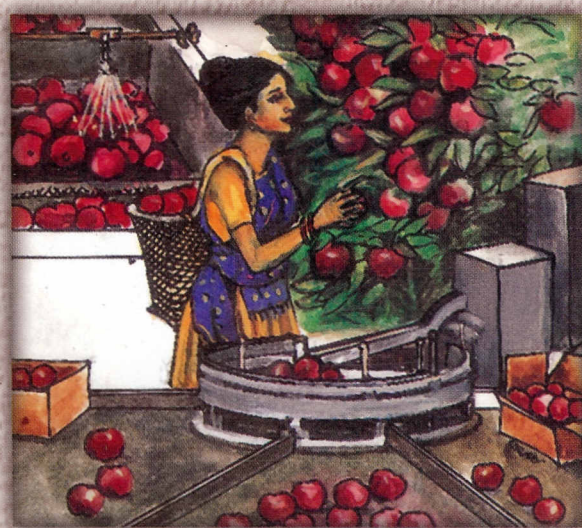




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Postharvest Management in Agriculture

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A S Chandel and R M Kamal



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lemon. *Progressive Horticulture*, 18: 1/2, 71-72; 4 ref. Treated and non-treated fruits were packed in perforated polyethylene bags and stored for 23 days at room temperature ($25 \pm 4^\circ\text{C}$). After 28 days, control of *A. niger* was best (83.7%) in fruits treated with Waxol-0-12 + captan at 0.1%, and next best (80.5%) with captan at 0.1% alone.

GUAVAS

Storage and storage decay

764 ATTERI, BR; ROY, SK. 1988. Assessment of losses of guava and orange at retail cutlet level. *2nd International Food Convention (IFCON-88)*. (Mysore: 1988: 18-23 Feb.).

765 CHAKRABARTI, N. 1983. A note on post-harvest rot of guava caused by *Fusarium solani*. *Indian Phytopathology*, 36: 3, 556; 4 ref.

Severe losses were caused by this disease in markets in Burdwan and its neighbourhood.

766 DHOOT, LR; DESAI, UT; RANE, DA. 1984. Studies on the shelf-life of guava fruits with polythene packaging and chemical treatments. *Journal of Maharashtra Agricultural Universities*, 9: 2, 185-188; 8 ref.

Mature fruits of the cv. Sardar (L-49) were dipped for 5 min in solutions of NAA or BA alone or with KMnO_4 (in all 23 treatments). Some fruits were packed in 150 gauge polyethylene bags with vents. All fruits were held for up to 12 days. Fruits treated with NAA at 150 p.p.m. and packed in bags had the best shelf-life.

767 DUTTA, P; BANIK, AK; RAYCHAUDHURY, R; DHUA, RS. 1991. Influence of ethylene absorbents on shelf life of guava fruits. *Indian Journal of Horticulture*, 48: 3, 213-216; 13 ref.

Mature green fruits of cv. L-49 were harvested just prior to the colour-break stage. The fruits were packed in 200 gauge, low-density polyethylene bags containing Celite- KMnO_4 and silicagel- KMnO_4 as the ethylene absorbents, or without ethylene absorbents. The bags were stored under ambient conditions ($29-32^\circ\text{C}$ and 82-85% RH). Fruit quality was assessed at 3-day intervals for up to 15 days. The lowest physiological weight loss (5.50%) and percentage ripening (50%) and highest percentage marketable fruits (70%) after 15 days of storage were obtained using Celite- KMnO_4 as an ethylene absorbent. The quality of fruits stored with

ethylene absorbents was comparable to those stored without ethylene absorbents.

768 GORAKH SINGH. 1988. Effect of calcium nitrate and plant growth regulators on the storage of Allahabad Safeda guava. *Indian Journal of Horticulture*, 45: 1-2, 45-50; 10 ref.

