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Postharvest Management in Agriculture

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ration. For longer periods of storage, 1000 p.p.m. SO₂ is required.

786 TANDON, DK; ADSULE, PG; KALRA, SK. 1984. **Effect of certain post-harvest treatments on the shelf life of guava fruits.** *Indian Journal of Horticulture*, 41: 1/2, 88-92; 9 ref.

Mature hard green to slightly yellow fruits of the cv. Allahabad Safeda (winter season crop) were treated in several different ways, packed in low-density polyethylene bags and held at ambient temperature (17 to 23°C) for up to 14 days. The control fruits were dipped in cold water for 5 min. Fruits dipped in 1000 p.p.m. Cycocel [chlormequat] solution for 5 min kept best, giving 75-80% marketable fruits at 14 days compared with 40-50% in the controls. Data are tabulated on fruit chemical composition at 6, 10 and 14 days.

787 TANDON, DK; SINGH, BK; KALRA, SK. 1989. **Storage behaviour of specific-gravity-graded guava fruits.** *Scientia Horticulturae*, 41: 1-2, 35-41; 10 ref.

Fruits of the cultivars Allahabad Safeda and Sardar were divided into specific gravity groups I, II and III (< 1.00, 1.00-1.02, and > 1.02, respectively). Fruits of group I of both cultivars were the largest, highest in vitamin C content, and had a higher acceptability score and a shelf life of 6 days. Fruits of group II had a shelf life of up to 8 days. Group III fruits were the smallest, and were relatively immature compared with the other 2 groups, poor in colour development and inferior in nutrient quality, especially in vitamin C content. The fruits of all 3 groups of Sardar were larger, more acceptable and higher in vitamin C content than those of Allahabad Safeda.

788 ULLASA, BA; RAWAL, RD. 1985. **A new fruit rot of guava caused by *Sclerotium rolfsii*.** *Current Science, India*, 54: 10, 470-471; 4 ref.

Incidence of this storage disease in local markets was 1-2% and the rot was also noticed occasionally in the field on low hanging fruits before harvest. Infection occurred without injury and the mycelium covered the entire surface within 1 wk. Typical sclerotia were formed after 1 wk and these were viable even after 1 yr.

789 UTIKAR, PG; SHINDE, PA; SONAWANE, CS. 1986. **Influence of temperature and incubation period on fruit for initiation and development by post-harvest fungi of guava.** *Current Research Reporter, Mahatma Phule Agricultural University*, 2: 2, 209-211; 2 ref.

The effects of temp. (5-35°C) and incubation period (up

to 7 d) on *Aspergillus flavus*, *A. niger*, *Phomopsis psidii*, *Colletotrichum sp.*, *Pestalotiopsis psidii* and *Syncephalastrum racemosum* storage decay of ripe guava fruits was studied. Temperature of 27-35°C resulted in the greatest fruit rot with initiation on the second day of incubation for most fungi.

SAPOTA (*Achras sapota*)

Postharvest handling

790 AVAIYA, YV; SINGH, SP. 1989. **Studies on storage behaviour of sapota (*Achras sapota* L.) cultivars as influenced by ripening retardants.** *Orissa Jrl. of Horticulture*, 17: 1-2, 55-60; 10 ref.

In an experiment carried out during Apr. 1989, fruits of sapodilla [*Manilkara zapota*] cultivars Kilipatti, Cricket Ball, Zumakhia, Calcutta Special, Mohargootee and Pilipatti were treated with 250 p.p.m. GA3, 6% fruit coating resin [unspecified], 6% CaCl₂, 1000 p.p.m. CCC [chlormequat] or water (control). The fruits were examined after 6 days' storage. Percentages of physiological weight loss, fruit spoilage, marketable fruits and TSS and total sugar, reducing sugar and ascorbic acid contents were assessed. Lowest percentage spoilage and highest percentage TSS and reducing sugar and total sugar contents were observed with Kalipatti. Highest percentage marketable fruits was obtained with Zumakhia and lowest percentage weight loss with Pilipatti. Of the ripening retardants tested, GA3 was most effective in reducing weight loss and fruit spoilage, and increasing ascorbic acid content. Fruit coating resin was most effective in increasing the percentage of marketable fruits and the reducing sugar and total sugar contents.

791 BADIYAL, KUSUM; SUMBALI, GEETA. 1990. **Note: new reports on diseases of sapodilla (*Achras sapota* L.) fruits.** *Philippine Agriculturist*, 73: 3-4, 359-363; 4 ref.

In a survey of a fruit market in Jammu, India during 1988-89, *Geotrichum candidum*, *Rhizopus oryzae*, *Cladosporium oxysporum* and *Penicillium italicum* were consistently isolated from diseased sapodillas, reported for the first time. Disease symptoms are described.

