

**A GUIDE TO**

**PAPAYA**

**GROWING**

**AND**

**MARKETING**

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## INTRODUCTION

**PAPAYA (*Carica papaya*)** is one of the very popular tropical fruits belongs to the cactus group of plants. While it can tolerate dry and hot environment, it needs adequate water supply through out its life span. It prefers deep loamy soils rich in plant nutrient, well drained, good air flow and plenty of sunlight.

### DESCRIPTION

Papaya is a fast growing tree-like herb that reaches 3 to 10 meters tall. It is usually without branched during its initial growth, When it reaches maturity usually after one year of production, new shoots appear at the lower trunk that develop into branches when the plant reaches it maximum high or when the main top stem is prune off

The whole plant contain a rich sap or white latex from which the substance called PAPAIN is extracted.

The leaves are arranges spirally, greenish or purplish green, measuring 25-27 c, in diameter. The leaves have 7-11 lobes that have prominent vains and are deeply and broadly toothed. Male, female and hermaphrodite (containing both male and female parts) flowers are found in separate plants. The fruits weigh 200 – 300 grams. for solo variety and up to 10 kilograms for the large variety. The flesh is yellow to re-orange when ripe. It tastes from watery blunt to sweet and very sweet with a mild and pleasant flavor and roma. Fruits from female plants are rounded while those from hermaphrodite plants are elongated or oblong. Seeds are numerous and are enveloped by a gelatinous seed coat.

### VARIETIES

There are generally two groups of papaya varieties, the small fruits called solo weighing 500 grams below and big fruits weighing 500 grams up to 10 kilos. They are both used as fresh table fruit. Some big varieties are used for processing and canning.

Tree fruits weighing less than 500 grams are called solo papaya because one fruit, can easily be consume by one person. There are several varieties of this size. Among them are Sunrise, Sunset, Kapoho, Hawaii, etc.

Big fruits are named after the place they are found to be growing like the Cavite Yellow. We have several native varieties. Morado is named according to its color. Because of the natural out-crossing, the plants do not produce true to type.

## **USES**

Ripe papaya is eaten fresh as breakfast and dessert fruit. It is made into fruit salad or juice and can be processed as jelly, marmalade, candies and crystallized fruits. Green fruits are pickled or cooked as vegetable. Flowers and young leaves may also be eaten. **PAPAIN** extracted from green mature fruits has industrial uses. (for Beer industry, as meat tenderizer, for certain drug preparations, silk degumming, and softening wool). Seeds may be used to expel intestinal worms and to induce abortion.

## **SOIL & CLIMATIC REQUIREMENTS**

1. Papaya is best grown in warm areas, plenty of sunlight.
2. They need adequate moisture and even distribution of rainfall throughout the year.
3. Papaya can not stand strong winds, but moderate airflow is ideal to keep them dry and avoid fungal infection to remain on plants. Where strong winds prevail, provide wind breaks by planting tall leafy trees across the wind path.
4. Papaya grows best in light, well-drained soil rich in organic matter. It can tolerate any kind of soil provided it is well drained but not too dry. Their roots are sensitive to water logging that even a short period of flooding say 3 hours can kill the plant.
5. Papaya grows best at 6.0 to 6.5 pH but can tolerate 5.8 to 7 pH.
6. Papaya is a tropical plant, prefers warm climate with abundant rainfall or irrigation. Temperature range of 21°C to 33°C is ideal for sturdy growth but higher temperature can be tolerated with adequate soil moisture and not too low relative humidity. This condition will produce sweeter fruits and firmer flesh.
7. Rainfall of 1.0 inches per week, well distributed during the growing season, is ideal. Poor drainage and standing water can kill the plant.
8. Papaya grows best at near sea level elevation although they can be found to grow even at 2000 meters above sea level. For high grades commercial production, papaya is best planted at elevation below 500 meters.

## **CULTURAL MANAGEMENT**

### **Propagation**

Papaya is propagated with seeds. Wash the seeds and remove the gelatinous covering as this can inhibit germination. Get seed from selected fruits produced by controlled pollination to insure the quality and uniformity of the plantings. Raise 3-4 seedlings per container (plastic bag) and field plant when they are 20 cm high.

## **Land preparation**

For open field planting, the land is plowed and harrowed twice. An elevated plot along the row is made by plowing on barring with two passes on each side. This will insure proper irrigation and drainage. Organic fertilizer and manure should be spread and incorporated in the soil during land preparation. .

## **Planting**

Planting distance is 2,5 m x 1.6 m to 3m x 2 m. This can be increased if papaya is inter-cropped with coconut and other crops. Retain one female or one hermaphrodite plant per hill by thinning out extra plants at flowering stage. In the absence of hermaphrodite plants, one male plant per 25-100 female plants is retained as pollinator.

