

**SELECTIVE DISSEMINATION OF INFORMATION**  
**As of APRIL 2020**

**APPLE**

**Lysiak, G., Michalska-Ciechanowska, A., & Wojdyło, A. (2020). Postharvest changes in phenolic compounds and antioxidant capacity of apples cv. Jonagold growing in different locations in Europe. *Food Chemistry*, 310, 125912. doi: 10.1016/j.foodchem.2019.125912**

Abstract

Apples cv. 'Jonagold' of the same quality were collected from four orchards in three European countries. The orchards differed in terms of longitude, latitude and microclimate. The apples were stored in controlled atmosphere storage for six months. Both after harvest and after storage the apples were compared in terms of physical and chemical properties. Differences in firmness, titratable acidity, total soluble solids, mass varied not >11%. Storability was little affected by harvest location. The sum of polyphenols was more strongly influenced by storage than by orchard location. The strongest degradation of flavonols after storage was in apples grown in the most southern region of harvest (Italy). The content of (+)- catechin and (-)-epicatechin depended on harvest location and its strong increase resulted in higher content of procyanidins and flavanols after storage. Changes in individual polyphenols were significant after storage and depended on harvest location.

Keywords: /*Malus domestica*/ /Orchard geographical location/ /Storage/ /Polyphenols/ /Postharvest quality/

**BANANA**

**Zhu, X., Song, Z., Li, Q., Li, J., Chen, W., & Li, X. (2020). Physiological and transcriptomic analysis reveals the roles of 1-MCP in the ripening and fruit aroma quality of banana fruit (Fenjiao). *Food Research International*, 130, 108968. doi: 10.1016/j.foodres.2019.108968**

Abstract

Fenjiao (*Musa* ABB Pisang Awak) is a popular banana cultivar due to its good taste and stress resistance, but it has a short shelf-life and deteriorates rapidly post-harvest. The effects of 1-methylcyclopropene (1-MCP) treatment on fruit physiology and quality and transcriptomic profiles are investigated in this study. The results showed that 1-MCP significantly delayed fruit ripening by repressing fruit softening and inhibiting the respiratory rate and ethylene production. The 1-MCP treatment delayed sugar accumulation and influenced the content of the precursors of the biosynthesis of aroma volatiles. 1-MCP reduced the production of flavor-contributing volatile esters isoamyl isobutyrate, isoamyl acetate and trans-2-hexenal and hexanal, but dramatically increased the hexyl acetate production at the full-ripening stage. The transcriptomic analysis showed that 1-MCP dramatically affected the transcript profiles during fruit ripening, especially the KEGG pathways involved in amino acid metabolism, biosynthesis of other secondary metabolites, carbohydrate metabolism, lipid metabolism, signal transduction, and translation classes. The key genes and the corresponding enzyme activities involved in the volatile and ethylene synthesis were severely repressed due to the 1-MCP treatment. The 1-MCP treatment effectively delayed Fenjiao fruit ripening, but affected volatile production by reducing the precursor production and expression level of genes involved in the metabolism pathways of ethylene, auxin and volatiles.

Keywords: /Fenjiao banana/ /1-Methylcyclopropene/ /Ripening/ /Volatiles/ /Transcriptomic profile/ /Fruit

quality/

**Martha Dwivanyab, F., Nugrahapraja, H., Fukusaki, E., Putriad, S.P., Novianti, C., Septhy Radjasa, S.K., Fauziah, T., Saria, L.D.N. (2020). Dataset of Cavendish banana transcriptome in response to chitosan coating application. *Data in Brief*, 29, 105337 <https://doi.org/10.1016/j.dib.2020.105337>**

Abstract

Banana is a climacteric fruit and its ripening process is greatly influenced by presence of ethylene. This physiological climacteric characteristic of banana fruit leads to a fast ripening and a short shelf-life. Application of edible coating such as chitosan aims to prolong fruit shelf life. The knowledge on gene expression will help to understand the fruit ripening process itself and chitosan effect on global gene expression. Global gene expression data of chitosan treated and control of Cavendish banana during fruit ripening were provided. Total RNA was isolated from banana pulp for differential gene expression analysis. The RNA-sequencing generated ranged from 16,155,947 to 23,587,110 total reads, with 75.8%–83.8% of reads were mapped against the genome reference. In total, 33,797–35,944 transcripts were detected. The transcriptomics data discussed in this publication are accessible through NCBI's Gene Expression Omnibus with GEO Series accession number GSE139457. These data provide information to identify candidate genes involved in fruit ripening in response to chitosan coating to design a better banana postharvest management.

Keywords: /Edible coating/ /Fruit ripening/ /Postharvest/ /RNA-Seq/

## **BLUEBERRY**

**Wang, S., Zhou, Q., Zhou, X., Zhang, F., & Ji, S. (2020). Ethylene plays an important role in the softening and sucrose metabolism of blueberries postharvest. *Food Chemistry*, 310, 125965. doi: 10.1016/j.foodchem.2019.125965**

Abstract

We studied the effects of ethylene on softening and sucrose metabolism in postharvest blueberry fruit by examining the responses of fruit firmness, cell wall polysaccharides, cell wall enzymes, four key genes of cell wall degradation and metabolism, enzyme activities, and five key genes of sucrose metabolism to exogenous ethylene treatments. Ethylene was found to accelerate blueberry softening, as it promoted the degradation of pectin and expression of pectinesterase (PE) and polygalacturonase (PG). Sucrose catabolism was accelerated with fruit softening, while sucrose content, sucrose phosphate synthase (SPS) activity were positively correlated with the loss of fruit firmness. Exogenous ethylene treatments promoted sucrose metabolism by inhibiting the expression of *VcSPS1* and *VcNIN2* and stimulating the expression of *VcSS1* and *VcCWINV1*. These results indicate that ethylene plays an important role in fruit softening and sucrose metabolism of blueberry at 20 °C, and there may be a link between sucrose metabolism and fruit softening.

Keywords: /Blueberry/ /Softening/ /Ethylene/ /Sucrose metabolism/ /Storage/

**Ma, Q., Cong, Y., Wang, J., Liu, C., Feng, L., & Chen, K. (2020). Pre-harvest treatment of kiwifruit trees with mixed culture fermentation broth of *Trichoderma pseudokoningii* and *Rhizopus nigricans* prolonged the shelf life and improved the quality of fruit. *Postharvest Biology and Technology*, 162, 111099. doi: 10.1016/j.postharvbio.2019.111099**

#### Abstract

The effects of pre-harvest treatment of the rhizosphere soil of kiwifruit trees with mixed culture fermentation broth (MCF) of *Trichoderma pseudokoningii* and *Rhizopus nigricans* on post-harvest shelf life and fruit quality were investigated. The soil was irrigated with MCF in April, June, September, and November every year for two consecutive years. This agronomic measure significantly improved the productive parameters and quality traits of kiwi fruit and increased the total phenol and flavonoid content and superoxide dismutase (SOD) and peroxidase (POD) activities to different degrees on days 0, 10, and 15 during storage at 25 °C. Further, the protein bands at different storage periods increased or decreased with the gradient of fermentation broth. Metabolomics analysis of LC-MS/MS data revealed that treatment with MCF altered several metabolites, including phytohormone, amino acids, vitamins, and flavonoids. These findings highlight the importance of further investigating the utility of pre-harvest MCF treatment in prolonging the shelf life and improving the quality of fruit, which may promote more reasonable and effective utilization of biocontrol agents in the future.

