

**SELECTIVE DESSIMINATION OF INFORMATION (SDI)  
PDF REPRINTS as of August 2013**

**GENERAL**

**COMMERCIAL TRIALS**

Spadoni, Neri, et al. 2013. Control on Monilinia rots on fruit naturally infected by hot water treatment in **commercial trials**. Postharvest Biol. & Technol., 86: 280 – 284.

**Abstract**

In recent years, safer methods for the control of fruit postharvest pathogens have been investigated and heat treatment could represent an effective and safe approach for managing postharvest decay such as Monilinia rots. In the present study, the effect of hot water treatment (HWT) (60°C for 30 and 60 s) on brown rot was investigated. More specifically, the influence of HWT was determined in in vitro trials on conidial germination of *Monilinia laxa*, *Monilinia fructicola* and *Monilinia fructigena* and in peach and nectarine fruit, naturally infected. The effect of hot water application on fruit quality was also assessed. *M. fructicola* showed a greater resistance to heat than *M. laxa* and *M. fructigena*, however conidia germination of all three species was completely inhibited by a dipping in hot water for 1 min at 55°C. The results of a large scale experiment under commercial conditions and several pilot trials showed a good antifungal activity of HWT in naturally infected fruit. After 6 days at 0°C and 3 days at 20°C, in both semi-commercial and commercial trials, the inhibition of decay was higher than 78% in four trials out of six. In addition, the treated fruit showed an acceptable commercial quality and no visual damage was observed as a consequence of HWT. The results demonstrated that HWT is a promising method to control Monilinia rots of peach and nectarine, and is safe and readily available for conventional and organic production under commercial conditions.

**Keywords:** /Commercial Trials/ /Heat treatment/ /Brown rot/ /Peach/

**FRUITS**

**APRICOT**

Coskun, Turkyilmaz, Aksu, et al. 2013. Effects of various sulphuring methods and storage temperatures on the physical and chemical quality of dried **apricots**. Food Chem. 141: 3670 – 3680.

**Abstract**

The effects of different sulphuring methods, i.e. sulphuring by “burning the elemental sulphites (BES),” “SO<sub>2</sub> gas from liquified SO<sub>2</sub> tank (SG)” and “dipping into sodium metabisulphite solution (DSM)” on the colour (brown colour formation and carotenoid degradation) and the loss of SO<sub>2</sub> in apricots from Hacihaliloglu and Kabaasi varieties stored at 5, 20 and 30 °C for a year were investigated. There were significant effects of variety, sulphuring method and especially storage at 30 °C on the brown colour formation and loss of SO<sub>2</sub> (P < 0.05). As storage temperature–time increased, β-carotene content

decreased. Sulphuring methods and variety did not show significant effect on  $\beta$ -carotene content ( $P > 0.05$ ). The changes in  $L^*$ ,  $b^*$  and  $C^*$  values were directly associated with  $\beta$ -carotene content and browning values. The most suitable method for all samples, except for Hacihaliloglu variety stored at 30 °C (BES), is SG, because the samples retained their attractive golden yellow colour during storage.

**Keywords:** /Apricots/ /Browning/ /Storage/

## **BANANA**

Nunes, Yagis, & Emond. 2013. Influence of environmental conditions on the quality attributes and shelf life of 'Goldfinger' bananas. *Postharvest Biol. & Technol.* 86: 309 – 320.

### **Abstract**

'Goldfinger' bananas (*Musa accuminata*, FHIA-01) were harvested, held for 14–22 d at five temperatures and a constant relative humidity (RH) or at five RHs and a constant temperature and evaluated for quality attributes. The objectives of this work were to: (1) create quality curves for bananas stored at chilling and non-chilling temperatures; (2) create quality curves for bananas stored at a non-chilling temperatures and different RHs; (3) identify which sensory quality attribute limits the shelf life and marketability of bananas when stored at chilling and non-chilling temperatures or at different RHs; and (4) correlate subjective sensory attributes with quantitative quality measurements. Results from this study showed that temperature had a more significant impact on the quality of banana than RH. Bananas stored at temperatures higher than 10°C were yellower and softer but had lower starch and higher soluble solids and total sugar content than those stored at lower temperatures. When stored at 2, 5 and 10°C, bananas developed chilling injury (CI) and abnormal ripening when transferred to 20°C. The most remarkable impact of RH on banana quality was on weight loss, which was significantly higher in fruit held below 80% RH than in fruit held in 87 or 92% RH. CI was the first sensory quality attribute to reach the limit of acceptability in fruit stored at 2, 5 and 10°C, whereas color changes and softening limited the shelf life of bananas stored at 15 and 20°C. Changes in color and/or softening were the two main sensory attributes that limited the shelf life of bananas stored at different RHs. Overall, for maximum quality and shelf life bananas should be stored at or above 15°C and 92% RH. Finally, sensory attributes can be used to estimate peel color, pulp softening and sweetness, while SSC can be used as a reliable and simple method to estimate the total sugar content of bananas stored at different temperatures or different RHs.

**Keywords:** /Banana/ /Temperature/ /Relative Humidity/ /Sensory Quality/ /Color/ /Texture/

Ewane, Chillet, Castelan, et al. 2013. Impact of the extension of black leaf streak disease on banana susceptibility to post-harvest diseases. *Fruits.* 68(5): 351 – 365.

### **Abstract**

The susceptibility of banana fruit to crown rot and anthracnose, the two main banana post-harvest diseases, is influenced by many pre-harvest abiotic factors. *Mycosphaerella* leaf spot diseases (MLSD) of bananas are biotic pre-harvest factors, which have an influence on fruit physiology. The fruit's susceptibility to post-harvest diseases may also be influenced by foliar diseases caused by *M. fijiensis*, responsible for black leaf streak disease (BLS), and *M. musicola*, which causes sigatoka disease (SD). The aim of our study was to determine the influence of these biotic pre-harvest factors on banana fruit's

susceptibility to crown rot and anthracnose. Materials and methods. A disease severity gradient was established in two experimental fields (Cameroon for BLSD and Guadeloupe for SD) where, at the flowering stage, six different levels of MLSL severity were selected. Fruit susceptibility was determined through necrotic surface assessments after artificial inoculation by *Colletotrichum musae* on the 3rd hand of harvested bunches. Results and discussion. BLSD significantly influenced banana sensitivity to crown rot ( $P < 0.001$ ) but only had a slight effect on the development of anthracnose ( $P = 0.041$ ). SD had no effect ( $P > 0.05$ ) on banana susceptibility to either post-harvest disease. These results are discussed with emphasis on the influence of variations in the source-sink ratio on fruit physiology. The influence of BLSD on crown rot disease suggests the need to take into account the management of these foliar diseases for an alternative control method of post-harvest diseases through integrated pest management programs.

**Keywords:** /Banana/ /Black sigatoka / /Black Leaf Streak Disease / /Anthracnose / /Crown Rots

## **CHERRY**

Aghdam, Dokhanieh, et al. 2013. Enhancement of antioxidant capacity of cornelian **cherry** (*Cornus mas*) fruit by postharvest calcium treatment. *Sci. Hort.*, 161: 160 – 164.

### **Abstract**

In order to enhance postharvest antioxidant capacity of cornelian cherry fruits, the effects of treatment with 0 (control), 40, 60 and 80 mM calcium chloride ( $\text{CaCl}_2$ ) on total phenols (TP), flavonoids (TF), anthocyanins (TA), ascorbic acid (AA) contents, DPPH scavenging activity and phenylalanine ammonialyase (PAL) enzyme activity were investigated in fruits stored at 4 °C for 21 days. The  $\text{CaCl}_2$  treatments were effective in maintaining higher total phenols, flavonoids, anthocyanins, ascorbic acid contents, as well as DPPH scavenging activity. Also, PAL enzyme activity of the cornelian cherry fruits was significantly increased by  $\text{CaCl}_2$  treatments. These results suggest that enhanced antioxidant capacity of cornelian cherry fruits might be due to the stimulation of PAL enzyme activity and thus triggering the phenylpropanoid-flavonoids pathways.

**Keywords:** /Cherry/ /Postharvest/ /Calcium Chloride/ /Postharvest/

## **CITRUS**

Luo, Zhou, & Zeng. 2013. Effect of *Pichia membranaefaciens* on ROS metabolism and postharvest disease control in **citrus** fruit. *Crop Protection*. 53: 96 – 102.

### **Abstract**

The yeast *Pichia membranaefaciens* has antagonistic effects against a wide range of phytopathogenic fungi that cause postharvest fruit decay. This work evaluated the effects of *P. membranaefaciens* on the reactive oxygen species (ROS) metabolism and disease control in harvested citrus fruit (*Citrus sinensis* L. Osbeck). The lesion diameter caused by *Penicillium italicum* and *Penicillium digitatum* on citrus fruit was remarkably reduced when the fruit was point-inoculated or dipped in a suspension of *P. membranaefaciens* at  $1 \times 10^8$  CFU mL<sup>-1</sup>. The application of *P. membranaefaciens* on citrus fruit enhanced the activity of superoxide dismutase, ascorbate peroxidase, and glutathione reductase, as well as the levels of hydrogen peroxide, the superoxide anion and glutathione, but

inhibited the decreasing ascorbic acid content. Furthermore, catalase activity was decreased by the same treatment. These results indicated that yeast treatment induced the synthesis of antioxidant enzymes which might have antagonistic effects against postharvest green and blue mold infection in citrus fruit.

**Keywords:** /Citrus/ /Disease Control/ /Postharvest Diseases/

## **JACKFRUIT**

Saxena, A., Saxena, T.M. & Raju, P.S. 2013. Effect of controlled atmosphere storage and chitosan coating on quality of fresh-cut **jackfruit** bulbs. *Food Bioprocess Technol.* 6 (8): 2182 – 2189.