Fifteen days before harvest the trees were sprayed with 1 or 2% $\text{Ca}(\text{NO}_3)_2$, 50 or 100 p.p.m. NAA or 20 or 40 p.p.m. GA3 in different combinations. After picking, the fruits were packed in 200 gauge low-density polyethylene bags and stored at ambient temperature. The least weight loss, the best reduction of respiration and incidence of fruit rot, and the optimum market quality for more than 6 days were obtained with 1% $\text{Ca}(\text{NO}_3)_2$ + 100 p.p.m. NAA. Untreated control fruits remained in marketable condition for 3 days only.

769 KARTAR SINGH; CHAUHAN, KS. 1982. Effect of certain post-harvest treatments on storage life of cv. L-49 of guava. *Haryana Journal of Horticultural Sciences*, 11: 3/4, 163-167; 6 ref.

Cooled and non-cooled fruits were dipped in Waxol or treated with KMnO_4 via impregnated vermiculite blocks and held for up to 8 days at room temperature (27°C). Fruits cooled and dipped in Waxol had the least weight loss and highest TSS and ascorbic acid contents. Treatment with KMnO_4 also gave good results compared with the non-treated control, especially with regard to ascorbic acid content.

770 KARTAR SINGH; CHAUHAN, KS. 1983. Effect of post-harvest application of Waxol-0-12 and KMnO_4 on guava fruits. *Punjab Horticultural Journal*, 23: 1/2, 38-42; 8 ref.

Fruits of the cv. L-49, harvested at the colour break stage, were dipped in Waxol-0-12 for 5 min or packed in 3-kg wooden boxes with a 5 X 5 cm vermiculite block impregnated with KMnO_4 as an ethylene absorbent. The fruits were stored at 4, 7 or 10°C and 85-90% RH for up to 24 days. The activities of pectinase and cellulase were lowest in fruits treated with Waxol-0-12 and stored at 4° .

771 KRISHNAIAH, J; SATYAPRASAD, CH; SINGH, TG; THIRUPATHAIAH, V. 1985. Post-harvest protection of guava fruits using Decco food-grade fruit coatings. *Indian Botanical Reporter*, 4: 2, 151-153; 16 ref., 1 tab.

The application of *Decco coatings* controlled post harvest diseases when used at 0.04 ml/100 g fruits. Spoilage fungi included *Aspergillus*, *Botryodiplodia*,

Colletotrichum, *Fusarium*, *Glomerella*, *Gloeosporium*, *Pestalotia*, *Penicillium* and *Phytophthora*.

772 MADHUKAR, J; REDDY, SM. 1990. Control of fruit-rot of guava by hot water treatment. *Indian Phytopathology*, 43: 2, 234-236; 9 ref.

Healthy, surface-sterilized guava fruits were dipped in hot water (50°C) both before and after inoculation with *Pestalotiopsis versicolor* and *Rhizoctonia solani* for 10, 20 or 30 minutes. Fruit rot decreased with increased duration of hot water treatment. Treatment for 30 minutes protected the fruits from fungal attack and preserved their storage quality.

773 MADHUKAR, J; REDDY, SM. 1989. Hitherto unrecorded post-harvest diseases of guava. *Indian Phytopathology*, 42: 3, 479.

The symptoms are described of previously unrecorded guava diseases which were observed in India and were caused by *Acremonium terricola*, *Cladosporium cladosporioides*, *Drechslera halodes* [*Setosphaeria rostrata*], *D. [Cochliobolus] hawaiiensis* and *Thielavia terricola*.

774 MADHUKAR, J; REDDY, SM. 1991. Seasonal incidence of post-harvest diseases of guava. *Indian Phytopathology*, 44: 1, 125-126.

775 MAJUMDAR, VL; PATHAK, VN. 1989. Changes in nutritional value of guava fruits infected by major post-harvest pathogens. *Plant Foods for Human Nutrition*, 39: 4, 311-315; 14 ref.

Post-infection changes in ascorbic acid, sugars, proteins and phenols were studied in guava fruits infected by major post-harvest pathogens which in order of importance were *Colletotrichum gloeosporioides*, (Penz.), *Botryodiplodia theobromae*, Pat., *Rhizopus arrhizus* Fischer., *Phomopsis psidii* Nag Raj and Ponnappa apud Ponnappa and Nag Raj, and *Pestalotiopsis versicolor* (Speg.) Steyaert. Contents of ascorbic acid, sugars and proteins declined in the fruits infected by *B. theobromae*, *C. gloeosporioides*, *Pestalotiopsis versicolor*, *Phomopsis psidii* and *R. arrhizus*. Total phenols increased in fruits infected by *Pestalotiopsis versicolor* and *R. arrhizus* while reverse was observed in fruits infected by other pathogens.