Keywords: /Kiwifruit/ /Mixed culture fermentation/ /Pre-harvest irrigation/ /Post-harvest quality/ /Shelf life/ /Metabolomics/

## CABBAGE

**Choi, E. J., Lee, J. H., Kim, H. K., Park, H. W., Son, J. Y., Park, C. W., ... Chun, H. H. (2020). Development of multi-pallet unit load storage system with controlled atmosphere and humidity for storage life extension of winter kimchi cabbage (*Brassica rapa L. ssp. pekinensis*). *Scientia Horticulturae*, 264, 109171. doi: 10.1016/j.scienta.2019.109171**

#### Abstract

In this study, a pallet unit load controlled atmosphere and humidity (PULCAH) system that can be installed in common cold storage rooms and enables the setting of different gas compositions and relative humidity (RH) levels was developed. Subsequently, kimchi cabbage was stored and evaluated under three conditions (PULCAH 1: 2 % O<sub>2</sub>/5 % CO<sub>2</sub> + 93 % RH; PULCAH 2: 2 % O<sub>2</sub>/5 % CO<sub>2</sub> + > 99 % RH; PULCAH 3: 0.5 % O<sub>2</sub>/10 % CO<sub>2</sub> + > 99 % RH) and the results compared with those obtained for storage in regular air at 85 % RH (control). After 150 days of storage at 0 °C, the weight losses under PULCAH 1 and 2 conditions were lower than those observed for the control. The trimming loss of the kimchi cabbage samples stored under PULCAH 1 condition was 13.3 %, which was the lowest among the samples. Moreover, under PULCAH 1 and 2 conditions, the initial pH and moisture content, soluble solid content, and reducing sugar content were better preserved than under the control or PULCAH 3 condition. The internal disorder/decay incidence percentage during storage exceeded 30 % in the case of the control but was less than 17 % for PULCAH 1 and 2 conditions. These results indicate that the postharvest storage life of kimchi cabbage can be extended through application of the developed PULCAH system operating at 2 % O<sub>2</sub>/5 % CO<sub>2</sub> atmosphere with 93 % RH.

Keywords: /Kimchi cabbage/ /Controlled atmosphere and humidity/ /Pallet unit load/ /Cold storage/

## CHERRY

Abdipour, M., Malekhossini, P. S., Hosseinifarahi, M., & Radi, M. (2020). Integration of UV irradiation and chitosan coating: A powerful treatment for maintaining the postharvest quality of sweet cherry fruit. *Scientia Horticulturae*, 264, 109197. doi: 10.1016/j.scienta.2020.109197

### Abstract

Sweet cherry is a non-climacteric fruit consumed more as fresh for its essential nutrients and phytochemical compounds. In this study, the single and combined effects of UV-B (21.6 kJ/m<sup>2</sup>), UV-C (21.6 kJ/m<sup>2</sup>) radiation, and chitosan (CS) coating 1 % treatments on fruit quality of sweet cherry were studied during 28 d at 4 °C. Sweet cherry fruit were evaluated for weight loss, firmness, total titratable acidity (TTA), pH, total soluble solids (TSS), ascorbic acid (AA), total anthocyanin content (TAC), antioxidant (AOX) capacity and total phenol compounds (TPC) every 7d. Compared with control, fruit quality was better maintained in UV/CS treated fruit. The UV/CS treatments significantly inhibited the decrease in the firmness, TAC, and AOX capacity, and the increased rate of weight loss and TSS in the sweet cherry fruit. Although both UV lights were effective in the maintenance of fruit quality, sweet cherries treated with UV-C showed higher TPC accumulation and related AOX capacity compared to UV-B treatment. Overall, the integration of UV lights (UV-B and UV-C) with CS was the best treatment that could strongly inhibit the increase in the weight loss and TSS and achieved the highest firmness, AA, TAC, AOX capacity and TPC. Our results indicate that the integrated management is a potentially effective method for preventing undesirable post-harvest changes and extending the shelf-life of sweet cherry fruit.

Keywords: /Anthocyanin/ /Antioxidant capacity/ /Sweet cherry fruit/ /Ultraviolet rays/ /Total phenol/

## CITRUS

Ouyang, Q., Okwong, R. O., Chen, Y., & Tao, N. (2020). Synergistic activity of cinnamaldehyde and citronellal against green mold in citrus fruit. *Postharvest Biology and Technology*, 162, 111095. doi: 10.1016/j.postharvbio.2019.111095

### Abstract

The citrus postharvest pathogen *Penicillium digitatum* is responsible for the green mold decay in citrus fruit, causing tremendous economic losses. In this study, we observed that the combination of cinnamaldehyde and citronellal (CO, 5: 16, v/v) exhibited synergistic action compared to the individual compounds on the mycelial growth of *P. digitatum*, with the minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) both being 0.40 mL L<sup>-1</sup>. And this synergistic action also verified by the spores' germination results of cinnamaldehyde, citronellal and CO against *P. digitatum*. Significantly, the postharvest wax + CO (WCO, 1 × MFC) treatment on Satsuma mandarin citrus fruit incubated with *P. digitatum* could effectively reduce the decay of green mold. After 5 d of storage, the rotting rate of WCO treatment was only 38 %, which was clearly lower than the control fruit (100 %). Simultaneously, WCO treatment maintained the quality of citrus fruit. Additionally, the effects of cinnamaldehyde, citronellal and CO on the cell wall and cell membrane integrity of *P. digitatum* showed that the combined use of citronellal or cinnamaldehyde accelerated the damage of cell wall and cell membrane. Therefore, the combination of cinnamaldehyde and citronellal (5: 16, v/v) is a promising natural preservative in controlling green mold and prolonging the shelf life of citrus fruit.

Keywords: /Cinnamaldehyde/ /Citronellal/ /Citrus/ /Fruit/ /*Penicillium digitatum*/ /Synergistic activity/

**Li, L., Zhang, M., Chitrakar, B., & Jiang, H. (2020). Effect of combined drying method on phytochemical components, antioxidant capacity and hygroscopicity of Huyou (*Citrus changshanensis*) fruit. *Lwt*, 123, 109102. doi:10.1016/j.lwt.2020.109102**

#### Abstract

Huyou fruit is mainly consumed in fresh form. The saturation of the fresh food market and the lack of deep processing research have caused a huge quantity of Huyou fruits to be wasted due to spoilage. In this study, microwave vacuum drying (MVD) was combined with freeze-drying (FD) to study the effect of drying processing on Huyou quality. MVD was used as pre-drying (MVD-FD), post-drying (FD-MVD) or pre-drying as well as post-drying (MVD-FD-MVD) of FD to process Huyou fruit. The drying characteristic, phytochemicals content, antioxidant activity, color, absorption behavior and hygroscopicity were evaluated as affected by drying conditions. The results showed that the combined drying in all cases significantly shortened the drying time of FD. FD samples had the highest content of reducing sugar and carotenoids. FD-MVD gave significant advantages in increasing the total phenol content and flavonoid content of Huyou extracts, which presented the highest antioxidant activity (based on the evaluation of DPPH scavenging activity and ferric reducing antioxidant potential). In terms of color, MVD-FD samples had good color as the FD samples. All dried samples exhibited similar moisture adsorption behavior. MVD-FD was the best in terms of the overall effect of maintaining product quality and reducing hygroscopicity when compared with FD and MVD.

Keywords: /Huyou/ /Drying/ /Phytochemical composition/ /Antioxidant capacity/ /Hygroscopicity/

## CUCUMBER

**Istúriz-Zapata, M., Hernández-López, M., Correa-Pacheco, Z., & Barrera-Necha, L. (2020). Quality of cold-stored cucumber as affected by nanostructured coatings of chitosan with cinnamon essential oil and cinnamaldehyde. *Lwt*, 123, 109089. doi: 10.1016/j.lwt.2020.109089**

#### Abstract

The edible coatings (EC) of nanostructured chitosan (CNCh) and chitosan (CCh) functionalized with cinnamon essential oil (CEO) or trans-cinnamaldehyde (TCA) improve the postharvest quality of cucumber and antifungal activity against *Fusarium solani*. Were measured physicochemical, physiological and microbiological parameters of the fruit during storage. The morphology of nanoparticles of chitosan was observed using transmission electron microscopy (TEM), particle size distribution and Zeta potential were measured. By TEM the chitosan nanoparticles (NCh) and nanoparticles (NChCEO) had a particle size of 5 nm and 8 nm, respectively. The NCh particle size distribution showed a diameter of 4.68 nm, for NChCEO was 4.34 nm and for NChTCA was of 4.86 nm. The Zeta potential was of -1.94 mV, -1.32 mV, and -2.48 mV respectively. With the EC some changes were observed; The fruit treated with CCh and CNCh showed a weight loss of 5.49% and 8.47%. In the fruit with EC and nanoparticles, the total chlorophyll content was higher at the end of storage. The colony forming units (CFU) of fungi and yeasts were effectively inhibited with ECs. The CCh and CNCh showed the lowest severity. The EC evaluated are a technological alternative to preserve the quality of the cucumber.

