

# Guava



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**B.N.:** *Psidium guajava* L.

**Family:** Myrtaceae

**Pollination:** Self pollinated

**Chromosome No. :**  $2n=22, 33$

**Centre of Origin:** Tropical America.

•Guava is native to tropical America where it occurs wild. It was introduced in India in the seventeenth century

**Agro-Climatic Requirements:** Guava is grown in both tropical and sub-tropical regions upto 1,500 m. above m.s.l. It tolerates high temperatures and drought conditions prevalent in north India in summers. However, it is susceptible to severe frost as it can kill the young plants. An annual rainfall of about 100 cm. is sufficient during the rainy season (July-September). Rainfall during the harvesting period deteriorates the quality of fruits. Heavy clay to very light sandy soils having pH between 4.5-8.2 are suitable for cultivation of guava. Good quality guavas are produced in river basins. The crop is sensitive to water-logging.

**Varieties:**

Lucknow 49, Allahabad Safeda, Chittidar, Harijha, Hafshi, Apple guava, Arka Mridula, Seedless, Allahabad Surkha.



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## Propagation

Guava is propagated both by seeds and vegetatively. But vegetative propagation is followed Commercially.

Layering is being commercially followed in the southern and western India with very good results. After bending the plant, its branches are covered with soil leaving the terminal portion open. In a few months the rooting of branches takes place which are then separated from the mother plants and planted in the nursery for further sale. Layering is a labour intensive method. A limited number of plants can only be multiplied from a mother plant. When mother plants are very tall, air layering of shoots is done during the rainy season using polythene and moist sphagnum moss. Use of root promoting plant growth regulator, IBA (3,000 ppm), promotes the rooting of air layers up to 100%. The main limitation of air layering is the poor establishment of air layering in the nursery after detachment from the mother plant. Further, the method is very cumbersome and labour intensive.

**Planting Season:** Planting is done during the rainy season. June-July is the ideal time for planting the layers and seedling.

**Spacing:** The plants are usually planted at a distance of 5-8 m. The exact planting distance is decided according to variety, soil fertility and availability of irrigation facilities. Standard spacing is 6 m. x 6 m. accommodating 112 plants/acre. By increasing the plant density, productivity can be increased. In the model scheme, a spacing of 6 m. x 6 m. with a population of 110 plants per acre has been considered which was commonly observed in areas covered during a field study. High density planting causes erect growth of branches making the plant tall, compact and also gives higher yield/unit area in early years of fruiting.



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**Planting Method:** Square system of planting is generally adopted. Pits of 1x1x1m. size are dug before the monsoon and filled with a mixture of farmyard manure and soil.

**Nutrition:** Time of fertilizer application depends on the region and crop variety. In north India, fertilizer is applied in the first week of May for rainy season crop and in first week of July for winter season crop. The plants are manured twice a year, first during June-July and second by during October. A fertilizer dose of 600 g. N, 400 g. K in Northern Region, 260 g. N, 320 g. P and 260 g. K in Eastern Region, 900 g. N, 600 g. P and 600 g. K in Southern Region and 600 g. N, 300 g. P and 300g. K/plant /year in Western Region is recommended.

**Irrigation:** Guava is mostly grown under rainfed condition. During winter season, irrigation is provided at an interval of 20-25 days and in the summer months it is provided at an interval of 10-15 days by the ring method.

**Training & Pruning:** Training of plants in young stage is essential in order to build a strong framework and to avoid weak crotches. Fruiting trees are pruned to check overcrowding in the orchard. The plants are trained as low headed trees to facilitate multiple hand pickings. Pruning is usually recommended after harvesting or in spring. Summer pruning is generally avoided as the plants get damaged due to sun burn.

**Intercultural Operations:** Weeds are usually removed by shallow cultivation. Green manuring is usually done during rainy season. Pre-emergence use of diuron (1.6 kg./ha.), oryzalin (1.67 litres/ha.), simazine (1.6 kg./ha.) or atrazine (1.6 kg./ha.) has been found to be effective in control of weeds.