776 MAJUMDAR, VL; PATHAK, VN. 1991. Effect of hot water treatment on post-harvest diseases of guava (*Psidium guajava* L.) fruits. *Acta Botanica Indica*, 19: 1, 79-80.

Fruits harvested in Jaipur were inoculated separately with *Botryodiplodia theobromae*, *Colletotrichum gloeos-*

porioides [*Glomerella cingulata*], *Pestalotiopsis versicolor*, *Phomopsis psidii* and *Rhizopus arrhizus*. After 24 h the fruits were dipped in hot water at 40, 45 and 50°C for 5 min and incubated at 25 ± 1° and 90% RH. The severity of rot was recorded after 4 and 8 d. There was a steady decrease in the severity of rots with rise in temp. of the treatment; severity was significantly decreased when the fruits were treated with hot water at 50°C.

777 MAJUMDAR, VL; PATHAK, VN. 1989. Incidence of major post-harvest diseases of guava fruits in Jaipur markets. *Indian Phytopathology*, 42: 3, 469.

During 1983-84, a survey was carried out on guava fruits from markets in Jaipur, Rajasthan, India. The most frequently isolated pathogens were *Botryodiplodia theobromae*, *Colletotrichum gloeosporioides* [*Glomerella cingulata*], *Fusarium solani*, *Pestalotiopsis versicolor*, *Phomopsis psidii*, *Phytophthora nicotianae* var. parasitica and *Rhizopus arrhizus*. In both years maximum decay was caused by *G. cingulata* and *B. theobromae*. A seasonal influence was observed on the incidence of certain rots. It is suggested that inoculum density, presence and concn of microbiotic components on the fruit surface, physiological state of the fruit and interaction of these factors with temp. and RH may influence the incidence of a particular rot at a particular time of the year.

778 RODRIGUEZ, LEA; BORYS, NW. 1983. The culture of guavas, *Psidium guajava* L. *Revista Chapin-go*, 8: 41, 41-45; 29 ref.

The total area in Mexico under guava is 14 750 ha and the annual production is 175 000 t. After India and Brazil, Mexico is the largest producer. Suitable climatic and soil conditions, botany, genetic resources, cultivars and propagation are briefly described, and land preparation, irrigation, weed control, pruning, fertilizing, harvesting, pests and diseases, processing, post-harvest treatment and medicinal uses are discussed.

779 SAGAR, VR; MAINI, SB. 1992. Economic utilization of rainy season guava - drying aspects. *Indian Fd. Packer*, 45: 6, 19-22.

780 SANJEEV KUMAR. 1991. Studies on post-harvest decay of guava (*Psidium guajava* L.) fruits caused by *Glomerella cingulata* (Stonem) Spauld and Schrenk (M.Sc: thesis). Haryana Agricultural University, Hisar.

The present experiment was conducted during 1990 on rainy season crop of guava. Symptoms of the disease on

fruits appeared in the last week of July in the form of brown to dark brown spots on fruits. Maximum disease incidence was found in Sonapat district and minimum in Sirsa district. There was recorded increased rotting with the increase in spore concentrations. Temperature between 25° and 35° C with average temperature 30° C was the best for the initiation of disease under field conditions. Maximum spore germination was observed at 30° + 11° C and at 100% relative humidity. Maximum growth of the fungus was observed on Czapek's agar medium and maximum sporulation was observed on potato dextrose agar + asparagine medium. Out of 18 varieties screened in vivo and in vitro, four varieties were found highly resistant, whereas rest of the varieties were susceptible in varying degrees. Biochemical analysis of susceptible and resistant varieties revealed that higher amounts of total soluble solids and ascorbic acid were present in all the resistant varieties as compared to the susceptible varieties. Out of the three fungicides used as pre-inoculation and post-inoculation treatments, bavistin was found the most effective. Out of the four oils used under pre-inoculation and postinoculation treatments, sunflower oil was the most effective. All the volatile substances controlled the disease effectively but at the same time these also deteriorated fruit quality.