Keywords: /Coatings/ /Chitosan/ /Nanoparticles/ /Essential oil/ /Cucumber/

## DATES

**Abu-Shama, H. S., Abou-Zaid, F. O. F., & El-Sayed, E. Z. (2020). Effect of using edible coatings on fruit quality of Barhi date cultivar. *Scientia Horticulturae*, 265, 109262. doi: 10.1016/j.scienta.2020.109262**

### Abstract

Fresh date fruits, especially Barhi cultivar, are favored and widely consumed at the Khalal maturity stage (first color edible stage). These fruits are seasonal and perishable and there is a need for extending their shelf life. This work was carried out to study the capability of some edible coatings (gelatin, chitosan, guar gum and their combinations) to delay the ripening of fruits and prolong their shelf life. The effectiveness of the coatings was evaluated by the changes in several parameters: weight loss, total soluble solids, reducing and total sugars, total chlorophyll and total carotenoids, vitamin C, total polyphenols, titratable acidity, sensory evaluation and total bacterial count. The obtained results showed that, all studied coating treatments led to extend the shelf life of Barhi date fruits comparing with control sample, but the highest effective treatments were T5 (0.5 % guar gum) and T9 (gelatin + guar + chitosan) followed by T6 (gelatin + guar). Also, all studied edible coating treatments had insignificant ( $p < 0.05$ ) effect on the organoleptic characteristics of Barhi date fruits. From these findings, the application of these treatments could be suggested to extend the shelf life of Barhi date fruits.

Keywords: /Barhi date/ /Edible coatings/ /Gelatin/ /Chitosan/ /Guar gum/ /Shelf life/

## DRAGON FRUIT

**Bordoh, P. K., Ali, A., Dickinson, M., Siddiqui, Y., & Romanazzi, G. (2020). A review on the management of postharvest anthracnose in dragon fruits caused by *Colletotrichum spp.* *Crop Protection*, 130, 105067. doi: 10.1016/j.cropro.2019.105067**

### Abstract

*Colletotrichum spp* is one of the major cosmopolitan phytopathogens that cause postharvest anthracnose in dragon fruits. The pathogen attacks fruits on the field, during long-distance transport, and cold storage, leading to shorter shelf life. Traditionally, the plants are sprayed with synthetic fungicides, which is a strategic approach to control diseases in general and anthracnose in particular for dragon fruit production. Due to the demand for safe storage methods for consumers and the concerns about the use of synthetic fungicides, their use is restricted to control dragon fruits anthracnose after harvest. Despite "Umikai" (natural Calcium) is the commonly used preservative by some exporters of dragon fruits in Vietnam, recent reports indicated that Sodium nitroprusside (a Nitric oxide donor) markedly controlled anthracnose in dragon fruit at recommended levels. However, due to detrimental effect of these nitric oxide donors and other synthetic chemicals on human health, concerns are raised by the governments and other stakeholders to abolish, if not regulate the use of these synthetic chemicals in pre- and postharvest management of anthracnose. Consequently, several alternative methods have been developed to control postharvest decay, but with little success. This review summarizes the findings published within the last decade on current management practices on postharvest anthracnose in dragon fruit. We conclude that hot air/vapor heat treatment, water treatment, modified and controlled atmosphere packaging are commercially practiced and effective in reducing postharvest decay in dragon fruits while, X-ray irradiation is still under experimentation, Additionally, natural products (propolis and chitosan) shows promising effect without leaving residual harmful effect and could be adopted on a commercial scale to reduce postharvest losses after further commercial trials.

Keywords: /Management/ /Postharvest decay/ /Alternative treatments/ /Anthracnose/ /*Colletotrichum* spp./ /Dragon fruits/ /Shelf life/

**Bordoh, P. K., Ali, A., Dickinson, M., & Siddiqui, Y. (2020). Antimicrobial effect of rhizome and medicinal herb extract in controlling postharvest anthracnose of dragon fruit and their possible phytotoxicity. *Scientia Horticulturae*, 265, 109249. doi: 10.1016/j.scienta.2020.109249**

Abstract

A study was conducted to evaluate the antifungal effect of ginger, turmeric rhizome and “dukung anak” (medicinal herb) crude extract against *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc. at minimal concentrations 2.5 g L<sup>-1</sup>, 5.0 g L<sup>-1</sup>, 7.5 g L<sup>-1</sup> and 10.0 g L<sup>-1</sup> (*in vitro*). Additionally, the possibility of using these extracts as an edible coating to control postharvest anthracnose in dragon fruits at maximum concentrations of 5.0 g L<sup>-1</sup>, 10.0 g L<sup>-1</sup> and 15.0 g L<sup>-1</sup> (*in vivo*) were elucidated. The results showed that all plant extracts possessed significant antifungal activity against *C. gloeosporioides* by inhibiting mycelial growth and conidial germination, and caused distortion, shrinking and swelling of fungal hyphae. Ginger crude extracts at 10.0 g L<sup>-1</sup> showed the best effect *in vitro* by suppressing mycelial growth (88.48 %) and conidial germination (87.50 %) which was comparable to commercial fungicide (Mancozeb) at 2.0 g L<sup>-1</sup> (80.45 %). *In vivo* study showed that all plant crude extract at 15.0 g L<sup>-1</sup> compounded disease incidence (DI) and disease severity (DS) due to phytotoxicity. However, using “dukung anak” at 5.0 g L<sup>-1</sup> or 10.0 g L<sup>-1</sup> significantly controlled anthracnose and this was not different in turmeric-treated fruits at 10.0 g L<sup>-1</sup> after 28 days of cold storage at 11 ± 2 °C, 80 % RH. On the contrary, dragon fruits treated with ginger at 5.0 g L<sup>-1</sup> and above experienced severe disease incidence due to phytotoxicity. In conclusion, crude extract of dukung anak or turmeric can be used as bio-fungicide to control anthracnose in dragon fruits at 10.0 g L<sup>-1</sup>, while concentration at 15.0 g L<sup>-1</sup> and above may exacerbate diseases in dragon fruits due to phytotoxicity.

Keywords: /Pitaya/ /Electrolyte leakage/ /Plant crude extract/ /Antifungal/ /*Colletotrichum gloeosporioides*/

## DURIAN

**Tan, X. Y., Misran, A., Daim, L. D. J., Ding, P., & Dek, M. S. P. (2020). Effect of freezing on minimally processed durian for long term storage. *Scientia Horticulturae*, 264, 109170. doi: 10.1016/j.scienta.2019.109170**

Abstract

Exposing fruits to freezing temperature has been shown to successfully extend the shelf life and control the microbiological activity in the fruits. However, freezing could also lead to undesirable losses in the fruit quality. The present work was conducted to investigate the effect of frozen storage on physicochemical qualities and microbial contaminations of “MK” (Musang King) and “D24” durian pulp and paste for one year. During frozen storage, both durian pulp and paste lost 1 %–2 % of their weight along with an increase in pulp softening. Changes in color intensity during freezing storage shifted the golden yellow “MK” pulp to higher h° (lighter yellow) and this directly reduced the total carotenoids and β-carotene contents in “MK”. Similarly, “D24” changed to pale yellow alongside reduction on L\* and C\* after one year of frozen storage. Long term frozen storage in the present work also decreased the SSC and ascorbic acid contents for both durian pulp and paste. However, the pH and TA were not affected. “MK” and “D24” pulp showed lower microbial contamination than paste, with higher contaminations observed in “D24”. These results showed that frozen storage could be used to preserve the quality of durians for less than one year of storage.

