

**SELECTIVE DISSEMINATION OF INFORMATION (SDI)
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GENERAL

CHITOSAN

Crouvisier-Urien, K., et.al. 2017. Impact of the homogenization process on the structure and antioxidant properties of chitosan-lignin composite films. Food Chem. 236: 120–126.

Abstract

This work investigated the impact of two homogenization treatments, High Shear (HS) and High Pressure (HP), on the structure and antioxidant activity of chitosan-lignin bio-composite films. Laser light scattering analysis revealed that smaller lignin particles were obtained after HP processing, around 0.6 μm , compared to HS treatment, between 2.5 and 5 μm . Moreover, these particles were more homogeneously distributed in the chitosan film matrix after HP process, while some aggregates remained after HS treatment, as highlighted by two-photon microscopy. The surface hydrophobicity of the composite films, as measured by water contact angle, increased after the two homogenization treatments. Finally, the antioxidant activity of the composite films was determined using the DPPH $\dot{\text{A}}$ assay. No significant difference in the radical scavenging activity was noticeable, neither after HS nor HP processing. However, a migration of lignin residues from the film to the extraction medium was noticed, particularly for HP process.

Keywords: /Chitosan/ /Active Packaging/ /Films/

Qiao, C., et.al. 2017. Molecular interactions in gelatin/ chitosan composite films. Food Chem 235: 45–50.

Abstract

Gelatin and chitosan were mixed at different mass ratios in solution forms, and the rheological properties of these film-forming solutions, upon cooling, were studied. The results indicate that the significant interactions between gelatin and chitosan promote the formation of multiple complexes, reflected by an increase in the storage modulus of gelatin solution. Furthermore, these molecular interactions hinder the formation of gelatin networks, consequently decreasing the storage modulus of polymer gels. Both hydrogen bonds and electrostatic interactions are formed between gelatin and chitosan, as evidenced by the shift of the amide-II bands of polymers. X-ray patterns of composite films indicate that the contents of triple helices decrease with increasing chitosan content. Only one glass transition temperature (T_g) was observed in composite films with different composition ratios, and it decreases gradually with an increase in chitosan proportion, indicating that gelatin and chitosan have good miscibility and form a wide range of blends.

Keywords: /Chitosan/ /Films/

COLD CHAIN

Mercier, S., et.al. 2017. Time-temperature management along the food **cold chain**: A review of recent developments. *Compr Rev Food Sci Food Saf* 16: 647-667.

Abstract

The cold chain is responsible for the preservation and transportation of perishable foods in the proper temperature range to slow biological decay processes and deliver safe and high-quality foods to consumers. Studies show that the efficiency of the cold chain is often less than ideal, as temperature abuses above or below the optimal product- specific temperature range occur frequently, a situation that significantly increases food waste and endangers food safety. In this work, field studies on time-temperature conditions at each critical stage of the cold chain are reviewed to assess the current state of commercial cold chains. Precooling, ground operations during transportation, storage during display at retail and in domestic refrigerators, and commercial handling practices are identified and discussed as the major weaknesses in the modern cold chain. The improvement in efficiency achieved through the measurement, analysis, and management of time-temperature conditions is reviewed, along with the accompanying technical and practical challenges delaying the implementation of such methods. A combination of prospective experimental and modeling research on precooling uniformity, responsive food inventory management systems, and cold chains in developing countries is proposed for the improvement of the cold chain at the global scale.

Keywords: /Cold Chain/ /Shelf-Life/ /Supply Chain/

EDIBLE COATING

Acevedo-Fani, A., R. Soliva-Fortuny and O. Martin-Belloso. 2017. Nanoemulsions as **edible coatings**. *Food Sci.* 15: 43-49.

Abstract

Edible coatings are used to preserve food quality but may serve to immobilize active ingredients on the food surface. Nanoemulsions are effective systems for encapsulating lipophilic active ingredients since the reduction of droplet size increases their solubility, stability and may enhance their biological activity. Therefore, this review aims to highlight the most important aspects in designing food nanoemulsions for active substances delivery and the recent advances in their application as edible coatings. Up to date, research studies confirm that nanoemulsion-based edible coatings can enhance the transport of antimicrobial substances to solid foods extending their shelf life. However, future studies should be oriented to assess the impact of nanoemulsions on the organoleptic properties of coated foods and their potential toxicity.

Keywords: /Edible Coating/

EDIBLE FILMS

Ochoa, T.A., et.al. 2017. Design and characterization of corn starch edible films including beeswax and natural antimicrobials. Food Bioprocess Technol 10: 103-114

Abstract

The effectiveness of edible films (EFs) used as coatings to maintain the quality and safety of fresh produce for long time depends on their functional properties characterization. This study was aimed to design and evaluate physico-chemical, barrier, mechanical, and antimicrobial properties of EFs based on corn starch (acetylated cross-linked (ACLS) or oxidized (OS)), micro-emulsified beeswax (BW, 0–1 % w/w), and two natural antimicrobials (lauric arginate (LAE, 400–4000 mg/L) and natamycin (NAT, 80–800 mg/L)). EFs based on ACLS or OS made with 1 % BW microemulsion produced homogeneous EFs surface and did not show changes in thickness or opacity. Water vapor permeability (WVP, $0.57 \pm 0.04 \text{ g mm m}^{-2} \text{ h}^{-1} \text{ kPa}^{-1}$ for ACLS, and $0.56 \pm 0.05 \text{ g mm m}^{-2} \text{ h}^{-1} \text{ kPa}^{-1}$ for OS) was reduced; tensile strength (TS, $51.48 \pm 5.92 \text{ MPa}$ for ACLS, and $40.96 \pm 4.98 \text{ MPa}$ for OS), and elastic modulus (EM, $211.30 \pm 7.85 \text{ MPa}$ for ACLS, and $203.50 \pm 5.35 \text{ MPa}$ for OS) were decreased, whereas elongation at break (E, $4.59 \pm 1.11 \%$ for ACLS, and $4.76 \pm 4.98 \%$ for OS) increased. The additive effect showed by the combination of natural antimicrobials (2000 mg/L of LAE plus 400 mg/L of NAT) incorporated into EFs with 1 % BW completely inhibited *Rhizopus stolonifer*, *Colletotrichum gloeosporioides*, *Botrytis cinerea*, and *Salmonella* Saintpaul. These properties of corn starch EFs used as coatings represent an excellent alternative to extend the shelf life of fresh produce.

Keywords: /Edible Films/ /Antimicrobials/

FOOD PACKAGING

Aytac, Z., et.al. 2017. Antibacterial electrospun zein nanofibrous web encapsulating thymol/cyclodextrin-inclusion complex for food packaging. Food Chem 233: 117–124. Food Packag. & Shelf Life 13: 20-26.

Abstract

Thymol (THY)/ γ -Cyclodextrin(γ -CD) inclusion complex (IC) encapsulated electrospun zein nanofibrous webs (zein-THY/ γ -CD-IC-NF) were fabricated as a food packaging material. The formation of THY/ γ -CD-IC (1:1 and 2:1) was proved by experimental (X-ray diffraction (XRD), thermal gravimetric analysis (TGA), ^1H NMR) and computational techniques. THY/ γ -CD-IC (2:1) exhibited higher preservation rate and stability than THY/ γ -CD-IC (1:1). It is worth mentioning that zein-THY/ γ -CD-IC-NF (2:1) preserved much more THY as observed in TGA and stability of THY/ γ -CD-IC (2:1) was higher, as shown by a modelling study. Therefore, much more THY was released from zein-THY/ γ -CD-IC-NF (2:1) than zein-THY-NF and zein-THY/ γ -CD-IC-NF (1:1). Similarly, antibacterial activity of zein-THY/ γ -CD-IC-NF (2:1) was higher than zein-THY-NF and zein-THY/ γ -CD-IC-NF (1:1). It was demonstrated that zein-

THY/ γ -CD-IC-NF (2:1) was most effective in inhibiting the growth of bacteria on meat samples. These webs show potential application as an antibacterial food packaging material.

