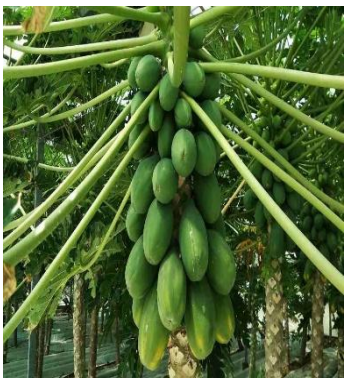
Advanced cultivation of papaya through organic method



Papaya has an important place among fruits. This fruit is used both raw and cooked. It is cultivated in most parts of India. Papaya contains abundant amount of vitamin A. Papaya is a panacea for people who have indigestion problems. Its consumption eliminates the problem of indigestion. This fruit calms bile and creates interest in food. It contains sufficient amount of water which helps in keeping the skin moist. Apart from this, papaya is also used in homemade beauty products. Many people apply papaya pulp on the face which brightens the face and keeps the skin moist. Papaya is widely used in the beauty world and industry. If it is cultivated in an advanced way, more income can be obtained at a low cost. Along with its cultivation, intercropping can also be done. Leguminous crops like peas, fenugreek, gram, French beans and soybean can be grown along with it but keep in mind that crops like chilli, tomato, brinjal, ladyfinger etc. should not be grown as intercrops between papaya plants. This harms the papaya plant.

Climate and soil for papaya cultivation

Papaya can be cultivated well in hot and humid climate. The temperature between 10° C – 40° C is best for papaya cultivation. The maximum temperature should not be above 40° C and the minimum should not be less than 5° C. Papaya is greatly damaged by heat and frost. For papaya cultivation, light loamy or loamy soil with 6.5-7.5 pH value and good drainage is most suitable. The depth of the soil should not be less than 45 centimetres.

Popular varieties of papaya

Red Lady: This variety has been developed by Punjab Agricultural University, Ludhiana, which has been named Red Lady 786. It is a hybrid variety. The specialty of this variety is that male and female flowers are on the same plant, which guarantees fruits from every plant. In other varieties of papaya, male and female flowers bloom on different plants, so it is difficult to identify which plant is male and which is female until the flowers bloom. This variety is ready in just 9 months. The weight of the fruit is between 1.5-2 kg. Its fruits are very tasty. It contains 13% sugar. It is not affected by papyric spot virus which affects ordinary papaya and it is tolerant to ring spot virus.

Pusa Delicious: This is a gynodioecious variety of papaya. Its plants are of medium height and give good yield. It is a variety with good taste, aroma and deep orange-coloured fruits, whose average yield is 58 to 61 kg per plant. It has a total soluble solids content of 10 to 12 Brix. The average weight of the fruit of this variety is 1.0 to 2.0 kg. The fruits start appearing on the plants

at a height of 70 to 80 cm from the ground surface. The fruits of this variety start appearing after 260 to 290 days of planting.

Pusa Dwarf: The plants of this variety are small and give more production of fruits. The fruits are oval shaped and weigh an average of 1.0 to 2.0 kg. The fruits start appearing on the plant at a height of 25 to 30 cm above the ground surface. This variety is most suitable for high density orcharding. Its yield is 40 to 50 kg per plant. When the fruit ripens, the pulp is yellow in colour.

Pusa Giant: The plant of this variety is strong, has good growth and has the ability to withstand strong winds. This is also a dioecious variety. The fruits are large in size with an average weight of 2.5 to 3.0 kg, which are suitable for the canning industry. The average yield per plant is 30 to 35 kg. This variety is also quite suitable for making petha and vegetables.

Pusa Nanha: This is a very dwarf variety of papaya, in which fruits start appearing 15 to 20 cm above the ground level. This plant can also be planted in orchards and pots on the roof. This is a dioecious variety which can bear fruits for 3 years. It has a total soluble solid of 10-12 Brix. About 25 kg of fruit is obtained per plant from this variety.

Arka Surya: This is a gynodioecious variety of papaya. Its average weight is 500 to 700 grams. Its total soluble solids are 10 to 12 Brix. This is a hybrid variety developed by Solo and Pink Flesh Sweet. The average yield of this variety is 55 to 56 kg per plant and the storage capacity of the fruit is also good.

Seed rate and seed treatment

100-120 grams of seeds are required for one acre area. Seeds collected from fully ripped fruit, well dried and kept in a glass jar or bottle with a covered mouth and not older than 6 months are suitable.