### **Abstract**

Fresh-cut jackfruit bulbs were evaluated for quality changes as effect of an additive pretreatment with CaCl<sub>2</sub>, ascorbic acid, citric acid, and sodium benzoate followed by chitosan coating. Different types of samples such as pretreated and coated, only pretreated, only coated, and untreated were subjected to controlled atmosphere (CA) storage (3 kPa O<sub>2</sub>+6 or 3 kPa CO<sub>2</sub>; N<sub>2</sub> balance) or normal air at 6 °C. CA conditions, pretreatment, as well as chitosan coating in synergy with each other, could significantly minimize the loss in total phenolics and ascorbic acid content of the samples to the levels of around 5% and 17%, respectively, during extended storage up to 50 days. Chitosan coating could also restrict the changes in microbial load. The CA condition of 3 kPa O<sub>2</sub>+ 6 kPa CO<sub>2</sub> was found to render higher efficacy in retaining quality attributes of the samples.

**Keywords:** /Jackfruit/ /Controlled Atmosphere Storage/ /Chitosan/

## **LONGKONG**

Lichanporn, I., C. Techavuthiporn, and S. Kanlayanarat. 2013. Inhibition of browning in **longkong** fruit by short term exposure to nitrous oxide (N<sub>2</sub>O). *Acta Hort.* 989: 69 – 72.

### **Abstract**

Longkong (*Aglaia dookoo* Griff), a famous tropical fruit of Southeast Asia, has a very short postharvest life due to rapid peel-browning. The effect of nitrous oxide (N<sub>2</sub>O) treatment on peel browning of fruit after harvest was investigated. Longkong fruit was exposed to 90% N<sub>2</sub>O for 0 (control), 3 and 6 h and then stored at 13°C and 90% RH. The results showed that exposure to N<sub>2</sub>O delayed the onset of peel browning. Treatment with N<sub>2</sub>O for 3 and 6 h significantly delayed the increase in browning index comparing to the control. This result correlated with the higher L value (lightness index) of treated fruit than that of untreated control. Peel pH of treated and untreated fruit did not significantly differ. Among the treatments, 90% N<sub>2</sub>O for 3 h was the most effective against browning.

**Keywords:** /Longkong/ /Browning/

## MANDARIN

Purbiati, T. and A. Supriyanto. 2013. Effects of harvesting method and storage temperature on shelf life of mandarin fruit cultivar 'SoE' from East Nusa Tenggara, Indonesia. Acta Hort. 989: 149 – 152.

### Abstract

'SoE' is the best mandarin variety in Indonesia. This mandarin that come from the province of East Nusa Tenggara Indonesia has characteristic orange rind color, easy to peel, sweet and sour balanced taste, but short storage life. The study aimed to find best harvesting and storage method for mandarin fruit 'SoE'. The treatments were 1) fruits were harvested by clipping which include a part of fruit stalk and stored at room temperature; 2) fruits were picked by hand without stalk of fruit and stored at room temperature; 3) fruits were harvested by clipping include a part of fruit stalk and stored in a cool box at temperature of 20°C; and 4) fruits were picked by hand without stalk of fruit and stored in cool box at a temperature of 20°C. Harvested fruits were transported to the laboratory of the Assessment Institute for Agricultural Technology of East Java. The study was done in Randomized Complete Block Design with five replications each with 4 fruits. After 12 d storage in a cool box, fruits harvested with or without stalk and stored at 20°C had lower weight loss and shrinkage than those stored at room temperature. Weight loss of fruit stored in cool box and at room temperature ranged from 4-5 and 18-21%, respectively. Fruit with intact stalk were less prone to fungal infection during °storage than those without fruit stalk.

Keywords: /Mandarin/ /Harvesting/ /Storage/ /Shelf Life/

## MANGO

Akem, C. et.al. 2013. The use of plant activators in mango postharvest diseases management. Acta Hort. 992: 369 – 376.

### Abstract

Anthracoze and stem end rots are the main postharvest diseases affecting mangoes in Australia and limiting the shelf life of fruits whenever they are not controlled. The management of these diseases has often relied on the use of fungicide applications either as field spray treatments, postharvest dips or both. Because of concerns with continuous fungicide use, other options for the sustainable management of these diseases are needed. Field trials were conducted to assess the efficacy of three plant activators for the control of these diseases over a 2-year period on 20-year old 'R2E2' mango trees in north Queensland. The activators evaluated were: Bion, Kasil and Mangocote. The efficacy of these activators was compared with that of a standard industry field spray program using a combination of fungicides, as well as to untreated controls. Conditions favoured good development of the target diseases in both years to be able to differentiate treatment effects. Kasil as a drench was as effective as the standard fungicide program on the management of anthracnose and stem end rots. Bion as foliar sprays showed similar efficacy with its effectiveness comparable with the standard spray program. Both activators had significantly less disease incidences when compared with the untreated control. The third activator, Mangocote was not vey effective in controlling the target diseases. Its effect was not significantly better than the untreated controls. The results from this 2-year study suggest that plant activators can play an effective role in mango postharvest disease management. Proper timing could reduce the number of fungicide sprays in an integrated disease management program enabling sustainable yields of quality

fruits without the continuous concerns of health and environmental risks from continuous reliance on fungicide use.

**Keywords:** /Mango/ /Postharvest diseases/ /Anthracnose/ /Stem end Rots/ /Disease Control/

Akem, MacManus, Lakhesar, et al. 2013. Comparison of fungicide dips efficacies for the control of mango postharvest diseases. Acta Hort. 992: 385 – 392.

### Abstract

The shelf-life of mangoes is limited by two main postharvest diseases when not consistently managed. These are anthracnose (*Colletotrichum gloeosporioides*) and stem end rots (*Neofusicoccum parvum*). The management of these diseases has often relied mainly on the use of fungicide applications either as field spray treatments and/ or postharvest dips. Current postharvest dips are under continuous threats because of health concerns and the maximum residue levels allowed on treated fruit continuous to be reviewed and re-assessed. Research needs to keep up with the rate at which changes are occurring following some of these reviews. The recent withdrawal of carbendazin (Spinflo), as a postharvest dip being used to manage stem end rots necessitated the urgent search for a replacement fungicide to manage this disease. A study was therefore undertaken to compare the efficacy of current and potential products that could be used to fill the gap. The following products were evaluated: Carbendazin (Spinflo), Prochloraz (Sportak), Thiobendazole (TBZ) and Fludioxonil (Scholar). These products were tested both under ambient temperatures and as hot dips to identify one that was most effective. Scholar® as a hot dip was the most effective product among the ones compared. It effectively controlled both anthracnose and stem end rots at highly significant levels when compared to the untreated control and even Spinflo which is being replaced. As a cold dip, it had some limited effect on anthracnose but had virtually no effect on stem end rots. Based on its performance in these experiments, the product has been recommended for rates and residue studies so that it can be registered as a hot dip for use in controlling postharvest diseases of mangoes.

**Keywords:** /Mango/ /Disease Control/ /Fungicide Dips/ /Postharvest Diseases/ /Stem end Rots/

Burondkar, M. M. 2013. Ripening behavior, storage and quality of 'Alphonso' mangoes as influenced by 1-methylcyclopropene. Acta Hort. 992: 597 – 606.

### Abstract

Investigations were carried out, for three consecutive years (2006-08), with an objective to test the efficacy of 1-methyl cyclopropene (1-MCP) in arresting the ripening and prolonging the storage and shelf life of 'Alphonso' mango fruit to suit export by sea transportation from India. After harvesting at physiological maturity, followed by pre-cooling at 13°C, fruit were exposed to vapors of 1-MCP at 70 mg/m<sup>3</sup> (1000 ppb) for 18 hrs in air tight (plastic) treatment chamber. The treated and untreated fruits were then transferred to walk-in cooler for storage at 13±1°C, for different intervals (14, 21, and 28 days), followed by ripening at ambient temperature. Effect of 1-MCP on ripening pattern of fruits examined at six difference stages (viz.unripe, turning pale green, ¼ ripe, ½ ripe, full ripe and decaying) indicated that 1-MCP treatment significantly arrested the ripening by 8 days and prolonged the subsequent stages by 9, 10, 12, 12 and 13 days, respectively, over untreated control fruit. The fruit quality assessed at different intervals viz. after 14, 21 and 28 days of storage and shelf life behavior at two stages (0 and 5 days) after storage in terms of TSS, Acidity, total sugar, reducing sugar and an

organoleptic ratings, were found to improve by 1-MCP treatment with 21 days storage plus 5 days shelf life (17.93°B, 0.31%, 14.15%, 4.3%, 6.78) and 28 days storage with zero days shelf life (17.24°B, 0.29%, 14.53, 4.63%, 6.45) over control (16.93°B, 0.38%, 14.02, 4.04%, 6.33) with significant reduction in occurrence of spongy tissue (physiological disorder) from 25.07% in control to 9.45 to 12.34 % in both these 1-MCP treatments, respectively.

**Keywords:** /Mango/ /Ripening/ /Storage/ /Quality/ /1-methylcyclopropene/

Chidtragool, S., and S. Ketsa. 2013. Modified atmosphere reduces chilling injury of mango fruit during low temperature storage. Acta Hort. 992: 513 – 520.

### **Abstract**

Fruit of 'Nam Dok Mai' mango were stored at 4°C. This resulted in chilling injury (CI), particularly in the peel which became grayish brown. This was followed by slight discoloration of the pulp. Further discoloration of peel and pulp occurred when the fruit were transferred to 25°C. The produce was also held in plastic packages with and without modified atmosphere (MA). Oxygen levels in the MA packages were about 19.7% and carbon dioxide levels about 2.6%, compared to close to atmospheric concentrations in the non-MA packages. MA packaging reduced CI. Total free phenolics content in the peel was highest in fruit held in MA packages. Phenylalanine ammonia lyase (PAL) and polyphenol oxidase (PPO) activities in the peel were lowest in MA-packed fruit. Total free phenolics might protect against CI. PAL and PPO activities may be causally related to CI-induced browning.