Keywords: /Food Packaging/

Ribeiro-Santos, R., M. Andrade and A. Sanches-Silva. 2017. Application of encapsulated essential oils as antimicrobial agents in **food packaging**. *Curr Opin Food Sci* 14:78–84.

Abstract

Recently natural antimicrobials have attracted a great deal of attention from the food industry. Innovations in food packaging have also been focused on the incorporation of these active additives in polymer matrices with the purpose of extending foods shelf life. Essential oils (EOs) from aromatic plants are potent antimicrobial agents. However, their volatility, low solubility in water, and susceptibility for oxidation limits their use. EOs encapsulation is one of the options to reduce these effects and to improve their biological activities. In this review, the relevance of EOs encapsulation and their incorporation into food packaging are discussed. Application of active antimicrobial packaging, based on encapsulated EOs, to foods is also addressed to evaluate their influence in food shelf life.

Keywords: /Food Packaging/

FRESH FRUITS AND VEGETABLES

Xiangbing Yang and Yong-Biao Liu. 2017. Residual analysis of nitric oxide fumigation on **fresh fruit and vegetables**. *Postharvest Biol & Technol* 132: 105–108

Abstract

Nitric oxide (NO) is a newly discovered fumigant which is effective against a wide range of postharvest pests. To register NO with US EPA for commercial use as a pesticide and to ensure its safety to consumers, it is necessary to analyze residues of NO fumigated products. In this study, we analyzed nitrate (NO_3^-) and nitrite (NO_2^-) ion concentrations in liquid extracts as residues on 20 fresh products at 24 h after 16 h fumigation treatments and compared them from untreated controls to determine effects of nitric oxide fumigation. Each product was subjected to two identical NO fumigation treatments except one treatment was terminated by flushing with N_2 and the other terminated by flushing with air. For most products, there were no significant differences in NO_3^- or NO_2^- level between the treatment that was terminated with nitrogen flush and the control. Only when NO fumigation treatment was terminated by flushing with normal air, there were significantly higher NO_3^- and NO_2^- concentrations in all fumigated products than both control and N_2 flushed fumigated products. NO_2^- -concentration was generally not detectable in both fumigated and control products. Therefore, our results indicated that there were no significant levels of residues from NO fumigated fresh products at 24 h after fumigation when fumigation was terminated properly with nitrogen flushing.

Keywords: /Fresh Fruits and Vegetables/

FRESH PRODUCE

Jun-Won Kang and Dong-Hyun Kang. 2017. Antimicrobial efficacy of vacuum impregnation washing with malic acid applied to whole paprika, carrots, king oyster mushrooms and muskmelons. *Food Control* 82: 126-135.

Abstract

Antimicrobial effect of vacuum impregnation (VI) applied to organic acid washing against *Salmonella* Typhimurium, *Escherichia coli* O157:H7 and *Listeria monocytogenes* on paprika fruit, carrots, king oyster mushrooms and muskmelons was investigated. Samples were treated with intermittent VI with 21.3 kPa and compared with dipping washing in 2% malic acid. The initial sample pathogen levels were approximately 10^5 - 10^7 CFU/cm². Enumerations of the three pathogens on paprika and carrots treated with VI washing were reduced to below the detection limit ($= 1 \log_{10}$ CFU/cm²) after 3-5 min and 15-20 min, respectively. For each time point where populations of the three pathogens were reduced to below the detection limit by VI treatment, populations of 1.2-1.9 log CFU/cm² and 2.5 to 2.8 log CFU/cm² survived on paprika and carrots, respectively, when subjected to dipping treatment. After 20 min of dipping treatment, surviving populations of the three pathogens ranged from 3.5 to 4.1 and 3.3 to 4.4 log CFU/cm² on king oyster mushrooms and muskmelons, respectively. After 20 min of VI treatment, surviving populations of the three pathogens ranged from 3.0 to 3.6 log and 3.1 to 4.1 log CFU/cm², respectively, on king oyster mushrooms and muskmelons. Additionally, there were no significant ($P \geq 0.05$) differences in pathogen reductions between dipping and VI treatment for both king oyster mushrooms and muskmelons. King oyster mushrooms ($R\alpha = 6.02 \pm 1.65 \mu\text{m}$) and muskmelons ($R\alpha = 11.43 \pm 1.68 \mu\text{m}$) had relatively large roughness values compared to those of paprika ($R\alpha = 0.60 \pm 0.10 \mu\text{m}$) and carrots ($R\alpha = 2.51 \pm 0.50 \mu\text{m}$). Scanning electron photomicrographs showed many deep protected sites in king oyster mushrooms and muskmelons with many microbes located deep in these sites following VI treatment. Instrumental color, texture and titratable acidity values of paprika and carrots subjected to VI washing treatment with 2% malic acid for 5 and 20 min were not significantly ($P \geq 0.05$) different from those of untreated control samples during 7 day storage.

Keywords: /Fresh Produce/ /Carrots/ /Muskmelon/ /Storage/

Shuanghuan Guo, Runze Huang and Haiqiang Chen. 2017. Application of water-assisted ultraviolet light in combination of chlorine and hydrogen peroxide to inactivate *Salmonella* on **fresh produce**. *Int J Food Microbiol* 257: 101-109.

Abstract

With the demand for fresh produce increases in recent decades, concerns for microbiological safety of fresh produce are also raised. To identify effective ultraviolet (UV) light treatment for fresh produce decontamination, we first determined the effect of three forms of UV treatment, dry UV (samples were treated by UV directly), wet UV (samples were dipped in water briefly and then exposed to UV), and water-assisted UV (samples were treated by UV while being immersed in agitated water) on

inactivation of *Salmonella* inoculated on tomatoes and fresh-cut lettuce. In general, the water-assisted UV treatment was found to be the most effective for both produce items. Chlorine and hydrogen peroxide were then tested to determine whether they could be used to enhance the decontamination efficacy of water-assisted UV treatment and prevent transfer of *Salmonella* via wash water by completely eliminating it. Neither of them significantly enhanced water-assisted UV inactivation of *Salmonella* on tomatoes. Chlorine significantly improved the decontamination effectiveness of the water-assisted UV treatment for baby-cut carrots and lettuce, but not for spinach. In general, the single water-assisted UV treatment and the combined treatment of water-assisted UV and chlorine were similar or more effective than the chlorine washing treatment. In most of the cases, no *Salmonella* was detected in the wash water when the single water-assisted UV treatment was used to decontaminate tomatoes. In a few cases when *Salmonella* was detected in the wash water, the populations were very low, ≤ 2 CFU/mL, and the wash water contained an extremely high level of organic load and soil level. Therefore, the single water-assisted UV treatment could potentially be used as an environmentally friendly and non-chemical alternative to chlorine washing for tomatoes after validation in industrial scale. For lettuce, spinach and baby-cut carrots, the combined treatment of water-assisted UV treatment and chlorine was needed to maintain a pathogen free environment in the wash water so that cross contamination could be prevented during fresh produce washing.