Preparing a Papaya Nursery

Growing plants in a nursery is very important for papaya production. Seedling trays/plastic bags/jute bags/wooden boxes are used for sowing seeds. Plastic bags of 200 gauge and 20×15 cm size are suitable. To grow the plant, prepare a mixture by mixing leaf compost, soil, sand and rotten cow dung manure in the ratio of 1:1:1:1. Before filling the mixture, treat it with 5 grams of Trichoderma powder per kilogram of mixture and leave it for 24 hours. After this, fill the seedling trays/plastic bags/jute bags/wooden boxes. Two seeds are carefully sown in each at a depth of 3 cm and light irrigation is done. After this, light irrigation should be done at an interval of 2-3 days to maintain proper moisture. Excessive and frequent irrigation should be avoided otherwise rotting and wilt disease occurs. The seeds germinate within 15-20 days of sowing. When the height of the plants is 25 cm and 4 to 5 leaves appear, that is, about two months after sowing the seeds, the

plants are ready for planting in the field. In Northern India, the right time for sowing seeds in the nursery is March-April or June-August.

Preparation of field for transplantation

Before planting the saplings, the field should be prepared well and levelled so that water does not accumulate. Then for papaya, pits of 50×50×50 cm size should be dug at a distance of 2×2 meters and they should be left open for 15 days so that the pits get proper sunlight and harmful insects and germs etc. are destroyed. After this, the plant should be planted. Per pit, 10 kg of rotten cow dung manure/ vermicompost/ Ghanajeevamrut, 500g of gypsum, 500g of neem cake should be mixed well in the dug soil and filled in the pit so that it remains 10-15 centimetres above the ground. After filling the pit, irrigation should be done so that the soil settles well.

Transplanting of seedlings

On the day of planting, at 11 am, 10-12 litres of water should be poured into each pit to moisten the soil. Planting of plants should be done after 3 pm. Immediately after planting, each plant should be given 1 litre of water while bathing.

Irrigation and other activities

It is very important to maintain the correct moisture level in the soil for good growth of papaya plants and production of good quality fruits. Excessive lack of moisture has an adverse effect on the growth of plants and fruit production. Generally, irrigate as per requirement at an interval of 10-15 days in autumn and at an interval of 5-7 days in summer. The modern method of irrigation, drip technology, can be adopted. Apart from this, keep removing the weeds growing around its plants from time to time. Although this problem is less in this, but during the rainy season, weeds grow more, they should be removed. Apart from this, smoke should be made in the field to protect it from frost in winter and irrigation should be done as per need to maintain moisture in the field.

Manure and Fertilizer

Papaya starts bearing fruits early, therefore availability of nutrients in the soil is necessary in sufficient quantity. Therefore, to get a good crop, 5 kg of Ghanajeevamrut/ vermicompost, 25 grams of gypsum, 100 grams of neem cake should be mixed and given three times in the months of March-April, July-August and October. 1 litre of Jeevamrut should be dissolved in ten litres of water and given in the basins per plant every month just before irrigation.

Harvesting and Yield

Fruits become ready to be plucked after 10 to 13 months of planting. The colour of the fruit's changes from dark green to light yellow and if water and liquid comes out instead of milk by

applying nails on the fruits, then it should be understood that the fruit is ripe. 40-70 kg of yield is obtained per plant.

Major insect-pests and their control measures

1. Whitefly

White fly is a small sized winged fly whose body is light yellow in colour on which a greasy substance like white powder is stuck. The wings are white in colour and legs are long which suck the juice of the leaves and cause damage due to which the leaves turn yellow and start curling downwards. Black spots start appearing on the fruits. Low temperature, high humidity and less rainfall help this insect to spread. This insect is a major vector in the spread of viral and bacterial diseases like leaf curl disease etc.

Control measures

- Along with keeping the orchard clean and weed free, the upper surface should be lightly hoed so that the birds eat and destroy the insect remains.
- Spraying of 5-7 days old buttermilk at the rate of 250 ml per 15 litres of water is beneficial.
- In case of insect infestation, Neemastra should be sprayed twice at an interval of 10 days or Neem oil solution (3 ml per litre of water) should be sprayed.

2. Aphids

Both the larvae and adults of this insect suck the juice from the lower surface of the leaves and act as the carrier of mosaic disease in the plant.

Control measures

- Yellow sticky trap should be used.
- In case of severe infestation, spray 250 ml of Neemastra per litre of water twice at an interval of 7 days.
- Aphids are effectively controlled by spraying 3 ml of vinegar per liter of water.
- Spraying of 5-7 days old buttermilk at the rate of 250 ml per 15 litres of water is beneficial.

3. Red spider mite

This is the main pest of papaya, due to which the fruits become rough and black in colour. And in case of attack on leaves, the leaves become mouldy and turn yellow.