781 SAXENA, AK; SAKSENA, SB. 1983. A new fruit rot disease of guava from India. *Indian Phytopathology*, 36: 1, 170-172; 15 ref.

A severe, post-harvest soft rot of guava fruits in markets and orchards in Gwalior during Oct.-Dec. 1979 was caused by *Dichotomyces cejpaii*. The fungus caused rotting of inoculated ripe fruit only after wounding.

782 SIDDIQUI, S; SHARMA, RK; GUPTA, OP. 1991. Physiological and quality response of guava fruits to posture during storage. *HortScience*, 26: 10, 1295-1297; 8 ref.

Fruits from the winter season crop of guava cv. Allahabad Safeda were harvested at the green mature stage and stored in ambient conditions in 3 postures: (1) natural, pedicel end vertically upward; (2) reverse, pedicel end vertically downward; and (3) horizontal, pedicel end sideways. Fruits in the natural posture showed the lowest physiological loss in weight, ethylene and CO₂ evolution rates, the highest soluble solids and ascorbic acid concentrations and were the slowest to ripen during storage. Organoleptic rating and other characteristics indicated that guava fruits should be packed in the natural posture to retain better quality for longer periods.

783 SINGH, BP; KALRA, SK; TANDON, DK. 1990. Behaviour of guava cultivars during ripening and storage. *Haryana Journal of Horticultural Sciences*, 19: 1-2, 1-6; 11 ref.

Eight commercially grown cultivars were harvested at the colour-break stage during the winter season. The fruits were packed in 5-kg ventilated wooden boxes using newspaper as the packing material. The fruits were stored for up to 12 days under ambient conditions (18 ± 2°C and 80-85% RH). The fruits were assessed for ripeness, firmness, physiological weight loss, TSS, titratable acidity, and vitamin C and Ca contents. The data are tabulated. The cultivars Chittidar and Sardar were noted for good shelf life (9 days) compared with a maximum of 6 days in Allahabad Safeda. The cultivars Sardar, Chittidar, Karela and Apple Colour were noted for high Ca content and relatively good pulp firmness for up to 9 days.

784 SINGH, HK. 1986. Effect of pre and post-harvest application of certain chemicals on physico-chemical changes in guava fruits during storage (Ph.D : thesis). Haryana Agricultural University, Hisar.

Pre-and post-harvest application of calcium compounded in combination with zinc chloride, calcium compounds alone and cycocel helped in increasing the shelf life and quality of guava fruits during the storage. Double spray of calcium nitrate 1% in combination with zinc chloride 0.2%, double spray of calcium nitrate 1% alone and 500 ppm cycocel as pre-harvest treatments minimised the loss in weight, reduced the rate of respiration, surface discolouration, disease incidence and increased firmness and finally maintained the edible quality in terms of total soluble solids, acidity, ascorbic acid, sugars, pectin, protein and carotenoids content of guava fruit for more than 4 days at ambient temperature and 12 days at low temperature storage conditions. Among post-harvest dip treatments, calcium chloride 1% alone or 1000 ppm cycocel were found most effective and increased the shelf life of fruits.

785 TANDON, DK; KALRA, SK; KULKARNI, JK; CHADA, KL. 1983. Chemical and microbiological evaluation of stored guava pulp in PVC containers. *Journal of Food Science and Technology, India*, 20: 3, 118-120; 8 ref., 3 tab.

Guava pulp was stored in 5 kg white PVC containers with 500, 750 and 1000 p.p.m. SO₂ at room temp. Fungi detected included *Aspergillus niger*, *Alternaria sp.*, *Candida sp.*, *Helminthosporium sp.* and *Saccharomyces sp.* For shorter periods of storage (up to 60 days), 500 p.p.m. SO₂ is sufficient to check the deterioro-

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-