Keywords: /Fresh Produce/

MODIFIED ATMOSPHERE AND HUMIDITY PACKAGING

Jalali, A., et.al. 2017. A comprehensive simulation program for modified atmosphere and humidity packaging (MAHP) of fresh fruits and vegetables. J Food Eng 206: 88-97

Abstract

Modified atmosphere and humidity packaging (MAHP) is used to extend shelf life and maintaining the quality of fresh fruits and vegetables by modifying desired gas concentration and relative humidity (RH) inside fresh produce package. Several factors affect the optimum design of MAHP, most of which are time and or temperature dependent. Hence, there is a vital need for a simulation tool that includes all affecting parameters and their interactive behavior on package gas composition and water vapour. In this study a comprehensive simulation program based on integrative mathematical modeling is presented. A number of validation experiments were conducted to evaluate the robustness of the simulation program under constant and varying temperature conditions during storage period and predict gas composition, humidity and moisture condensation dynamics in packaged strawberry and plum. The simulated results were satisfactory with those obtained experimentally. The validated simulation program was then used for optimization of modified humidity packaging for both plum and strawberry. The predicted equilibrium headspace humidity was 94.0 and 98.8% for strawberries and plums, respectively which was very close to measured values of 93.5 and 94.1%, respectively. Therefore, the simulation program was found to be a convenient tool to virtually test the package under a broad range of environmental conditions such as temperature and RH resembling real

supply chain conditions and ensure proper selection of packaging systems for the optimum performance.

Keywords: /Modified Atmosphere and Humidity Packaging/ /Fresh Produce/

PACKAGING

Akomolafe, O.M. And T.V. Awe. 2017. Microbial contamination and polyethylene packaging of some fruits and vegetables retailed at Akure and Ado Ekiti, South Western Nigeria. J. Stored Prod. Postharvest Res. 8(6): 65-72.

Abstract

This study was carried out to reveal microbial contaminants on some selected ready-to-eat fruits and vegetables (eggplant, apple, tiger nut, bitter kola, cola nut, date and carrot) vended at motor parks, busy roads and local markets in Akure and Ado Ekiti metropolis (South Western Nigeria). It also evaluated the effectiveness of polyethylene packaging in controlling microbial contamination of these foods using product shelf life indices as criteria. Bacteria contaminants were isolated from samples and characterized using standard microbiological methods. Samples were also disinfected and stored in 1, 4, 7, 10 and 13 μm thick polyethylene bags at 29°C and 84% RH for 10 days. Result showed that cola nut, carrot, eggplants and tiger nut sold at all wholesale and retail points studied (100%) were contaminated. Apple and bitter kola at wholesale points were however free of microbial contaminants as was also observed for apple at two of its retail points (20%) and bitter kola at only one of the ten retail points studied (10%). *Staphylococcus* spp. was the most frequently isolated, followed by *Klebsiella* spp., others include *Proteus*, *Bacillus*, *Pseudomonas*, *Serratia* and *Streptococcus* species. Storage of bitter kola, eggplant and date in 7, 10 and 13 μm thick polyethylene films extended shelf life for ten days in ambient temperature of the tropics, while 1 and 4 μm were best for carrot under the same condition. Contrariwise, cola nuts stored in the different polyethylene thicknesses studied became discoloured during storage. Packaging of bitter kola, eggplant, date and carrot in polyethylene prevented microbial contamination and extended shelf life during retailing.

Keywords: /Packaging/ /Polyethylene/ /Storage/

Licciardello, F. 2017. **Packaging**, blessing in disguise. Review on its diverse contribution to food sustainability. Trends in Food Sci & Technol 65: 32-39.

Abstract

Background: Packaging has been blamed for representing one of the highest environmental impacts in food productions. Although it cannot be denied that packages, with special regards for materials production, processing and disposal, carry some impact, other aspects should be considered for an objective assessment of packaging environmental role.

Scope and approach: The paper, through a survey of specific literature, aims to estimate the actual relative impact of packaging with respect to the overall food products environmental load, to present an overview on the ongoing efforts spent for making packaging more sustainable and the packaging-product system more efficient and to highlight the novel positive consideration that food packaging should receive. Special focus has been addressed to the recent contributions which have correlated food waste reduction, achieved through packaging innovations, with an overall environmental improvement.

Key findings and conclusions: Considerations based on the packaging relative environmental impact and on the potential of suitable innovations to reduce food wastes, lead to a broader concept of sustainable packaging and should drive future strategies for sustainability improvement. Packaging reduction and a shift to alternative materials and/or technologies should be especially addressed for products characterized by a high packaging relative impact; vice versa, when packaging represents a low burden compared to other life cycle phases, the overall environmental performance will be improved with measures aimed at reducing food waste, which, in turn, could imply an affordable increase in the packaging impact.

Keywords: /Packaging/ /Shelf Life/

POLYETHYLENE FILMS

Ahmed, J., et.al. 2017. Rheological, structural, ultraviolet protection and oxygen barrier properties of linear low-density **polyethylene films** reinforced with zinc oxide (ZnO) nanoparticles.

Abstract

Linear low-density polyethylene (LLDPE) and zinc oxide (0–10%, w/w) nanocomposite (NC) films were produced through melt-mixing extrusion process. Both LLDPE and LLDPE/ZnO NC exhibited predominating liquid-like property in the lower frequency range, however, a distinct gel point was detected at higher frequency. At 10% loading of ZnO to LLDPE followed the time-temperature-superposition (TTS) principle adequately in the selected temperature range (140–170 °C). Tensile strength (TS) of the NC increased whereas the elongation at break (EAB) decreased with increasing loading concentration of ZnO. NC films showed lower transparency, b^* - values (yellowness), and ΔE^* - values (total color difference) than the control LLDPE film. Incorporation of ZnO improved the ultraviolet (UV) barrier properties whereas the oxygen transmission rate decreased significantly from about 11,000 to 8000 $\text{cm}^3/(\text{m}^2 \text{ 24 h})$. X-ray diffraction (XRD) analysis confirmed the crystalline structure of the NC films, and an improvement in thermal stability was detected through thermogravimetric analysis. Scanning electron microscopy (SEM) exhibited well dispersion of nanoparticles in the NC matrix with a coarse film surface. Thus, LLDPE/ZnO nanocomposite films could be used as a food packaging material to prevent oxygen and UV induced lipid oxidation in food materials.

Keywords: /Polyethylene Films/

QUALITY

Ilic, Z.S., and E. Fallik. 2017. Light quality manipulation improves vegetable quality at harvest and postharvest: A review. *Environ Exper Bot* 139: 79-90.

Abstract

Modification of spectral quality via coloured shade nets can act as a physiological tool to modify the crop microenvironment and advance plant growth and yield. This literature review presents data on the physiological responses in vegetables linked to light quality under different coloured shade nets. The physiological parameters discussed in the review include: vegetable growth parameters (leaf area, leaf chlorophyll), tissue structure, fruit ripening, physiological disorders, pest and disease incidence, fruit quality parameters (soluble solids content and titratable acidity), phytochemicals (antioxidant activity, ascorbic acid, carotenoid and flavonoid contents) and aroma volatile compounds at harvest. Also, it is evident in the reviewed literature that light quality influences the biosynthesis, accumulation and retention of vegetable phytochemicals, as well as the decay development during storage. These new strategies to modulate light quality should be conveyed to vegetable producing farmers, thus allowing them to preserve the freshness and post-harvest quality of vegetables for an extended period of time, and to meet the consumers demand for vegetables with high nutritional value all year round. Research on light manipulation in horticultural systems is necessary for a sustainable and market-oriented open field and greenhouse vegetable production in the future.