Keywords: /Durian pulp/ /Durian paste/ /Freezing/ /Physicochemical/ /Microbial contamination/

**Tan, X. Y., Misran, A., Cheong, K. W., Daim, L. D. J., Ding, P., & Dek, M. S. P. (2020). Postharvest quality indices of different durian clones at ripening stage and their volatile organic compounds. *Scientia Horticulturae*, 264, 109169. doi: 10.1016/j.scienta.2019.109169**

Abstract

The aim of the present work was to characterize the quality of durians at consumption stage. Seven clones of durian namely "Musang King", "D24", "D88", "IOI", "XO", "Red Prawn" and "Black Thorn" were characterized based on their physicochemical properties. The organic acid contents, sugar compositions and  $\beta$ -carotene of durian clones were measured by high-performance liquid chromatographic (HPLC), while the volatile organic compounds (VOCs) were analyzed using headspace solid phase microextraction (HS-SPME) coupled with gas chromatography-mass spectrometry (GC — MS). There were significant differences on all the postharvest parameters in the selected durian clones. "Black Thorn" having orange pulp yield the highest  $\beta$ -carotene content ( $4.55 \times 10^{-5}$  kg/kg FW). The dominant sugars in the pulp of all durian clones were dominated by sucrose followed by glucose and fructose. Sulfur- and ester-containing compounds were the predominant VOCs found. Principal component analysis (PCA) allowed for the grouping of different durian clones based on VOCs.

Keywords: /Durian/ /Physicochemical/ /Sugar/ /Carotenoid/ /Volatile organic compounds/ /Sensory/

## EASTER LILY

**Lu, N., Wu, L., & Shi, M. (2020). Selenium enhances the vase life of *Lilium longiflorum* cut flower by regulating postharvest physiological characteristics. *Scientia Horticulturae*, 264, 109172. doi: 10.1016/j.scienta.2019.109172**

Abstract

In this paper, we studied the role of sodium selenite ( $\text{Na}_2\text{SeO}_3$ ) in improving the cut flower's vase life of *Lilium longiflorum*. Experimental findings displayed that  $\text{Na}_2\text{SeO}_3$  remarkably enhanced the activities of superoxide dismutase (SOD), peroxidase (POD), catalase (CAT), ascorbate peroxidase (APX), glutathione reductase (GR), dehydroascorbate reductase (DHAR) and monodehydroascorbate reductase (MDHAR), improved relative water content (RWC) and the levels of soluble sugar, proline and soluble protein in cut flower's petals of *Lilium longiflorum*, compared with control. Meanwhile,  $\text{Na}_2\text{SeO}_3$  remarkably decreased the production of malondialdehyde (MDA) and hydrogen peroxide ( $\text{H}_2\text{O}_2$ ), compared with control. Furthermore,  $\text{Na}_2\text{SeO}_3$  remarkably improved the vase life of *L. longiflorum* cut flowers, compared with control. These findings suggested that  $\text{Na}_2\text{SeO}_3$  improved the vase life by regulating the antioxidant system and osmotic adjustment ability of *L. longiflorum* cut flowers.

Keywords: /*Lilium longiflorum*/ /Sodium selenite/ /Vase life/ /Antioxidant system/ /Osmotic adjustment/

## EGGPLANT

**Li, X., Yue, H., Xu, S., Tian, J., Zhao, Y., & Xu, J. (2020). The effect of electrolyzed water on fresh-cut eggplant in storage period. *Lwt*, 123, 109080. doi:10.1016/j.lwt.2020.109080**

### Abstract

In this study, changes in the number and species of microorganisms and levels of anthocyanins, total phenolics, and antioxidants in eggplants treated with acid electrolyzed water (AEW), slightly acid electrolyzed water (SAEW), and sterile distilled water (DW) were examined. In eggplants treated with DW, an increase of 1.22 and 1.76 log CFU/g, and 1.51 and 1.92 log CFU/g was observed in the counts of total aerobic bacteria, and yeast and mold than those treated with SAEW and AEW, respectively. The anthocyanin content in samples treated with AEW and SAEW was higher than that detected in samples treated with DW. The abilities of the eggplants treated with AEW and SAEW to scavenge DPPH were higher than those of eggplant samples treated with DW. On day 8 of storage, its richness in fresh-cut eggplant samples treated with SAEW and DW was higher than those treated with AEW

Keywords: /Eggplant/ /Electrolyzed water/ /Antioxidants/ /High-throughput sequencing/

## FRESH FRUITS

**Hussein, Z., Fawole, O. A., & Opara, U. L. (2020). Harvest and Postharvest Factors Affecting Bruise Damage of Fresh Fruits. *Horticultural Plant Journal*, 6(1), 1-13. doi:10.1016/j.hpj.2019.07.006**

### Abstract

Fresh fruits are susceptible to bruising, a common type of mechanical damage during harvest and at all stages of postharvest handling. In the quest of developing and adopting strategies to reduce bruise damage, it is of utmost importance to understand major factors influencing bruise susceptibility of fresh produce at these stages. This review presents a critical discussion of factors affecting bruising during harvest and postharvest handling of fresh fruits. Excessive compression forces during harvesting by handpicking or machines, and a series of impacts during harvesting, transport and packhouse operations can cause severe bruise damage. The review has further revealed that bruising is dependent on a number of other factors such as produce maturity, ripening, harvest time (during the day or season) and time lapse after harvest. The susceptibility to bruising is partly dependent on how these factors alter the produce physiological and biochemical properties, and the environmental conditions such as temperature, humidity and several other postharvest treatments. Hence, the successful applications of harvesting techniques by use of trained personnel and proper harvesting equipment are essential to reduce both the incidence and severity of bruising. Furthermore, the careful selection of postharvest handling temperature and other treatments can increase resistance of fresh produce to bruise damage.

Keywords: /Bruise damage/ /Harvest/ /Postharvest/ /Fruit quality/

## GRAPE

Godana, E. A., Yang, Q., Wang, K., Zhang, H., Zhang, X., Zhao, L., ... Legrand, N. N. G. (2020). Bio-control activity of *Pichia anomala* supplemented with chitosan against *Penicillium expansum* in postharvest grapes and its possible inhibition mechanism. *Lwt*, 124, 109188. doi: 10.1016/j.lwt.2020.109188

### Abstract

Blue mold decay caused by *Penicillium expansum* is one of the recently identified diseases of grapes (*Vitis vinifera*). The increasing concern about the use of chemical substances and pesticides in postharvest fruit pushes the trends of research toward bio-control strategies which are more sustainable and eco-friendly. This study determined the bio-control efficacy of *Pichia anomala* alone and supplemented with 1% chitosan in the grapes against blue mold disease. The result showed that chitosan (1%) better induced the bio-control efficacy of *P. anomala*. *P. anomala* supplemented with 1% w/v chitosan significantly reduced the disease incidence, lesion diameter and natural decay of grapes without affecting the fruit quality compared to the control. In addition it enhanced the activities of disease defence related enzymes like ascorbate peroxidase (APX) and chitinase (CHI); and decreased the formation of malondialdehyde (MDA) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) which are responsible for fruits deterioration. The scanned electron microscope (SEM) concisely illustrates how the high denser yeast cells on the wounds reduced the growth of *P. expansum* mycelia. So it can be concluded that, *P. anomala* alone or *P. anomala* supplemented with 1% w/v chitosan can be presented as a potential bio-control alternative against the postharvest blue mold of grapes.

Keywords: /Bio-control/ /*Pichia anomala*/ /Chitosan/ /*Penicillium expansum*/ /Grape/

Kim, J. D., Kang, J. E., & Kim, B. S. (2020). Postharvest disease control efficacy of the polyene macrolide lucensomycin produced by *Streptomyces plumbeus* strain CA5 against gray mold on grapes. *Postharvest Biology and Technology*, 162, 111115. doi: 10.1016/j.postharvbio.2019.111115

### Abstract

Microbial secondary metabolites have been a valuable source of antifungal compounds for the fungicide industry to develop plant disease control agents. In order to find natural antifungal compounds useful for the control of *Botrytis cinerea* causing postharvest gray mold, we screened microbial culture extracts and found the extract of *Streptomyces plumbeus* strain CA5 which was isolated from the soil sample of Chuncheon Province. The cell extract of CA5 strain markedly reduced the disease incidence of gray mold on grapes to a value of 22.2 % while the non-treated control showed 100 % disease incidence. The active ingredient (CA5A) was identified from the cell extract of CA5 strain using a variety of chromatographic methods and spectroscopic analyses. The structure of CA5A was determined to be the polyene macrolide lucensomycin. Lucensomycin showed inhibitory effects against the spores of *B. cinerea* at a concentration as low as 1 mg L<sup>-1</sup> and completely inhibited gray mold development on grapes at a concentration of 100 mg L<sup>-1</sup>.

