



PRODUCTION TECHNOLOGY OF PAPAYA

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Common Name: Papita, Melon tree

Botanical Name: *Carica papaya*

Family: - Caricaceae

Chromosome Number: - $2n=2X=18$

Origin: - Mexico

Edible Part: - Mesocarp

Introduction and Uses

Papaya is a popular fruit famous for its high nutritive and medicinal values. It comes early in bearing than any other fruit crop. Produce fruits in less than a year and the production of fruit is quite high per unit area. Papaya is the most preferred fruit for kitchen garden. Normally it is planted as filler plant in orchard of fruit trees with long juvenile period. It is good source of vitamin-A (2500IU) and vitamin-C (85mg per 100gm) of fruit and is rich in the enzyme papain which help in the digestion of proteins. A small piece of raw papaya cooked along with meat makes it very tender. Papain is a very useful product it is said to remove skin blemishes is considered beneficial for the treatment of stomach ulcers, diphtheria and even cancer. It also has industrial uses. Papaya is good source of pectin, which is extracted from green fruit. (Singh and Saxena, 2008).

Climate

Papaya is basically a tropical plant it also grow well in sub-tropical parts. Low temperature and frost limit its cultivation in higher altitudes. Excessively cold nights cause the fruits to mature slowly and to be of poor quality in the winter season. It can be grown from the sea level an altitude of 1000 meters, but above an altitude of 600 meter. It can be cultivated in a temperature in a temperature range of 25-35°C. It can be grown successfully as a rainfed crop in areas with 1500-2000 mm of evenly distributed annual rainfall. High humidity affects the sweetness of the fruits. A warm and dry climate is needed during the ripening season. It is very sensitive to frost. It cannot shallow rooted plant. (Anonymous, 2015).

Soil

Papaya can be growing in a variety of soils However, a rich sandy loam is ideal for papaya plantation. It alluvial soil which is found along the deltas and river banks However it cannot grow in shallow soils that do not let water drain off easily. A fertile line free and well drained soil is preferred for papaya cultivation. Light soils with pH between 6.5-7.0 are very good for papaya. (NHB, 2020)

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. (Singh and Saxena, 2008).

Propagation

The most common method of propagation of papaya is from seeds. Seeds are collected from well mature, ripe and large fruits borne on female plants to hermaphrodite plants as the case may be. The fruits are cut open and seeds are carefully extracted in trays. They are washed and dried in the sun or shade and are stored in bottles. Fresh seeds may be mixed with fine cold wood-ash which absorbs the slimy coating on them and helps to keep the seeds separate on drying. About 500 g seed is required for raising in one hectare. Seedlings can be raised in the raised nursery beds or in polythene bags; however the seedlings from the latter one are good. Seed used for raising the seedling should be fresh as their viability is lost in about 45 days. (Anonymous, 2015)

Planting method

The seedling can be raised both on raised beds in polythene bags.

- 1) **Preparation of seed bed and raising of seedling:** - The seedbeds are prepared on well drained soil where the farmyard manure is thoroughly mixed. The seedbed should be 2 meter long, 1 meter wide and 15 cm high above the ground level. The seeds are sown in the second week of July to third week of September. The sowing of the seed in two, three lots of 15 days interval. Seed before sowing are treated with 3g. seed is enough to raise seedling for one acre. The seed are sown 2-3cm deep and 15cm apart. The distance from row to row is also kept 15 cm. A light irrigation is given immediately after sowing the seed.

Aftercare and transplanting of seedlings:- The seed germinate in 2 to 3 weeks. When the seedling have emerged, drench the nursery beds with 0.2 percent captan (200g in 100 liter of water) to prevent the damping off young seedlings. One month after the emergence, the seedlings attain the height of about 15 cm and they are recommended for transplanting in the field.

- 2) **Raising the seedling in polythene bags:-** Papaya seedling are now-a-days raised in polythene bags which stand better transportation as compared to those raised in seed beds. Perforated polythene (150-200 gauges) bags of 20×15 cm size are used as container. The bags are filled with mixture containing FYM, soil and sand in equal proportion. Two or three seeds are sown in one bag and after germination only one seedling is retained. These seedlings in the polythene bags should be treated with captan (0.2%) after their emergence. The transplanting in this case is done along with polythene bags. (Bal , 2014)

Planting operation

- 1) **Best time to plant papaya:** - The best time for papaya planting is either July- September or February- march.
- 2) **Preparation of land:** - Preparation of land, pits measuring 50cm×50cm×50cm should be dug out at spacing of 1.5×1.5×1.5m (4400 plants per hectare) and kept exposed for a few days. These should be refilled with a mixture of top soil and well rottom farmyard manure. To each pit add 10ml of chlorpyrifos 20 EC mixed in 2 kg soil as protection against white ants.

3) High density planting of papaya: - Closer spacing of 1.2×1.2×1.2m for cv. Pusa Nanha is adopted for high density planting, accommodating 6,400 plants/ ha. (Mishra and Chandra, 2008).