792 BANIK, D; DHUA, RS; GHOSH, SK; SEN, SK. 1988. **Studies on extension of storage life of sapota (*Achras sapota* L.).** *Indian Journal of Horticulture*, 45: 3-4, 241-248; 7 ref.

Experimental data showed that all 14 treatments (dips, coatings and wraps) tested extended storage life compared with the non-treated control. Fruits kept at 10-

12°C in polyethylene bags with permanganate-silica gel could be stored for up to 18 days with minimum spoilage (30%) while other treatments gave poorer results after 12 days of storage. Fruits kept (1) at 10-12°, (2) in polyethylene bags with permanganate-silica gel at room temperature and (3) those treated with NAA at 50 p.p.m. and then coated with 6% paraffin wax retained better marketable quality during storage for up to 12 days than fruits under any other treatment. With untreated fruits there was 100% spoilage on the 9th day of storage.

793 GAUTAM, SK; CHUNDAWAT, BS. 1989. Postharvest changes in sapota cv. Kalipatti: I. Effect of various postharvest treatments on biochemical changes. *Indian Journal of Horticulture*, 46: 3, 310-315; 17 ref.

Fruits harvested at colour change were dipped for 20 minutes (1) in a solution of GA at 300 p.p.m., (2) in kinetin at 100 p.p.m., or (3) in silver nitrate at 40 p.p.m. All fruits were held in ambient conditions to ripen. All treatments retarded ripening and extended shelf life by retarding the pre-climacteric respiration rate and ethylene production, and postponed their climacteric peaks compared with the untreated control.

794 KARIYANNA. 1989. Investigations on standardization of maturity indices, post-harvest physiology and post-harvest technology of kalipatti sapota (*Manilkara achras* (Mill.) Fosberg) fruits (Ph.D : thesis). University of Agricultural Sciences, Bangalore. 201 p.

The physical and chemical characteristics of *Kalipatti sapota* fruits were studied between 200 and 275 after fruit set at 15-day intervals to assess the optimum stage of maturity. The ripening behaviour, physico-chemical parameters and sensory features of the fruits were also studied. Physical parameters such as breadth, fresh weight, volume, firmness, pulp; skin ratio and dry weight, and the chemical parameters such as total soluble solids, total titrable acidity and TSS: acid ratio were all significantly correlated with the final edible quality of ripe fruits, thus providing their usefulness in deciding the maturity of fruits. Chemical and sensory parameters of the ripe fruits developed out of the fruits harvested after 245 days of fruit set and beyond that stage, did not differ significantly among themselves. The ripening and senescence of sapota fruits were characterised by highly perceivable changes in various physical, physiological, biochemical and sensory parameters. There was significant decrease in weight, volume and firmness of fruit during ripening and senescence,

whereas pulp: skin ratio and dry matter increased. Sapota was found to follow a typical climacteric pattern of respiration with the climacteric peak coinciding with edible ripeness. There was a decline in total titrable acids, ascorbic acid, pectin and phenols and an increase in TSS and sugar content. The treatment with Waxol significantly reduced the PLW and delayed the ripening of fruits but had an adverse effect on taste and flavour of ripe fruits and increased the incidence of rotting. Packaging in perforated polyethylene bags was also effective in reducing the PLW and delaying the ripening of fruits but there was considerable spoilage of fruits due to rotting. However, this rotting could be effectively checked by treating the fruits with bavistin (500 ppm) before packaging. Treating the fruits with 1000 ppm and above concentrations of ethrel significantly enhanced the ripening of fruits. Packing the fruits in any manner was significantly effective in protecting the fruits from injuries during transportation and thereafter enhancing the shelf life of fruits when compared to simply dumping the fruits on the trolley. The most effective method was packing the fruits in plastic crate with green pongamea leaves as cushion.

795 RAO, DVR; CHUNDAWAT, BS. 1989. Post harvest changes in respiration and enzyme activities in sapota (*Manilkara achras* (Mill.) Forsberg). *Ind. Jrl. of Pl. Phys.*, 32: 2, 105-109.

Uniform, well matured sapodilla fruits grown from labelled inflorescences on cv. Kalipatti trees in the experimental orchard at Gujarat Agricultural University were used to measure postharvest variations in some enzymes in relation to respiration. Respiratory rate and enzyme activity were estimated daily in 10 g samples of fruit pulp until ripeness was obtained (8 samplings were made). Changes in the activities of pectin methyl esterase (PME) and oxidative enzymes such as catalase, peroxidase and polyphenol oxidase (PPO) were studied during ripening at ambient temperatures (28-30°C) and 70-80% RH. Respiration of the climacteric type was exhibited. There were significant increases in the activities of all of the enzymes except PPO. The activity of PME increased 5-fold up to the 5th day after harvest and then gradually decreased. Catalase and peroxidase activities showed a continuous 4- to 7-fold increase while PPO activity showed only a 3-fold increase.

