



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

- Botanical Name : *Carica Papaya L*
- Family : Caricaceae
- Chromosome No. : $2n = 18$
- Papaya has long been known as wonder fruit of the tropics and is one of the five major fruit crops of tropical world, papaya fruits throughout the year and a remunerative fruit crop which is grown in almost every part of the country.
- It gives maximum yield per unit and income next to banana.
- It is generally grown as fruit plant in kitchen garden, home garden or nutrition garden and later as commercial fruit.
- It is also planted as a filler plant in a fruit orchard.

Composition and Uses

Papaya is a very delicious, wholesome, refreshing fruit with a unique food value. The ripe fruits are used for desert purpose, preparation of jam, jelly, soft drinks, ice cream, flavoring, crystallized fruits, canned in syrup, fruits salad. The unripe fruits are consumed as vegetables also as a contraceptive. The seeds also have medicinal properties. The milky latex which is obtained from immature fruits is known as papain, which is a proteolytic enzyme used in several ways.

- As a digestive aid and for the treatment of ulcer & diphtheria.
- In the industry of pre-shrinking of wool and degumming of natural silk and rayon.
- Tenderization of meat and it is used for tanning of leathers.
- Used in brewing industries as a clarifying agent for beer etc.
- Used in preparation of drugs for treating intestinal cancer, tape worms, round worms and kidney disorders. The carpaine alkaloid present in green parts and in seeds used as heart stimulant, as diuretic and for treatment of amoebic dysentery.
- Preparation of chewing gum, cosmetics, papers and adhesive materials.
- It is also be used for extraction of oil from liver of Tuno fish.

Papaya is very nutritious, it contains high quantities of vitamin A and ranks second to mango in the content of vitamin-A (carotene), the vitamin A is associated with carotene but the yellow pigment of papaya is caricaxanthene. It also contains Vit. C, riboflavin, niacin, good source of Ca, P, Fe, fat and carbohydrates.

Apart from papain, raw fruits can also be used for extraction of pectin. Pectin is generally extracted using alcohol precipitation method. It is used in food industry as flavouring extract and emulsifying agent.

Tutti frutti

Papaya bits (immature) are first soaked in brine and boiled in sugar syrup and immersed in sugar syrup for 48-60 hours with permitted colours.

- The other products like, Papaya jam, canned slice, papaya beverages, fruit bars/toffee bars, soft drinks etc, could be made out of the fruits.

Origin and Distribution

- India is the second largest producer of papaya in the world after Brazil.
- It is a fruit native to tropical America and commercially grown in many parts of the world viz., Australia, Hawaii, Taiwan, Puerto Rico, Peru, Florida, Texas, California, South Africa, Pakistan, Bangladesh and India.
- In India, it was introduced by Portuguese in 1611.
- It is grown in Karnataka, Bihar, Kerala, TN, Assam, Gujarat, Maharashtra, Andhra Pradesh, Madhya Pradesh etc.

Climate and soil

- Papaya is tropical in its climatic requirement. It is susceptible to frost.
- It requires warm humid climate and can be cultivated up to an elevation of 1000-1200 m above MSL.
- It thrives well at temperature between 38-44⁰C, but optimum range is 22-36⁰C, a day temperature of 35⁰C and 25⁰C night temperature are most suitable.
- Papaya grows well under well drained soil with a pH range of 6-7.
- It prefers fertile soil, deep clayey and calcareous and rocky soils are not suitable

Species and Cultivars

The genus *Carica* contains 48 species of which, only 3-4 species are important.

1. *Cariaca papaya* – It is a cultivated commercial species and polygamous in nature.
2. *C. monoica* - Monoecious and is suited for mild climate, found in Amazon basin.
3. *C. candamarcensis* – This species is known as mountain papaya is suited to cold climate.
4. *C. gracilis* – Ornamental
5. *C. pubescens* - Mountain papaya
6. *Carica dodecaphylla* – Jaracatia
7. *Carica goudotiana* –Papayuelo
8. *Carica stipulata* – Chamburo
9. *Carica quercifolia*- Oak Leaved Papaya
10. *C. stipulate* etc.

Varieties/Cultivars

Honey dew

- It is dioecious with less percentage of male plant and breeds true to the type from seed, semi tall variety, bear fruits low on the trunk heavily.
- This variety is popular all over India, also known as Madhu Bindu

Sunrise Solo

- The variety is named 'solo' because one man can easily consume one fruit.
- This is gynodioecious variety from Hawaii with small sized fruits, pyriform and yellowish orange pulp and keeping quality is good

Coorg honey dew

- Selection from Honey dew at IIHR, Chethalli.