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**Inter-cropping:** Leguminous crops or vegetable can be grown as intercrops during the first three years of planting provided irrigation facility is available.

**Growth Regulators:** The winter crop is much superior in quality compared to the monsoon crop. Farmers often reduce monsoon crop by deblossoming to get a higher price. This is done by growth regulators like maleic hydrazide on spring flush of flowers. Growth regulators like NAA, NAD and 2, 4D have been found to be effective in thinning of flowers and also manipulating the cropping season.

### **Plant Protection Measures**

**Insect Pests:** The insect pests mostly observed are fruit fly, stem borer, bark eating caterpillar, thrips, nematodes, mealy bug and scale insect.

**Diseases:** The main diseases reported are wilt, fruit canker, fruit rot, anthrachose and grey leaf spot.

**Disorders:** Fruit drop is a serious disorder in guava resulting in about 45-65% loss due to different physiological and environmental factors. Spraying of GA has been found to be effective in reducing the fruit drop in guava. Bronzing of guava has been observed in places having low soil fertility and low pH. Affected plants show purple to red specks scattered all over the leaves. Foliar application of 0.5% diammonium phosphate and zinc sulphate in combination at weekly intervals for two months reduces the bronzing in guava.

### **Harvesting and Yield**

The plants start bearing at an early age of 2-3 years but they attain full bearing capacity at the age of 8-10 years. The yield of a plant depends on its age, cropping pattern and the cultural practices. A 10 year old plant yields about 100 to 150 kg. of fruits every year. If both rainy and winter season crops are taken, more yields may be obtained in the rainy season.



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## LITCHI

- | Litchi is most important subtropical, evergreen luscious fruit tree.
- | B.N-*Litchi chinensis*
- | Related species-Rambhutan and Longan.
- | Family-Sapindaceae
- | 2n-(2X)-30
- | Origin place:-South china
- ✓ Fruit reach in India in 17th century.
- | Largest producer(in world)-china(1st), India(2nd)
- | In India:-Bihar(area, production, productivity), W.B, Assam

### **Climate**

Grows well in moist atmosphere

#### υ **TEMPERATURE**

- a) For growth-30 degree Celsius
- b) During flowering and fruit dev-21 degree Celsius.
- c) Wet spring, dry summer, light winter is desirable.

### **Soil**

- υ Fairly deep, well drained, loam soil rich in organic matter is best  
Soil type-sandy loam or clay loam
- υ pH-5.5-7
- υ Soil testing should be done first(pH and nutrient analysis).
- υ High lime require for good litchi cultivation





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## Propagation

- ∪ Seed propagated-7-12 years for bearing
- ∪ Vegetatively propagation-Air layering(common and easiest) on 1 year old shoot.
- ∪ Root stock-*Litchi philippiensis*.
- ∪ Appropriate time for propagation-July to October.
- ∪ IBA@200ppm is used –effective rooting in air layering.
- ∪ Other method of propagation-Stooling, apical grafting, approach grafting, and shield budding.

## Cultivation

- ∪ Pit size-1mx1mx1m.
- ∪ Planting system- square system
- ∪ Spacing -10x10m(normal) 7.5x7.5m(need protection against frost and wind)
- ∪ Mixture of FYM(20-25kg),boan meal(2kg), sulphate and potash(400gm) recommended during planting
- ∪ Note:-new plants should be inoculated with mycorrhizal fungi.

## Nutrient Management

Age of the plant (in years)	Manure/Fertilizer applied (per plant/year in kg)			
	FYM	CAN (Calcium ammonium nitrate)	Super phosphate	Muriate potash of
1-3	10 - 20	0.3-1.00	0.2-0.6	0.05-0.15
4-6	25 - 40	1.0-2.0	0.75-1.25	0.20-0.30
7-10	40 – 50	2.0-3.0	1.50-2.0	0.35-0.45
Above 10	60	3.5	2.25	0.60



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**Irrigation:-**drillers or micro sprinklers.

a) from flowering to completion of the post-harvest flush.

b) duration-7 to 10 day intervals from panicle emergence to fruit harvest or until the post-harvest flush appears.

