased more rapidly in pieces or leaves stored in CO₂-containing atmospheres than in air or low O₂, alone, and before the loss of marketable quality. Of six enzymes in the ascorbate-glutathione pathway that were assayed, only ascorbate peroxidase activities were lower in a 10% CO₂ atmosphere than in air-stored cut romaine lettuce. Reduced and total glutathione concentrations were substantially lower in the CO₂-stored romaine lettuce.

Keywords: /Lettuce/ /Quality/ /Modified Atmosphere/

Cantwell, M.I., et.al. 2016. Quality of water jet and blade cut romaine salad. Acta Hort. 1141: 153–158.

Abstract

Cutting operations for fresh-cut produce are usually accomplished by stainless steel knives. Waterjet cutting employs a very small stream of high-pressure water, and the type of nozzle, conveyor speed, and water pressure are the main factors that affect the quality of the cut. Two tests were conducted, cutting romaine lettuce either by an Urschel Translicer 2500 on a pilot process line using new or used and reconditioned (e.g., 3× used and sharpened) blades or by a KMT pilot waterjet system using standard or food-grade nozzles. Cut romaine showed whitening dehydration and red discoloration defects on cut surfaces. In both tests, cut romaine packaged commercially in a modified atmosphere had only minor differences in cut surface defects between blade and waterjet cutting. However, large differences due to cutting treatments were observed in cut romaine stored in bags without modified atmosphere at 2.5°C. In test 1, pieces were of very high quality with no differences between cutting

method until 18 days at 2.5°C, when waterjet-cut pieces had higher visual quality with less discoloration than blade-cut pieces. New knife blades produced less damage to cut surfaces than used and reconditioned blades. The food grade nozzle was superior to the standard waterjet nozzle. In test 2, discoloration appeared by day 9 in bags with no modified atmosphere at 2.5°C, and there were clear quality differences between cutting methods, with waterjet cutting using the food grade nozzle better than blade cutting. There were no persistent differences in total bacterial counts between cutting methods. Potentially, improved cutting technology could reduce the need for extreme package atmospheres and/or ensure higher product quality with package leakers.

Keywords: /Lettuce/ /Fresh-Cut/ /Discoloration/

Hayes, R.J. and I. Simko. 2016. Breeding lettuce for improved fresh-cut processing. Acta Hort. 1141: 65 - 76.

Abstract

Lettuce is a widely grown vegetable that is used to make fresh-cut salads, which are popular with consumers because of their convenience. Production and processing of fresh-cut lettuce is continually evolving, offering more products and becoming more efficient. Breeding new lettuce cultivars specialized for this market can offer further improvements, but has received attention only within the last decade. Improvements to plant morphology can increase yield, quality, and production efficiency. Crops must meet high stringencies for internal defects and cultivars specialized for fresh-cut often need enhanced levels of resistance to these problems. Modified atmosphere packages (MAP) are used to reduce browning or pinking of cut surfaces. Development of cultivars that do not discolor could minimize or eliminate the need for MAP. New cultivars with longer shelf-life could reduce waste and increase the distribution system's efficiency. The nutritional content of fresh-cut lettuce can decline after processing. Research that addresses this issue may improve the popularity of fresh-cut lettuce. Lettuce and its wild relatives have genetic variation for plant morphology, quality, and resistance to abiotic stresses that can be used to breed improved lettuce cultivars. Quantitative trait loci (QTL) mapping has determined the inheritance of many traits useful for the fresh-cut industry. This knowledge should be used to devise molecular breeding methods that accelerate cultivar development. These approaches are particularly useful for improving postharvest traits, since phenotypic assays for these traits are often laborious and destructive, require specialized equipment, and typically test large numbers of plants.

Keywords: /Lettuce/ /Shelf Life/ /Discoloration/

Kim, Jun-Hee, Lim, Ki-Hyun Kwon and Se-Wook Oh. 2016. Effects of malic acid or/ and grapefruit seed extract for the inactivation of common food pathogens on fresh-cut lettuce. Food Sci. & Biotechnol. 25 (6): 1801 – 1804.

Abstract

This study investigated the antimicrobial activity of malic acid (MA), grapefruit seed extract (GSE), and combined (MA+GSE) treatment against Escherichia coli O157:H7, Salmonella Typhimurium, and Listeria monocytogenes on fresh-cut lettuce. The antimicrobial effects of 1% MA and 0.5% GSE alone and in combination (1% MA+0.5% GSE) were tested on artificially inoculated lettuce during storage at 5 °C for 14 days. The maximum reductions of E. coli O157:H7, S. Typhimurium, and L.

monocytogenes were 4.96, 4.80, and 3.95 log CFU/g observed with MA+GSE during storage for 14 days, respectively. MA+GSE showed the greatest reduction against *E. coli* O157:H7 and *L. monocytogenes*. These results indicate that the combined treatment was more effective than MA and GSE alone treatment. Therefore, it suggests that MA + GSE could be used as an effective intervention method for improving microbiological safety of fresh-cut lettuce.