Keywords: /Quality/ /Storage/

FRUITS

CANTALOUPE

Macarisin, D., et.al. 2017. Internalization of *Listeria monocytogenes* in cantaloupes during dump tank washing and hydrocooling. *Int. J. Food Microbiol* 257: 165-175

Abstract

Recent listeriosis outbreaks and recalls associated with cantaloupes urge for studies to understand the mechanisms of cantaloupe contamination by *Listeria monocytogenes*. Postharvest practices such as washing and hydrocooling were suggested to facilitate the contamination of fresh fruits by human pathogens. This study assessed the potential of *L. monocytogenes* internalization into cantaloupes during dump tank washing and immersion-type hydrocooling in water contaminated with *L. monocytogenes*. The effect of cantaloupe cultivar, water temperature, and harvesting technique on *L. monocytogenes* internalization was also evaluated. Full slip (cantaloupe without any residual stem) Western and Eastern cultivar cantaloupes were pre-warmed to 42 °C (to imitate peak-high field temperatures of freshly harvested cantaloupes) and then immersed in water at 6 °C and 18 °C containing 4 and 6 log CFU/ml of *L. monocytogenes*. Clipped (cantaloupe with short stem residues

obtained by clipping the stem at harvest) Western and Eastern cantaloupes were pre-warmed to 42 °C and then immersed in water at 6 °C containing 6 log CFU/ml of *L. monocytogenes*. Additionally, full slip and clipped Western cantaloupes were equilibrated to 18 °C and then immersed in water at 18 °C containing 6 log CFU/ml of *L. monocytogenes* (isothermal immersion without temperature differential). Water containing *L. monocytogenes* infiltrated both full slip and clipped cantaloupes through the stems/stem scars and was then distributed along the vascular system in hypodermal mesocarp reaching the calyx area of the fruit. The current study demonstrated that, under experimental conditions, *L. monocytogenes* can internalize into cantaloupes during immersion in water contaminated by *L. monocytogenes*, both in the presence and absence of temperature differential, and that temperature differential moderately enhanced the internalization of *L. monocytogenes*. The incidence and levels of *L. monocytogenes* internalized in the middle-mesocarp were significantly affected by harvesting technique but not by cantaloupe cultivar.

Keywords: /Cantaloupe/ /Postharvest/

CHERRY

Aglar, E., et.al. 2017. Effect of modified atmosphere packaging and 'Parka' treatments on fruit quality characteristics of sweet **cherry** fruits (*Prunus avium* L. '0900 Ziraat') during cold storage and shelf life. *Scientia Horti* 222: 162–168

Abstract

The study was carried out to determine the effects of pre-harvest Parka and post-harvest MAP treatments on weight loss, decay ratio, color characteristics, firmness, soluble solids content (SSC) and titratable acidity-like quality parameters and vitamin C, total phenolics, total antioxidant capacity (according to FRAP and TEAC) and total monomeric anthocyanin-like bioactive compounds of '0900 Ziraat' sweet cherry cultivar throughout cold storage and shelf life. MAP treatments significantly retarded weight loss throughout cold storage. Decay ratios throughout cold storage and shelf life were also lower in Parka, MAP and Parka + MAP treatments. In general, higher L*, chroma and hue angle values were measured in MAP and Parka + MAP treatments. As compared to control treatment, higher flesh firmness values were observed in Parka and Parka + MAP treatments at the end of storage and in Parka, MAP and Parka + MAP treatments in the last shelf life analysis (21st day). In cold storage and shelf life analyses lower SSC values were obtained from Parka and Parka + MAP treatments. Vitamin C contents were better maintained with MAP and Parka + MAP treatments. Total phenolics were higher in Parka + MAP treatments in all analyses of cold storage, but higher in control treatment in all shelf life analyses. In 21st day storage and shelf life analyses, antioxidant capacity (according to FRAP) of all treatments was lower than the control treatment. In all analyses, generally higher total monomeric anthocyanin contents were obtained from control fruits. It was concluded that combining pre-harvest Parka treatments with postharvest MAP treatments could be used as an efficient tool in maintaining flesh firmness of sweet cherry fruits significantly influencing consumer preferences.

Keywords: /Cherry/ /Firmness/ /Weight Loss/

Belge, B., et.al. 2017. Cell wall metabolism in cold-stored 'Somerset' sweet **cherry** fruit. Acta Horti 1161: 543-548

Abstract

'Somerset' is a dark-red, sweet cherry (*Prunus avium* L.) cultivar displaying remarkable firmness levels, with concomitantly longer shelf-life potential in comparison to other cultivars. It is generally accepted that fruit firmness depends mainly on the composition, structure and interconnections among cell wall polysaccharides. However, the biochemical mechanisms involved in cell wall disassembly vary widely among species, and the understanding of the processes underlying firmness loss in cherry fruit is particularly poor, although a critical role for β -galactosidase (β -Gal) activity has been suggested. In this study, 'Somerset' fruit were hand-collected at commercial maturity, and kept at 0°C for 14 or 28 days plus 3 additional days at 20°C to simulate commercial shelf life. Firmness, weight loss and juiciness were assessed in each case as indicators of fruit texture. Soluble and insoluble cell wall materials were extracted from yophilized tissue, and a number of cell wall-modifying enzyme activities were also assessed therein. While β -xylosidase (β -Xyl), pectate lyase (PL), α -L-arabinofuranosidase (AFase) and pectin methylesterase (PME) activities were apparently connected to ripening-related firmness changes in this cherry cultivar, data obtained do not support a role for β -Gal in this process.

Keywords: /Cherry/ /Cold Storage/ /Quality/

Bro, P.B. and I. Rojas. 2017. Electronic **cherry** for impact detection in postharvest operations. Acta Horti 1161: 523-528.

Abstract

The design and construction of a synthetic, electronic cherry (eCherry) used for detecting impacts during postharvest operations is described. The eCherry is a 34-mm diameter sphere molded with silicone rubber or similar material and contains a microcontroller, a static memory, a three axis accelerometer and a battery. The development of the eCherry consisted of an initial stage where the electronics were built into a sphere similar in size to an apple, and a second stage where modified circuits were molded into the final cherry size device. The accelerations measured with the eCherry were found to have very close agreement with theoretical values determined when the device was mounted in a centrifuge. The impacts from drops onto steel or sponge rubber were found to differ mainly in the duration of the impact, as opposed to the magnitude of the initial impact. The eCherry has been found to detect low magnitude accelerations that might cause damage during transport and processing.

Keywords: /Cherry/ /Postharvest Damage/

Comabella, E., B. Belge and I. Lara. 2017. Does total antioxidant capacity play a central role in postharvest deterioration of 'Sweetheart' sweet **cherry** fruit? Acta Horti 1161: 515 – 522.