Keywords: /Antagonistic actinomycete/ /Gray mold/ /Polyene macrolide/ /Biofungicides/ /Lucensomycin/ /Postharvest disease/

## HONEYSUCKLE

Dziedzic, E., Błaszczak, J., Bieniasz, M., Dziadek, K., & Kopeć, A. (2020). Effect of modified (MAP) and controlled atmosphere (CA) storage on the quality and bioactive compounds of blue honeysuckle fruits (*Lonicera caerulea* L.). *Scientia Horticulturae*, 265, 109226. doi: 10.1016/j.scienta.2020.109226

### Abstract

*Lonicera caerulea* L. is a new edible species, which is cultivated for its healthy properties of fruit; however the fresh fruit is characterized by short shelf-life. Therefore the studies were undertaken to extend post-harvest permanence of fresh honeysuckle fruit. The experiments were carried out to assess the quality of fruits of four blue honeysuckle cultivars after short-term storage in controlled (20 % CO<sub>2</sub> and 5 % O<sub>2</sub>) (CA) and modified atmosphere (MAP) in Xtend bags. Storage in a normal atmosphere (NA) served as control conditions. Significant impact of storage condition and cultivars on individual qualitative traits as well as the content of bioactive components and antioxidant activity of fruits has been demonstrated. The cultivar 'Vostorg' maintained the firmness of the fruit, while the cultivar 'Indigo Gem' maintained soluble solids content, but this last cultivar was characterized by large losses of fruit weight, resulting from the size and shape of the berry. The controlled atmosphere condition has contributed to a significant reduction in fruit respiration intensity during storage. The results indicated that MAP condition, in relation to NA condition, had a more favorable effect on the content of bioactive components (total anthocyanins) and thus on the antioxidant activity of fruits using the FRAP method.

Keywords: /Antioxidant activity/ /Fruit measurements/ /Fruit respiration rate/ /*Lonicera caerulea*/ /Polyphenols/ /Storage condition/

## JUJUBE FRUIT (CHINESE DATES)

Cheng, S., Yu, Y., Guo, J., Chen, G., & Guo, M. (2020). Effect of 1-methylcyclopropene and chitosan treatment on the storage quality of jujube fruit and its related enzyme activities. *Scientia Horticulturae*, 265, 109281. doi: 10.1016/j.scienta.2020.109281

### Abstract

The purpose of this study was to investigate the effects of 1-methylcyclopropene (1-MCP) and chitosan treatment on the storage of Xinjiang jujube fruit at 0 ± 1 °C (relative humidity 90 %–95 %) for 42 d. Indicators such as rotting rate, firmness, and soluble solids as well as peroxidase (POD), polyphenol oxidase (PPO), lipoxygenase (LOX), superoxide dismutase (SOD), catalase (CAT), and ascorbate peroxidase (APX) activities were measured. The results showed that 1-MCP or chitosan treatment alone inhibits rotting, delays the decline of soluble solids, maintains fruit firmness, and inhibits the accumulation of malondialdehyde. Furthermore, the activities of antioxidant enzymes such as POD, SOD, CAT, and APX are increased, while those of PPO and LOX are inhibited. However, the effect of 1-MCP and chitosan together is superior to that of 1-MCP or chitosan treatment alone. In conclusion, our results indicate that combined 1-MCP and chitosan treatment is an effective strategy for improving the postharvest quality and prolonging the shelf life of Xinjiang jujube fruit.

Keywords: /Coating preservation/ /Jujube fruit/ /Storage quality/ /Enzyme activity/

## KIWI

Huan, C., Zhang, J., Jia, Y., Li, S. E., Jiang, T., Shen, S., & Zheng, X. (2020). Effect of 1-methylcyclopropene treatment on quality, volatile production and ethanol metabolism in kiwifruit during storage at room temperature. *Scientia Horticulturae*, 265, 109266. doi: 10.1016/j.scienta.2020.109266

### Abstract

Kiwifruit are highly perishable during ripening, leading to the loss of quality and flavors, as well as the development of off-flavor. The aim of this work was to investigate the effect of 1-methylcyclopropene (1-MCP) treatment with different concentrations on fruit quality, volatile production and off-flavor development in kiwifruit cv. 'Bruno' during storage. In this study, both 0.5  $\mu\text{L L}^{-1}$  and 1  $\mu\text{L L}^{-1}$  1-MCP treatments were effective in delaying fruit ripening, decreasing fruit decay, slowing fruit softening and maintaining fruit taste during storage. The effect of 1  $\mu\text{L L}^{-1}$  1-MCP treatment on improving postharvest quality of kiwifruit was more obvious than 0.5  $\mu\text{L L}^{-1}$  1-MCP treatment. Moreover, 1-MCP treatments, especially 1  $\mu\text{L L}^{-1}$  1-MCP treatment, could effectively eliminate off-flavors by suppressing ethanol metabolism in kiwifruit during storage. However, 1  $\mu\text{L L}^{-1}$  1-MCP treatment suppressed fruity aroma development in kiwifruit by inhibiting the synthesis of esters during fruit ripening. In contrast, 0.5  $\mu\text{L L}^{-1}$  1-MCP treatment not only maintained fresh and green aromas of kiwifruit, but also had no negative effect on the development of fruity aroma in kiwifruit during the whole storage. In conclusion, 0.5  $\mu\text{L L}^{-1}$  of 1-MCP might be an optimal concentration for improving postharvest quality and maintaining aroma development in kiwifruit cv. 'Bruno' during storage.

Keywords: /Kiwifruit/ /1-MCP treatment/ /Volatile production/ /Aroma/ /Off-flavor/

## MANDARIN

Bang, I. H., Lee, E. S., Lee, H. S., & Min, S. C. (2020). Microbial decontamination system combining antimicrobial solution washing and atmospheric dielectric barrier discharge cold plasma treatment for preservation of mandarins. *Postharvest Biology and Technology*, 162, 111102. doi: 10.1016/j.postharvbio.2019.111102

### Abstract

The effect of a microbial decontamination system that integrates antimicrobial washing and in-package atmospheric dielectric barrier discharge cold plasma (ADCP) treatment on mandarin preservation was studied. A 0.2 % highly activated calcium oxide (CaO) aqueous solution and slightly acidic electrolyzed water containing 0.5 % fumaric acid (FS solution) were tested as antimicrobial washing solutions. ADCP treatment was applied to mandarins packaged in commercial polyethylene terephthalate (PET) containers at 26 or 27 kV for 1, 2, 3, or 4 min. *Penicillium digitatum* disease incidence on mandarins was lowest (77.1 %) after ADCP treatment at 27 kV for 2 min. *P. digitatum* disease incidence on untreated mandarins or those treated with ADCP after washing with CaO solution, FS solution, or CaO solution and FS solution consecutively was 97.3 %, 64.3 %, 87.1 %, or 80.0 %, respectively. ADCP treatment after washing with CaO solution (CaO-ADCP treatment) did not affect the appearance of mandarins, but altered the glossiness of the sensory attributes of mandarins ( $p < 0.05$ ). CaO-ADCP treatment retarded increases in the respiration of the fruit and total soluble solid content of the flesh during storage at 4 °C, as well as the total polyphenol contents of mandarin peel at 4 °C and 25 °C. Neither ADCP treatment with nor without washing affected the pH of the flesh, ascorbic acid concentration of the flesh, antioxidant capacity of the peel, or color of the peel during storage at 4 °C and 25 °C. The results of this study demonstrated the potential of CaO-ADCP treatment for enhancing the storability of mandarins in plastic packages by inhibiting the growth of *P. digitatum* on fruit while minimizing changes to fruit quality during storage.