Keywords: /Lettuce/ /Fresh-Cut/ /Food Borne Pathogens/

Klug, Tammila Venzke, et al. 2017. Effect of tannin extracts on biofilms and attachment of *Escherichia coli* on lettuce leaves. *Food Bioprocess & Technol.* 10: 275 – 283.

Abstract

Lettuce is often involved in foodborne outbreaks caused by pathogenic *Escherichia coli*. Current control strategies have often proved ineffective to ensure safe food production. For that reason, the present study compared the efficacy of tannin extracts and chlorine treatments on the reduction of *E. coli* ATCC 25922 adhered to lettuce leaves. *E. coli* was inoculated artificially on leaf surfaces of fresh crisp lettuce. Effectiveness of water, chlorine (200 mg/L), and three commercial available tannin extracts from *Acacia mearnsii* De Wild. (tannin AQ (2 %, w/v), tannin SG (1 %, v/v) and tannin SM (1 %, v/v)) treatments was evaluated using the viable plate count method and scanning electron microscopy (SEM). SEM results revealed that bacterial cells are attached as individual cells and in clusters to the leaf surface after 2 h of incubation. Biofilm formation was observed after 24 h of incubation. The tannin SM treatment was able to reduce counts in approximately 2 log CFU/cm² on leaf segments. However, treatment was less effective in the reduction of *E. coli* counts after 24 h of incubation when compared to 2 h incubation of the same extract. The results suggest that the tannin SM extract diminishes *E. coli* counts adhered to and under biofilm formation on lettuce leaves and its effect is similar to the use of chlorine solutions.

Keywords: /Lettuce/ /Lactuca Sativa/ /Biofilms/

Min, Sea C., et al. 2017. In-package inhibition of *E. coli* O157:H7 on bulk Romaine lettuce using cold plasma. *Food Microbiol.* 65: 1 – 6.

ABSTRACT

Dielectric barrier discharge atmospheric cold plasma (DACP) treatment was evaluated for the inactivation of *Escherichia coli* O157:H7, surface morphology, color, carbon dioxide generation, and weight loss of bulk Romaine lettuce in a commercial plastic clamshell container. The lettuce samples were packed in a model bulk packaging configuration (three rows with either 1, 3, 5, or 7 layers) in the container and treated by DACP (42.6 kV, 10 min). DACP treatment reduced the number of *E. coli* O157:H7 in the leaf samples in the 1-, 3-, and 5-layer configurations by 0.4 and 0.8 log CFU/g lettuce, with no significant correlation to the sample location ($P > 0.05$). In the largest bulk stacking with 7 layers, a greater degree of reduction (1.1 log CFU/g lettuce) was observed at the top layer, but shaking the container increased the uniformity of the inhibition. DACP did not significantly change the surface morphology, color, respiration rate, or weight loss of the samples, nor did these properties differ significantly according to their location in the bulk stack. DACP treatment inhibited *E. coli* O157:H7 on bulk lettuce in clamshell containers in a uniform manner, without affecting the physical and biological

properties and thus holds promise as a post-packaging process for fresh and fresh-cut fruits and vegetables.

Keywords: /Lettuce/

MUSHROOM

Djekic, Ilija, et.al. 2017. Application of quality function deployment on shelf-life analysis of *Agaricus bisporus* Portobello. LWT - Food Sci. and Technol. 78: 82 - 89.

Abstract

The aim of this study was to analyze application of quality function deployment on examining the shelf-life of *Agaricus bisporus* Portobello packed in modified atmosphere packaging stored for 22 d at 4 °C. Mushrooms were packaged under three modified atmosphere packaging conditions: high nitrogen packaging (HNP); low carbon dioxide packaging (LCP); low oxygen packaging (LOP). Packaging with air inside initially was used as the atmosphere treatment (AIR). In respect to color changes, total color difference and browning index showed the greatest range for HNP and the smallest range for LOP. Regarding sensory analysis, LOP and AIR had the best results for overall quality compared to LCP and HNP. Odor characteristics were best scored for LOP while AIR had the worst impact on this feature. The highest level of quality deterioration was observed for LCP and HNP mushrooms while AIR mushrooms had the lowest level of deterioration. Quality function deployment showed that the best 'Quality Score' was for LOP, followed by AIR. LCP and HNP had the worst 'Quality Score' during the entire shelf-life.