**Weed control:-**be controlled by mulching, chipping and spot-spraying with herbicides

→ (Use glyphosate at 5 to 10 ml/litre or paraquat at 1 to 6 ml@/litre plus a wetter at 1,25 ml@ per litre to control grasses and broadleaf weeds.)

**Others:-mulching, mixed cropping, inter-cropping, etc.**

✓ **Training:** making a good shape and strong frame work by removing dead and diseased branch and shoot.

✓ **Prunning:-**improve the yield and quality of fruits.

✓ **Girdling:** The Indian farmer may girdle the branches or trunk of his litchie trees in September to enhance flowering and fruiting.

**Harvesting**

∪ Harvesting time:-May-june.

∪ Maturation time:-50-60 days

∪ Litchi is non climatic fruit.

**Yield and storage**

∪ 80-150 kg fruits/tree.

∪ Storage temp:-0-1 degree celcius with 80-85%RH.

∪ Stogae life:-3-4 weeks.

∪ Grade used in litchi:-extra class, grade-I,grade-ii.



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# PAPAYA

The papaya (*Carica papaya*) is one of the important delicious fruit crop grown in the tropical and subtropical parts of the world. It is originated in Mexico and spread to almost all the corners of the tropical world. The papaya is highly productive and interesting crop. It is easy to grow as short duration crop. As a raw fruit, it is used in cooking and some preparations. Its latex is used as a papain in food and medicine industry. Ripe fruit is very delicious containing vitamin A and Carbohydrates.

**Climate and Soil:** The papaya being tropical crop favours high temperature and high humidity. It is very susceptible to frost and hail storm. The long days are favourable for good quality and flavour. During flowering, high rains are injurious and cause heavy damage. The papaya grows under wide types of soils. However, very shallow and very deep black soils are not suitable medium, fertile, well drained and lime free soils are preferred for papaya cultivation.

## Varieties

Important varieties under cultivation: Pusa delicious, CO-2, Coorg honey, Pant 1, Ranchi, Pusa majesty, CO-3, Pink flesh, Washington, Pusa giant, CO-4, Honey dew, Pusa dwarf, CO-5, Pusa nanha, CO-6.





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**Propagation:** Commercially the papaya is propagated by seeds. The tissue culture technique is limited to research laboratories only. The seeds lose viability in a short period and therefore the seeds should not be stored for more than a season. The seedlings in polybags are prepared. Due care is taken to avoid damping off of the newly germinated and young seedlings. The seedlings become ready for transplanting within 6-8 weeks.

**Planting and Season:** Planting is done during the flowering seasons:

- Spring season (February – March)
- Monsoon season (June-July)
- Autumn season (October-November)

Heavy rains, hot air, frost, etc are considered while selecting the season for planting in a particular area. The pits of 30 x 30 x 30 are prepared in already selected and prepared field at the distance of 2.5 to 3 meters distance. The pits are fitted with well-decomposed FYM and NPK mixtures. A care is taken not to disturb the roots while transplanting the seedlings.

**Interculturing:** Interculturing is mainly done to remove the weeds during the early period of growth, weeding and hoeing in between rows also favour better aeration to root zone. Some times pre-emerging weed killer like Basalin is used. Secondly, roughing is done to remove extra plants, weak plants and affected plants. After ensuring one plant per pit, earthing up is done 30 cm in radius around the plants.



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**Irrigation:** For better growth, production and quality, the optimum soil moisture is maintained by irrigating the crop judiciously. Irrigation interval well depend on season, crop growth and soil type. In no case, water should be allowed to stagnate causing root and stem rot. Drip system of irrigation is beneficial and the actual quantity of water to be given per plant per day should be worked out critically.