Keywords: /Mandarin/ /Cold plasma/ /Calcium oxide/ /Fumaric acid/ /Electrolyzed water/ /Penicillium/

**Queb-González, D.B., Lopez-Malao, A., Sosa-Morales, M.E., Villa-Rojasa, R. (2020). Postharvest heat treatments to inhibit *Penicillium digitatum* growth and maintain quality of Mandarin (*Citrus reticulata blanco*). *Heliyon*, 6, 1, doi.org/10.1016/j.heliyon.2020.e03166.**

Abstract

Use of fungicides is a common practice as a postharvest treatment to control fruit decay. Nowadays, environment friendly technologies, such as heat treatments, are viable replacements. This study evaluated the effects of post-harvest heat treatments (traditional and microwave-assisted) on mandarins intentionally inoculated with *Penicillium digitatum*. For the studied heat treatments, the target temperature was 50 °C, which was held for 2.5 min. After heating, mandarins were cooled and stored at 25 °C for 13 days. MW treatments effectively prevented mold growth during storage, while HW only delayed it. Control mandarins (without treatment) showed the highest significant weight loss. Neither thermal treatment nor storage affected fruit juice pH ( $p > 0.05$ ). Treated mandarins had a significantly lower vitamin C content than control fruits throughout storage, and all mandarins lost firmness by the 13th day ( $p < 0.05$ ). Control and MW-treated mandarins had lower citric acid content; however, they retained color, total soluble solids (TSS) and had a higher maturity index. While HW mandarins did not have changes in citric acid content, they had higher TSS, and lower maturity index. MW-assisted treatments were effective at inactivating molds and helped retain some nutritional and physical-chemical characteristics of mandarins. However, juice of MW-treated mandarins was not preferred by judges in the sensory tests, the juice was rated lower than that obtained from the other treatment. Postharvest heat treatments may constitute a helpful application to control mandarin' fungal decay.

Keywords: /Food science/ /Microbiology/ /Food technology/ /Food microbiology/ /Food quality/ /Postharvest food processing/ /Thermal food processing/ /Hydrothermal treatments/ /Microwave-assisted treatment/ /Penicillium/ /Postharvest treatments/ /Citrus reticulata blanco/

## MANGO

**Ntsoane, M. L., Sivakumar, D., & Mahajan, P. V. (2020). Optimisation of O<sub>2</sub> and CO<sub>2</sub> concentrations to retain quality and prolong shelf life of 'shelly' mango fruit using a simplex lattice mixture design. *Biosystems Engineering*, 192, 14–23. doi: 10.1016/j.biosystemseng.2020.01.009**

Abstract

The experimental design and gas mixture selection is of great importance in the definition of optimal gas concentrations for use in storage of fresh produce. The aim of this study was to optimise O<sub>2</sub> and CO<sub>2</sub> concentrations under controlled atmosphere conditions to understand the effect on quality and shelf life of 'Shelly' mango fruit stored at 13 °C for 28 d. This was achieved by designing three experimental points (gas compositions = O<sub>2</sub>, CO<sub>2</sub> and N<sub>2</sub>) using simplex lattice mixture design to (i) determine single and interaction effects of gas compositions on selected quality parameters and (ii) determine the optimal gas combination in order to maintain quality and prolonging shelf life of 'Shelly' mango fruit. The estimated model parameters coefficients successfully categorised the single and interaction effects of O<sub>2</sub>, CO<sub>2</sub> and N<sub>2</sub> gas compositions. The selected quality attributes experimental data was fitted well using the canonical Scheffe type special cubic model, resulting in coefficient of Determination, R<sup>2</sup> = 0.70 to 0.97. The low O<sub>2</sub> and high CO<sub>2</sub> in CA-2 managed to retard ripening and mass loss, and reduce fruit softening and chlorophyll degradation. Positive relationship was observed for linear effect in all quality attributes, while binary and ternary interaction effects varied across all the treatments. The optimal gas compositions for storage of 'Shelly' mango fruit in terms of selected quality attributes ranged between 5 and 8% O<sub>2</sub> +

5–9% CO<sub>2</sub> + 86–91% N<sub>2</sub>. The results highlight the potential use of simplex lattice mixture design to optimise CA storage conditions.

Keywords: /Controlled atmosphere/ /fruit quality/ /special cubic model/ /pigments/

**Ebrahimi, F., & Rastegar, S. (2020). Preservation of mango fruit with guar-based edible coatings enriched with *Spirulina platensis* and Aloe vera extract during storage at ambient temperature. *Scientia Horticulturae*, 265, 109258. doi: 10.1016/j.scienta.2020.109258**

Abstract

In this study, the effects of guar gum (GG) edible coatings enriched with *Aloe vera* (AL) gel and ethanolic, and the aqueous extract of *Spirulina platensis* (SPE and PSW) on the physicochemical qualities of the mango (*Mangifera indica* L.) stored at the ambient temperature ( $25 \pm 2$  °C) for 3 weeks were investigated. It was found that the coatings reduced the respiration rate and the weight loss of the mango fruits. Fruits coating with GG + SPE significantly showed higher firmness in comparison with the control. Coating fruits with GG + AL remarkably reduced fruit weight loss. Also, GG + AL coated fruits significantly maintained the ascorbic acid content of mango. The results also indicated that the total phenol and antioxidant activity were much higher in the GG + SPE coated fruits, as compared to other ones. As the storage time was increased, the ascorbic acid content, titratable acidity (TA) and pH of the fruits were decreased, while weight loss and TSS were increased. The peel color changes during storage were much lower in the coated fruits in comparison to those in the control. Coated fruits showed a much lower *a\** value than the control. It could be, therefore, concluded that guar edible coatings enriched with *Spirulina platensis*, especially the ethanolic extract, could have considerable effects on increasing the shelf life of mango fruit.

Keywords: /Mango/ /Edible coatings/ /Algae/ /Shelf life/ /Phenolic compounds/ /Biochemical/

## MUSHROOM

**Chen, Q., Li, M.-S., Ding, W., Tao, M.-M., Li, M.-R., Qi, Q., ... Zhang, L. (2020). Effects of high N<sub>2</sub>/CO<sub>2</sub> in package treatment on polyamine-derived 4-Aminobutyrate (GABA) biosynthesis in cold-stored white mushrooms (*Agaricus bisporus*). *Postharvest Biology and Technology*, 162, 111093. doi: 10.1016/j.postharvbio.2019.111093**

Abstract

White mushrooms were harvested and then packaged, the air was evacuated from the package, and then one of two inert gases, N<sub>2</sub> or CO<sub>2</sub>, was pumped into the sealed packages. After storing all mushrooms at 4 °C, dynamic quantitative changes in polyamines and amino acids were subsequently detected. The results showed that the content of polyamines (PAs) in the white mushrooms was significantly increased due to the climacteric effect after 24 h of cold storage, but anaerobic treatment inhibited the biosynthesis of PAs and maintained a level as low as that of fresh mushrooms. In addition, anaerobic treatment significantly changed the amino acid content, especially the content of  $\gamma$ -aminobutyric acid (GABA), which was more markedly increased when the mushrooms were treated with N<sub>2</sub>. Then, the multiple enzymatic activities related to the GABA synthesis pathway were determined, including that of arginine decarboxylase (ADC), ornithine decarboxylase (ODC), diamine oxidase (DAO), polyamine oxidase (PAO), and glutamate decarboxylation (GAD), and the results showed that PAs metabolism played a great role in driving GABA biosynthesis in mushrooms that were exposed to N<sub>2</sub>.

Keywords: /Anaerobic packaging/ /White mushroom/ /Polyamine- $\gamma$ -Aminobutyric acid/ /Postharvest storage/

**Park, D. H., Park, J. J., Olawuyi, I. F., & Lee, W. Y. (2020). Quality of White mushroom (*Agaricus bisporus*) under argon- and nitrogen-based controlled atmosphere storage. *Scientia Horticulturae*, 265, 109229. doi: 10.1016/j.scienta.2020.109229**

#### Abstract

This study was conducted to identify effective CA (Controlled Atmosphere) gas compositions for the storage of white mushrooms. We analyzed the quality characteristics of mushrooms inside argon-based and nitrogen-based CA storage. Mushrooms were stored under 5 different gas compositions in a chamber for 9 days at 4°C. The CO<sub>2</sub> production, weight loss and color change in 90% argon gas was lower than that of all other samples at the end of the storage period. Further, the samples in a CA retained their hardness during the 9-day storage time, unlike the control. The viable count of aerobic bacteria showed the highest value under the control condition. The smallest viable count of *Pseudomonas* spp. was detected under 75% nitrogen condition. Polyphenol oxidase activity was lowest under 75% argon condition. In summary, a 90% argon gas was shown to be the most effective at preventing deterioration in mushroom quality.