Keywords: /Mushroom/ /Shelf-life/ /Modified Atmosphere/ /Quality/

Ventura-Aguilar, R.I., M.T. Colinas-Leon, S. Bautista-Banos. 2016. Combination of sodium erythorbate and citric acid with MAP, extended storage life of sliced oyster mushrooms. LWT – Food Sci. & Technol. 79: 437 – 444.

Abstract

The single and combined effects of UV-B (1.5 kJ m⁻²) and UV-C (4.0 kJ m⁻²) radiation treatments were studied on the phenylalanine ammonia-lyase (PAL) activity, phenolic content and antioxidant capacity (TAC) of shredded fresh-cut carrots during 72 h at 15 °C. Non-irradiated samples were used as control (CTRL). PAL activity of UV-B and CTRL samples was increased by approximately 760% after 72 h while increases of 120–140% in the remaining radiation treatments were found. Chlorogenic acid represented 70% of the sum of phenolic compounds of initial samples. UV-B treatment showed the highest phenolic accumulation with 498% after 72 h, regarding its initial value, while single and combined UV-C treatments achieved an accumulation of 440%, which was similar to CTRL samples. Such phenolics data were highly correlated (R² = 0.82) to total antioxidant capacity throughout storage. Conclusively, UV-B treatment achieved the highest phenolic compounds accumulation and related antioxidant capacity in shredded carrot during 3 days at 15 °C. Furthermore, the use of UV-C treatment with sanitizing purposes combined with UV-B radiation did not negatively affect the accumulation of bioactive compounds, achieving similar enhancements to CTRL samples

Keywords: /Carrots/ /Fresh Cut/

PEA

Collado, E., et.al. 2016. Overall quality of minimally processed pea seeds stored in modified atmosphere packaging. *Acta Horti*: 1141: 137 – 144.

Abstract

Peas (*Pisum sativum* L. var. *saccharatum*) are an important source of protein, carbohydrates, vitamins and minerals. Pods are harvested before physiological maturity and stored at temperatures near 0°C. Because of their very high respiration rate, and even though they are classified as a non-climacteric product, loss of quality is fast. Most studies conducted on fresh peas have dealt with the fresh pods, but very little information is available on the optimum storage conditions for immature pea seeds, which are well adapted to preparation as a minimally processed product. The effects of sanitation with chlorine (100 ppm, pH 6.5) or, alternatively, with acidified sodium chlorite (300 ppm, pH 1.8) and passive modified atmosphere packaging (MAP) on overall quality of fresh pea seeds (cultivar 'Lincoln') were assessed during storage at 1 and 4°C. After 12 days, atmospheres within packages were 8 kPa CO₂/12 kPa O₂ and 11 kPa CO₂/10 kPa O₂ at 1 and 4°C, respectively. Spoilage microbial growth (mesophilic, enterobacteria, psychrotrophs, yeasts and mould) were around 2 log CFU g⁻¹ and 3 log CFU g⁻¹ at 1 and 4°C, respectively. However, enterobacterial growth was drastically reduced at 1°C regardless of the disinfectant used. Colour, firmness and sensory quality were acceptable, with best quality at 1°C. Low temperature storage allowed a high-quality product to be obtained, even after 12 days of storage, with acidified sodium chlorite being a good alternative to chlorine. However, more research is needed to study its effects on other quality parameters.

Keywords: /Pea/ /Modified Atmosphere/ /Quality/

Mohamed A.M. El-hamahmy, et.al. 2017. Physiological effects of hot water dipping, chitosan coating and gibberellic acid on shelf-life and quality assurance of sugar snap peas (*Pisum sativum* L. var. *macrocarpon*). *Food Packag. & Shelf Life*. 11: 58 – 66.

