



## Cultivation of Papaya: A Practical Guide

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Papaya (*Carica papaya*), belonging to the family Caricaceae, is an important fruit crop of tropical and subtropical regions. It originated in Tropical America, perhaps introduced in India in 16<sup>th</sup> century and is now widely cultivated across the world due to its attractive taste, bright colour, and high nutritional value. The fruit is rich in vitamins A and C and contains the enzyme papain, which helps in digestion. Because of its adaptability to warm climates and high market demand, papaya cultivation is considered economically beneficial for farmers. Papaya is a fast-growing and short-lived plant that starts bearing fruits within a year of planting. The fruits are green when immature and turn yellow, orange, or red depending on the variety as they ripen. It is a climacteric fruit with soft pulp and a central cavity filled with seeds (Fuggate *et al.*, 2010). Papaya plants have large lobed leaves and are herbaceous in nature. The crop is grown widely in tropical and subtropical regions, with India and Brazil being the major producers, while Mexico is a leading exporter (Evans and Ballen, 2012). Under proper management, papaya plants can produce fruits within 9–12 months, giving high yields per hectare (Gonsalves, 1998). Papaya is valued not only for its fruit but also for its medicinal and industrial uses. Different plant parts such as fruits, leaves, and roots are used for various purposes. The enzyme papain, obtained from immature fruits, is used in food processing, medicine, and other industries. The fruit is also rich in essential nutrients like vitamins, minerals, and fibre, making it highly beneficial for human health (Huerta-Ocampo *et al.*, 2012).

### Production Technology

Selection of a suitable site is essential for successful papaya cultivation. The following factors should be carefully considered:

#### Climate

Papaya performs best in warm tropical and mild subtropical climates. The ideal temperature range for its growth is 21°C to 32°C. It can be cultivated up to an altitude of about 1000 m above sea level. Exposure to low night temperatures (below 12–14°C) during winter adversely affects plant growth and fruit production. The crop is highly sensitive to frost, strong winds, and waterlogging conditions, which can cause serious damage.

#### Sunlight

Papaya requires full sunlight for proper growth and fruiting. At least 6 hours of direct sunlight daily is necessary for optimum yield.

#### Soil

Deep, fertile, and well-drained sandy loam soil is most suitable for papaya cultivation. A soil pH of 6.0 to 7.0 is considered ideal. Proper drainage is critical, as water stagnation may lead to root diseases.

## Growing and Potential Belts

Papaya is cultivated in several regions across India. Important growing belts include:

State	Growing belts
Andhra Pradesh	Cuddapah, Medak, Kurnool, Rangareddy
Assam	Nagaon, Darrang, Karbi Anglong
Gujarat	Kheda, Ahmedabad, Jamnagar
Jharkhand	Simdega, Ranchi, Lohardaga, Hazaribagh, Chatra
Karnataka	Bellary, Bidar, Bangalore (R & U), Mandya, Shimoga, Chitradurga, Mysore, Belgaum, Hassan
Maharashtra	Sangli, Satara, Pune, Nasik, Sholapur, Nagpur, Amravati
Madhya Pradesh	Dhar, Khandwa, Bilaspur, Ratlam, Guna
West Bengal	North & South 24-Parganas, Hooghly, Nadia, Midnapur

## Varieties Cultivated

Major papaya varieties grown in different states are listed below:

State	Varieties
Andhra Pradesh	Honey Dew, Coorg Honey Dew, Washington, Solo, Co-1, Co-2, Co-3, Sunrise Solo, Taiwan
Jharkhand	Ranchi Selection, Honey Dew, Pusa Delicious, Pusa Nanha
Karnataka & Kerala	Coorg Honey Dew, Coorg Green, Pusa Delicious, Pusa Nanha
West Bengal	Ranchi Selection, Honey Dew, Washington, Coorg Green
Orissa	Pusa Delicious, Pusa Nanha, Ranchi Selection, Honey Dew, Washington, Coorg Green

## Land Preparation

Papaya should be grown on well-drained upland areas. In open or elevated fields, plants are exposed to strong winds; therefore, planting windbreaks around the orchard is recommended to protect the crop.

## Planting

**Planting Material:** Papaya is mainly propagated through seeds, although tissue culture plants are also used commercially. About 250–300 g of seed is required per hectare. Seedlings are raised in nursery beds (3 m × 1 m × 10 cm) or in containers such as pots or polythene bags. Seeds are treated with fungicides like 0.1% Monosan before sowing at a depth of about 1 cm with 10 cm row spacing. Light irrigation is provided, and beds are covered with polythene sheets or straw to ensure proper germination.