**Keywords:** /Mango/ /Chilling Injury/ /Storage/ / Modified Atmosphere/

Kumpoun, W. and J. Uthaibutra. 2013. Storage life extension of 5°C of 'Nam Dok Mai See Thong' mango by perforated package. Acta Hort. 989: 143 – 148.

### **Abstract**

The export of Thai mango fruit to EU market currently entails high cost of air freight. Reducing cost by prolonging storage life for 25 d is an interesting issue to allow sea freight. The objective of this research was to find a suitable package for mango during cold storage. Individual mango fruit was packed in 3 types of package as polyethylene terephthalate box, polyethylene bag and multilayer nylon bag with 2 levels of perforated holes (1.0 and 1.5 cm<sup>2</sup>/m<sup>2</sup>). All fruit were kept at 5°C for 21, 28 and 35 d and transferred to ripen at room temperature (25±3°C). Result showed that mango fruit packed in polyethylene terephthalate box with perforated holes 1.5 cm<sup>2</sup>/m<sup>2</sup> had the longest storage life of 28 d without any chilling injury symptom. Moreover, the fruit was able to ripe when it was transferred to room temperature for 7 d. Fruit packed in polyethylene bag and multilayer nylon bag package with both sizes of perforations showed chilling injury symptoms within 28 d of storage.

**Keywords:** /Mango/ Modified Atmosphere Packaging/ /Storage/

Mekwatanakarn, W. and R. Chairat. 2013. Antioxidant capacity of mango pulp and peel stored at two temperatures. Acta Hort. 992: 139 – 142.

### **Abstract**

Mango (*Mangifera indica* L.) is an important tropical fruit that is receiving increased attention because of its potential antioxidant activity. In the present study, changes in antioxidant capacity of mango pulp and peel extracts stored at two temperatures were examined. Mature-green mangoes 'Nam Dok Mai' stored at 15 or 25°C were evaluated for antioxidant capacity every three days during storage. Antioxidant activity of mango pulp and peel extracted in methanol was determined using DPPH free radical scavenging activity. Results showed that antioxidant capacity of mango pulp and peel increased during 6 d of storage and after that declined at both temperatures. The antioxidant capacity of mango pulp stored at 15°C was about two-fold higher than that stored at 25°C. The highest increase in antioxidant capacity occurred at 15°C. Mango fruits stored at 25°C had lower antioxidant capacity than those stored at 15°C. Antioxidant capacity of mango peel was higher than that of pulp at both temperatures. These results suggest that low temperature storage may provide a good technique to increase antioxidant capacity in mango fruits. Mango peels which are discarded after processing may be valuable for use in nutraceutical and functional foods.

**Keywords:** /Mango/ /Antioxidant/ /Temperature/

Mitra, S. K. 2013. Postharvest technology of **mango**: recent development and challenges of a future free-trade world market. Acta Hort. 992: 499 – 504.

#### **Abstract**

The world fruit trade is expanding but mango sales are restricted by improper handling and inadequate transport facilities in the developing countries. One of the major problems currently restricting international trade in mangoes is the variation in physiological maturity that occurs in a single consignment. Under present conditions, this produces a lack of uniformity in ripening that result in fruit being offered for sale at different stages of ripeness at any particular time. Disease problems, sensitivity to low storage temperature and the general perishable nature of the fruit limit transport distance of fresh fruits from the site of harvest. The currently available technology (low temperature storage, CA storage, use of ionizing radiation and coatings) can keep the fruit for about to four weeks. The establishment of both sanitary and phytosanitary (SPS) agreement and Technical Barrier to Trade (TBT) under GATT was to facilitate trade and unjustified restrictions on trade. However, to date, the export of fresh mangoes from Asian and African countries still face problems in gaining market access, especially in the developing countries. More research has to be carried out to gather scientific information in order to comply with the phytosanitary measures of the importing countries.

**Keywords:** /Mango/ /Postharvest Technology/ /Ripening/ /Maturity/

Patil. K. R. et.al. 2013. Post harvest chemical induction of vegetative growth and its physiological behavior in relation to regulation of flowering in 'Alphonso' **mango** (*Mangifera indica* L.). Acta Hort. 193 – 200.

#### **Abstract**

The influence of nutrients and different chemicals (KNO<sub>3</sub> – 3%, NH<sub>4</sub>(NO<sub>3</sub>)<sub>2</sub> – 2%, Thiourea – 0.5%, Urea – 2%, GA<sub>3</sub> – 50 ppm, Hydrogen cyanamide – 2%, Ethrel – 3000 ppm) and cultural treatments (light pruning, irrigation) applied at post harvest stage on old and new shoots, was investigated on 34 years old mango during 2008-09 in randomized block design with three replications with the aim to induce post harvest early vegetative growth, followed by flowering. All the treatments significantly influenced

the duration and percentage of post harvest vegetative growth and flowering along with yield. Among the treatments, Potassium nitrate (3%) showed significant effect on early induction and higher percentage of vegetative growth in both the types of shoots (Old: 87.67% and New: 55.67%) over control (65% and 40.33%) followed by 2% ammonium nitrate (76.67%) and 2% urea (77%). Both the sources of nitrogen i.e., thiourea (0.5%) and potassium nitrate (3%) resulted in significantly higher flowering percentage (77.17% and 67.5%) over rest of the treatments, whereas KNO<sub>3</sub> induced early flowering by 19.87 days, over control. Similarly, KNO<sub>3</sub> (3%) retained significantly higher number of fruits per panicle (4.20), followed by light pruning (4.13) over control. GA<sub>3</sub> and foliar spray of urea resulted significant increase in chlorophyll content up to flowering and gradually decreased with advancement of flowering. The C: N ratio estimated at four stages revealed that old shoots (12.95, 12.72, 9.60, 8.75) significantly recorded higher C:N ratio over group of new shoots (12.69, 12.30, 9.58, 11.74) except at the fruit bud stage.

**Keywords:** /Mango/ /Physiological Behaviour/

Singh, Z, and S.S. Saharah. 2013. Controlled atmosphere storage of mango fruit – an overview. Acta Hort. 992: 481 – 492.

### **Abstract**

Highly perishable nature of mango fruit and its susceptibility to chilling injury when stored below 13°C limits its international trade. Cold storage of mango at 12- 13°C is successful only for 2-3 weeks coupled with substantial losses in fruit quality. Controlled atmosphere (CA) in combination with an optimum storage temperature has been reported to prolong the storage life and maintain fruit quality including aroma volatiles in mango fruit depending upon cultivar. Fruit quality is an important factor in influencing consumer preferences in international and domestic markets. This paper will focus on fundamental and applied aspects of CA storage of mango fruit and its implications in facilitating international trade. Various researchers have attempted to optimise CA conditions for different cultivars of mango as the CA requirements of mangoes vary among cultivars and inappropriate CA conditions adversely affect quality of ripe mango fruit. CA comprising of low O<sub>2</sub> concentrations (<2%) has been reported to accumulate ethanol and adversely affect fruit quality of 'Tommy Atkins' and 'Delta R2E2' mangoes. For about a decade, my research group has been exploring the effects of CA on extending storage life, maintaining fruit quality including aroma volatiles production in mango fruit. CA storage comprising 3% O<sub>2</sub> in combination with 6% CO<sub>2</sub> at 13°C seems to be promising for extending the storage life of the Australian mango cultivars 'Kensington Pride' (KP) and 'R2E2' up to six weeks, with good fruit quality and maintaining a high concentration of the major volatile compounds responsible for the aroma of ripe mangoes. The applications of CA in preventing chilling injury, postharvest diseases and insect disinfestations have also been discussed.

**Keywords:** /Mango/ /Controlled Atmosphere Storage/

Watanawan, C. et.al. 2013. Harvest maturity determination mango maturity determination for export mango (*Mangifera indica* L.) 'Nam Dok Mai'. Acta Hort. 989: 111 – 114.

### **Abstract**

Harvesting 'Nam Dok Mai' mango fruit destined for export markets requires a maturity stage that ensures minimum risk of ripening during refrigerated transport and acceptable potential for subsequent

ripening. Fruit maturity was indexed in terms of near infrared spectroscopy (NIR) values and compared this with peel and flesh color, dry matter content (DMC), total soluble solids (TSS), titratable acidity (TA), visual score for export fruit and sensory taste. Sixty fruit lots picked 84-119 days after fruit set (DAFS) were used. Results showed that NIR values compared well with DMC and TSS values which increased with increasing stage of maturity. The optimum maturity stage for harvesting fruit for export was 105-112 DAFS; fruit had comparably higher NIR values, DMC, TSS, VSE and taste values than fruit harvested at earlier stage of maturity.

**Keywords:** /Mango/ /Maturity/ /Quality/

## MANGOSTEEN

Bayogan, E. R. V. and D.R.V. Delgado. 2013. Effects of relative humidity on pericarp hardening in mangosteen. (*Garcinia mangostana* L.) fruit. Acta Hort. 989: 153 - 160.

### Abstract

The study determined the effect of various relative humidity (RH) levels (91, 86, 81, and 69%) on the incidence of pericarp hardening in reddish purple mangosteen fruit. Total soluble solids did not vary with RH. The changes in sepal and visual quality were slower in fruit stored at high RH (91, 86%). On the other hand, weight loss and respiration were significantly highest in the lot held in 69%. Electrolyte leakage was 18.4% lower in fruit held in 91% compared to those held in 69%. During storage, firmness was increased the greatest in fruit in 69% with significantly firmer fruit and harder pericarps at 44.1 N relative to a firmness of 16.7 N in fruit held at an RH of 91% at 15 d after treatment (DAT). Pericarp hardening was delayed up to seven days in fruit stored at 91% RH which resulted in a shelf life that was seven days better. Lignin content at 12 to 18 DAT was significantly lower in fruit stored at high RH coinciding with harder pericarp compared with fruit at low RH. Thus at 20±2°C, it is recommended to store reddish purple mangosteen fruit in RH such as 91 and 86%.