There are no reliable characteristics to distinguish male, female and hermaphrodite plants until they bear flowers. This is the reason why 2-3 plants are recommended to be planted and allowed to grow on each hill until flowering. The plants bear flower in 6 months after germination. When the flowers appear and the sex determined, remove the male and undesirable plants. Leave only on vigorous hermaphrodite or female plant.

1. Remove side growths along the leaf axles that occur during the early stages of plant growth. They compete with plant nutrients needed by the plant. These areas can also harbor pests and diseases.
2. Always exercise general sanitation. Clean fields minimize spread of pests and diseases.
3. Regularly remove diseased, senescent and dried leaves. These areas provide good habitat and unnecessary source of pests and diseases.
4. Cut down and carry away blown down and diseased trees from the field. Diseased leaves and fruits will be removed and buried or burned.

## **Irrigation**

To minimize flower drop or fruit drop, irrigate the plants before the soil gets dry. Weekly watering is advisable during dry months. Avoid too much watering to avoid fungal infection. See to it that soil is aerated from time to time through shallow cultivation too avoid root rot.

1. If possible, transplant during the rainy or cloudy days to assure good plant start.
2. After transplanting, make sure the plants get adequate water every 2-3 days until they are well established.
3. Water the papaya plants regularly especially when the climate is hot or dry to prevent growth retardation, flower abortion and dropping of young fruits.

## Fertilization

The best fertilizer are the foot prints of the owner in the field. This is to say, plant nutrition should constantly be monitored and needed fertilizer is applied on time. The best fertilizer is the organic compost mixed with the soil during land preparation. This should be augmented with chemical fertilizers high in potash and contain trace mineral elements. Boron is one critical element that needs to be always present as it is needed for flower fertilization and fruit development. 20-40 grams Boron is adequate for each plant.

### FERTILIZER RATE PER HECTARE PER MONTH

AGE (Months)	Amium Sulfate (21-0-0)	Muriate of Potask (0-0-60)	TripleSuperPhosphate (0-24-0)	Rate per Hill
1 to 4	3.0 bags	2.0 bags	-	185 grams
5 to 7	5.0 bags	2.0 bags	-	255 grams
8 to 11	6.0 bags	3.0 bags	-	330 grams
6, 12, 18	6.0 bags	3.0 bags	2.0 bags	400 grams

## Propping

Propping is necessary to support the growing plants, especially during the fruiting stage.

1. Use wooden poles, or bamboo as propping materials.
2. Prop only leaning plants. Observe what direction the plant is leaning to. This is where you place your poles keeping in mind to contract gravitational force.
3. Use two poles by forming an X placed along the center of gravity of the plant. Wrap or cushion the point of the plant where the poles are tied with used fertilizer bags to avoid hurting the plant. Cut or wounded stems may induce stem rot. So avoid cutting or bruising the stem.

## Weed control

Weeding is very necessary for papaya, to sanitize its immediate environment from insect pests that climb the trunk like ants carrying aphids and scales. It will remove competitor for plant food nutrients in the soil. Weeds ar host and vector/carrier of pest and plant diseases.

1. Round weed newly established fields. Clean an area of one meter radius around the base of the plant.
2. We avoid herbicides as much as possible since they kill microorganism in the soil that helps enhance decomposition of organic wastes into fertilizer and plant food.
3. Slash tall weeds in between the rows or pass them with harrow to keep them down.
4. Maintain the cleanliness of the field at all times.
5. Always remember tha weeds can reduce by 25% your production.

### **Pest and disease management**

1. **Oriental fruit fly** is a major pest of papaya that exporters are concerned. They deposit their eggs on mature fruits. Harvest fruits at the mature green stage and dispose properly over ripe & infested fruits to avoid spread of pest.
2. **Army and Cut-worm** – The larvae feeds on young and mature leaves of the host plants, making large holes on the leaves. Control – Decis, spray the leaves and stems after emergence. Repeat procedure every two weeks. Use 1.5 tbs. per 16 liters water (1 knapsack load sprayer).
3. **Grubs (Japanese Beetle)**. As the larvae grow older, they become voracious and feed on the roots. Control Decis – use 4 tbs. per 16 liters water. Drench the soil at the base of the stem. Apply organic fertilizer with herbal pesticide property.
4. **Scale insects** – Round, oval pear shaped flattened scales of various colors on trunks or fruits. Control – Spray Malathion 4 tbs. per 16 liters water. Spray Lime sulfur 1 tbs per gallon water.
5. **Red spider mites** – Tiny 8 legged yellow, dark green or reddish spider on the underside of foliage. Mites prefer to feed on very young plant tissues. They can transmit viral disease. Prevention – A heavily infested parts (branches and leaves) should be pruned and buried or burned. Spray with herbal insecticide or Lime sulfur. When planting, see to it that seedlings are clean without infestation or diseases.
6. **Mites and aphids** suck plant sap and may transmit virus diseases. To control, remove alternate host, ants and allow natural predators and enemies in the plantation. Spraying herbal insecticide and lime sulfur underneath the leaves will greatly help clean the plant of these pest.
7. **Thruioops** – Tiny, elongated, winged dark brown or black adults – white or yellow when young. Control by spraying Malathion, Decis or Lime sulfur at weekly intervals.