**Planting Season:** Planting is generally done during:

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

**Spacing:** A spacing of 1.8 × 1.8 m is commonly followed. Higher density planting (1.5 × 1.5 m) can increase productivity. For dwarf varieties like Pusa Nanha, spacing of 1.2 × 1.2 m is recommended, accommodating about 6,400 plants per hectare.

**Planting Method:** Seedlings are transplanted into pits of 60 × 60 × 60 cm size. Pits are prepared about two weeks before planting and filled with topsoil mixed with 20 kg farmyard manure, 1 kg neem cake, and 1 kg bone meal. Spacing depends on plant vigour, with taller varieties planted farther apart than dwarf types.

## Nutrition

Papaya requires a high level of nutrients for proper growth. Along with the basal application of 10 kg farmyard manure per plant, 200–250 g each of nitrogen, phosphorus, and potassium per plant is recommended. While 200 g nitrogen is sufficient for fruit yield, higher nitrogen levels (up to 300 g) improve papain production.

## Micronutrients

Spraying micronutrients such as ZnSO<sub>4</sub> (0.5%) and boric acid (0.1%) enhances plant growth and yield.

## Irrigation

Irrigation scheduling depends on soil type and climate. During the first year, regular watering is essential. In the second year, irrigation is given every 15 days in winter and every 10 days in summer. Basin irrigation is commonly practiced, while drip or sprinkler systems are suitable for areas with limited rainfall.

## Intercultural Operations

Weed control is important, especially during the early growth stage. Regular weeding and shallow hoeing help maintain soil health. Pre-emergence herbicides such as fluchloralin or butachlor (2.0 g/ha) can be applied after transplanting to control weeds. Earthing up is done before or after monsoon to prevent waterlogging and support plant stability.

## Intercropping

Intercropping with suitable crops, particularly legumes, can be beneficial. However, intercropping should be avoided once flowering begins.

## Removal of Male Plants

In dioecious varieties, about 10% male plants are retained for pollination. Excess male plants should be removed after flowering.

## Pruning

Regular pruning of dead or damaged branches promotes a healthier and more productive tree.

## Support

As papaya plants grow tall, staking may be required to prevent lodging, particularly in windy areas.

## Plant Protection Measures

**Insect Pests:** Common pests include fruit flies (*Bactrocera cucurbitae*), aphids (*Aphis gossypii*), red spider mites (*Tetranychus cinnabarinus*), stem borers, and weevils. Removal of affected plant parts and spraying insecticides such as dimethoate (0.3%) or methyl demeton (0.05%) helps control infestation.

**Diseases:** A number of illnesses that can seriously affect papaya's growth and yield are common. One of the most destructive infections is Papaya Ringspot Virus (PRSV), which manifests as yellowing, stunted development, leaf mottling and the distinctive ring-shaped spots on fruits. Fruit quality is impacted by anthracnose, which is brought on by *Colletotrichum gloeosporioides* and causes tiny, water-soaked lesions on fruits that become black and sunken. *Oidium caricae* is the causative agent of powdery mildew, a white, powdery fungal growth on plants that causes defoliation and decreased photosynthesis. A major problem in wet settings is Phytophthora Blight, which is produced by *Phytophthora palmivora* and causes root rot, damping-off, stem lesions, and rapid plant decline. To lessen these difficulties, effective disease control using resistant cultivars, hygienic field practices, and prompt fungicide administration are crucial. It has been discovered that the infections can be effectively controlled by applying wettable sulphur (1 g/l), carbendazim/thiophanate methyl (1 g/l) and Kavach/ Mancozeb (2 g/l).

## Harvesting and Yield

Fruits are harvested when they reach full size and show a slight yellowing at the tip. Maturity is also indicated when latex becomes watery instead of milky. Papaya plants start bearing fruits within 6–9 months after planting.

The economic lifespan of a papaya plant is about 3–4 years. Yield varies depending on variety and management practices, but generally ranges from 75 to 100 tonnes per hectare.

## Conclusion

Papaya cultivation is highly rewarding due to its nutritional value and economic returns. Proper management practices, including suitable site selection, balanced nutrition, irrigation, and pest control, are essential for achieving high productivity and quality fruits.

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Fig. 1: Flowering of papaya



Fig. 2: Papaya seedlings raised in polybags



Fig. 3: Papaya tree bearing fruits



Fig. 4: Papaya ring spot virus infected plants