Control measures

- As soon as the attack is seen on the plant, the affected leaves should be plucked and buried in a pit far away.
- Agneyastra solution should be sprayed at the rate of 250 ml per litre of water twice at 10 days interval.
- It is beneficial to spray 5-7 days old buttermilk at the rate of 250 ml per 15 litres of water.

4. Mealybug

This insect is round in shape and somewhat long, whose body is covered with a white greasy powder like flour, which is removed from its body by this insect. This insect lays white eggs on the lower surface of the leaf, from which the babies emerge within 25-30 days. Both the larvae and adults suck the juice from leaves, soft branches, flowers and fruits, which affects the growth of the plant and the fruits become deformed and of poor quality. This insect grows rapidly in high temperature and low humidity.

Control measures

- Keep observing the orchard. If infestation of the insect is seen, the affected leaves and fruits should be plucked and destroyed.
- This insect infestation is more in conditions of low and high humidity; therefore, the orchard should be irrigated regularly through the basin method.
- Spraying of 5-7 days old buttermilk at the rate of 250 ml per 15 litres of water is beneficial.
- In case of high infestation, spraying of Neemastra/ Brahmaastra should be done twice at an interval of 10 days.
- In case Neemastra/ Brahmastra is not available, Neem oil solution (3 ml per litre of water) can be sprayed.

5. Fruit fly

Fruit fly is brown or dark brown in colour. Its wings are transparent. A fly lays about 2000-3000 eggs in its lifetime. The fly lays eggs by inserting its genitals inside the fruit. Within 3 days, white caterpillars emerge from the eggs which eat the fruit from inside. Its life cycle is of 16 days.

Control Measures

- Irrigation should be done at appropriate intervals and the amount of moisture should be controlled.
- Yellow coloured sticky traps should be used in the garden during the fruiting period.
- Fruits should be plucked on time. The fallen fruits in the garden should be removed and destroyed immediately.
- In case of pest infestation, Neemastra/ Agneyastra should be sprayed twice at an interval of 10 days or Neem oil solution (3 ml per litre of water) should be sprayed.

Major diseases and their prevention

1. Damping off

This disease is mainly caused by fungus in the nursery, which causes a lot of damage to the plants. Its effect is most on the newly germinated plants, due to which the plant rots and falls down near the ground. The measures used to prevent this disease should also be kept in mind.

Prevention of disease

- To prevent this, before sowing, the soil of the nursery should be treated with 2.5 percent solution of formaldehyde and covered with polythene for 48 hours. This work should be done 15 days before planting the nursery.
- To prevent this disease in the nursery, spraying of Trichoderma (3 grams per litre of water) should be done at an interval of one week.
- The nursery should be kept covered with plastic during rains.
- The location of the nursery should be changed time to time.

2. Collar/ stem rot

The first symptoms of this disease of papaya appear in the form of watery spots or patches on the stem of the plant near the ground surface. In favourable weather, these watery spots (patches) increase in size and form a belt around the stem. The leaves on the top of the diseased plant wither and their colour turns yellow and such leaves die and fall prematurely. The diseased plants do not bear fruits, even if the fruits are formed, they fall before ripening. Due to the weakening of the diseased part of the stem, the entire tree breaks and falls from the base and such plants finally die.

Prevention of disease

- Papaya should not be planted in waterlogged areas. There should be proper arrangement of water drainage in the papaya garden.
- Before planting, mix 1 kg of Trichoderma in 100 kg of rotten cow dung or compost in the pits and then use 5-6 kg of it in each pit. By doing this, the severity of the disease decreases and the plants grow well.
- The diseased plants should be uprooted along with their roots and burnt immediately. By doing this, the spread of the disease decreases.
- Irrigate the soil around the plant thoroughly with one percent Bordeaux mixture. Do this 2-3 times in June-July depending on the severity of the disease.