**Keywords:** /Mangosteen/ /Firmness/ /Shelf Life/

\_\_\_\_\_. 2013. Pericarp hardening of mangosteen (*Garcinia mangostana* L.) fruit as affected by modified atmosphere packaging and 1-methylcyclopropene. Acta Hort. 989: 121 – 130.

### Abstract

The effects of modified atmosphere using cling wrap (0.012 mm) and polyethylene bags (0.0417 mm) as well as the use of 1000 nL.L-1 1- methylcyclopropene (1-MCP) in an airtight container for 4 h on light purple with green streaks (M1) and reddish purple (M2) mangosteen fruit were determined. Regardless of fruit maturity, weight loss was highest in the control treatment followed by 1-MCP, cling wrap and polyethylene (PE) bags, respectively. In both M1 and M2 fruit, browning and shriveling of the sepals (rating of 2) as well as visual quality (rating of 4) were delayed by more than 7 d, respectively, when cling wrapped, held in PE bags or treated with 1-MCP. Electrolyte leakage was significantly lesser in treated fruit compared with the control at 15 d after treatment (DAT). Lignin content increased in all treatments during storage with lower levels observed in treated fruit. Pericarp firmness was significantly higher in the control lot at 9 DAT (M2) and 12 DAT (M1) with fruit in the three treatments showing very

slight increases in firmness. Relative to the untreated control, the onset of pericarp hardening, disease occurrence and shelf life termination were significantly delayed by modified atmosphere packaging and 1-MCP by up to 43%. Except for lignin content at 12 DAT, there was however no significant difference among the two fruit maturities as well as among the three treatments (cling wrap, PE bag, and 1-MCP) in terms of days to pericarp hardening, days to disease occurrence, and shelf life.

**Keywords:** /Mangosteen/ /Firmness/ /Pericarp Hardening/ /Polyethylene Bag/

## PAPAYA

Ali, Asgar. 2013. Effect of ozone pre-conditioning on quality and antioxidant capacity of papaya fruit during ambient storage. Food Chem. 142: 19 - 26.

The objective of this study was to compare the physico-chemical characteristics and antioxidant activity of ozone-treated papaya fruit and untreated fruit. Freshly harvested papaya fruit were exposed continuously to ozone fumigation (0, 1.5, 2.5, 3.5 and 5 ppm) for 96 h prior to ambient storage at  $25 \pm 3$  °C and  $70 \pm 5\%$  relative humidity (RH) for up to 14 days. The fruit exposed to 2.5 ppm ozone had higher levels of total soluble solids (25.0%), ascorbic acid content (12.4%), b-carotene content (19.6%), lycopene content (52.1%), and antioxidant activity (30.9%), and also reduced weight loss (11.5%) at day 10 compared to the control. The sensory attributes of papaya treated with 2.5 ppm ozone was superior in sweetness and overall acceptability. These results support the application of ozone as a non-thermal and safe food preservation technique for papaya which can benefit both the producers and consumers.

**Keywords:** /Papaya/ /Quality Ambient Storage/ /Sensory Evaluation/

## PERSIMMON

Ding, X., et.al. 2013. 2014. Effect of cold storage and controlled freezing point storage on eleven persimmon cultivars. Acta Hort. 996: 423 – 425.

### Abstract

This study was carried out to observe the effects of refrigerated storage and freezing point storage on the healthy fruit ratio, fruit appearance, flesh flavor and firmness of 11 astringent persimmon cultivars. The results showed that, under refrigerated storage, 'Mopan' persimmon, 'Xiaoshi' and No.1 persimmon were the most storable, and the next were 'Dashi', 'Shuishi', however, 'Xiaoniuxin' persimmon, 'Gaishi', 'Huoshi' and 'Huishi' showed poor storage property. Among the 11 tested cultivars, 4 cultivars were more appropriate for controlled freezing.

**Keywords:** /Persimmon/ /Cold Storage/

Ferri, A., et.al. 2013. Viability and in vitro germination rate of pollen grains of *D. kaki* Thunb., *D. lotus* L. and *D. virginiana* L. in relation to storage time and temperatures. Acta Hort. 996: 97 – 102.

### Abstract

Most persimmon production relies on parthenocarpy; nevertheless male fertility is a relevant issue for breeding and, secondarily, when, for specific environmental or productive conditions, fruit-set needs to be improved. One of the bottle-necks in breeding is the natural sex-expression of persimmon (a polygamous dioic species) linked to the effect of anthropic selection of progenies, which leads to a small amount of monoic cultivars. In non-native areas of persimmon, germplasm collections usually hold a very limited number of pollen donors. Hence pollen storage is an important step in order to conserve/transport viable pollen grains for breeding purposes. In this study pollen grains of three accessions of *D. kaki*, one of *D. lotus* and one of *D. virginiana* have been stored at +4, -20, -80°C and in liquid nitrogen, for 0, 15, 30, 90, 180 and 360 days. Pollen grain viability and in vitro germinability depended mostly on temperature and duration of storage. After one year of conservation, storage in liquid nitrogen allowed to have rates of viable and germinable pollen grains ranging from 11 to 18% and from 5 to 9%, respectively; on the contrary, pollen grains stored for the same time at +4 and -20°C, even if viable in small amounts, did not germinate.

**Keywords:** /Persimmon/ /Storage/

Itamura, H. et.al. 2013. Relationships among ethylene, cell wall degrading enzyme activities and on-tree softening in persimmon (*Diospyros kaki* Thunb.) fruit. Acta Hort: 996: 379 – 384.

#### **Abstract**

Persimmon (*Diospyros kaki*) fruit soften naturally on the tree during late autumn. We investigated the relationships among ethylene production, the cell wall degrading enzymes polygalacturonase (PG), pectinesterase (PE),  $\beta$ -D-galactosidase ( $\beta$ -D-Gal) and  $\alpha$ -L-arabinofuranosidase ( $\alpha$ -L-Arf), and on-tree softening of persimmon 'Saijo' fruit. Fruit were harvested from mid-September to late November from a commercial orchard in Matsue, Japan. Flesh firmness decreased gradually until early November and then decreased rapidly. Activity of PG decreased slightly in early October and thereafter was maintained at the same level until late November. Activity of PE increased during September and October and peaked in mid-November. Activity of  $\beta$ -D-Gal increased rapidly from mid to late November, whereas  $\alpha$ -L-Arf activity increased rapidly from early to late November. Fruit that showed abnormal on-tree softening and fruit that represented a softening degree ranging from 1 (firm) to 4 (very soft or part of the peel ruptured) were harvested on the same date in late October and the activity of four cell wall degrading enzymes and internal ethylene concentration were determined. The internal ethylene concentration increased rapidly from softening degree 2 to 3. The activity of PE,  $\beta$ -D-Gal and  $\alpha$ -L-Arf increased with advancing degree of softening. Consequently, on-tree fruit softening in late autumn might be caused by cell wall decomposition by the cooperative activities of PE,  $\beta$ -D-Gal, and  $\alpha$ -L-Arf induced by ethylene synthesis.

**Keywords:** /Persimmon/ /Ethylene/ /Softening/

Li, B. 2013. A brief introduction to postharvest research and utilization of persimmon (*Diospyros kaki*) in China: ancient time to today. Acta Hort. 996: 373 – 378.

#### **Abstract**

Persimmon (*Diospyros kaki* Thunb.) originates from China. Chinese people began to cultivate persimmon in a certain area during the Tang-Song dynasty (618- 1279 AD), and used it as “woody food” to survive a crop failure during the Ming-Qing dynasty (1368-1911 AD). In the meantime, some earliest

traditional utilization methods of persimmon developed in ancient times. With the progress of society and technology and communication among countries, modern postharvest physiology and processing techniques were researched and developed in China. Some outstanding achievements are: (1) methods for astringency removal in ancient times by use of alkaloid (earliest record in 1279), mixing with other fruits or foliage (1067), warm water (1116), lime water (1279), mulberry leaf and salt solution (Mid-17th century) and naturally ripening (1578); the earliest record of dried persimmon is in 1116-1313; the record of processing persimmon paint in the 15th century; and the simple and easy storage technology; (2) modern postharvest physiology researches and processing technology, comprising postharvest fruit characteristics, improving keeping quality, and some processed products, (3) important utilization in health care.

**Keywords:** /Persimmon/ /Postharvest/

Li, J., et.al. 2013. Discrimination of maturity and storage life for 'Mopan' persimmon by electronic nose technique. *Acta Hort*: 385 – 390.

### **Abstract**

Over the last few years, electronic nose (E-nose) technology has enhanced the possibility of exploiting information on aroma to assess fruit ripening stage and storage life. The objective of this study was to evaluate the capacity of E-nose for monitoring the changes in volatile production occurring at different ripeness stages and storage life for 'Mopan' persimmon, using a specific electronic nose device with 10 different metal oxide sensors (portable E-nose, PEN 3). Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA) were used to investigate whether the E-nose was able to distinguish among the different ripeness stages (physiology-ripe, full-ripe and over-ripe) and storage stages. The obtained results proved that E-nose could distinguish among the ripeness states and storage states of 'Mopan' persimmon. The E-nose was able to detect the differences in volatile profile of 'Mopan' persimmon better when using LDA. On the other hand, the separation of controlled freezing point storage and common cold storage for 'Mopan' persimmon at 45 d was achieved by using both PCA and LDA. Some sensors in E-nose have a very important influence on the current recognition pattern of E-nose. A subset of only a few sensors in E-nose can be chosen to explain all the variance and the current result could be used in further studies to optimize the number of sensors.

**Keywords:** /Persimmon/ /Storage/ /Maturity/

Yu, X and X. Ding. 2013. Application of several prepared preservative agents and package materials on Xin an-niuxinshi persimmon storage. *Acta Hort*. 996: 443 – 446.

