PRODUCTION TECHNOLOGY OF GUAVA (*Psidium guajava* L.)

GUAVA is one of the most important fruit and it is considered as apple of the tropics. In India, its position is forth after mango, banana, and citrus so far as area and production of major fruits are considered. One of the most gregarious of fruit trees, the guava, *Psidium guajava* L., of the myrtle family (Myrtaceae).

**Selected species**

- *Psidium amplexicaule*
- *Psidium aracao*
- *Psidium araca*
- *Psidium australre*
- *Psidium cinereum*
- *Psidium dumetorum*
- *Psidium firmum*
- *Psidium friedrichsthalium*
- *Psidium galapageium* – Galápagos Guava
- *Psidium guajava* L. – Apple Guava, Common Guava
- *Psidium guineense* Sw. – Guinea Guava, *araçá-do-campo* (Brazil)
- *Psidium harrisianum* Urb.
- *Psidium havenense* Urb.
- *Psidium incanescens* Mart.
- *Psidium littorale* – Cattley Guava, Peruvian Guava, *“araçá”* (Colombia), *“Chinese Guava”* (as invasive species)
  - *Psidium littorale* var. *cattleianum* – Strawberry Guava
  - *Psidium littorale* var. *littorale* – Lemon Guava, *waiawī* (Hawai‘i)
- *Psidium montanum* Sw. – Mountain Guava
- *Psidium pedicellatum*
- *Psidium robustum*
- *Psidium rostratum*
- *Psidium rufum*, Purple Guava
- *Psidium sartorianum*
  Sartre Guava, "arrayán"
  (Mexico), guyabita del Peru (Panama, Costa Rica), cambuí (Brazil)
- *Psidium sintenisii* – hoja menuda
- *Psidium socorrense*
- *Psidium spathulatum*[^20]

Formerly, round and pear-shaped guavas were considered separate species—*P. pomiferum* L. and *P. pyriferum* L.—but they are now recognized as mere variations. Small, sour guavas predominate in the wild and are valued for processing.

**Cultivars:** In India much attention is given the characteristics of local and introduced guava cultivars and their suitability for various purposes. Among common white-fleshed cultivars are:

- **'Apple Colour'**—of medium size, slightly oblate; deep-pink skin, creamy-white flesh, moderate amount of seeds, very sweet flavor (0.34-2.12% acid, 9 to 11.36% sugar); heavy bearer; good keeping quality; good for canning.
- **'Behat Coconut'**—large, with thick white flesh, few seeds; poor for canning.
- **'Chittidar'**—medium to large, round-ovate, white-fleshed, mild acid-sweet flavor; bears moderately well; keeps well; good for canning.
- **'Habshi'**—of medium size with thick, white flesh, few seeds; halves good for canning.
- **'Lucknow 42'**—of medium size, roundish, with creamy-white, soft flesh; sweet, pleasant flavor; very few seeds; good quality; bears heavily; keeps fairly well; not suitable for canning.
- **'Lucknow 49'**—medium-large with cream-white, thick flesh, few seeds; acid-sweet; good quality; heavy bearer; high in pectin and good for jelly; halves good for canning.
- **'Safeda'**—of medium size, with very thin skin, thick, white flesh, few seeds. Outstanding quality for canning. A famous guava, widely planted, but susceptible to wilt and branches are brittle and break readily.
'Smooth Green'–of medium size, with thick white flesh, few, small, hard seeds. Halves are firm, good for canning.

'Allahabad'–large, white-fleshed, with few, medium-sized, fairly hard seeds.

'Karela'–medium-large, pear-shaped, furrowed, rough-skinned, with soft, granular, white flesh; sweet, rich, pleasant flavor. Poor bearer. Not popular.

'Nagpur Seedless'–small to medium, often irregular in shape; white-fleshed.

'Seedless' (from Allahabad)–medium to large, pear-shaped to ovoid; with thick white flesh, firm to soft, sweet. Light bearer; poor keeper.