Keywords: /Argon/ /Controlled atmosphere storage/ /Nitrogen/ /Quality/ /White mushroom/

#### PAPAYA

**Parven, A., Sarker, M. R., Megharaj, M., & Meftaul, I. M. (2020). Prolonging the shelf life of Papaya (*Carica papaya* L.) using Aloe vera gel at ambient temperature. *Scientia Horticulturae*, 265, 109228. doi: 10.1016/j.scienta.2020.109228**

#### Abstract

The edible coating is one of the promising aspects in the preservation of climacteric fruits like papaya. Among the various edible coating, *Aloe vera* gel has drawn serious attention to the scientific community as one of the promising bio-preservatives due to its human health benefit and antimicrobial properties. The packaging of fruits using polythene bags is already a common practice. Thus, this study was conducted to evaluate the effect of no packaging and packaging with both perforated and unperforated polythene, together with *Aloe vera* gel coated and uncoated papaya fruits on post-harvest ripening behaviour and physicochemical properties when stored at room condition (25 ± 2 °C temperature and 80–85 % relative humidity). The results showed that *Aloe vera* gel coating alone delayed colour development during storage compared to the control (no packaging without *Aloe vera* gel). After 12 days of storage (DAS), the weight loss and moisture content of fruits treated with only *Aloe vera* gel were 11.7% and 89.9% respectively, whereas in control, the weight loss was 25.2% and moisture content was 87.1%. Moreover, soluble solids concentration (SSC) and disease severity were reduced as around 3% and 29% respectively, for coated compared to uncoated fruits. Similar to *Aloe vera* gel coating, packaging of papaya fruits with only both types of polythene bag showed better performance compared to control but not as much as *Aloe vera* gel coating alone. In addition, if the fruits are coated with *Aloe vera* gel as well as packed with polythene bag their edible quality drastically reduces once the fruits reach their peak climacteric or ripening stage, although these results were more severe with unperforated polythene compared to perforated polythene bags. These findings also suggest that *Aloe vera* gel as an edible coating could be used commercially for extending the storage life of papaya fruits for up to 14 days, while packaging of *Aloe vera* gel-coated papaya fruits in polythene bags must be avoided during storage, transportation, and marketing. In addition, this is in accordance with the need to avoid the use of non-recycled plastic material due to its pollution effects on ecosystems worldwide.

Keywords: /Bio-preservatives/ /*Aloe vera* gel/ /Papaya fruit/ /Post-harvest/ /Disease severity/

## PEAR

Zhang, H., Zhao, L., Fan, C., Wang, P., Cui, M., Liu, L., ... Wang, J. (2020). Impact of methyl salicylate on storage quality, ethylene action, and protein profiling of 'Zaosu' pear (*Pyrus bretschneideri*). *Scientia Horticulturae*, 264, 109196. doi: 10.1016/j.scienta.2020.109196

### Abstract

'Zaosu' pear, an early-maturing cultivar harvested in summer in China, readily exhibits quality deterioration and senescence owing to the lack of refrigeration and effective postharvest technology. To explore possible molecular mechanisms of methyl salicylate (MeSA) in delaying senescence, 'Zaosu' pear was treated with 0.05 mmol L<sup>-1</sup> MeSA and stored at 25 ± 2 °C. The effects on quality, ethylene synthesis and signaling elements, and protein profiling were evaluated. MeSA maintained fruit postharvest quality. In the treated fruit, the yellowing index, weight loss, and color L\* value retained lower levels, and the yellowing index was 69 % of that of the control after 20 days, whereas the hue angle and texture properties (fracturability, firmness, and chewiness) had increased levels. The respiration rate and ethylene content, and ethylene biosynthesis and signaling components *ACS4*, *ACO1*, *ACO4*, *ETR1*, *ETR2*, *ERS2*, *CTR1*, *EIN2*, and *EIL1*, were inhibited and downregulated by MeSA, respectively, while *ERS1* was upregulated. Thirty-eight different expression proteins were identified by 2-DE and MALDI-TOF/TOF MS analysis in the treated and untreated fruits. Among them, related ripening and senescence proteins 2-methylene-furan-3-one reductase, abscisic stress-ripening protein, annexin RJ4, and mitochondrial outer membrane protein porin were down-accumulated during storage, while electron transfer flavoprotein was up-accumulated later in the storage period. These results indicated that MeSA postponed the ripening and senescence of postharvest 'Zaosu' pear.

Keywords: /Methyl salicylate/ /Quality/ /Ethylene synthesis/ /Signaling elements/ /Protein profiling/

## PLUMS

Wang, L., Sang, W., Xu, R., & Cao, J. (2020). Alteration of flesh color and enhancement of bioactive substances via the stimulation of anthocyanin biosynthesis in 'Friar' plum fruit by low temperature and the removal. *Food Chemistry*, 310, 125862. doi:10.1016/j.foodchem.2019.125862

### Abstract

'Friar' plum (*Prunus salicina* Lindl.) fruit were transferred to shelf life (25 °C) following different storage periods at low (0 °C) or intermediate (5 °C) temperature. The earliest flesh reddening appeared in plums during shelf life removed after 28 d at 0 °C and 14 d at 5 °C, respectively, in comparison with turning yellow in plums remained at 25 °C immediately after harvest. The flesh reddening developed rapidly thereafter. Anthocyanins, in particular, cyanidin 3-O-glucoside, significantly accumulated in the reddening tissue, and activities of enzymes associated with the phenylpropanoid pathway were considerably activated after the removal. The removal elicited extremely high ethylene production in plums, which might mediate the activation of the anthocyanin biosynthesis in response to cold stress signal. The results provided a potential approach for postharvest regulation of flesh color and accumulation of bioactive substances in plums, which could lead to attractive attributes and health-promoting effects on consumers.

Keywords: /Plum fruit/ /*Prunus salicina*/ /Storage/ /Shelf life/ /Flesh reddening/ /Anthocyanins/ /Phenylpropanoid pathway/ /Ethylene/

## POMEGRANATE

Amos, O., Julian, F., Ebrahiema, A., Umezuruike, A., Opara, O. (2020). Postharvest physiological responses of pomegranate fruit (cv. Wonderful) to exogenous putrescine treatment and effects on physico-chemical and phytochemical properties. *Food Science and Human Wellness*. <https://doi.org/10.1016/j.fshw.2020.02.007>

### Abstract

Pomegranate fruit (cv. Wonderful) were treated with putrescine (1, 2 and 3 mmol/L) before storage for 4 months at 5 °C and 95 % RH and the effects on postharvest life and quality attributes were studied. Results showed that incidence of physiological disorders such as external decay, husk scald, chilling injury and aril browning increased with progressive storage but treating pomegranate fruit with putrescine reduced incidence of most disorders. Control fruit had higher levels of external decay (1.72 %–33.26 %), chilling injury (10.53 %–38.77 %) and scalding (15.04 %–100 %) with less attractive color during 4 month storage. Variations were observed on other fruit quality parameters although treatment with putrescine at 2 and 3 mmol/L concentration reduced changes in color, total soluble solid, Titratable acidity and ascorbic acid. Sensory parameters were best preserved in fruit treated with 2 mmol/L concentration of putrescine with respect to juiciness and crispness. Treatment of pomegranate fruit with putrescine resulted in improved storability and fruit quality during storage. Therefore, for short term storage, 2 mmol/L concentration of putrescine could be recommended for maintaining fruit quality especially in the first two months of storage. However, for longer storage period, a higher concentration is recommended, as 3 mmol/L concentration was the most effective in alleviating disorders and maintaining physico-chemical parameters and sensory attributes during storage in this study.