### **Abstract**

Preservative agents and package materials of MAP have influence on persimmon storage. Studies were carried out to compare some prepared preservative agents on the persimmon fruits storage at room temperature and refrigerated storage. Persimmon fruits were packed in 4 kinds of plastic bags stored in a refrigerator at 5°C. The result showed that some treatments of preservative solution could prolong 'Xin' an-niuxinshi' persimmon storage life as long as 40 d at room temperature. GA3, active carbon support ethylene absorbers and ethylene glycol and glycerin mixture showed significant influence at refrigerated temperature. It also showed perforated HDPE was better for persimmon package compared with non-perforated LDPE, 0.04 mm non-perforated HDPE and 0.02 mm non-perforated HDPE.

**Keywords:** /Persimmon/ /Storage/ /Refrigerated Storage/ /Modified Atmosphere Storage/

## **PINEAPPLE**

Khayankarn, S. 2013. Using electrolyzed oxidizing water combined with an ultrasonic wave on the postharvest diseases control of pineapple fruit cv. 'Phu Lae'. *Crop Protection*. 54: 43 – 47.

### **Abstract**

The effects of ultrasound (US) and electrolyzed oxidizing (EO) water on postharvest decay of pineapple cv. Phu Lae were investigated using *Fusarium* sp. isolated from pineapple fruits. The effect of EO water and US irradiation on in vitro growth inhibition of *Fusarium* sp. was studied. Spore suspensions were treated EO water with free chlorine at 100, 200 and 300 ppm and different frequencies of 108, 400, 700 KHz and 1 MHz US irradiation for 0, 10, 30 and 60 min and incubated at 27 °C for 48 h. The study showed that all treatments of EO water totally inhibited the spore germination of the fungus. Additionally, US irradiation of 1 MHz for 60 min was the most effective to suppress the spore germination when compared with the control. When the fruits inoculated with *Fusarium* sp. were washed in EO water at 100 ppm and US irradiation or combination of US and EO water significantly inhibited the decay incidence and prolonged the shelf life of the pineapple for 20 days. Treatments had no effect on fruit quality (weight loss percentage, total soluble solids, titratable acidity, pH, and ascorbic acid). The potential for EO water in combination with US in pineapple handling systems is high, due to marked synergistic effects against fungal decay of decrowned pineapple fruit during storage.

**Keywords:** /Pineapple/ /Postharvest Diseases/

Puthmee, T. 2013. Effects of trimming and storage temperature on quality of fresh-cut pineapple cultivar 'Tradseethong'. *Acta Hort*. 989: 193 – 198.

### **Abstract**

Recently, the value of fresh-cut products is increasing especially ready-to eat types due to increasing consumer demand for convenience foods. Most of them are fruits such as pineapple, melon and jack fruit that take a lot of time to peel out. Quality of fresh-cut produce is important. In this study, the effects of trimming types and storage temperature on quality of fresh-cut pineapple were investigated. To assess the effect of temperature, fresh-cut pineapple was stored at 4, 10 and 13°C with 92-95% relative humidity. Weight loss, firmness and overall appearance (color, odor, sweetness and pulp browning) were recorded every 2 d. The result showed that fresh-cut pineapple stored best at 10°C which most effectively reduced weight loss, delayed firmness loss, and maintained sensory quality. Subsequent experiment used 10°C as storage temperature to determine the effects of trimming types. Two types of trimming were compared; long section per half of fruit and sixteen pieces per half of fruit. Results showed that sixteen pieces type had a lower total ascorbic acid and higher contamination with total microbial plate count than a long section per half of fruit. The sixteen pieces cut had also lower scores for sweetness, color and overall acceptability. Our results suggest that for maximum retention of quality, pineapple should be trimmed as long sections per fruit half, and stored at 10°C.

**Keywords:** /Pineapple/ /Fresh Cut/ /Trimming/ /Quality/

## **POMEGRANATE**

Fawole & Opara. 2013. Harvest discrimination of pomegranate fruit: postharvest quality changes and relationships between instrumental and sensory attributes during shelf life. *J. Food Sci.* 78 (8): S1264 – S1272.

### **Abstract**

Harvest maturity discrimination was carried out for “Ruby” pomegranate cultivar in simulated handling conditions for long distant supply chains. Fruit were harvested at 3 different maturities along days after full bloom (DAFB); Harvest 1 (H1) at 133 DAFB, H2 at 143 DAFB, and H3 at 157 DAFB. The effects of harvest maturity and storage duration on fruit quality attributes during a 6-wk period of cold storage (5°C, 95% RH) and subsequent 5 d of shelf life (20°C, 75% RH) were investigated. Instrumental evaluation of aril color, juice content, juice absorbance (520 nm), total soluble solids (TSS), pH, titratable acids (TA), and phytochemical components including total phenolics, flavonoids, and anthocyanins were carried out. Textural properties of arils which included hardness, toughness, bioyield point, and Young’s modulus were also investigated. During the shelf life period, arils from individual fruit were rated by a trained sensory panel based on appearance, taste, and texture. Relationships between the instrumental and descriptive sensory data were explored and fruit harvest maturities were discriminated using discriminant analysis. Among the attributes evaluated, TSS : TA, sweet taste, and the CIE hue angle ( $h^\circ$ ) were the most decisive attributes distinguishing the harvest maturities. The optimum time for harvesting was at 143 DAFB (H2) when fruit TSS : TA ratio was  $> 55$ , which coincided with significantly higher rating for sweet taste in fruit at H2 than at H1 and H3 during shelf life. The harvest index proposed in the current study could be used as a guide to establish a reliable harvest maturity index to assist in assuring fruit quality in consideration of long supply chains for the investigated cultivar.

**Keywords:** /Discriminant analysis/ /Harvest index/ /Pomegranate/ /Sensory attributes/ /Storage/

## **TABLE GRAPES**

G. Melgarejo-Flores, G. 2013. Antifungal protection and antioxidant enhancement of table grapes treated with emulsions, vapors, and coatings of cinnamon leaf oil. *Postharvest Biol. & Technol.* 86: 321 – 328.

### **Abstract**

Table grapes have high market value in international markets due to their attractive taste and high antioxidant content. However, their market potential is limited by losses due to *Botrytis cinerea* Pers. Fr. Cinnamon leaf oil (CLO) is a natural fungicidal and antioxidant agent that can be used to avoid postharvest losses due to *B. cinerea* Pers. Fr. and to increase the antioxidant levels of this produce. CLO was applied to grapes as water emulsions (0, 0.5, 2.5, and 5 g L<sup>-1</sup>), as vapors (0, 0.196, 0.392, and 0.588 g L<sup>-1</sup>), or as a chemical incorporated into pectin coatings (0 and 36.1 g L<sup>-1</sup>). Afterwards, berries were stored at 10°C for 15 d and were evaluated periodically for the fungal decay index, the total phenolic and flavonoid contents and the antioxidant activity using the Trolox equivalent antioxidant capacity and DPPH• radical inhibition methods. The odor acceptability of the treated berries was evaluated after 10 d of storage. The CLO emulsion (5 g L<sup>-1</sup>) significantly reduced the fungal decay without affecting the antioxidant properties of the berries. The application of CLO as a vapor was more effective according to the evaluated parameters than the emulsions; all tested concentrations inhibited fungal decay and

increased the flavonoid content and antioxidant activity. When CLO was incorporated into the pectin, no fungal decay appeared, and the highest antioxidant activity was observed after 15 d of storage. Additionally, all treatments, except the emulsion treatment, increased the odor acceptability of the treated berries compared to the control berries. From this study, it can be concluded that CLO as vapors or coatings can be used to control decay and increase the antioxidant health benefits of grapes due to CLO's antifungal and antioxidant properties.

**Keywords:** /Table Grapes/ /Coatings/ /Fungal Decay/

## **VEGETABLES**

### **SOYBEAN SPROUTS**

Liamnimitr, N. and S. Photchanachai K. Nakano. 2013. Effect of citric acid on browning of soybean sprouts during storage. Acta Hort. 989: 389 – 394.

#### **Abstract**

The effect of citric acid on browning of soybean sprouts was studied. Soybean sprouts soaked with water and citric acid at concentrations of 1, 2.5, 5, and 10%, and sprouts without soaking (control sample) were packed in polypropylene bags and stored at 13°C and 85% relative humidity. The browning score in hypocotyls and roots and over-all acceptance were intensively evaluated by three trained panelists. Total ascorbic acid and DPPH (diphenylpicrylhydrazyl) radical scavenging activity were monitored. Sensory qualities were also assessed by ten consumers. Though soybean sprouts soaked with 10% citric acid had the lowest browning score in the hypocotyls and roots, the over-all acceptance by trained panelists was not accepted. Conversely, 1% citric acid was the best concentration that maintained the soybean sprouts quality for 4 days. The browning score in the hypocotyls of the soybean sprouts soaked with 1% citric acid was slightly higher than that of the 10% citric acid. The total ascorbic acid content was not significantly different among the samples soaked with citric acid, but it was significantly higher compared to, both the sprouts soaked with water and the control. However, the DPPH radical scavenging activity was slightly delayed by soaking sprouts in water compared to the other samples. The sensory evaluation by consumers showed significantly, that 1% citric acid maintained the greatest crispiness and gave the highest over-all consumer preference. In conclusion, 1% citric acid was the most promising concentration, which prevented quality loss, and maintained consumer acceptance within a shelf-life of four days.

**Keywords:** /Soybean Sprout/ /Browning/ /Citric Acid/

### **TOMATO**

Aghdam, Morteza, Soleimani. 2013. Mitigation of postharvest chilling injury in tomato fruit by prohexadione calcium. J. Food Sci. Technol. 50(5): 1029 – 1033.

#### **Abstract**

Storage of tomato (*Solanum lycopersicum*) as originally tropical fruit is limited by the risk of chilling injury (CI). To develop an effective technique to reduce CI, the effects of treatment with 0, 50 and 100

$\mu\text{M}$  prohexadione-calcium (Pro-Ca) on CI, electrolyte leakage (EL), malondialdehyde (MDA) and proline contents, and activities of phospholipase D (PLD) and lipoxygenase (LOX), were investigated in tomato fruit stored at  $1^{\circ}\text{C}$  for 21 days. Treatment with Pro-Ca, without significant difference between two applied concentrations, significantly mitigated chilling injury. Also, Pro-Ca treatment maintained lower levels of EL and MDA content, higher level of proline content and inhibited the increases in PLD and LOX activities compared with the control fruit. These results suggest that Pro-Ca might mitigate CI by inhibiting PLD and LOX activities and by enhancing membrane integrity.