Abstract

The effects of chitosan coating (CC), gibberellic acid (GA3), and hot water dipping (HWD) to improve quality and extend shelf-life of chilled pea by reducing chilling injury and postharvest decay were evaluated. Pea pods were subjected to treatments consisting of CC (at 1 and 3%), GA3 (at 1 and 2 mmol L⁻¹), and HWD (at 45 °C for 20 min and 55 °C for 1 min) followed by storage at 4 °C in a refrigerator set at 85–90% relative humidity for 35 d. No decay occurred in pods treated with GA3 at 1 mmol L⁻¹ while CC at 1% resulted in 7% decay compared to 22–55% decay by CC at 3% and HWD treatments. Chitosan coating (1%) and GA3 (1 mmol L⁻¹) reduced titratable acidity by 11.5 and 13.4%, respectively and chilling injury by 0.18 and 0.20%, respectively compared to 7% chilling injury by HWD treatments and the untreated control at the end of the storage period. The HWD treatment enhanced active oxygen-scavenging systems, such as peroxidase and catalase compared to CC and GA3 treatments. The content of reducing sugars was stable in all storage periods. Pods treated with CC and GA3 had the highest amount of total chlorophyll (8.4 and 8.9 mg g⁻¹ FW), vitamin C (1.2 and 1.8% mg 100 g⁻¹ FW), phenolics (1.9 and 1.6 mg g⁻¹ FW), and protein (11.5 and 13.2 mg g⁻¹ FW) at the end of the storage period.

Keywords: /Peas/ /Chilling Injury /Chitosan/ /Hot Water Treatment/

PUMPKIN

Cho, J.L.Y., et al. 2016. Extending shelf-life of minimally processed pumpkin with a carrageenan-based coating. Acta Hort. 1141: 175 – 180.

Abstract

The effect of carrageenan coating at different concentrations on minimally processed pumpkin cubes was studied. Pumpkin cubes were subjected to a 3 min dipping into a solution containing carrageenan-based (0.1, 0.3 or 0.5%, w/v) and glycerol (0.1%, w/v) coating. Samples (130-150 g) were packed into a polypropylene container (volume: 450 mL). Physical (weight loss, appearance and colour), chemical (pH, titratable acidity, soluble solids concentration and ascorbic acid content) and sensory evaluations were assessed during storage at 2°C (70% relative humidity), at 3- or 4-day intervals for 3 weeks. Uncoated and coated minimally processed pumpkin cubes were subjected to a steaming process (100°C) for 5-7 min and were cooled prior to sensory evaluation. Uncoated pumpkin cubes had significant weight loss ($p < 0.05$) and tended to have a drier appearance after 10 days of storage. Higher concentrations of the coating (0.3 and 0.5%) caused a jelly-like appearance and was able to prevent moisture loss. Appearance of microbial spoilage started on the surface of uncoated pumpkin cubes after 17 days of storage. From the study, no significant differences were found for firmness or chemical variables among treatments throughout the storage period. Pumpkin cubes coated with 0.1, 0.3 or 0.5% of carrageenan were found to retain colour, better texture and noted positive sensory scores until the end of the storage period compared to uncoated pumpkin cubes. The results indicated that 0.1% carrageenan coating was the most effective as a coating treatment in terms of sensory quality and ability to prolong shelf-life of minimally processed pumpkin cubes up to 20 days.

Keywords: /Pumpkin/ /Shelf-Life Minimally Processed/ /Edible Coating/

TOMATO

Buccheri, M. and M.I. Cantwell. 2016. Fruit ripening conditions affect the quality of sliced red tomatoes. Acta Hort. 1141: 159 – 166.

Abstract

Fresh-cut tomato slices can deteriorate rapidly, with a correspondingly short shelf-life. Almost all research to date has focused on fresh-cut tomato preparation and storage, and little research has considered how postharvest handling of the whole fruit could affect the quality of the prepared fresh-cut product. The quality and shelf life of slices prepared from ripe tomato fruit (hue angle 43) were evaluated in relation to initial ripening stage (breaker, 10% red, or turning, 30% red) ripening temperature (15, 20, or 25°C) and postharvest treatment with ethylene. Tomatoes ripened at a lower temperature (15°C) had higher fruit firmness, while tomatoes kept at 25°C had lower lycopene content and lower firmness. Juice loss increased during the storage of all slices, and was higher in slices from breaker stage fruit and from fruit treated with ethylene, but was not much affected by fruit ripening temperature. Lycopene content of the slices declined consistently during storage at 5°C. This study clearly showed that full red tomatoes can be a fresh-cut product with good slice integrity and adequate shelf-life (8-11 days at 5°C). The results also emphasize the need to assess postharvest handling protocols specific for fresh-cut tomato processing.

Keywords: /Tomatoes/ /Ethylene/ /Fresh-Cut/ /Ripening/

Giuffrida, F., et.al. 2016. Shelf-life of fresh-cut tomato in relation to cut and fruit types. Acta Hort. 1141: 199 – 206.