796 SURYANARAYANA, V; GOUD, PV; VEERANNA-GOUD, P. 1984. Effect of post-harvest Ethrel treatment on ripening of sapota fruits. *Andhra Agricultural Jrl.*, 31: 4, 308-311; 7 ref.

Sapota [*Sapodilla*] fruits, cv. Oval, were treated (dip-

ping and exposure to gas) with 1000, 2500 and 5000 p.p.m. of Ethrel [ethephon] after harvest and stored for 10 days in air-tight boxes. Fruits attained edible ripeness on the eighth day after harvest in the control, and on the third day in the 5000 p.p.m. treatment and on the fourth day in the 1000 and 2500 p.p.m. treatments. Ethrel caused significant increases in reducing sugars, total sugars, total soluble solids (TSS), ascorbic acid and total titratable acidity, while a reduction in non-reducing sugars, sugar/acid ratio and TSS/acid ratio was noticed. The effect of Ethrel increased with increase in concentration from 1000 to 5000 p.p.m. Thus, Ethrel (5000 p.p.m.) can be used for quick ripening and for improving the quality of sapota fruits.

Storage decay

797 KARIYANNA; BOJAPPA, KM; REDDY, TV. 1990. **Postharvest treatments to extend the shelf life of sapota fruits.** *Acta Horticulturae*, No. 269, 391.

Sapodilla fruits (cv. Kalipatti) were dipped in 6% Waxol, Bavistin [carbendazim] (250 or 500 p.p.m.) or hot water (50°C for 10 min.) and packed in 150 gauge thick polyethylene bags with 1% ventilation. Storage decay was high in all fruits except those dipped in 500 p.p.m. Bavistin. Waxol treatment delayed ripening, but none of the treatments prevented the deterioration of fruits due to overripening after 9 days' storage. None of the treatments had any effect on fruit TSS and acid contents.

MANGOES

Postharvest handling

798 CHADHA, KL; THAKUR, RS; RAJPUT, MS; SAMRA, JS. 1984. **Leaf nutrient status of three mango cvs at flowering and post-harvest stages.** *Indian Journal of Horticulture*, 41: 1/2, 83-84; 5 ref.

Leaf N, P, K, Ca, Mg and S contents were determined in March and June in the cultivars Dashehari, Chausa and Lucknow Safeda. The data are tabulated. The contents of all nutrients declined post-harvest in all cultivars and this was attributed to earlier translocation into the developing fruits.

799 CHAPLIN, GR. 1989. **Advances in post-harvest physiology of mango.** *Acta Horticulturae*, No. 231, 639-648; 50 ref.

Research on postharvest physiology of mango carried out during the last 15 years is reviewed. Ethylene

treatment in storage and CA storage, or bagging or coating of fruit, is not consistently beneficial and can give poor fruit quality due to 'off' flavours. Low pressure storage increases postharvest life but is expensive. Mangoes are susceptible to chilling injuries when stored below 12°C, probably because of physical changes in membrane lipids. There is limited evidence that chilling injuries can be reduced by gradually reducing the storage temperature to allow fruits to adapt to low temperature. Physiological disorders such as spongy-stem, soft-nose, internal breakdown and jelly seed are influenced by pre-harvest climatic and cultural factors. Treatments such as fumigation and irradiation, to increase postharvest life, are discussed. Determination of flavour components by HPLC and GC-MS are being used to supplement the subjective assessment of fruit quality by taste panels.

800 JOSHI, GD; ROY, SK. 1989. **Effect of integrated post harvest handling on quality and shelf life of alphonso mango fruits.** *Maharashtra J. Hort.*, 4: 2, 96-103.

801 KATRODIA, JS; RANE, DA; SALUNKHE, DK. 1989. **Biochemical nature of spongy tissue in Alphonso fruits.** *Acta Horticulturae*, No. 231, 835-839; 16 ref.

Spongy tissue, occurring in fruits ripened indoors at room temperature (35 ± 1°C) and in fruits exposed to intense sunlight (fruit pulp reaching 48°), was analysed. Affected tissues had lower pH, lower ascorbic acid, beta-carotene, reducing and non-reducing sugar contents, lower amylase and invertase activities, and higher acid and starch contents than the unaffected surrounding pulp, which was similar to tissue from healthy ripe fruits. It is concluded that spongy tissue is a localized physiological disorder where ripening is inhibited, and is caused by overheating.

802 KATRODIA, JS; RANE, DA. 1989. **Pattern of distribution of spongy tissue in the affected Alphonso fruits at different locations.** *Acta Horticulturae*, No. 231, 873-877; 6 ref.

Spongy tissue, occurred in 19% of mangoes at harvest, was localized predominantly at the distal end of the fruit, whereas postharvest exposure of fruits to the sun around midday resulted in the greatest occurrence of spongy tissue in the middle part of the fruit. This localization, sometimes on one side of the fruit only, points to convected heat as being the cause of spongy tissue disorder.