Abstract

'Sweetheart' cherries (*Prunus avium* L.) have sweet flavour, bright red colour and a distinctive heart shape, which contributes to their wide commercial acceptance. They display also comparatively high firmness and long shelf-life potential. Enzyme-catalysed disassembly of cell walls has been generally targeted as the main factor accounting for ripening-related changes in fruit firmness and overall texture, but the biochemical mechanisms involved in this process appear to include additional factors such as oxidative scission of cell wall polysaccharides. In this study, 'Sweetheart' fruit were hand-collected at commercial maturity, and kept at 0°C for 15 or 30 days plus 3 days at 20°C to mimic their retail period. Firmness, weight loss and juiciness, together with the incidence of decay and stem browning were chosen as indicators of commercial quality of fruit. Cell wall materials were extracted and fractionated, related enzyme activities were assessed, and ascorbic acid content as well as radical scavenging activity (RSA) were also determined. Fruit displaying higher RSA showed higher values for firmness and lower weightloss, decay and stem browning incidence. Higher firmness levels were associated to higher RSA and to yields of the cell wall fractions enriched in covalently-bound pectins and hemicelluloses. B-galactosidase, pectinmethylesterase and endo-1,4-β-D-glucanase activities correlated inversely to firmness, while pectate lyase activity appeared to be relevant for solubilisation of cell wall materials and was inversely related to ascorbic acid content.

Keywords: /Cherry/ /Postharvest Quality/ /Storage/

Delgado-Adamez, J., et.al. 2017. Application of microbial antagonists in combination with sodium bicarbonate to control postharvest diseases of sweet **cherries**. *Acta Horti* 1161: 529-534.

Abstract

Postharvest diseases cause considerable losses in fruits and vegetables during transportation and storage. Synthetic fungicides are the primary mean to control postharvest diseases. However, biological control has emerged as one of the most promising alternatives to chemical fungicides. Several postharvest diseases can now be controlled by microbial antagonists. The aim of this work was to study the antagonistic action of four yeasts and two bacteria in combination with sodium bicarbonate (SB, NaHCO₃). The combination of microbial antagonists and SB were capable of reducing the percentage of infected wounds. In contrast, in stand-alone treatments, cherries treated either with microbial antagonists or with SB, the percentage of infected wounds was very high. Three antagonistic yeasts, *Hanseniaspora uvarum*, *Cryptococcus laurentii* and *Pichia guilliermondii*, in combination with SB, were effective against several of the main postharvest pathogens (*M. laxa*, *A. niger* and *B. cinerea*) on sweet cherries at 25°C. Thus, the combination of microbial antagonists and SB could be an alternative to chemicals for the control of postharvest rot on cherries.

Keywords: /Cherry/ /Postharvest Diseases/

Diaz-Mula, H.M., et.al. 2017. Pre-cooling application before cold storage delayed ripening and maintained high antioxidant activity of 'Sonata' sweet **cherry**. *Acta Horti* 1161: 561-568.

Abstract

Sweet cherry (*Prunus avium* L. 'Sonata') fruits were harvested at commercial ripening and transferred immediately at laboratory. Fruits were selected for the following treatments: control (cold storage) and pre-cooling (air pre-cooling and cold storage). After that fruits were stored at 2°C for 4, 8 and 12 days plus an additional period of 2 days at 20°C. Evaluation of quality parameters (weight loss, total soluble solids, acidity, firmness, and colour) revealed that control cherries showed acceleration on the changes of these parameters while in those pre-cooled fruits retardation was observed. In addition, accumulation of total phenolics, total anthocyanins and total carotenoids was also delayed over storage, although final concentrations were always higher in pre-cooled than in control cherries. In conclusion, the application of pre-cooling treatment before cold storage could be a good tool to retard the postharvest ripening process of sweet cherry and in turn to extend the storability of this perishable fruit. Interestingly, at the end of storage pre-cooled cherries showed higher antioxidant activity, in both hydrophilic and lipophilic fractions, than control fruits, showing higher health-beneficial effects for consumers.

Keywords: /Cherry/ /Postharvest Quality/ /Storage/

Miguel-Pinatdo, C., et.al. 2017. Improvement of 'Sweetheart' **cherry** quality by modified atmosphere packaging (MAP). Acta Horti 1161: 549-554.

Abstract

Sweet cherries are highly perishable, since they undergo rapid deterioration after harvest, including dehydration, softening, and decay. In order to improve *Prunus avium* L. 'Sweetheart' marketability, passive modified atmosphere packaging (MAP) was used. Thus, fruits packed in polyethylene film were stored at 2°C for 6, 13 and 20 days and quality parameters were assessed, namely weight loss, colour (L*, C* and h), firmness, soluble solids content (SSC), titratable acidity (TA), total phenols and epiphytic moulds and yeasts counts. As control, fruits were stored without packaging. Results showed that colour, SSC, TA, total phenols, and acceptability index (SSC/TA) were unaffected by the postharvest treatment. Moreover, MAP reduced weight loss and increased fruit firmness, with no effect on moulds and yeasts counts.

Keywords: /Cherry/ /Modified Atmosphere Packaging/

Wang, Y. and T.C. Einhorn. 2017. Harvest maturity and crop load influence pitting susceptibility and postharvest quality deterioration of sweet **cherry** (*Prunus avium* L.). Acta Horti. 1161: 613-620.

Abstract

The objectives of this research were to determine the effects of harvest maturity and crop load level on fruit quality of 'Lapins' and 'Sweetheart' at harvest and after storage. For harvest maturity experiments, harvests occurred when average skin color as described by CTIFL color chips was 4.0, 5.5, or 6.5 for 'Lapins', and 3.0, 4.5 or 5.5 for 'Sweetheart'. With delayed harvest timing, fruits of 'Lapins' and

'Sweetheart', darkened, accumulated soluble solids (SSC) and softened. Respiration rate and titratable acidity (TA) remained relatively unchanged. Fruit of late-harvested 'Lapins' and 'Sweetheart' (skin color of 6.5 and 5.5, respectively) were more susceptible to pitting and showed duller skin color and increased stem browning after storage compared to less advanced fruit from earlier harvests. Fruit harvested at skin color 5.5 and 4.5 for 'Lapins' and 'Sweetheart', respectively, had the best balance between fruit quality attributes and postharvest and shipping quality. For crop load trials, three crop loads were generated on scaffolds 30 days after bloom, establishing fruit densities of 2-3, 5-7, or >10 fruit spur⁻¹. Results indicated that crop load level was positively related to yield but inversely related to fruit quality. Fruit from high crop load treatments were smaller and had lower SSC, TA, and fruit firmness (FF) at harvest and greater incidence of pitting following storage. Regardless of harvest maturity and crop load treatments, FF was negatively correlated with pitting susceptibility of both cultivars. In conclusion, appropriate harvest timing and proper management of crop load can markedly improve fruit quality, resistance to pitting, and storage/shipping quality of 'Lapins' and 'Sweetheart' sweet cherries.

Keywords: /Cherry/ /Maturity/ /Quality/

KIWIFRUIT

Seong Bok Oh, et.al. 2017. Characteristic of fruit development for optimal harvest date and postharvest storability in 'Skinny Green' baby kiwifruit. *Scientia Horti* 222: 57–61.

Abstract

Actinidia arguta, commonly known as hardy kiwifruit or baby kiwifruit has become very popular in the market due to its taste and can be eaten raw without peeling. However, characteristics of fruit development for optimal harvest date and postharvest storability of baby kiwifruit is diverse in contrast to those of green kiwifruit and yellow kiwifruit. This study was conducted to find the characteristics of fruit development for optimal harvest date and storability period post harvesting in baby kiwifruit for two years (2013–2014). The results showed that fruit weight increased showing a single sigmoid curve. The starch and sugar contents increased significantly and reached to a maximum level at 130–133 days after full bloom (DAFB) respectively. The soluble solids content (SSC) and fruit dry matter also increased and reached to a maximum stage until harvesting. Post-harvested fruits were examined after cold storability at 1 °C for 65 days. The physiochemical measurements such as SSC, fruit firmness increased with a reduction of starch content and titratable acidity (TA) at initial DAFB. However, the fruits harvested at latter stage (approx. 130–133 DAFB) after cold storability showed higher SSC content and a lower TA and fruit firmness. Moreover, the respiration rate in fruit increased till 20 days of storage and thereafter decreased slowly. This study demonstrated that quality of baby kiwifruit can be optimized through identification of ideal harvest date and by controlling storage conditions.

