

# Guava Manual

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## INTRODUCTION

- Guava (*Psidium guajava* L.), also known as the apple of poor is an important fruit crop, belongs to the family of *Myrtaceae*
- Guava has achieved commercial importance in tropical and subtropical areas because of its wide adaptability to various soils and climatic conditions and higher returns
- Guava origin was native America (Mexico) and South America (Peru)
- At present, it is mainly produced in South Asian countries, Cuba, Brazil, California, India, Malaya, and Pakistan
- Guava is the 4<sup>th</sup> most important fruit of Pakistan and ranks 3<sup>rd</sup> in production in Punjab
- In Pakistan, it is grown in all the provinces over an area of 61.37 thousand hectares with a production of 498.95 thousand tones in 2020-2021
- The major guava growing areas are Shiekhupora, Gujranwala, Sangla hill, Okara, Sahiwal, Faisalabad in the Punjab; Larkana, Hyderabad, Dadu, shikarpur in Sindh; Haripur, Hazara, Mardan and Bannu in the KPK





## Nutritional components and medical properties

- Guava fruit is a rich source of Vitamin C. It is also an excellent source of Vitamin B, Vitamin A, dietary fiber, Phosphorus, Calcium, and Iron
- Guava is used as a popular remedy for gastrointestinal infections such as diarrhea, dysentery, stomach aches, and indigestion
- Guava leaves are used for stomach pain, diabetes, and wound healing. It is also used to manage high blood pressure and weight loss

## Varieties

- **Karela:** This type of fruit is medium-large and pear-shaped. It has rough skin with soft granular white or red flesh. Its average yield is 60 to 75 kg per plant. Its special feature is that seeds are very rare in it
- **Allahabad:** It is the most popular and demanded variety of guava among all varieties. It has deep red color inside and is rounded in shape. The fruit is sweet, pleasantly flavored with few hard seeds inside it. Its average yield is 80 to 100 kg per plant
- **Safeda:** Medium size variety of guava with very thin skin. It has thick white and creamy flesh with few seeds inside
- **Larkana surahi:** Fruit is large with rough skin. The flesh of the fruit is white and with few seeds. Gives an average yield of 80 to 100 kg per plant
- **Apple color:** it is a pink-colored medium-size fruit. It has a slightly deep pink sink and white flesh. This type of guava is very sweet with good keeping quality
- **Seed less:** A white variety of guava and have a firm to a soft texture. It is the poor bearer variety of guava
- **Sharkpuri gola:** This is a round, white-colored, medium-sized type of guava. It has a sweet and pleasant flavor. Its average yield is 70 to 90 kg per plant
- **Selection 313:** This is a new variety of guava. It is green in color and pear-shaped. Its pulp is in pink color and seeds are in the middle of the fruit which can be easily pulled out. The fruit is very sweet. Its average yield is 65 to 85 kg per plant

## Climate

- Guava is a fruit of warm and semi-humid regions but grows well in both humid dry tropical or subtropical climates.
- It is cultivated successfully from sea level to an altitude of 1000 to 1500 meters.
- The optimum temperature required for guava growth is 23 to 28°C. Young plants are susceptible to cold conditions and cannot tolerate frost
- A dry atmosphere at the time of flowering and fruit setting is ideal. However, high temperature at the time of fruit development causes fruit to drop  
Excessive rainfall is also harmful as it caused negative effect on cosmetic beauty of fruits





## Soil

- The guava does equally grown on heavy clay to very light sandy soils, however good quality guavas are grown on river-basin
- It can be grown in the soil having a pH range from 4.5-8.5
- Guava is also grown on the land having a high water table, but good drainage is recommended.
- Guava is also saline-tolerant fruit

## Propagation

Propagation of guava is done in both ways sexually (seeds) and asexually (budding, cutting, and grafting)

### Sexual propagation:

- In sexual propagation, take healthy fruits and seeds are separated from the pulp of guava. The seeds were sown to raise into seedling. The seedlings when reach a height of 6-9ft are ready to be transplanted in field
- The seeds should be sown immediately after extraction from the ripe fruits
- For better growth soak the fresh seeds in water for 10 to 15 days
- About 1-year-old seedlings are ready for budding and grafting
- propagation through seeds is usually discouraged as it has long juvenile phase, low yield and poor quality fruits