Keywords: /Decay/ /Chilling injury/ /Phytochemical/ /Sensory properties/ /Principal component analysis/

## POTATO

Kiatsi, E., Tosetti, R., & Terry, L. A. (2020). Susceptibility to blackheart disorder in potato tubers is influenced by sugar and phenolic profile. *Postharvest Biology and Technology*, 162, 111094. doi: 10.1016/j.postharvbio.2019.111094

### Abstract

Blackheart (BH) is a physiological disorder of potato tubers in which internal tissue becomes discoloured during storage. The development of BH has been previously linked with general phenolic accumulation. In this study, five potato stocks cv. Maris Piper with different susceptibility to BH were selected across two consecutive seasons, whereupon targeted analysis of sugar and individual phenolic compounds in two tuber sections (flesh and heart) was conducted after storage at 1.5 °C or after one week at 15 °C. The most susceptible stock to BH had the highest accumulation of reducing sugars, while crypto- and neo-chlorogenic acids (chlorogenic acid isomers) were more abundant in flesh tissue of non-susceptible stocks. It is postulated that these metabolites may represent putative pre-symptomatic predictive biomarkers of stock susceptibility to BH.

Keywords: /Blackheart/ /Chlorogenic acid isomers/ /Fructose/ /Glucose/ /Shelf-life/ /Susceptibility/

## STRAWBERRY

Nguyen, V. T., Nguyen, D. H., & Nguyen, H. V. (2020). Combination effects of calcium chloride and nano-chitosan on the postharvest quality of strawberry (*Fragaria x ananassa* Duch.). *Postharvest Biology and Technology*, 162, 111103. doi: 10.1016/j.postharvbio.2019.111103

### Abstract

This study aimed to investigate influences of calcium chloride (CaCl<sub>2</sub>) concentrations combined with nano-chitosan coating on the quality of strawberry during postharvest storage. The fruit were dipped in different concentrations of calcium chloride (1 %, 2 %, 3 %, 4 %) before being coated with 0.2 % nano-chitosan. Physico-chemical analysis including the overall quality index, weight loss, firmness, titratable acidity, total soluble solid, l-ascorbic acid content, antioxidant capacity, total phenolic content, total anthocyanin content, and malondialdehyde content were performed in 3 d intervals until fruit became unmarketable. Among six examined treatments, a combination of 3 % CaCl<sub>2</sub> and nano-chitosan (NCTS) was the most effective one as maintaining the highest score of overall quality index of strawberry stored at 4 °C up to 15 d. The treatment also significantly reduced weight loss, preserved l-ascorbic acid, total anthocyanin contents, antioxidant capacity, and retarded malondialdehyde production. The scanning electron microscope image showed a smooth surface of strawberries coated with 3 % CaCl<sub>2</sub> combined 0.2 % nano-chitosan. There was no bitterness detected in the treated strawberries after being stored 15 d at 4 °C. The major volatile compounds determined in the initial day were remained until the 15th d of storage.

Keywords: /Strawberry/ /Volatile compounds/ /SEM/ /Nano-chitosan/ /Postharvest quality/

## TOMATO

Dyshlyukab, L., Babich, O., Prosekov, A., Ivanovabe, S., Pavskyae, V., Chaplyginae, T., (2020). The effect of postharvest ultraviolet irradiation on the content of antioxidant compounds and the activity of antioxidant enzymes in tomato. *Heliyon*, 6(1), e0388 <https://doi.org/10.1016/j.heliyon.2020.e03288>

### Abstract

The effect of different doses of long-wavelength UV-A (320 nm–400nm) irradiation on physicochemical and antioxidant characteristics of tomatoes grown on the territory of the Russian Federation was studied. The obtained results show that this kind of processing does not cause deterioration of qualitative parameters of vegetables (texture, color, soluble solids content, titratable acidity). It was established that the total content of phenolic compounds, carotenoids and flavonoids increases (p-value<0.05) in tomatoes at all the investigated wavelengths (353 nm, 365 nm and 400 nm), while the content of chlorophylls reacts ambiguously: at some wavelengths, it increases, at other, it decreases. The maximum increase in antioxidant activity, as compared to untreated samples, is observed in tomatoe samples irradiated for 360 min within the range of 365 nm. For different types of tomatoes, the increment for common content of phenolic compounds is – 42.9–55.0 %, carotenoids – 24.0–56.0 %, flavonoids – 28.0–33.0 %, β-carotene – 70.9–71.6 %, lycopene – 62.6–69.0 %, lutein – 64.8–72.0 % from original. The studies reveal some potential of post-harvest ultraviolet irradiation (A-range) of tomatoes to increase their antioxidant activity. However, more research is needed to confirm this fact and the possibility to develop some technology.

Keywords: /Bioactive compound/ /Food analysis/ /Nutrition/ /Plant products/ /Postharvest food processing/ /Qualitative research in nutrition/ /Tomatoes (*Solanum lycopersicum* L.)/ /Antioxidant activity/ /UV-A-radiation/ /Phenolic compounds/ /Physicochemical parameters/ /Functional food/

**Zhao, S., Guo, Y., Wang, Q., Luo, H., He, C., & An, B. (2020). Expression of flagellin at yeast surface increases biocontrol efficiency of yeast cells against postharvest disease of tomato caused by *Botrytis cinerea*. *Postharvest Biology and Technology*, 162, 111112. doi:10.1016/j.postharvbio.2019.111112**

#### Abstract

In this study, bacterial flagellin was expressed at the cell surface of *Saccharomyces cerevisiae* EBY100 via yeast surface display system. The effect of the yeast on controlling the postharvest decay of tomato fruit caused by *Botrytis cinerea* and the possible mechanisms were investigated. The results showed that the yeast expressing flagellin at cell surface could significantly induce disease resistance against *B. cinerea* in tomato wounds. The genes involved in biosynthesis of salicylic acid and jasmonic acid, and plant defense were markedly up-regulated in tomato wounds by the yeast strain expressing flagellin. In addition, application of the yeast strain significantly induced the superoxide radical generation in tobacco leaves and tomato fruit. These findings suggest that expressing flagellin at yeast cell surface may be an effective strategy to increase the biocontrol efficiency of antagonist yeast against disease in postharvest fruit.

Keywords: /Flagellin/ /Yeast surface display/ /Induced resistance/ /Tomato/ /*Botrytis cinerea*/

**Zhang, X., Tang, H., Du, H., Liu, Z., Bao, Z., & Shi, Q. (2020). Comparative N-glycoproteome analysis provides novel insights into the regulation mechanism in tomato (*Solanum lycopersicum* L.) During fruit ripening process. *Plant Science*, 293, 110413. doi:10.1016/j.plantsci.2020.110413**

#### Abstract

Protein N-glycosylation plays key roles in protein folding, stability, solubility, biogenesis, and enzyme activity. Tomato (*Solanum lycopersicum* L.) is an important vegetable crop with abundant nutritional value, and the formation of tomato fruit qualities primarily occurs in the fruit ripening process. However, a large number of N-glycosylation-mediated mechanisms in regulating tomato fruit ripening have not been elucidated to date. In this study, western blot assays showed that the extents of mature N-glycoproteins were differentially expressed in mature green fruits (fruit start ripening) and ripe fruits (fruit stop ripening). Next, through performing a comparative N-glycoproteome analysis strategy, a total of 553 N-glycosites from 363 N-glycoproteins were identified in mature green fruits compared with ripe fruits. Among them, 252 N-glycosites from 191 N-glycoproteins were differentially expressed in mature green fruits compared with ripe fruits. The differentially expressed N-glycoproteins were mainly located in the chloroplast (30 %) and cytoplasm (16 %). Gene Ontology (GO) analysis showed that these N-glycoproteins were involved in various biological processes, cellular components and molecular functions. These N-glycoproteins participate in biological processes, such as metabolic processes, cellular processes and single-organism processes. These N-glycoproteins are also cellular components in biological process cells, membranes and organelles and have different molecular functions, such as catalytic activity and binding. Notably, these N-glycoproteins were enriched in starch and sucrose metabolism and galactose metabolism by KEGG pathway analysis. This community resource regarding N-glycoproteins is the first large-scale N-glycoproteome during plant fruit ripening. This study will contribute to understanding the function of N-glycosylation in regulating plant fruit ripening.

Keywords: /N-glycosylation/ /Fruit ripening/ /Tomato/ /Quality/