- This variety produces no male plants.
- The plants are either hermaphrodite or female.
- Fruits borne on female plants are almost seedless and are of excellent quality.

Washington

- The plants are vigorous, stem and leaf stalks are with purple ting, fruits medium to large, round to ovate, sweet, pulp orange colour with good flavour.

The improved strains released from Tamil Nadu Agricultural University, Coimbatore

- **Co-1:** It is a selection from variety Ranchi, dwarf type medium sized, spherical shape and greenish yellow fruits with golden yellow pulp good keeping quality, yield is about 100 – 120 tons/ha
- **Co-2:** It is a dioecious, semi dwarf, medium tall type, very good for table and papain extraction. It yields 5-6g. of papain per fruit.
- **Co-3:** A hybrid between Co-2 x Sunrise solo. It is gynodioecious in nature, Tall vigorous plant with medium sized fruits. The pulp is attractively red coloured and is good for table purpose, Yields 100-220 tons/ha
- **Co-4:** A hybrid derivative from Co-1 x Washington. It is dioecious, medium- tall plant with large fruits (1-1.5kg) , Yields 100-220 tons/ha
- **Co-5:** Selection from Washington and the plants are exclusively selected for papain extraction and yields about 14-15 g. of papain/fruit, Yields 100-220 tons/ha.
- **Co-6:** Selection from pusa majesty, it yields about 80-100 fruits and also a high papain (7.5-8 g/fruit) yielder i.e., 890 kg of dry papain/ha, Yields 100-220 tons/ha
- **Co-7:** It is also a gynodioecious developed through multiple crosses CP-75 (Pusa deliciousxCo-3) and coorg Honey dew, yields 160-180 tone/ha.

PUSA, Bihar-released some improved varieties.

- **Pusa delicious** - It is a gynodioecious with medium sized fruits (1.5kg) and high yielder, male has been eliminated genetically by sibmating with hermaphrodite.
- **Pusa majesty:** A gynodioecious, medium round fruits with good keeping quality. Plants resistant to virus diseases. The fruit with stand long distance transport.
- **Pusa giant-** Dioecious variety with big sized fruits (2-3.5 kg), plants are very vigorous and resistant to wind damage. The fruits are suitable for canning industries.
- **Pusa dwarf:** The plants are dwarf and bears fruits at 38cm from the ground, they are dioecious and medium yielder, medium sized fruits, suitable for HDP and home gardens.
- **Pusa nanha:** A dioecious dwarf mutant and well suited for kitchen garden, nutrition garden and pot cultivation. It yields about 60-65 tonnes of fruit/ha. It is developed by gama radiation, suitable for High density planting.

Varieties released from Pantnagar University- Pant-1, 2 & 3.

- IIHR, developed some hybrids, they are
- IIHR-39- Sunrise solo x Pink Flesh Sweet.
- IIHR-57- waimanello x PPS.
- Now a days Taiwan hybrids are grown on large scale – Red lady.

Propagation

- Papaya is usually propagated by seeds.
- The seeds should be collected from healthy ripe fruits essentially from of plants free from pest & diseases.
- The seeds should be rubbed with ash to remove mucilaginous coating (Aril/Sarcotesta) to facilitate better germination.
- However seeds can be stored for 45 days in a air tight container and stored at 10⁰C.
- Before sowing, soaking seeds in 100ppm GA solution to enhance germination percentage.

Sowing

- Seeds to be sown in poly bags (22 x 15 cm with 150 gauge) 6 weeks prior to transplanting.
- The media should be disinfected by using 2 per cent formalin solution, 4 seeds per polybag should be sown, if it is dioecious variety or 2 seeds, if it is hermaphrodite variety.
- Seeds also sown in raised nursery beds; About 350 g seeds are required to plant one hectare area.
- Germination will be observed in 2-3 weeks after sowing.
- About 6-7 weeks old seedlings will be ready for transplanting.

Planting

- The pit size of 1-1.5 cubic feet should be dug at 1.8 x 1.8m or at 2.4 x 2.4m apart and filled with 30-40 kg FYM with 25gm aldrin 5 per cent dust will be added to the pits and filled with top soil. Planting is done during monsoon season.
- Due to sex variation more than one seedlings are required per pit.
- In case of dioecious varieties Co-1 & Co-2, four seedlings are transplanted/pit, whereas, two seedlings are sufficient in case of hermaphrodite types like solo, Coorg Honey Dew etc.
- After planting irrigate the pit & provide staking.

Intercropping and inter cultivation

- Different short duration vegetables can be profitably grown for about six months from planting.
- For control of weeds, weedicides like fluchloralin or butachlor at 2.0 kg/ha have to be applied.
- Post emergent herbicides - Glyphosate has also been found effective.