A seedless type at Poona, India, was found to be a triploid with 33 chromosomes in place of the usual 22.

Other white-fleshed guavas with poor canning qualities are: 'Dharwar', 'Mirzapuri', 'Nasik', 'Sindh', and 'White Supreme X Ruby'.

Among red-fleshed cultivars in India there are:

'Anakapalle'–small, with thin, red flesh, many seeds; not suitable for canning.

'Florida Seedling'–small, with thin, red, acid flesh; many seeds; not suitable for canning.

'Hapi'–medium to large, with red flesh.

'Hybrid Red Supreme'–large, with thin, red, acid flesh; moderate amount of seeds; not suitable for canning.

'Kothrud'–of medium size with medium thick, red flesh; moderate amount of seeds; not suitable for canning.

'Red-fleshed'–of medium size with many (about 567) fairly soft seeds; high in pectin and good for jelly; not suitable for canning.

Indian breeders have crossed the guava with its dwarf, small-fruited relative, *P. guineense* Sw., with a view to reducing tree size and enhancing hardiness and yield.

**Pollination:** The chief pollinator of guavas is the honeybee (*Apis mellifera*). The amount of cross-pollination ranges from 25.7 to 41.3%.

**Climate Requirement:** Guava are adopted to areas with hot summers and cool winter. In some areas an average monthly maximum temperature higher than 32 °C and minimum temperature 3 °C are regarded as restrictive for the cultivation of guavas. Temperature of up to 45 °C can be tolerated although the highest yield are usually recorded at mean temperatures of 23 to 28 °C. Optimum vegetative growth occurs between 15 and 28 °C.
quality of the fruits becomes inferior when mean temperatures fall below 15 o C during the maturation period. Guavas are more drought resistant than most tropical trees and grow best in areas with an annual rainfall of 1000 to 1500 mm.

**Soil Requirement:** The guavas grow well in any type of soil conditions, but will produce better in rich soils high in organic matter. They also prefer a well-drained soil in the pH range of 5 to 7. Good drainage is recommended but guavas are seen growing spontaneously on land with a high water table—too wet for most other fruit trees but will not tolerate salty soils.

**Irrigation:** As compared to other fruit crops guava needs less irrigation. In the early stage plants required 8-10 irrigations a year, while full grown trees require irrigation during April to June at 15 days interval to get good yield. Irrigation during winter was also found effective in improving the fruit quality of winter crop. In south India, irrigation induces fruiting in guava more or less throughout the year.

**Pruning:** Shaping the tree and removing water shoots and suckers are usually all that is necessary. Guavas can take heavy pruning, however, and can be used as informal hedges or screens. Since the fruit is borne on new growth, pruning does not interfere with next years crop.

**Manuring and Fertilization:** Guavas are fast growers and heavy feeders, and benefit from regular applications of fertilizer. Mature trees may require as much as 50 to 80 kg of FYM, 1 kg ammonium sulfate or 800g of calcium ammonium nitrate, 3kg of super phosphate and 2 kg of potassium sulphate.

**Propagation:** Guava seed remain viable for many months. They often germinate in 2 - 3 weeks but may take as long as 8 weeks. Since guavas cannot be depended upon to come true from seed, vegetative propagation is widely practiced. They are not easy to graft, but satisfactory techniques have been worked out for patch-budding by the Forkert Method (probably the most reliable method), side-veneer grafting, approach grafting and marcotting. The tree can also be grown from root cuttings. Trees grown from cuttings or air-layering have no taproot, however, and are apt to be blown down in the first 2 or 3 years. One of the difficulties with budded and grafted guavas is the production of water sprouts and suckers from the rootstocks.

In India, air-layering and inarching have been practiced for many years. However, trees grown from cuttings or air-layers have no taproot and are apt to be blown down in the first
2 or 3 years. For this reason, budding and grafting are preferred. Approach grafting yields 85 to 95% success. At the Horticultural Experiment and Training Center, Basti, India, a system of patch budding has been demonstrated as commercially feasible. Tongue layering is a common practice in Maharashtra. In case of grafting using root stock wedge grafting is done.