### Asexual propagation:

- Asexual propagation is done through cutting, grafting, budding, and sometimes layering
- In Pakistan, layering of guava fruit is done only in Hyderabad and has a high success rate there
- Raised seedlings of guava are used for grafting and budding

## Land preparation

- The land for plantation is prepared by plowing, leveling, harrowing, and removing weeds from the previous crop
- The pits of 3ft x 3 ft x 3 ft size are dug at a distance of 16-18ft and filled the pits with a mixture of neem cake, farmyard manure, and topsoil
- The preparation of land and digging of pits is not required, if soil is highly fertile and rich in organic matter

## Planting methods

- The planting is usually recommended during August-September and February-March using the square planting method (row to row and plant to plant distance is equal)
- Since High density plantation (HDP) is also started in Pakistan so planting distance is decided according to the variety, fertility of soil, and accessibility of irrigation facilities

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- Guava trees grow rapidly and start fruiting after 2-4 years



### Pruning and training

- Training and pruning of plants at the young stage is necessary to provide a strong framework for guava tree and to avoid weak crotches
- Light pruning at the time of first harvesting is required to maintain the productivity of guava
- A large number of new shoots emerges on the tree in every growing season and most of them are lateral and very few are terminal branches
- After 1-year lateral shoots dry out, and terminal shoots accommodate the prolonged growth
- Mostly pruning is recommended during the spring season or after harvesting, because summer pruning may cause sun burning in the plant
- Guava plant flowers 2 times a year, winter crop is generally preferred as it gives higher yield with good fruit quality
- During the summer season, for a particular time (May, June, July) farmers stop irrigation of orchards, all these issues are extremely harmful to the plant's health. It is a certified fact that in the absence of leaves, the process of making food in the plant is stopped and the plants become weak
- In addition, the temperature of cells inside the plants also increases. On weak plants, diseases and other germs are easily overcome, plants start to dry slowly. Therefore, it is necessary to remove summer fruits in a harmless way
- 2, 4-D @ 30 mg per liter of water is the most effective chemical suggested for deblossoming of summer flowers.
- After setting guava fruit only takes 125 days to reach maturity

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## Irrigation

- Irrigation of plants depends on the soil and climatic condition of the area
- Small plants need frequent and light irrigations during the year
- Large plants need more quantity of water especially during fruit development
- The requirement of water varies from 15.6 to 61 liter per day per plant in December and April, respectively
- Irrigation should be done with intervals of 10 days in summer and 25 days in winter
- The monthly schedule for the irrigation of guava plants is as follows:

April to December	8-12 days break	October to November	15-20 days break
December to January	20-25 days break	February to March	15-20 days break

- Drip irrigation on 2 days interval is recommended for guava plants

## Fertilizer application

- The demand for chemical and indigenous fertilizers continues to change depending on the plant age, type, climate, and management
- Guava blooms in early April as compared to other normal plants
- As guava plant shows new growth and fruiting at the start of April instead of March like other fruit plants. Therefore, the first dose of nitrogen should be given at the end of March instead of February
- Chemical fertilizer should be applied before winter-flowering till August and September so that the guava plant can complete its vegetative growth

### Fertilizers requirement (kg/acre)

Age of the plant (Year)	Urea (g/plant)	SSP (g/plant)	MOP (g/plant)	Well decomposed cow dung (kg/plant)
1 to 3 year	150-200	500-1500	100-400	10-20
4 to 6 year	300-600	1500-2000	600-1000	25-40
7 to 10 year	750-1000	2000-2500	1100-1500	40-50
Above 10 year	1000	2500	1500	50

## Intercrops

- After guava plantation, during early 3-4 years before the start of fruit, other crops can also be cultivated
- Vegetables and leguminous crops are also useful for guava plants. Grow vegetables like carrot, radish, brinjal, and okra as intercrops
- Leguminous crops like gram, beans, etc. can also be sown as intercrops



## Diseases of guava

- There are many pathogens, mainly fungi, few bacteria,, and some physiological disorders, which affect the guava crop
- These pathogens cause different types of diseases in guava plants from the growing stage to maturity and fruiting time.
- Some major diseases, their symptoms, and management practices are described below

### Guava Wilt

- Pathogen attack young as well as old plants
- Caused by various fungi like *Fusariumsolani*L.,*Macrophominaphaseolina*L., and *Gliocladiumroseum*L.
- Light foliage loss turgidity
- Yellowing and wilting of leaves
- Bark can be detachable from the cortex
- Light brown blotching in vascular tissues