Important Varieties

Pusa Nanha, Pusa Delicious, Pusa Dwarf, Pusa Giant, Pusa Majesty, Pusa Nanha, Sunrise Solo, Arka Surya, Honey Dew, CO-1, CO-2, CO-3, CO-5, CO-6 etc. (Bose, 1990)

Flowering and fruiting

The species *carica papaya* is found to flower throughout the year. The plants flower is about 10 months in north India and in five in the south at the stage all male plants are uprooted, leaving about 10 to 15 percent male population in the field. The male flower appears in the axil of the 24th leaf and that of female in 18th to 20th leaf female and male flowers developed within 32 and 42 days respectively, after bud initiation. The flower opened between 8 and 11 AM. Another dehiscence was completed within 10 to 36 hours before the flower opened and the stigma become receptive a day before the flower opened remaining receptive for 6 days. The papaya took 145 to 165 days to attain ripe stage from the date of flowering.

Intercropping

Papaya is intercropped with crops like coconut, peanut, pineapple, jackfruit, coffee etc. In India they are also planted as fillers for litchi, guava and mango. This is mainly because they stay on field for 2-3 years. In case papaya is cultivated in the entire orchards. Then vegetables like garlic, radish, tomatoes, cabbage, cauliflower etc. are grown for the first year. However no crops are cultivated alongside after the first year since competition for nutrition is likely at later stages.

Irrigation

Papaya is very sensitive to water logged condition. Adequate irrigation helps in rapid fruit development and also to obtain regular fruit yield. Divide the field into segments. Generally, papaya crop is irrigated at 4-5 days intervals in summer and 8-10 days in winter depending on soil condition. If rain is there avoid irrigation. Water should not stay near the stem of plants to prevent collar rot. (Bose, 1990)

Application of fertilizers

Apply FYM 10 kg/plant as basal. Apply 50g in each of N, P and K per plant at bi-monthly intervals from the third month of planting after removing unwanted sex forms. Apply 20g in each of *Azospirillum* and *Phosphobacterium* at planting, again six months after planting.

Fustigation technique

Apply 10 liters of water per day + 13.5g urea and 10.5g muriate of potash/week through drip irrigation and soil application of super phosphate 300g per plant at bimonthly intervals starting from 3-4 months after planting immediately after thinning of plants is recommended.

After cultivation

Male trees should be removed after the emergence of inflorescence maintaining one male tree for every 20 female trees for proper fruit-set. In each pit only one vigorously growing female / hermaphrodite tree should be retained and other plants should be removed.

In gynodioecious type like (CO-3, & CO-7) keep one hermaphrodite type/pit and remove female trees.

Micronutrients

Spray 0.5 percent Zinc sulphate and 0.1 Percent Boric acid at 4th and 8th MAP to improve growth and yield.

Weeding

Weeding should be done regularly to keep the basins free of weeds when the papaya is planted as filler in orchards. Two hoeing one in February-March and other in July-August are sufficient to check the growth of weeds. No weedicides should be sprayed since papaya is a shallow rooted fruit crop and plants can be damaged.

Frost Protection

Since papaya is sensitive to frost in North India. Papaya cultivation must have adequate frost protection. Frost occurs during the months from December to February. Generally planting is done before the onset of winter. In addition, the plants are covered by thatching around them with polythene bags of the plant size. The bags must have air holes punched in them on the upper side. This is for the first winter, the next year, gunny bags can be used to wrap the plant around the fruit and at the apex.

Disease

The main diseases the affect papaya crop are Anthracnose, powdery mildew, stem rot and damping off. Water logging around the roots is the chief reason for rots to occur. Wettable sulphur, carbendazin and mancozeb are effective in controlling this disease. (Bose , 1990)

Insect-Pests

Aphids, red spider mite, stem borer, fruit flies, grey weevils and grasshoppers are the insects attacking papaya plants. Destroying the infected part and spraying prophylactic spray like 0.3% dimethoate would help control them.

Harvesting and Fruit Handling

Papaya plants tend to over bear. Fruits are so crowded that they do not get proper space for development. Fruit thinning should be done to get well sized fruits. Proper size is attained after 5-6 months of flowering. Near ripening fruits change colour from green to yellowish green. Fruits should be harvested at maturity.

After harvesting the fruit should be placed in single layer and covered with straw till ripening. For distant markets it should be packed in baskets by placing straw below and newspaper along with gunny bag above to avoid bruising of fruits. Papaya is a climacteric fruit hence; it can be artificially ripened by dipping fruits in 500ppm ethephon. At ripening fruits attain golden yellow colour of skin.

Conclusion

Papaya is considered one of the most important fruits because it is a rich source of antioxidant nutrients, vitamins C, fiber and minerals (e.g., potassium and magnesium). Factors such as fungal diseases, physiological disorders, mechanical damage or a combination of these are the leading causes of post-harvest losses. In addition, papaya is a source of the digestive enzyme papain, which is used as an industrial ingredient in brewing,

meat tenderizing, pharmaceuticals, beauty products, and cosmetics. Production in India has increased significantly within the last few years.

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