**Keywords:** /Tomato/ /Chilling Injury/ /Postharvest/

Dong, Xiaoqing. 2013. Rapid ingress of gaseous 1-MCP and acute suppression of ripening following short-term application to mid climacteric tomato under hypobaria. *Postharvest Biol. & Technol.* 86: 285 – 290.

### Abstract

Our previous studies demonstrated that tomato fruit (breaker or pink) exposed at the mid climacteric stage to hypobaric hypoxia for 6 h exhibited transient increased sensitivity to sub saturating levels of 1-methylcyclopene (1-MCP). In the present study, we examined the effect of gaseous 1-MCP ( $500 \text{ nL L}^{-1}, 20.8 \text{ } \mu\text{mol m}^{-3}$ ) applied to mid-climacteric (>60% peak ethylene production) tomato fruit under hypobaric hypoxia (10 kPa, 2.1 kPa  $\text{O}_2$ ) for 1 h. Application of  $500 \text{ nL L}^{-1}$  1-MCP under atmospheric conditions had little effect on softening and timing and magnitude of peak ethylene production, and moderate effects on respiration and lycopene and PG accumulation. By contrast, mid climacteric fruit exposed to  $500 \text{ nL L}^{-1}$  gaseous 1-MCP under hypobaric hypoxia for 1 h showed acute disturbance of ripening. Firmness and hue angle declines were delayed for ten days and peak ethylene production for eleven days compared with trends for the other treatments. Maximum ethylene production did not exceed 50% of maxima for the other treatments and a definitive respiratory climacteric was not observed. Accumulation of internal gaseous 1-MCP was enhanced under hypobaric hypoxia. Internal 1-MCP in fruit exposed to  $20 \text{ } \mu\text{L L}^{-1}$  1-MCP ( $831 \text{ } \mu\text{mol m}^{-3}$ ) under hypobaric hypoxia for 2 or 10 min averaged  $7.5 \pm 0.5$  and  $8.7 \pm 1.4 \text{ } \mu\text{L L}^{-1}$ , respectively, compared with  $0.8 \pm 0.3$  and  $3.9 \pm 0.7 \text{ } \mu\text{L L}^{-1}$  in fruit exposed under atmospheric conditions. After 1 h exposure, internal 1-MCP averaged  $10.8 \pm 2.2 \text{ } \mu\text{L L}^{-1}$  under hypobaric hypoxia compared with  $5.3 \pm 1.4 \text{ } \mu\text{L L}^{-1}$  under atmospheric conditions. The results indicate that high efficacy of 1-MCP applied under hypobaric hypoxia is due to rapid ingress and accumulation of internal gaseous 1-MCP.

**Keywords:** /Tomato/ /Climacteric/ /Ethylene/ /1-Methylcyclopropene/ /Ripening/

Kamal Kant, Kamal Ajay Arora, V. P. Singh & Raj Kumar. 2013. Effect of exogenous application of salicylic acid and oxalic acid on post harvest shelf life of tomato (*Solanum lycopersicon L.*). *Ind J. Plant Physiol.* 4 – 9.

### Abstract

The effects of oxalic acid (OA) and salicylic acid (SA) application were studied on the ripening behavior and post harvest shelf-life of tomato (*Solanum lycopersicon L.*) fruits. Green mature fruits of twenty cultivars were treated with OA (2, 3 and 4 mM) and SA (0.5, 0.75 and 1 mM), separately at  $20^{\circ}\text{C}$  for 15 min by dip method and double distilled as control. The most effective concentration for all cultivars was 3 mM OA and 0.75 mM SA, which prolonged the shelf life in comparison to control. It

prolonged the shelf life by 4 days, while 0.75 mM SA prolonged the shelf life by 7 days with respect to control. Thus, SA has more potential than OA in regulation of tomato fruit ripening. Among 20 cultivars, the best results were found with Pusa Gaurav and Pusa Rohini on the basis of physical parameters such as maximum shelf life, lower weight loss percentage and ion leakage in comparison to control and other cultivars studied.

**Keywords:** /Tomato/ /Oxalic acid (OA)/ /Salicylic acid (SA)/ /Shelf life/

Pansa, Liplap, et.al. 2013. Effect of hyperbaric pressure and temperature on respiration rates and quality attributes of tomato. Postharvest Biol. & Technol. 86: 240 – 248.

### **Abstract**

Previous work with hyperbaric treatment of tomato focused on application at lower temperature (13°C). In this work, hyperbaric treatment at varying pressure levels (i.e., 0.1, 0.3, 0.5, 0.7 and 0.9 MPa) at ambient temperature (20°C) was tested as a potential alternative to conventional refrigerated storage (0.1 MPa at 13°C) to preserve tomato quality. The experiments were divided into 3 phases: (1) 4 day of hyperbaric treatment, (2) 5 day of post-treatment ripening, and (3) 10 day of post-treatment ripening. Respiration rate (RR) of the tomatoes was continuously monitored during the course of the hyperbaric treatments. Quality attributes were assessed immediately after removal from the hyperbaric treatments and after 5 and 10 day ripening at 20°C after removal from the treatments. Hyperbaric treatments at  $\geq 0.3$  MPa resulted in RR equal or higher than the RR in control fruit (0.1 MPa at 20°C). The lowest RR was obtained from tomato stored at 0.1 MPa at 13°C. Hyperbaric treatment at 0.5, 0.7 and 0.9 MPa significantly reduced weight loss, retained color, firmness, total soluble solid (TSS), titratable acidity (TA) and TSS:TA ratio at similar levels as the tomato treated at 13°C and 0.1 MPa. Firmness after treatment was highest for fruit from 0.1 MPa at 13°C and from 0.5, 0.7 and 0.9 MPa at 20°C. The higher firmness advantage declined by 5 day of ripening after treatment, with higher firmness only being retained for fruit from the 0.9 MPa at 20°C and the 0.1 MPa at 13°C treatments. After 10 day ripening, firmness was similar for all treatments. Lightness ( $L^*$ ) and hue angle were greater for all treatments compared with the 0.1 MPa at 20°C treatment. However, only the greater hue angle difference was maintained after 5 day of ripening. After 10 day ripening, no significant differences were found in color attributes. Only 0.1 MPa at 13°C retained higher soluble solids, lower titratable acidity and higher TSS: TA ratios after treatment and after 5 day ripening. At 10 day of ripening none of the quality attribute differences noted were retained for any of the treatments. These results show that the only consistent effect of hyperbaric treatment at 0.5, 0.7 and 0.9 MPa was to reduce weight loss and enhance firmness retention up to 5 day ripening after treatment.

**Keywords:** /Tomato/ /Storage/ /Pressure Treatment/ /Shelf life/ /Quality/

Tiecher, Aline. 2013. 2013. UV-C effect on ethylene, polyamines and the regulation of tomato fruit ripening. Postharvest Biol. & Technol. 86: 230 – 239.

### **Abstract**

Molecular responses of tomato fruit harvested at the breaker ripening stage treated with UV-C (3.7 kJ/m<sup>2</sup>) and 1-methylcyclopropene (1-MCP; 2  $\mu$ L/L) both separately and in combination, were evaluated postharvest until fruit reached fully ripe stage. Metabolite content and transcript accumulation of selected genes were examined in both the exocarp and mesocarp tissues of tomato

fruit. UV-C radiation induced ethylene production but delayed red color development. As expected, 1-MCP inhibited ethylene production, color development and loss of flesh firmness. UV-C treatment delayed degreening and carotenoid accumulation when compared to control fruit. In addition, polyamine content of UV-C treated fruit was higher than in untreated tomatoes. In general, the studied genes had increased transcript accumulation one day after UV-C treatment and the mesocarp showed higher gene expression than the exocarp. 1-MCP prevented transcript accumulation of almost all genes on either the exocarp or mesocarp one day after treatments. The 1-MCP + UV-C induction of total carotenoid accumulation suggested that UV-C induction of total carotenoid accumulation is a partially ethylene dependent event, since 1-MCP alone inhibited accumulation and UV-C alone induced accumulation. Chlorophyll degradation was also partially ethylene dependent. 1-MCP prevented degradation, but control and UV-C treated fruit had high chlorophyll degradation while 1-MCP + UV-C treated fruit showed chlorophyll degradation higher than in 1-MCP alone and lower than in UV-C alone. The results suggest that UV-C slows down ripening, despite ethylene production stimulation, with molecular changes more pronounced in the mesocarp than the exocarp, and changes limited to phytochemical content, which may be influenced by the increased polyamine content.

**Keywords:** /Tomato/ /Ethylene/ /1-Methylcyclopropene/

Tiwari, Gopal, et al. 2013. Non-destructive maturity determination in green tomatoes using a handheld visible and near infrared instrument. *Postharvest Biol. & Technol.* 86: 221 – 229.