**Application of manures and fertilisers:** The papaya is a very feeder and requires the application of chemical, organic and biofertilisers. The dose of NPK @ 500 kg each per ha, along with 20-25 tonnes of FYM 50 to 100 kg of ormichemi micronutrients and ultrazyme sea weed extract granules. 25 kg is found for a crop of about 50 tonnes within 18-20 months. Additional 60% of this dose is again applied for the second flush.

**Plant protection:**

- Papaya Fruit Fly, Papaya mealybug, Whitefly, Aphid, Red Spider mite
- Powder mildew, downy mildew and stem rot

**Harvesting:** Usually the fruits are harvested when they are full size, light green with a tinge of yellow at epical end. When the latex ceases to be milky and become watery the fruits are considered suitable for harvesting. First picking may start at 14/15 months after planting. Three to five pickings for one season are often taken fetching about 30-35 tonnes per hectare.



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## PINEAPPLE

- , candy etc. B.N. *Ananas comosus*. M
- Family:-Bromeliaceae
- Origin:-Brazil
- It is a good source of Vitamin A and B and rich in Vitamin C and calcium.
- It contains phosphorus and iron.
- The fruit contains a special enzyme called 'Bromelin' which digests protein.
- Fruit is used for table purpose, preparations of juices, slices, tit bits, squash, jam, mixed jam.

**Climate:** Pineapple is tropical fruit. It requires moderate temperature and high humidity. The optimum temperate range is 21<sup>0</sup>C to 23<sup>0</sup>C. At low temperature, no fruit bud differentiation takes place. A well-distributed rainfall of 150 c. m. per year is adequate.

**Soil:** Crop is grown on light to medium soils. Soils should be well drained. Sandy loams, laterites and slightly acidic soils with pH 5.5 to 6.00 are suitable for crop cultivation.



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### **Propagation: -**

Pineapple is propagated by vegetative method, suckers, slips, crown and disc are used for its multiplication. Slips are best for planting.

### **Planting:**

For planting rainy season is the best, planting is done at beginning of monsoon in dry region and at the end of the monsoon in high rainfall area. Planting is done either in flat beds or in shallow trenches. The planting distance in the single row system should be 25 x 60 x 90 cm and in double row system 25 x 30 x 90cm.

### **Manuring:**

Pineapple is heavy feeder. It requires 600 kg N, 400 kg P and 400kg K per ha. Nitrogen is given in two split doses, first at beginning of monsoon and second in the month of February.



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## **Harvesting and Yield:**

It matures in both 15 to 20 months after planting. Usually flowering takes place from February to April and fruits are ready from July to September. The fruits are harvested when they just become yellow. An average yield is 10 to 15 tonnes per hectare.





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### **Varieties:**

Gaint kew or kew:- It is one of the most important cultivars of Pineapple . It is ideal for canning industry. Flesh of the fruit is yellow, fibreless and juicy. The fruit is cylindrical in shape with average weight 1.9 kg . It is a late maturing variety.

Queen :- It is the second important cultivar which is grown in our country. It is an early maturing variety, used as table variety. It is mostly grown in Bengal region. The fruits are small cylindrical, with average weight 1.2 kg. Fruit colour is golden yellow while the flesh is deep golden yellow

Mauritius :- It is a mid season variety. Fruits of this variety are medium sized with yellow and red skin.

Red spanish



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## **Removal of suckers, slips and crowns**

Suckers start growing with the emergence of inflorescence, whereas slips grow with the developing fruits. The fruit weight increases with increasing number of suckers/plant, while the increased number of slips delay fruit maturity. Crown size has no bearing on the fruit weight or quality. Hence desuckering can be delayed as much as possible, while the slips are recommended to be removed as soon as they attain the size required for planting. Removal of crown is not required as it mars the appeal of the fruit and also makes handling difficult. Partial pinching of crown consisting of the removal of the innermost whorl of leaflets along with growing tips 45 days after fruit set is ideal to get fruits of better size and shape.