3. Leaf curl

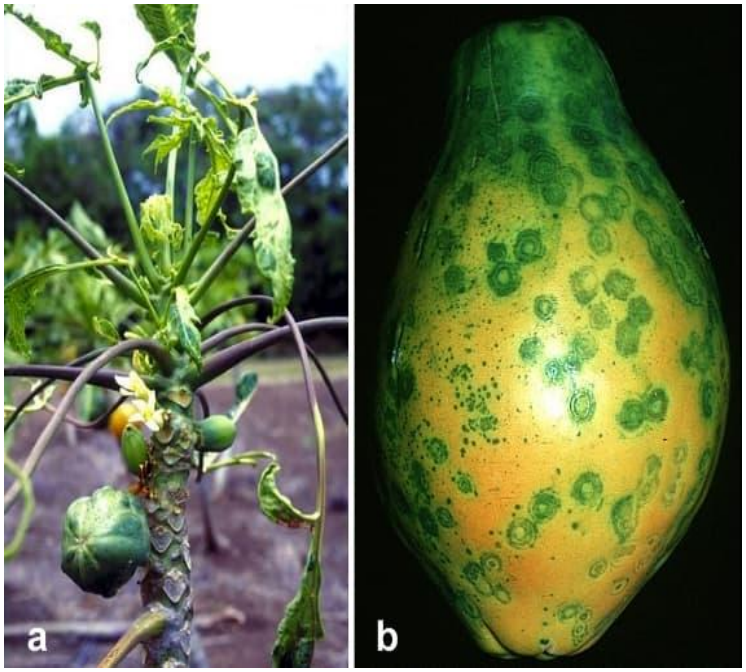
Symptoms of leaf curl disease are seen only on leaves. The affected leaves become small and wrinkled. Deformation of leaves and yellowing of their veins are common symptoms of the disease. The affected leaves turn downwards and as a result they look like an inverted cup. This is a special symptom of leaf curl disease. The leaves become thick, brittle and rough due to overgrowth on the upper surface. Affected plants bear fewer flowers. In the severity of the disease, leaves fall and the growth of the plant stops.

Prevention of disease

- Always use healthy plants for transplantation.

- On seeing symptoms of the disease, the affected plant should be uprooted and burnt.
- This disease is spread by an insect called white fly, for the control of which a solution of Brahmastra/Agneyastra should be prepared at the rate of 250 ml per litre of water and sprayed at an interval of one month after transplantation.

4. Ring spot disease

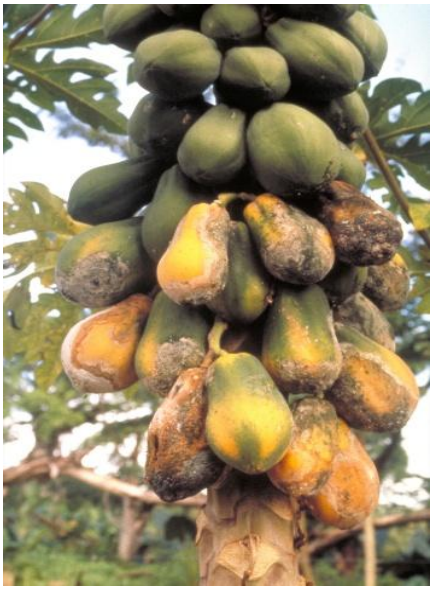


Papaya ring spot virus (PRSV) is a major threat to papaya cultivation, causing huge economic losses and affecting food security globally. This virus is highly contagious and can destroy papaya crops if not managed effectively. Symptoms of this disease first appear on the soft leaves of papaya plants. When affected by this disease, spots start forming on the leaves and the leaves appear small in size and torn. Dark green blisters appear on the leaves and the leaves start curling downwards. After some time, symptoms of the disease can also be seen on the stems. Dark green spots and long stripes start forming on the stems. As the disease progresses, spots start appearing on the fruits as well. These spots turn brown when the fruits ripen.

Prevention of the disease

- Always use healthy plants for transplantation.
- Planting papaya plants after the rains reduces the chances of this disease.
- The use of neem cake and compost manure in the field reduces the spread of this disease.
- On seeing the symptoms of the disease, the diseased plant should be uprooted and burnt.
- This disease is spread by an insect called aphid. For controlling this insect, yellow sticky trap should be used. In case of severe infestation, a solution of 250 ml of Brahmastra/Agneyastra per litre of water should be prepared and sprayed twice at an interval of 7 days.
- Spraying a solution of 3 ml of vinegar per litre of water effectively controls aphids.

5. Fruit rot



This is the main disease of papaya fruit. It has many fungal agents in which *Colletotrichum gloeosporides* is the main one. Semi-ripe and ripe fruits are affected. In this disease, small round wet spots are formed on the fruits. Later they grow and merge together and their colour becomes brown or black. This disease occurs from the time of fruit setting till ripening due to which the fruits fall before ripening.

Prevention of the disease

- There should be proper arrangement of water drainage in the orchard.
- The affected plants should be uprooted along with the roots and burnt, and other new plants should not be planted in place of the affected plants.
- There should be no plants of the pumpkin family around the papaya garden.
- When symptoms of the disease appear, spray one percent Bordeaux mixture 2-3 times at 7 days interval.

For more information, please contact

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