Keywords: /Kiwifruit/ /Maturity/ /Storage/

LIME

Opio, P., et.al. 2017. Efficacy of hot water immersion on **lime** (*Citrus aurantifolia*, Swingle cv. Paan) fruit packed with ethanol vapor in delaying chlorophyll catabolism. *Scientia Hort.* 224: 258-264

Abstract

Postharvest quality deterioration in lime (*C. aurantifolia* Swingle cv. Paan) fruit is indicated by loss of green color as a result of chlorophyll degradation. The effect of hot water immersion on lime fruit packed with ethanol vapor pad (EP) in delaying chlorophyll degradation under storage at 10 °C was investigated. Mature green lime fruit weighing on average 250 g were immersed in hot water at 50 °C for 5 min, thereafter, packaged with 0.6 g EP or without in polypropylene trays sealed with perforated (6-mm hole) polypropylene film (25 µm thick). Postharvest quality, physiological changes and activities of chlorophyll degrading enzymes were determined. The results revealed that hot water immersion and packing fruit with EP effectively delayed chlorophyll degradation through suppressing the activity of chlorophyll degrading enzymes; chlorophyllase, chlorophyll degrading peroxidase, Mg-dechelataase, and pheophytinase in lime fruit. Furthermore, ethylene production as well as respiration was inhibited during the early stages of storage. These results suggest that hot water immersion with EP packaging inhibits chlorophyll degradation in lime fruit through suppression of chlorophyll degrading enzymes as well as ethylene production.

Keywords: /Lime/ /Postharvest Quality/

MANDARIN

Ma, G., et.al. 2017. Identification and quantitative analysis of β -cryptoxanthin and β -citraurin esters in Satsuma **mandarin** fruit during the ripening process. *Food Chem* 234: 356–364.

Abstract

In this study, to investigate the xanthophyll accumulation in citrus fruits, the major fatty acid esters of β -cryptoxanthin and β -citraurin were identified, and changes in their contents were investigated in two Satsuma mandarin varieties, 'Miyagawa-wase' and 'Yamashitabeni-wase', during the ripening process. The results showed that β -cryptoxanthin and β -citraurin were mainly esterified with lauric acid, myristic acid, and palmitic acid in citrus fruits. During the ripening process, β -cryptoxanthin laurate, myristate, and palmitate were accumulated gradually in the flavedos and juice sacs of the two varieties. In the flavedo of 'Yamashitabeni-wase', β -citraurin laurate, myristate, and palmitate were specifically accumulated, and their contents increased rapidly with a peak in November. In addition, functional analyses showed that CitCCD1 and CitCCD4 efficiently cleaved the free β -cryptoxanthin, but not the β -cryptoxanthin esters *in vitro*. The substrate specificity of CitCCDs towards free β -cryptoxanthin indicated that β -cryptoxanthin esters might be more stable than free β -cryptoxanthin in citrus fruits.

Keywords: /Mandarin/ /Ripening/

MANGO

Silva, G.M.C., et.al. 2017. The chitosan affects severely the carbon metabolism in mango (*Mangifera indica* L. cv. Palmer) fruit during storage. *Food Chem* 237: 372–378.

Abstract

Mango is a highly perishable fruit with a short post-harvest time due to the intense metabolic activity after harvesting. In attempt to evaluate the effects of chitosan in mango fruits, it was treated with 0%, 1%, 2% or 3% of chitosan solutions, placed into plastic trays, and stored at room temperature. Changes in physical and chemical parameters were evaluated. Chitosan delayed the climacteric peak, water loss and firmness. Further, few changes in soluble solid content, titratable acidity, pH of the pulp as well as in sugar content and decreased starch degradation were observed. Altogether, our results suggest chitosan edible coating effectively prolongs the quality attributes, affecting basic mitochondrial respiration and starch degradation rate.

Keywords: /Mango/ /Chitosan/ /Storage/ /Postharvest Quality/

PEAR

Ting-Tiao Pan, et.al. 2017. Insights into the changes in chemical compositions of the cell wall of pear fruit infected by *Alternaria alternata* with confocal Raman microspectroscopy. *Postharvest Biol & Technol* 132: 119–129

Abstract

In this paper, fresh pear fruits and those infected by *Alternaria alternata* (*A. alternata*) were studied by confocal Raman microspectroscopy (CRM) to illustrate the changes in chemical compositions of cell wall. Firstly, Raman spectra of the cell wall of both fresh and infected fruits were collected with spatial resolution at micron level, and then label-free in situ imaging of chemical compositions in the cell wall were mapped. The results showed that there were significant changes in the signal intensity of cell wall, especially in the later stage of *A. alternata* infection. After 8 days of infection at room temperature, the signal intensities at 1086 and 871 cm^{-1} , which were associated with cellulose and pectin, were decreased by 58.50% and 58.67%, respectively, revealing changes in the main components of the infected cell wall. Meanwhile, the chemical images of the cell wall of both fresh and infected fruits were compared, indicating that *A. alternata* infection caused the alterations of morphological structure and chemical compositions in the cell wall in a time-dependent manner. Our results confirmed that CRM is a useful tool for the identification of compositional changes in the cell wall caused by fungal infection without the need for any chemical treatment. For the first time, the current research applied CRM in phytopathology for investigating interactive relationship between a pathogen and its host, thus offering a new way for in-depth study of pathogen-host interactions at cellular level.

Keywords: /Pear/

Xiao Wu, et.al. 2017. Chemical composition, crystal morphology and key gene expression of cuticular waxes of Asian pears at harvest and after storage. *Postharvest Biol & Technol* 132: 71–80.

Abstract

Cuticular wax of three Asian pear cultivars, 'Kuerle', 'Xuehua' and 'Yuluxiang' at harvest and after 7 months of storage, was analyzed to determine its chemical composition, crystal morphology, and expression levels of associated genes. The highest cuticular wax concentration was observed in 'Kuerle' and the lowest in 'Xuehua'. The surface wax was mainly composed of alkanes, primary alcohols, terpenoids, fatty acids, and aldehydes. After storage, the total wax concentration at all cultivars decreased, and the wax crystal structures became glossier. 'Yuluxiang' fruit showed the strongest resistance to *Alternaria* rot. Gene expression analysis indicated that four structural genes (*CER6*, *KCS9*, *KCS20* and *FDH1*) expressed at higher levels and three genes (*CER60*, *DGAT1* and *MAH1*) expressed at lower levels in stored fruit were involved in wax synthesis, and the expression levels of two wax transportation genes (*LTPG1* and *LTP4*) and a transcriptional activator (*MYB96*) were also consistent with the wax concentration of the cultivars. Overall, understanding the differences in the cuticular wax in fruit at harvest and after storage among the cultivars may lead to a better understanding of their contributions to disease resistance and postharvest storage properties.