8. **White flies** - Minute winged insects – Control Spray with Malathion and Lime sulfur. Herbal pesticide will also drive away the insect pest.
9. **Nematodes** also cause damage to papaya roots. Planting marigold or spreading organic fertilizer will greatly help suppress nematode infestation.
10. **Damping-off** infect both the seedlings and the mature plants. Cultivating the soil to aerate with good drainage will reduce this fungal disease. Allow sunlight to penetrate the soil surface to dry-off the fungus.
11. **Anthracnose** infects the fruits during ripening. They appear as circular spots on the fruit. Spraying herbal fungicides at weekly interval before harvest is an effective control. Hot water treatment similar to mango (dip in 45°C for 20 minutes or 52°C for 10 minutes. 58°C for 30 seconds) reduce or eliminate decay. See to it that the fruits are well dried after the hot water treatment. **Control** - Spray Dithane M-45 6 tbs. per 16 liters water, Mancozeb or Zineb use 2.5 tbs. per 16 liters water, Lime sulfur mix 1 tbs. per gallon of water.
12. **Papaya ring-spot virus** initially appears as oil streaks on stem and petioles and as it progresses, mottling of leaves become evident. Severely infected plants do not flower or they die young. To control, plant is isolated, removed and burned. Use tolerant varieties.
13. **Ants** – Small to large, yellow, red brown or black winged or wingless ants. They live in colonies. Control – Regular hand weeding and cultivation at the base of the plant to disturb foraging ants and nests. Maintain a weed free area at the base of each plant, the diameter of which is the same as the plant canopy
14. **Mealybugs** – Flatten oval insects (1-4 mm long). They can transmit a viral disease known as leaf drop and will cause a reduced yield. Control by spraying Malathion at the rate of 1.5 to 3.0 tbs. per 16 liter knapsack sprayer or 4 tbsp. Lime sulfur. Control the presence of ants that spread mealy bugs and other minute insects. Spray herbal pesticide.
15. **Aphids** – These are tiny lice-like insects with color ranging from pink yellow, brown to black. They can transmit a viral disease known as rosette. Control by spraying Decis the stem, leaves after emergence. Repeat procedure every two weeks, Use 1.5 tablespoon per 16 liters of water (1 knapsack spray load). Spray weekly with Lime sulfur 1 tbs. per gallon water.
16. **Phytophthora** – Roots, fruit and stem rot. Seedling damping-off, root rot, trunk cankers and fruit rots. Prevention by removal of infected plants and fruits from the field and dispose properly by burying or burning. Control with



Treat the fruits with dip in hot water (45°C for 20 minutes, 52°C for 10 minutes or 58°C for 1 minute). Air dry the fruits and wrap in clean paper and place in wooden or hard plastic fruit crates. Never allow harvested fruits to be exposed to direct sunlight. Transport them carefully by stocking fruit crates so as not to allow movement and bumping during transit to market.

**YELLOW AND RED PAPAYA SPECIFICATIONS  
FOR PROCESSING**

Fruit Size	Diameter greater than 5" Length greater than 10"
Flesh Thickness	¾ " to 1 inch
Internal Maturity	At least 2" from stem-end in 50% color
Shape	Cylindrical or round
Freshness	Firm (half-day old)
Bruising	Maximum of ¼ skin surface
Appearance	Disease free fruits. No mechanical damage
Others	Free from toxic pesticides, nitrates and other chemical residues.

**Marketing**

Markets of papaya are: domestic, export and processing plants. There are fruit traders and consolidators who buy from farmers and transport them to the cities for retailers. Some big fruit processors and exporters enter into growers marketing contract. Other growers have their own market outlets or suki. Prices vary according to variety and the supply and demand situation.

While papaya has a big export demand, only a few exporting companies have access to these markets because of the stringent requirements and big capital outlay. Government agencies like D.A. and DTI with their commercial and agricultural attaches assigned abroad can greatly help develop export market for papaya and other fruit commodities produced in the Philippines.

**Prices**

Price ranges differ in different areas and variety. Solo papaya usually command a higher price from P5.00 to P10.00 a kilo while the large varieties for processing are purchased at P2.50 to P3.50 a kilo. Retail prices ranges from P6.00 to

P15.00 a kilo ripe fruits. Cost of production however ranges from P1.50 to P3.50 a kilo. Profitability of papaya growing is based on market situation.

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