### Management

- Through proper sanitization, we can manage the disease
- Keep field well-drained and avoid water logging condition

- Removed and burnt wilted plants away from the field
- Treat guava plant with 0.1% of water-soluble quinolone sulfate, it protects wilt for at least 1 year



### Fruit Rot

- Fruit rot caused by *Phytophthora nicotianae* L.
- Whitish Cotton growth develops very fast as fruits mature and covers the infected area in few days
- Calyx disease of fruit start during the rainy season Fruit skin turns light brown to black and becomes a little softer below the whitish cotton mass
- Diseased fruit drops immediately from the tree
- Humid and cool weather favorable to disease development

### Management

- Dry rot can be managed using fungicides like ziride 0.3%
- Treatment of seeds with bavistin 3g/kg controls the disease more efficiently
- Spray the plant with the mixture of metalaxyl and mancozeb (250g/100 L water) with 15 days break



### Fruit canker

- Infection generally occurs on green fruit and hardly on leaves
- Fruit canker is caused by *pestalotiopsispsidii* L.
- Affected fruit become hard and small rusty brown spots appear on the leaves
- The margins of lesions become raised and a depressed area appears inside
- In the earlier stage of infection circular, the unbroken brown necrotic area was observed in fruit
- The pathogen is a wound parasite and it avoids injury to fruits

### Management

- This disease can be controlled by spraying of bordeaux mixture or lime sulfate 1% at 15 days intervals
- Summer irrigation and nutritional management decrease the spread of disease
- Apple color and safeda varieties of guava are greatly resistant to this disease
- Potassium iodide and arsenic oxides can also inhibit the growth of the pathogen





### Stem canker

- Caused by *Phytophthora parasitica*.
- Twigs are affected that show wilting of plant leads to death
- Initial symptoms of the disease are longitudinal cracks in the bark on the stem or branches
- Pathogens mostly attack stem, striking the translocation of nutrients in guava
- The fruit turns dark brown to black structure and dried within 4 days
- Pathogen remains in the bark of the plant and becomes active under favorable conditions

### Management

- Removal and destruction of infected stem
- High sanitation is also required
- The spread of disease in the early-stage is controlled by 3-4 spraying of 1% Bordeaux mixture or lime sulfur at 15 days intervals
- Management of canker through the use of fungicides
- 0.2% copper oxychloride spray after pruning can reduce stem canker



## Pest and their control

### Fruit fly

- A serious pest of guava "*Bactrocera**correcta* L. and *Anastrepha**suspense*L.
- Female lay eggs under the epidermis of young fruit, later fruit starts decaying and drop
- Dark-colored lesions appear in fruit

### Management

- Infected fruit should be removed and bury them deeply in soil almost 1-2 ft deep
- Organic insecticides derived from tea tree leaves having methyl eugenol is very effective to control fruit flies
- Summer plowing is done to expose pupa of fruit fly





### Scale insect

- The causal organism is *Coccus viridis* L. and *Pulvinaria psidii* L.
- The sticky substance covered the leaves and sooty mold grows on the leaves
- Leaves and fruits drop from the tree and reduced tree vigor
- Gray fattened scales appear on leaves, twigs, and branches

### Management

- Fallen plant material should be burnt
- Application of horticultural oil and conservation of natural enemies
- Use of insecticides is also helpful for its management



## Harvesting

- Harvesting should be done when fruits reached the maturity stage
- White guava is picked when attain full-size and changes colour from dark green to light green
- Hand-picking of ripened fruits is suggested
- For rainy season harvesting period is in August, for winter crops it is November- December and for the spring season crop
- The fruit matures within 90-150 days after the flowering stage
- The harvesting period may last for 8-10 weeks
- To avoid over-ripening of fruits, do harvesting at the proper time
- Guava develops the best color and flavor only when they completely ripe on the tree
- A 10 years old guava tree gives a yield of up to 100 kg of fruit per year



### Post-harvest management

- After harvesting, proper fruit grading is done based on its size and weight
- The fresh fruit has a short shelf life so the proper storage of fruit is required
- The fruits are properly packed using bamboo baskets of different sizes and fiber boxes or cardboard boxes.