Keywords: /Pear/ /Storage/

TABLE GRAPES

Yanfei Shen and Huqing Yang. 2017. Effect of preharvest chitosan-g-salicylic acid treatment on postharvest table grape quality, shelf life, and resistance to *Botrytis cinerea*-induced spoilage. *Scientia Horti* 224: 367-373

Abstract

Sulfur dioxide fumigation used for many years to preserve quality and extend shelf life of table grapes is now under scrutiny for their adverse effects on food safety and the environment. Here, three new preharvest treatments, chitosan, chitosan plus salicylic acid, and chitosan-g-salicylic acid (CTS-g-SA), were evaluated for their effects on decay incidence, grape quality, and shelf life during cold storage. Of the three preharvest treatments tested, CTS-g-SA treatment exhibited enhanced activities of phenylalanine ammonia lyase, chitinase, and β -1, 3- glucanase, while also promoting accumulation of phenolic compounds and greater resistance to *Botrytis cinerea* decay. Moreover, CTS-g-SA application significantly decreased respiration rate, weight loss, and decay incidence, while improving levels of total soluble solids, titratable acidity, and sensory attributes of table grapes during storage. Coating fruits with CTS-g-SA has potential as a preharvest tool to enhance the quality and extend the postharvest shelf life of table grapes. This treatment is a highly effective and safer alternative to treatments currently in use.

Keywords: /Table Grapes/ /Shelf Life/ /Storage/

VEGETABLES

CARROTS

Rajitha, K., et.al. 2017. Shelf-life extension and quality retention in fresh-cut carrots coated with pectin. *Innov Food Sci Emerg Technol.* 42: 91-100

Abstract

Fresh-cut carrot slices were treated with 2% calcium chloride, 2% calcium propionate, 0.01% chlorine, 0.5% hydrogen peroxide, chitosan (0.5 and 1%), 5% sesame oil emulsion, 0.5% ascorbic acid and a mixture of 0.5% ascorbic acid and 0.03% EDTA, low methoxyl pectin (0.75 and 1.5%), methyl cellulose, and polyvinyl alcohol (2 and 4%). Samples coated with polyvinyl alcohol or pectin could be stored at 8 °C for 12 days, compared to other treatments, where the samples could be stored only for 5–7 days. However, pectin, because of its GRAS status and efficacy was selected for coating the fresh-cut carrots for shelf-life and biochemical characterization studies. An increase of about eight to twelve times in the concentration of phenolic acids was seen in control samples stored for eight and 12 days. About three- to seven-fold increase in the total flavonoid concentration was seen in control samples, compared to pectin-treated samples during their storage for eight and twelve days. Among the flavonoids, accumulation of apigenin, hesperetin, myricetin and naringenin was higher, compared to other flavonoids in control samples. Fresh and pectin-coated samples were closely placed in the biplot for phenolic acids and flavonoids, indicating comparable concentrations of phenolic acids and flavonoids in fresh as well as pectin-coated carrots. An increase of about three and seven times in the concentration of phenolic acids and flavonoids, respectively was observed in control samples, compared to pectin-treated samples on the twelfth day of storage. This could be directly co-related with white blush formation and bitterness in control samples, resulting in low acceptability for such samples.

Industrial relevance: Low shelf-life of fresh-cut carrots during storage is largely attributed to white blush and deterioration in sensory attributes. This study revealed that coating of fresh-cut carrot slices with low methoxyl pectin helped in extending their shelf-life up to 12 days during refrigerated storage. Compared to control, carrot slices coated with 0.75% pectin showed nearly three-fold lower accumulation of phenolic acids, responsible for white blush formation and seven-fold lower flavonoid content, responsible for astringency and bitterness in fresh-cut carrot slices during storage for 12 days. Therefore, pectin coating of fresh-cut carrots for enhancing their shelf-life holds promise for commercial applications.

Keywords: /Carrots/ /Fresh-cut/ /Shelf-life/

CHERRY TOMATOES

Tumwesigye, K.S., et.al. 2017. Evaluation of novel bitter cassava film for equilibrium modified atmosphere packaging of cherry tomatoes. *Food Packag. & Shelf Life* 13: 1-14.

Abstract

Equilibrium modified atmosphere packaging (EMAP) technology offers the possibility to maintain produce postharvest quality and extend its shelf-life. However, EMAP stability depends on well-tuned packaging design parameters to match environment conditions. This study defined design requirements of a biobased film EMAP that can preserve quality and prolong shelf-life of fresh cherry tomatoes under recommended and simulated abuse supply chain conditions. Optimum EMAP was evaluated based on headspace gas composition at 10–20 °C, 75–95% RH and verified by determining quality changes of packed cherry tomatoes in using a continuous or micro-perforated (0.27 µm) bio-based intact bitter cassava (IBC) film. This was compared with a non-bio-based polymer film (oriented polypropylene, OPP). The IBC film attained equilibrium O₂ (2–3%) after 180 h at 10 °C, with 0 and 1 perforation, for 75 and 95% RH while OPP film maintained a downward O₂ fall. Continuous and micro-perforated IBC film did not show any major differences in equilibrium headspace O₂, thus perforation can be neglected. Based on desirability optimisation results, biobased IBC film demonstrated better optimized EMAP system in attaining recommended gas and stretching cherry tomato shelf-life as compared to non-biobased (OPP) film. The application of bio-based IBC film offers new possibilities in packaging fresh produce under equilibrium modified atmosphere without compromising their quality.

Keywords: /Cherry Tomatoes/ /Shelf-Life/ /Packaging/

Lifen Zhang, et.al. 2017. Influence of rice bran wax coating on the physicochemical properties and pectin nanostructure of cherry tomatoes. Food Bioprocess Technol 10:349-357.

Abstract

The effects of rice bran wax coating on the physi-cochemical properties such as firmness, weight loss, titratable acidity (TA) and soluble solid content (SSC) of cherry tomatoes were studied during cold storage. The chemical and nanostructure properties of chelate-soluble pectin (CSP) were also investigated by high-performance liquid chromatography (HPLC), Fourier transform infrared spectroscopy (FTIR) and atomic force microscopy (AFM). The results indicated that there was no significant difference of firmness between control (2.48 N) and waxed (2.87 N) fruits at the end of storage (20 days), while the weight loss of waxed fruits (13.54%) was lower than that of control fruits (16.02%). And the degree of esterification (DE) of both fruits decreased after cold storage by FTIR. The structural analysis by atomic force microscopy (AFM) indicated that rice bran wax coating inhibited the degradation of CSP. The CSP molecular widths ranged from 15 to 250 nm, and the vertical heights varied from 0.2 to 2.0 nm. Greater frequency (*Fq*) of large width and length CSP was found in waxed fruits than in control fruits. The results suggest that rice bran wax coating was an effective way to preserve fresh fruits.

Keywords: /Cherry Tomatoes/ /Edible Coating/

MUSHROOM

Wenwen Wei, et.al. 2017. Fresh-keeping effects of three types of modified atmosphere packaging of pine-mushrooms. Postharvest Biol & Technol 132: 62–70

Abstract

Pine-mushrooms are one of the most prized mushrooms. They are difficult to store. Modified atmosphere packaging has been widely used in mushroom storage, but few reports are associated with pine-mushrooms. The effects of polyvinyl chloride (PVC), silicon windows (SW) and polyethylene (PE) packaging materials on the sensory of texture, senescence, browning and odor changes have been evaluated and the preliminary mechanisms have been studied. Texture changes were most efficiently delayed by PE as a result of the lowest respiration rates and weight loss. Senescence was most efficiently delayed by PE and PVC as a result of the raised CAT activities and ascorbic acid contents. Browning was most efficiently delayed by PE as a result of the decreased PPO activities. Odor changes were most efficiently delayed by SW, the decreased ammonia contents may be important reason. Different water vapor and gas transmission properties of packaging may determine the different pine-mushroom sensory.