Abstract

Three typologies of tomato (round 'Ventero', ribbed 'Marmalindo', elongated 'Sir Elyan') were minimally processed in slices or wedges and packaged in polypropylene trays (500 g each). Slices (7 mm thick) were obtained by cutting fruits perpendicularly to the main axis. For wedges, fruits were divided into 4 or 8 parts (depend on fruit diameter). Initially (day 0), and after 3, 6 and 9 days of storage at 5°C, quality attributes (microbial load, colour, pericarp firmness, soluble solids, titratable acidity, dry matter, antioxidant activity, content of vitamin C, lycopene and β -carotene) were evaluated. Concentrations of CO₂ and O₂ in the trays were also measured. Oxygen concentration decreased dramatically in the ribbed tomato trays after 3 days of storage. The reduction of O₂ during storage was higher for wedges compared to slices and started before on elongated tomato type compared to round tomatoes. For maintaining a good microbiological quality during cold storage, cutting in slices or wedges should be opportunely suited to tomato type. Firmness was lower (12.8%) in the slices of elongated tomato compared to the wedges, whereas no differences were found in ribbed and round tomatoes. Lycopene content decreased in round tomato slices compared to wedges (about 16%), no differences were observed in ribbed and elongated tomatoes. A vitamin C reduction (26%) was observed in the elongatedtomato cut in slices compared to wedges.

Keywords: /Tomato/ /Minimally Processed/ /Storage/ /Shelf Life/

Jiang, Yunbin, et.al. 2017. Inactivation of *Salmonella* Typhimurium and quality preservation of cherry tomatoes by in-package aerosolization of antimicrobials. Food Control. 73: 411 - 420.

Abstract

The purpose of the present study was to investigate the efficacy of in-package aerosolized aqueous sanitizers in reducing populations of *Salmonella entericaserovar* Typhimurium on tomato fruit and in maintaining fruit quality. Cherry tomatoes were inoculated with a cocktail of attenuated *S.Typhimurium* ATCC 53647 and 53648 strains on the smooth skin surface and stem scar area. Next, 200 ppm free chlorine, and peroxyacetic acid (PAA) and aqueous ClO₂ at different concentrations, 2% lactic acid + 2% acetic acid + 2% levulinic acid, and 3% acetic acid + 3% lactic acid were aerosolized into a clamshell container containing cherry tomatoes. Results showed that *S.Typhimurium* populations on smooth tomato surfaces were reduced by more than 5 log CFU/fruit with 400 ppm PAA, 2% lactic acid + 2% acetic acid + 2% levulinic acid, 3% acetic acid + 3% lactic acid, and aqueous ClO₂ (100 and 400 ppm). On the stem scar area, 400 ppm aqueous ClO₂ was more effective in reducing *S.Typhimurium* populations than other treatments, achieving 4.89 log CFU/fruit reduction, followed by 400 ppm PAA (2.62 log CFU/fruit). The efficacy of ClO₂ and acid combination treatments increased during 3-week storage at 10 °C, achieving >3 log CFU/fruit inactivation with the acid combination and ca. 6 log with for 400 ppm with ClO₂. None of the treatments significantly ($p > 0.05$) affected color, appearance, firmness, vitamin C, lycopene or antioxidant values of tomatoes during 3 weeks of storage; although, an acidic odor was detected for samples treated with the organic acids in the earlier period of the storage. These

results suggest that in-package aerosolized sanitizers can be used as a novel method for the inactivation of *Salmonella* on tomato fruit.

Keywords: /Tomato/ /Quality/

Li, Zhiguo, Andrews, James and Wang, Yuqing. 2017. Mathematical modelling of mechanical damage to tomato fruits. *Postharvest Biol. & Technol.* 126: 50 – 56.

Abstract

A 3D virtual model was developed of compression of a whole tomato fruit to 10% deformation. This included a 1/4 geometrical model of the fruit, an up-plate probe and a bottom-plate base. The fruit model included the cuticle, a pericarp frame and septal tissues, and a nearly incompressible surface-based water-filled locule. The cuticle was meshed into quadrilateral membrane elements whilst the pericarp frame and septal tissues were meshed into hexahedral brick elements with an edge size of 0.4 mm, approximating cells in the fruit. Assuming elastic-plastic constitutive behaviour and von Mises yield criterion for the cuticle and cell elements, the cuticle did not yield during simulation whilst the cells that had yielded were mainly distributed inside the pericarp tissues and near the stem-blossom axis. The vertical compression resulted in a main local deformation response in the contact area and a minor equatorial structural response. The internal damage volume increased from 0 to 6672 mm³ when a vertical force from 0 to 6.5 N was applied and the corresponding deformation of the model fruit ranged from 0 to 10%. The relationship between internal damage volume and percentage deformation (or compression force) followed the 4-parameter sigmoidal model. Tiny internal damage of fruit at the micro scale began from the start of the compression but was not easily observed when the fruit deformation was <3%. This mathematical modelling method to find the internal damage volume might also be used for other fruits.