## **Abstract**

A non destructive method based on visible and near infrared spectroscopy, was investigated for determining the maturity of green tomatoes at harvest. The interactance spectrum of tomato fruit at the firm green stage were measured in less than 5 s with a handheld spectrometer (400–1000 nm) utilizing an optical design with a 0° angle between the incident illumination and the detection view. Results showed that the predominant change in the interactance spectra in green tomatoes useful for predicting changing maturity levels occurred in the 600–750 nm portion of the 400–1000 nm region, typically associated with chlorophyll. Variety-specific Bayesian classification models and a joint variety ‘global’ classification model were developed to predict tomato maturity after 7 d of storage in a 20°C ripening room using canonical discriminant analysis techniques applied to the interactance spectra from 600 nm to 750 nm. Variety specific models correctly identified 75–85% of immature tomatoes and 82–86% of mature green tomatoes in internal cross-validation, however external validation performance decreased when applied to predict maturities in a cultivar external to the training set. False positive rates of these models in identifying immature and mature green tomatoes varied from 3% to 40% and 0% to 31% respectively. A ‘global’ model, trained on two cultivars showed more stability and correctly predicted 71% of immature and 85% of mature green tomatoes, with false positive error rates of 13% and 22%, respectively, in internal cross-validation of both varieties. This handheld system showed good potential as a rapid, non destructive technique to aid tomato production managers in the identification of immature green tomatoes at harvest and could be a valuable tool in delivering more flavourful fruit to consumers by reducing the amount of immature fruit harvested by workers.

**Keywords:** /Tomato/ /Green Tomato/ /Maturity/ /Maturity/

## **HERBS AND SPICES**

### **ARTICHOKES**

Sabi, M., N. V. Logegaray and A. Chiesa. 2013. Postharvest behaviour of **artichoke** genotypes (*Cynara scolymus* L.) under different storage conditions. *Acta Hort.* 989: 363 – 368.

#### **Abstracts**

The artichoke is a highly perishable vegetable due to its high metabolic activity. In recent years, there has been considerable interest in sexual reproduction of this crop because new cultivars obtained from seed produce high yield, homogeneous plants and it has less plant diseases. Moreover, they have good performance for using by the industry. The aim of this study was to evaluate the behavior and postharvest quality of three genotypes of globe artichoke in two sorraje conditions. Two hybrids obtained by sexual reproduction (Madrigal and Concerto) and the most commonly cultivar used in Argentine obtained by vegetative propagation (Romanesco) were evaluated. The material was harvested, packed and stored in chambers for two weeks. Postharvest treatments were: a) stored in refrigerated chamber 1°C and 90% RH, and b) stored in non refrigerated chamber at room temperature. Both treatments were stored for 14 d. Weight loss, colour and organoleptic characteristics (visual quality, external browning, pilosity, bracts opening) were measured during sorraje period. Genotypes showed no significant differences in weight loss percentage at seven days. Significant differences were found in weight loss due to sorraje temperature. After eight days, Concerto had lower weight loss than other materials. Only Concerto had not significant differences in colour parameters during sorraje period. All artichoke cultivars stored at room temperature reached no more than seven days of shelf life. In contrast, hybrids stored at 1°C maintained the visual quality for two weeks.

**Keywords:** /Artichoke/ /Storage/ /Weight Loss/ /Visual Quality/

### **MINT**

Curutchet, Ana, et.al. 2014. Nutritional and sensory quality during refrigerated storage of fresh-cut **mints** (*Mentha piperita* and *M. spicata*). *Food Chem.* 143: 231– 238.

#### **Abstract**

The effect of storage time on quality attributes of refrigerated fresh-cut mints (*Mentha* \_ *piperita* and *M. spicata*) was studied. Atmosphere composition, respiratory activity, weight loss, surface colour, total chlorophyll, carotenoids, browning potential, total phenols, flavonoids, radical-scavenging activity, ascorbic acid and essential oil yield and composition were analysed. Respiratory activity of peppermint and spearmint samples diminished moderately (42% and 28%, respectively) after 21 days at 0 °C. A slight modification of the internal atmosphere was achieved. Surface colour, chlorophyll, carotenoid and antioxidant compounds remained almost constant. The yield of essential oil did not change or it showed an apparent increase after 21 days at 0 °C, depending on plant growth stage. The characteristic flavour components of peppermint (menthone and menthol) increased, while the contents of the main constituents of spearmint essential oil showed minor variations after storage. The conditions assayed for packaging and storing fresh-cut mints were adequate to achieve a relatively long shelf life and they retained their antioxidant properties.

**Keywords:** /Mint/ /Culinary Herbs/ /Refrigerated Storage/

## **ORNAMENTALS**

### **CARNATION**

Ina, B. C., et.al. 2013. .Morphological and molecular characterization of ethylene binding inhibition in **carnations**. Postharvest Biol. & Technol. 86: 272 – 279.

Ethylene perception by ethylene receptors can be suppressed by ethylene antagonists, such as 1-methylcyclopropene (1-MCP). 1-MCP binds to ethylene receptors blocking ethylene binding, and thereby suppresses ethylene responses, including flower senescence and petal abscission. Despite its antagonistic propensity, plants treated with 1-MCP often regain sensitivity to ethylene, suggesting that ethylene receptors are synthesized de novo post-treatment. To investigate this observation, we determined the relationship between the mRNA levels of ethylene biosynthesis and ethylene receptor genes and the degree of ethylene sensitivity of carnation flowers after ethylene and 1-MCP treatments. Flowers treated with a single application of 1-MCP lost the inhibitory effect in ethylene production after 7 d of the treatment. In contrast, multiple treatments with 1-MCP completely suppressed several ethylene biosynthesis genes and ethylene production throughout the experiment. Multiple 1-MCP treatments increased vase life by almost three-fold relative to control flowers. Eventually ethylene-independent browning and desiccation on the edges of petals contributed to loss of vase life. We observed that the transcript levels of the ethylene receptor genes, DcETR1 and DcERS1, decreased with flower development, but increased at the onset of floral senescence. Our results suggest that ethylene receptors are continually synthesized during later stages of floral development. While ethylene responsiveness is temporarily blocked by 1-MCP treatment, we predict that new receptors synthesized days after 1-MCP treatment can bind ethylene. This leads to the observed recovery of ethylene sensitivity in the flowers. In addition, we predict that the degradation of ethylene receptors that is stimulated by ethylene binding is prevented by successive treatments with 1-MCP prior to recovery of ethylene sensitivity. This study improves our understanding about the uses and effectiveness of 1-MCP and will facilitate the development and improvement of postharvest treatments for multiple crops.

**Keywords:** /Carnation/ /Ethylene Biosynthesis/ /1-MCP/ / Cut flowers/

## **FREESIA**

Akbudak, B. et.al. 2013. Combined effects of 1-methylcyclopropene and modified atmosphere packaging on the quality of **Freesia** during storage. Acta Hort. 1002: 349 – 354.

### **Abstract**

In the study, the effect of 1-methylcyclopropene (1-MCP), normal (NA) and modified atmosphere (MA) storage treatments were investigated on postharvest quality properties of freesia (*Freesia* sp.). Freesias harvested in the experiment were divided into two groups: the first group of samples was treated with 675 ppb 1-MCP, the other group was not treated with 1-MCP. Cover materials in different characteristics were used in MA. All of the samples were stored 14 days at 4±1°C temperature and 80±5% relative humidity and some quality analysis was done in the samples taken from 0, 7 and 14 days. When the quality parameters used in the study were examined, 1-MCP delayed the opening of flowers in general, in NA and MA groups, and showed a mitigating effect on flower dumps. In the end of the

study, the best results in terms of postharvest quality characteristics were obtained from 1-MCP and 50  $\mu$  PE combined treatment.

**Keywords:** /Freesia/ /Modified Atmosphere/ /Quality/ /1-MCP/

## **LILY**

Wu, Xue Wei, Jeung Keun Suh and Li Hua Wang. 2013. Effects of modified atmosphere packaging and storage conditions on freshness maintenance of cut flowers of Oriental **Lily** 'Activa'. Acta Hort. 1002: 381 – 388.

### **Abstract**

Two experiments were conducted to evaluate the effects of modified atmosphere packaging (MAP) with N<sub>2</sub> and 1-methylcyclopropene (1-MCP), storage temperature, and storage duration on the freshness maintenance of cut flowers of Oriental lily 'Aktiva'. Application of MAP with 1-MCP gas increased the vase life by 8.8 d as compared to the control, and flower opening and senescence were delayed. This effect could be attributed to the reduced ethylene evolution. The vase life of cut lily flowers was increased by the interaction of MAP, storage temperatures at 5°C, and storage duration for 7 d which can be attributed by increased water uptake. This could be related to a delayed flower opening, increased water uptake, and reduced ethylene production. In conclusion, cut flowers treated with 1-MCP packaging and storage at 5°C for 7 d effectively increase the vase life of Oriental cut 'Activa' lily flowers.

**Keywords:** /Lily/ /1-methylcyclopropene/ /Modified Atmosphere Packaging/ /Storage/

## **PEACH FLOWERS**

Beckmann-Cavalcante, M. Z., et.al. 2013. Postharvest longevity of **peach flowers** on cut stems. Acta Hort. 1000: 203 – 208.

### **Abstract**

The aesthetic quality of peach flowers (*Prunus persica* (L.) Batsch) can make it a good choice for use as cut flowers. The flower branches of peach trees present perfect and complete flowers with colors ranging from white to deep pink. The objective was to determine the postharvest longevity of peach flowers obtained following pruning for sale as cut flowers. At the time of pruning, branches of three peach cultivars ('Maciel', 'Leonense' and 'Jade') were randomly collected from a commercial orchard in Pelotas, Rio Grande do Sul State, Brazil. The stems were standardized to 40 cm in length and were placed in a room (air temperature  $13 \pm 1^\circ\text{C}$  and relative humidity  $80 \pm 5\%$ ) in containers filled with 1 L of tap water. Experiment was performed in a completely randomized block design in a factorial arrangement with 3 cultivars ('Maciel', 'Leonense' and 'Jade') and 8 keeping durations in water (0, 2, 5, 7, 9, 12, 14 and 16 days) after harvest. Each treatment was replicated for four times with five stems per replication. The assessments were made by counting the number of buds that failed to reach anthesis (closed flowers), number of open flowers, and the number of senesced flowers that were removed. Results showed that more than half (11 stems) of stems of 'Jade' kept ornamental quality for at least 16 days from the beginning of the experiment. By this time, 'Leonense' showed 35% and 'Maciel' showed

55% of stem discard. The stems of 'Maciel', 'Leonense' and 'Jade' meet the minimum requirements for postharvest longevity.