Keywords:/Mushroom/ /Modified Atmosphere Packaging/

OKRA

Juan Liu, et.al. 2017. Analyses of quality and metabolites levels of okra during postharvest senescence by ¹H-high resolution NMR. Postharvest Biol & Technol 132: 171-178.

Abstract

Okra were stored for 19 days at 25 °C and nuclear magnetic resonance spectroscopy was used to monitor the changes of metabolite levels. Seventeen metabolites were identified and their relative levels were analysed by principal component analysis. The first principal components were isoleucine, fatty acids, γ -aminobutyrate, glutamine, asparagine, unsaturated lipids, choline, phosphocholine and cinnamic acid. Decreases of glucose and sucrose levels were responsible for the quality reduction. Accumulation of cinnamic acid was involved in the lignification of okra tissue in the late storage period. Amino acids and γ -aminobutyrate levels increased during storage, which indicated the degradation of proteins. Increased electrolyte leakage and chlorophyll loss were also observed. The results indicated that NMR technique could be a good choice for metabolomic analysis of okra.

Keywords: /Okra/

SPINACH

Pyatkovskyy, T., et.al. 2017. Fresh produce sanitization by combination of gaseous ozone and liquid sanitizer. J Food Eng 210: 19-26

Abstract

The effect of different combinations of gaseous ozone and Pro-San L against *Escherichia coli* on baby spinach was investigated. Three different ways to combine liquid and gaseous sanitizer application were compared. The most effective combination was the initial spray application of Pro-San L (0.66% Citric acid, 0.036% SDS) followed by vacuum cooling and ozonation under pressure of 68.9 kPa (10 PSIG) which reduced *E. coli* O157:H7 counts by 3.9 log CFU/g. Spray application of Pro-San L after the gaseous ozone injection under vacuum followed by immediate system pressurization to 68.9 kPa was less effective (2.7 log CFU/g reduction) due to vacuum internalization of bacteria deeper into produce tissue. This method was not significantly different from a single application of liquid sanitizer. Spray Pro-San L application followed by a long term (up to three days) gaseous ozone treatment decreased microbial load to an undetectable level after the first day of application. However the increase of exposure time to sanitizers led to some damage of spinach leaves. Long term combination liquid-gaseous sanitizer treatment resulted in better appearance of fresh produce than a single application of liquid and gaseous sanitizers.

Keywords: /Spinach/ /Fresh Produce/

TOMATO

Ayomide, O.B., et.al. 2017. Data on the no-load performance analysis of tomato postharvest storage system. DOI: <http://dx.doi.org/10.1016/j.dib.2017.06.044>

Abstract

In this present investigation, an original and detailed empirical data on the transfer of heat in a tomato postharvest storage system was presented. No-load tests were performed for a period of 96 hours. The heat distribution at different locations, namely the top, middle and bottom of the system was acquired, at a time interval of 30 minutes for the test period. The humidity inside the system was taken into consideration. Thus, No-load tests with or without introduction of humidity were carried out and data showing the effect of a rise in humidity level, on temperature distribution were acquired. The temperatures at the external mechanical cooling components were acquired and could be used for showing the performance analysis of the storage system.

Keywords: /Tomato/ /Storage/

TUBERS AND ROOTCROPS

POTATO

Sulc, M., et.al. 2017. Changes in anthocyanidin levels during the maturation of color-fleshed potato (*Solanum tuberosum* L.) tubers. Food Chem 237: 981–988

Abstract

Certain potato cultivars are capable of producing anthocyanin pigments in the potato skin and flesh and those pigments have been shown, together with other phytochemicals, to promote good health. Six common anthocyanidins (cyanidin, delphinidin, petunidin, pelargonidin, malvidin and peonidin) were analyzed weekly for 15 weeks in red- and purple-fleshed potato cultivars (Red Emma, Königspurpur, Valfi and Blaue de la Mancha) grown in field conditions using a validated LC-(+ESI)MS/MS method. Pelargonidin was the major type detected in red-fleshed cultivars whereas petunidin was the major type detected in the purple ones. Neither cyanidin nor delphinidin were found in any of the cultivars. The anthocyanidin levels observed were as high as 78 mg/100 g FW during tuber growth; however, fully matured tubers contained only 10–39 mg anthocyanidins/100 g FW. Anthocyanidin levels were moderately correlated with global solar irradiation ($r < 0.6252$) but not with rainfall or daily temperature.

Keywords: /Potato/ /Maturity/

ORNAMENTALS

ORNAMENTAL GINGER

Goncalves, C., et.al. 2017. Zingiber zerumbet flower stem postharvest characterization. Ornam Hortic. 23(2): 127-130.

Abstract

About the *Zingiber zerumbet* little is known about its cut flower postharvest and market, despite its high ornamental potential. The inflorescences, which resemble a compact cone, emerge from the base of the plants and start with green color changing to red with the age. This study objective was to characterize floral stem of ornamental ginger in two cultivate conditions and to evaluate the longevity of those submitted to post-harvest treatments. Flower stems were harvest from clumps cultivated under full sun and partial shade area, and were submitted to the postharvest treatments: complete flower immersion in tap water (CFI) or only the base stem immersion (BSI). The flower stems harvested from clumps at partial shade presented higher fresh weight, length and diameter of the inflorescences compared to flower stems harvested from clumps at full sun area. The flower stem bracts cultivated in full sun area changed the color from green to red 10.69 and 11.94 days after BSI and CFI postharvest treatments, and the vase life were 22.94 and 28.19 days, respectively. Flower stem harvest in partial

shade area change the color only after 18.94 and 18.43 days and the vase life durability was 27.56 and 31.81, respectively. The complete immersion of the flower stem increase the vase life durability in 5.25 and 4.25 days compared to flowers kept with the stem base immersed only, in flower stems harvested from clumps cultivated in full sun area and partial shade area, respectively. Flower stems harvested from clumps cultivated in partial shade area and completely immerse in tap water during 3 hours increase the vase life durability in 8.87 days compared to flowers harvested from clumps cultivated in full sun area and base immersed only.

Keywords: /Ginger/ /Vase Life/ /Cut Flower/

ROSE

Castricini, A., et.al. 2017. Postharvest aspect of roses. *Ornam Hortic* 23(2): 160-165.

Abstract

This study aimed to evaluate respiratory activity, color changes and fresh weight variation of 'Carola' (red), 'Avalanche' (white) and 'Avalanche Chá' (tea) roses for seven days after harvest. Respiratory activity, coloration of petals and fresh weight loss were evaluated. Treatments were composed of three rose cultivars and seven days of evaluation, in a 3 x 7 factorial and a completely randomized design with four replicates of two flowers per plot. To determine the respiratory activity, in addition to the four replicates, an "experimental control" was used as a fifth replicate without roses. 'Avalanche' and 'Avalanche Chá' roses with petals of similar luminosity showed no browning during days after harvest, but are distinct in terms of chromaticity. 'Carola' rose has less shiny petals. On harvest day, the respiratory activity is elevated and reduces later until the fourth day, in which there is elevation of this parameter again coinciding with high fresh weight loss. During days after harvest, small changes in the color of petals were observed; however, the main changes were observed in respiratory activity and fresh weight loss.

Keywords: /Rose/