Keywords: /Tomato/ /Mechanical Damage/

Rongai, Domenico, et.al. 2017. Antifungal activity of pomegranate peel extract against fusarium wilt of tomato. *Eur. J. Plant Pathol.* 147:229–238.

Abstract

Pomegranate (*Punicagranatum*) is an important source of bioactive compounds and has been used in folk medicine for many centuries. This paper describes the in vitro antifungal activity of pomegranate peel aqueous extract (pae) on the development of Fusarium wilt of tomato caused by *Fusarium oxysporum*, f. sp. *lycopersici*. HPLC-DAD-ESI/MS analysis was performed to identify punicalag and ellagic acid, which are the main antifungal compounds. In vivo tests established the efficacy of pae treatments in controlling Fusarium wilt by evaluating improvements in growth variables of tomato plants. At high concentrations, pae showed allelopathic activity in tomato plants. The germination and the radicle growth of tomato seeds were significantly affected by pae. Increasing the extract concentration led to a progressive decrease in germination and in the length of the radicle. The reduction of the Fusarium population in soil and the increase in number of healthy plants obtained as a result of pae treatments indicate that this plant extract could have an important role in biologically-based management strategies for the control of Fusarium wilt in tomato crops.

Keywords: /Tomato/ /Fusarium Wilt/

HERBS & SPICES

ARTICHOKE

Fabio Licciardell, et.al. 2017. Quality traits of ready-to-use globe artichoke slices as affected by genotype, harvest time and storage time. Part II: physiological, microbiological and sensory aspects. LWT – Food Sci. & Technol. 79: 554 – 560.

Abstract

The microbiological, physiological and sensory characteristics of ready-to-use globe artichoke slices subjected to a shelf life study are reported. The traits of three genotypes ('Apollo', 'Exploter' and 'Spinodi Palermo'), grown in an experimental field, were monitored for 11 d at 4 °C. Significant variations due to genotype, harvest time, storage time and their interactions were found. The selected packaging system allowed the generation of a passive atmosphere, which did not affect the produce metabolism. Microbial populations, with the exception of yeasts and moulds, did not exceed the limits suggested for minimally processed vegetables. Sliced artichoke heads from early and late harvests showed a shelf life of 11 and 7 d, respectively. The 'Exploter' proved to be the most suitable genotype for minimal processing as it received the highest overall sensory score at the end of the storage period.

Keywords: /Artichoke/ /Minimally Processed/ /Sensory Evaluation/

CORIANDER

El-Zaaddi, Hussein, et.al. 2017. Preharvest treatments with malic, oxalic, and acetylsalicylic acids affect the phenolic composition and antioxidant capacity of coriander, dill and parsley. Food Chem. 226:179 – 186.

ABSTRACT

The effects of a preharvest treatment with malic (MA), oxalic (OA), or acetylsalicylic (ASA) acid at three concentrations (1, 2 and 3 mM) on the bioactivity and antioxidant capacity of coriander, dill, and parsley were investigated. The antioxidant capacity of the herbs extracts was assayed by spectrophotometric methods by using three different analytical methods: ORAC, FRAP, and ABTS; the effects of treatments were very positive in coriander, produced intermediate results in dill, and no effects were found in parsley plants. Polyphenol compounds were identified by LC-MS-QT and quantified by UPLC-PDA-FL. Thirty phenolic compounds were identified in these three herbs. The major compounds were (i) coriander: dimethoxycinnamoylhexoside and quercetin-3-O-rutinoside, (ii) dill: neochlorogenic acid and quercetin glucuronide, and (iii) parsley: apigenin-7-apiosylglucoside (apiin) and isorhamnetin-3-O-hexoside. The application of these three organic acids favored the accumulation of phenolic compounds in coriander plants, but had no significant positive effects on dill and parsley. The treatments leading to the best results in all three plants were the application of MA or OA at 1 mM.

Keywords: /Coriander/ /Dill/ /Parsley/ /Preharvest Treatments/

ENDIVE

Nüblin, Simone, et.al. 2017. Effects of Quillaja saponaria extract and Na-lauroyl-L-arginine ethylester on reducing selected foodborne pathogens in vitro and maintaining quality of fresh-cut endive (Cichorium endivia L.) at pilot plant scale. Food Control. 73: 393 – 400.