**Pests and diseases:** Fruit fly, Scale insect, Bark eating caterpillar and Mealybug are the important pest affecting the growth and yield of guava. And major diseases are wilt of guava, fruit canker, Anthracnose and Cercospora leaf spot occurring in northern and eastern India as well as other guava growing areas.

Cartap hydrochloride was found most effective in managing guava fruit borer.

Inoculation technique (stem hole inoculation) for reproduction of wilt in guava has been standardized.

*Gliocladium roseum* has been found most potent causal pathogen for guava wilt, as it produces symptoms in grown up plants in field within 2 months of inoculation.

Bio-control agents, *Aspergillus niger* (AN 17) and *Penicillium citrinum* have been identified for the control of guava wilt.

Co-cultivation with *Curcuma domestica*, *Allium sativum* and *Tagetes erecta* were found effective in reducing the incidence of wilt in guava.

Corn meal medium was found best for multiplication of guava wilt antagonists, *Trichoderma harzianum*, *Aspergillus niger* and *Penicillium citrinum*. Ninety-five isolates of *Fusarium* sp. from wilted plants of guava were collected from different parts of India. Population of spiral nematode was found high in wilt affected guava plant(s).

**Harvesting and Yield:** Guava fruits mature for harvesting after 4-5 months of anthesis (Pande and Mishra, 1984) Tripathi and Gangvar (1971) recorded 0.960-0.950 specific gravity, 12 to 12.6 per cent TSS and 0.36 to 0.41 per cent acidity at the time of fruit maturity. In warmer regions guavas will ripen all year. There is a distinctive change in the color and aroma of the guava that has ripened. For the best flavor, allow fruit to ripen on the tree. Fruit that has changed color cannot be stored for any extended periods. It bruises easily and will quickly deteriorate or rot. Economic yields are obtained from 7 to 8 years onward. It varies in different cultivars, management of orchid and season of cropping. The average yield per tree was estimated to be 350 kg from the grafted trees (Singh, 1980). Mitra et al. (1981)
recorded maximum yield was recorded in L-49 followed by Allahabad Safeda and Chittidar in rainy season.

**Post Harvest Management:**
Guava fruits of cv. Allahabad Safeda could be stored for 28 days in 0.25 per cent ventilated LDPE bags at 50°C.

The storage study of nectar prepared from 5 pink fleshed varieties of guava revealed that nectar prepared from HPS-I-35 was best after 6 months of storage.

Among 5 pink fleshed guava varieties, HPSI-16 was found best for processing.

Guava slices from cv. Lalit could be stored in 400Brix sugar syrup for 9 months.
CFB boxes (190X300X80mm) of 2 kg capacity with 0.5 per cent ventilation were designed and fabricated for extending the shelf-life of guava fruits (cv. Sardar).

**Crop Regulation** - It is recommended to give application of 100 ppm GA in first week of January and June and that of 1000 ppm CCC in first week of October every year; plus 600 ppm Ethrel in first week of February and July in the first year and only in first week of July in subsequent years for higher hasta bahar and more monetary returns from guava under Plain Zone conditions of Western Maharashtra.

**Old Orchard Rejuvenation** - The unproductive old (up to 35 years) guava orchard planted in medium black soil can be rejuvenated by deheading the trees at 60-75 cm height from ground level giving clean cut and keeping the straight stump as far as possible. The pruned infected branches be destroyed. The cut surface of trunk be pasted with bordeaux paste. The orchard be ploughed. Basins of 3 x 3 m size be prepared and recommended dose of manures and fertilizers (50 kg F.Y.M. and 900:300:600 g NPK/plant) be applied and the orchard immediately irrigated. When the sprouts appear on the deheaded trunk, 3-4 upright growing well- spaced sprouts be maintained as future branches and the other sprouts be removed.