**Keywords:** /Peach flowers/ /Cut flowers/ / Quality/ /Vase Life

## **POINSETTIA**

Dole, J. M. and I.F. McCall R. Kobayashi. 2013. Postharvest handling of 'cut Renaissance', 'winter rose early' and 'Jester' poinsettias. Acta Hort. 1000: 285 – 292.

### **Abstract**

Much work has been previously done on *Euphorbia* 'Renaissance Red' as a cut flower grown for its large inflorescence of curly red bracts. In the current studies 'Renaissance Marble', 'Renaissance Peppermint', and 'Renaissance Pink' had a consumer vase life of 20.1 to 35.0 days and a wholesale vase life of 5.8 to 11.3 days, which was comparable to 'Renaissance Red' when flowers were harvested and placed in vases filled with deionized water. 'Renaissance Pink' tolerated dry storage in floral boxes and/or 24-hours of 2°C storage, but 'Renaissance Marble' vase life was reduced by storage in water or 2°C storage. For 'Renaissance Peppermint' 2°C storage reduced the vase life; however, consumer vase life was still 16.6 to 19.7 days when foliage was removed. While Winter Rose Early (WRE) cultivars produced up to 1.6 more stems per pot than 'Renaissance Peppermint' and 'Renaissance Red' cultivars, the WRE stems were much shorter than the Renaissance stems. All of the WRE cultivars had a consumer vase life of at least 22 days in any of the treatments, which was not affected by storage temperature, storage conditions, or foliage removal. Wholesale vase life for all three cultivars ranged from 8.3 to 14.0 days and was generally reduced if the stems had leaves. When stored at 20°C for 24 hours in water, 'Jester Red' had the longest consumer vase life of the Jester cultivars, 23.9 to 30.0 days, while 'Jester Marble' and 'Jester Pink' had a shorter vase life of only 10.1 to 16.5 days. Wholesale vase life was much shorter for all three cultivars and varied from 2.0 to 4.8 days. Jester cultivars and 'Renaissance Red' flowers did not tolerate 2 or 4 weeks of 10°C dry storage. Jester and WRE cultivars were sensitive to chilling damage at 2°C.

**Keywords:** /Poinsettia/ /Postharvest Handling/

## **ROSE**

Horibe, Takanori, Shohei Yamaki, Kunio Yamada. 2013. Effects of auxin and methyl jasmonate on cut rose petal growth through activation of acid invertase. Postharvest Biol. & Technol. 86: 195 – 200 .

### **Abstract**

Petal growth associated with flower opening depends on cell expansion caused by water influx. To understand the mechanism of flower opening and to develop a method for improving cut flower quality, we investigated the changes in the amount of soluble carbohydrates and invertase activities in rose (*Rosa* 'Meivildo') petals using attached and cut flowers, and the effects of  $\alpha$ -naphthylacetic acid (NAA) and methyl jasmonate (MeJA) on cut flowers. Cut rose flowers were harvested at the tight bud stage (TB), or mature bud stage (MB), which is the commercial harvest stage, and 2 days after TB. Cut flowers were immediately treated with deionized water or 1% (w/v) glucose. Fresh weight (FW) and the levels of soluble carbohydrates in petals in cut flowers were lower under postharvest conditions than

those of attached flowers during flower opening. Although invertase activities in petals of attached flowers increased drastically during TB and MB, those in the petals harvested at TB did not increase under postharvest conditions. These results suggested that sucrose metabolism, including invertase activity, could be an important factor in cut rose flower opening to a greater extent after harvest. In addition, we tried to control flower opening by affecting invertase activities in petals of cut rose flowers. Cut flowers treated with NAA opened faster and those treated with MeJA opened later than in controls. Levels of soluble carbohydrates and invertase activity in petals were also changed by these treatments. In flowers treated with NAA, activities of both vacuolar and cell wall invertases increased 1 day after treatment and then decreased through to the end of the treatment, although activities in control flowers never increased after harvested. By contrast, cell wall invertase activity in MeJA treated flowers increased 1 day later than with the NAA treatment and remained at a relatively high level until 4 days after treatment compared to the controls. Our results suggest that inducing invertase activity in postharvest conditions may important for the quality of cut roses.

**Keywords:** /Rose/ /Cut Flower/ /Quality/

## **TUBERS AND ROOTCROPS**

### **CASSAVA**

Acedo, J.Z. and A.L. Acedo, Jr. 2013. Controlling postharvest physiological deterioration and surface browning in cassava (*Manihot esculenta* Crantz) roots with hot water treatment. Acta Hort. 989: 357 - 362.

#### **Abstract**

Cassava is a staple food of almost one billion people in the developing world and is a raw material for various industrial products. A primary constraint in production and utilization is the very short shelf life of the fresh roots of 1-3 d due to rapid postharvest physiological deterioration (PPD) and cut surface browning. This study determined the effects of hot water dip (HWD) in controlling PPD in whole or unpeeled roots and both PPD and surface browning in peeled roots of cassava cultivar 'Golden Yellow'. Unheated roots served as control. Recommended modified atmosphere packaging (MAP) was included as combination treatment. Storage was done at ambient (25-33°C, 65-88% relative humidity). HWD reduced PPD especially when combined with MAP. It was more remarkable in reducing surface browning of peeled roots whereas MAP had no effect. HWD at 54-56°C for 10 min was the more promising treatment for PPD control while HWD at 57-59°C for 10 min for surface browning control. MAP with or without HWD markedly reduced weight loss of both unpeeled and peeled roots. Hydrocyanic acid (HCN) content was low; it increased in response to 54-56°C HWD.

**Keywords:** /Cassava/ /Browning/ /Physiological Deterioration/ /Hot Water Dip/ /Shelf Life/

### **POTATO**

Liu, Xun, et.al. 2013. The potato protease inhibitor gene, St-Inh, plays roles in the cold-induced sweetening of potato tubers by modulating invertase activity. Postharvest Biol. & Technol. 86: 265 – 271.

#### **Abstract**

Reducing sugar accumulation is determined mainly by acid invertase activity in cold-stored potato tubers. The potato Kunitz-type protease inhibitor St-Inh reduces acid invertase activity in vitro, is linked with a quantitative trait locus for sugar content, and is therefore speculated to be involved in the cold-induced sweetening (CIS) of potato tubers. In this study, the expression profile of St-Inh in various organs of potato plants and stored tubers was characterized, and it was found that expression was highest in tubers and was strongly suppressed by low temperatures. This expression pattern was opposite to reducing sugar accumulation in the cold-stored tubers, suggesting a possible involvement of St-Inh in CIS in tubers. Over-expression of St-Inh in tubers resulted in lower acid invertase activities and reducing sugar contents in comparison with wild-type tubers, confirming the role of St-Inh in resistance to CIS. Interestingly, a greater reduction in potato tuber CIS was obtained after over expression of the tobacco invertase inhibitor NtIn-vInh2, which belongs to the pectin methylesterase/invertase inhibitor family. The NtInvInh2 transgenic tubers had an even lighter chip color than did the St-Inh transgenic tubers. Both inhibitors are confirmed to be involved in reducing potato CIS, although protease inhibitors of the pectin methylesterase/invertase type may have a stronger capacity to inhibit acid invertase activity than Kunitz-type ones. These results provide novel clues to the mechanism by which potato CIS is regulated.

**Keywords:** /Potato/

Thabèt Yangui, Sami Sayadi, Abdelhafidh Dhouib . 2013. Sensitivity of *Pectobacterium carotovorum* to hydroxytyrosol-rich extracts and their effect on the development of soft rot in potato tubers during storage. *Crop Protection* 53: 52 – 57.

### **Abstract**

A hydroxytyrosol-rich olive mill wastewater (HROMW) (29.3% weight: dry weight) and a hydroxytyrosol-rich extract (HRE) (52.7% weight: dry weight) were prepared from the fresh olive mill wastewater (OMW) using hydrolysis and post-hydrolysis purification processes. The minimal bactericidal concentrations of HROMW and HRE against *Pectobacterium carotovorum* subsp. *carotovorum* were 72 and 40 g L<sup>-1</sup>, respectively. According to the European standard method (EN 1276: 1997), HROMW and HRE showed powerful disinfectant properties and reduced the viability of *P. carotovorum* by more than 5 log units after a contact time of 5 min at 2% dry weight: volume. Curative and preventive controls of potato soft rot were obtained by treatment of tubers with HROMW or HRE 3 days before or 3 days after their infection with *P. carotovorum*, respectively. The soft rot development during potato tuber storage was significantly reduced by treatment with HRE. This extract could be used in eco-friendly strategies of post-harvest disease control and could substitute for chemical pesticides.

**Keywords:** /Potato/ /Soft Rot/ /Storage/

### **YAM**

Doroy, F. S. and A.L. Acedo Jr.2013. Yam tuber sprouting in response to postharvest heat treatment combined with preharvest maleic hydrazide spray. *Acta Hort.* 989: 353 – 356.

### **Abstract**

The effects of postharvest hot water dip (HWD) alone or in combination with preharvest maleic hydrazide (MH) spray on tuber sprouting in purple yam cultivar 'Kinampay' were investigated. Freshly harvested tubers were obtained from plants sprayed or unsprayed with MH (3.3 kg active ingredient/hectare) one month before harvest and then subjected to dipping in either 50-55°C water or potable water for 20 min before storage or after one month storage at ambient (23-31°C, 65-92% RH). Both HWD treatments promoted tuber sprouting during 5-month storage. However, when combined with MH treatment, they enhanced the inhibitory effect of MH on tuber sprouting. Weight loss correlated with sprouting of tubers. Respiration and ethylene production rates also compared well with sprouting incidence except that the rates were higher in tubers HWD treated before storage than that treated after one month storage. HWD-treated tubers had markedly increased  $\alpha$ -amylase activity.

**Keywords:** /Yam/ /Dioscorea alata L./ /Hot Water Dip/ /Physiological Changes/