Abstract

The aim of the present study was to evaluate the applicability of Quillaja saponaria extract (QSE) and Nalauroyl- L-arginine ethyl ester (LAE) as antimicrobial wash water additives in fresh-cut lettuce processing. Antibacterial activities of LAE and QSE against selected strains of the foodborne pathogens Salmonella enterica, Bacillus cereus, Staphylococcus aureus, Pseudomonas aeruginosa, and Listeria monocytogenes were examined in vitro. Minimum inhibitory concentrations determined by broth micro dilution assay demonstrated that LAE exhibited a strong antimicrobial activity with MICs between 4 and 32 mg/mL against all tested strains, whereas QSE showed a weaker antimicrobial activity with MICs >512 mg/mL. On a pilot-plant scale, the effects of warm water washing at 45 °C for 120 s with and without 40 mg/L QSE or 100 mg/L LAE as well as cold water washing at 4 °C for 120 s with QSE or LAE, respectively, of shredded endive (Cichorium endivia L.) were investigated regarding microbiological and sensory quality as well as physiological properties. Samples were analyzed for headspace O₂ and CO₂ levels, phenylalanine ammonia- lyase activity and contents of nitrite and nitrate during nine days of cold storage at 4 °C. By analogy to its antimicrobial effect against the foodborne pathogens in vitro, LAE allowed up to 4 log₁₀ cfu/ mL reduction of the microbial load in the washing water of the pilot plant, and might therefore reduce cross-contamination while saving water. The addition of LAE to warm washing water impaired sensory properties of fresh-cut endive during storage, which was predicted by chlorophyll fluorescence imaging analyses. QSE treatment combined with warm water washing best retained sensory appearance throughout our study, being possibly suitable for the production of premium products.

Keywords: /Endive/ /Fresh-Cut/ /Microbial Quality/

TUBERS AND ROOTCROPS

POTATO

Ierna, A., et.al. 2016. Sensory and physico-chemical characteristics of minimally processed “early” potato tubers as affected by anti-browning treatments and cultivar. Acta Hort. 1141: 229 – 236.

Abstract

In several Mediterranean countries potato production is focused on the “early” crop type. Early potatoes have usually lower dry matter content than tubers from the usual crop and they are a proven source of vitamins (e.g., ascorbic acid) and other antioxidant compounds (total phenolics). The enhanced interest in fresh-cut products has recently led to the expansion of minimally processed early potatoes production. Limited information exists in the literature about the qualitative traits of minimally processed “early” potato. In this work we studied the effects of three anti-browning dipping treatments (SW, sterile deionized water; SB, 0.2% sodium bisulfite, commonly used by the fresh-cut potato industry; AA+CA, 2.0% ascorbic acid + 2.0% citric acid) on the sensory and physico-chemical characteristics of minimally processed tubers from eight cultivars (‘Antea’, ‘Arinda’, ‘Ditta’, ‘Liseta’,

'Marabel', 'Matador', 'Mondial' and 'Spunta') widely grown in the Mediterranean basin. Slices were packaged in Polyamide/Polyethylene (PA/PE) bags (15×20 cm; 85 µm thick) under passive modified atmosphere, stored at 4±1°C and evaluated after 9 days. Overall, the AA+CA treatment resulted in a better sensory quality (less browning and off-odor, more firm texture) and enriched nutritional profile (higher citric acid and ascorbic acid contents and higher antioxidant activity) with respect to water and sulfited dipping. 'Arinda', 'Marabel', 'Matador' and 'Spunta' cultivars performed best, whereas 'Antea' and 'Ditta' appeared not to be suitable as minimally processed tubers. These preliminary results demonstrate that the choice of cultivar represents a key issue in determining the overall quality of minimally processed "early" tubers.

Keywords: /Potato/ /Minimally Processed/ /Browning/ /Sensory Evaluation/

Lin, Qiong, et.al. 2017. UV-C treatment on physiological response of potato (*Solanum tuberosum* L.) during low temperature storage. *J. Food Sci. Technol.* 54(1): 55 – 61.

Abstract

The storage of potato tuber (*Solanum tuberosum*.) at low temperatures minimizes sprouting and disease but can cause cold-induced sweetening (CIS), which leads to the production of the cancerogenic substance acrylamide during the frying processing. The aim of this research was to investigate the effects of UV-C treatment on CIS in cold stored potato tuber. 'Atlantic' potatoes were treated with UV-C for an hour and then stored at 4°C up to 28 days. The UV-C treatment significantly prevented the increase of malondialdehyde content (an indicator of the prevention of oxidative injury) in potato cells during storage. The accumulation of reducing sugars, particularly fructose and glucose, was significantly reduced by UV-C treatment possibly due to the regulation of the gene cascade, sucrose phosphate synthase, invertase inhibitor 1/3, and invertase 1 in potato tubers, which were observed to be differently expressed between treated and untreated potatoes during low temperature storage. In summary, UV-C treatment prevented the existence of oxidative injury in potato cells, thus, lowered the amount of reducing sugar accumulation during low temperature storage of potato tubers .

Keywords: /Potato/ /Storage/

SWEET POTATO

Ji, Chang Yoon, et.al. 2017. Transcriptome profiling of sweet potato tuberous roots during low temperature storage. *Plant Physiol. & Biochem.* 112: 97 - 108.

Abstract

Sweet potato [*Ipomoea batatas* (L.) Lam] is a globally important root crop with high industrial value. However, because sweet potato tuberous roots undergo chilling injuries that negatively affect their quality at temperatures below 10 °C, postharvest damage during the winter season is a major constraint for industrialization. To understand chilling injury response during postharvest low temperature storage, we used next-generation sequencing technology to comprehensive analyze the transcriptome of tuberous roots stored at optimal (13 °C) or low temperature (4 °C) for 6 weeks. From nine cDNA libraries, we produced 298,765,564 clean reads, which were *de novo* assembled into 58,392 unigenes with an average length of 1100 bp. A total of 3216 differentially expressed genes (DEGs) were detected and categorized into six clusters, of which clusters 2, 4, and 5 (1464 DEGs) were up-regulated

under low temperature. The genes in these three clusters are involved in biosynthesis of unsaturated fatty acids, pathogen defense, and phenylalanine metabolism. By contrast, genes in clusters 1, 3, and 6 (1752 DEGs), which were generally down-regulated at low temperature, encode antioxidant enzymes or are involved in glycerophospholipid, carbohydrate, or energy metabolism. We confirmed the results of the transcriptome analysis by quantitative RT-PCR. Our transcriptome analysis will advance our understanding of the comprehensive mechanisms of chilling injury during low temperature storage and facilitate improvements in postharvest storage of sweet potato tuberous roots.

Keywords: /Sweet Potato/ /Chilling Injury/ /Low Temperature Storage

ORNAMENTALS

CARNATION

Boxriker, Maïke, et.al. 2017. Comparative transcriptome analysis of vase life and carnation type in *Dianthus caryophyllus*L. Scientia Hort. 217: 61 – 72.

Abstract

Vase life (VL) and storage are the main breeding objectives in carnations due to their direct influence on consumer satisfaction and the transportability around the world. Molecular markers in carnation are available for different traits but not so far for VL, especially not SNP-based markers (single nucleotide polymorphism). Therefore, bulked segregant analysis (BSA) was introduced in carnation for the first time. 500 genotypes were phenotyped for the trait VL, contrasting bulks were generated and used for transcription sequencing with a combination of RNA-Seq and MACE (massive analysis of cDNA ends). Gene ontology (GO) terms were used for comparative analysis of annotated transcripts by comparing bulks with short and long VL. Differential expression (DE) of transcripts between the bulks with short and long VL was detected only by a higher expression of transcripts in the GO terms in the bulk with short VL. By literature review, many DE transcripts attributable to VL were identified. Little is known about the molecular differences between the carnation types standard and mini. The comparison of carnation types showed more DE transcripts as compared to the analysis of VL. Potential SNP markers were selected, but they are usable only for one carnation type, which indicates that the markers have to be established separately for the carnation types standard or mini.

Keywords: /Carnation/ /Vase Life/

TORCH GINGER

Mattos, Drucylla Guerra, et.al. 2017. Water relations in post-harvested torch ginger affected by harvest point and carnauba wax. Postharvest Biol. and Technol. 127: 35 – 43.

Abstract

The use of post-harvest techniques that enhance quality and longevity of cut flowers is essential for successful marketing. However, for some species the most appropriate procedures are still unknown. The aim of this work was to evaluate the storability and post-harvest quality of flower stems of torch ginger harvested at two stages of flower opening, treated or not with carnauba wax, and stored at 16 or 21 °C. Carnauba wax (0, 0.75, 1.5 and 3.0% w/v) was applied to flowers at two stages of opening (semi-

open and open bracts). Evaluations were performed every other day for 20 d. Visual quality was analysed by means of a grading scale; and relative fresh weight, water absorption, transpiration, water balance and bract anatomy were assessed. Carnauba wax was deposited as epicuticular sheets, but its application had no effect on the physiological or visual quality of the floral stems. Semi-open stage provided better visual quality for a larger number of days during the tested period of storage, along with physiological responses that contributed to the improvement of post-harvest longevity.

Keywords: /Torch Ginger/ /Storage/ /Longevity/