

Harvest Maturity Indices

Papayas require about 3 months from flowering to fruit maturity. The main measure of harvest maturity is skin colour. Immature fruit are entirely green in colour. As the fruit matures, streaks of yellow appear at the blossom end. At this stage, the fruit is mature but not fully ripe. The fruit will continue to turn yellow, eventually ripening to a completely yellow or yellow/orange colour.

Fruit harvested at the immature green stage will not ripen properly, will taste flat, and shrivel too early. Flavour and taste improve as the fruit turns more yellow in colour, but firmness decreases. Fruit intended for the domestic market can be harvested at a more mature stage than export market fruit.

Domestic marketed fruit should be harvested when the skin colour is between one-quarter to one-half yellow. Fruit harvested at the full yellow or yellow/orange colour stage will be highest in sugar content, but the texture will be soft. Fruit harvested at this stage is too soft and bruises easily during transport.

Papayas for export should be harvested between the one-stripe stage (one yellow stripe showing at the blossom end) and the quarter-ripe stage (some yellow at the blossom end). Fruit harvested at these stages will be able to withstand the transport to distant markets.



When transporting fruit, it is important to note colour of the fruit, how long the fruit will be in transit, and the temperature at which the fruit will be stored during transit to ensure that the fruit arrives at the export market in the correct state of maturity. Many importers prefer fruit to arrive at the half-yellow colour stage.

Destructive measurements used for determining harvest maturity include internal pulp colour and % soluble solids content (sugar content). These indices are used to test randomly selected fruit in order to compare fruit size with maturity. The internal pulp colour of mature papaya fruit changes from cream to yellow-orange as the

external skin colour changes from green to yellow-orange. The soluble solids content of mature fruit should be at least 11.5%, and can be determined by placing several drops of juice on a hand-held refractometer.

Harvest Methods

Papayas are harvested manually by hand, with a knife, or with a specialized cutting blade. When harvesting by hand or with a knife, the fruit is either snapped off or cut off the tree. If a portion of the stem is still attached, it should be trimmed closely against the top of the fruit. Latex out of the cut stem end can cause staining of the fruit surface.

Papaya fruit is very sensitive to bruising and must be handled gently at all times. Fruit should not be allowed to drop to the ground, as this will cause bruising and brown spots, soften the pulp and increase chances of postharvest decay. Papayas should be harvested during the coolest part of the day. As the fruit temperature rises, it is easier to bruise.

The first sorting of marketable versus unmarketable fruit should be made in the field. Severely damaged or defective fruit should be put into a separate container and thrown out in a location away from the papaya trees to minimize the build-up of disease prone materials in the area. The remaining marketable fruit, whether intended for local market or export, should be carefully placed in a strong, well-ventilated, padded, stackable field container. The field container should not hold more than 20 kg (44 lb) of fruit and should be put in a shaded area when full. Use of canvas sacks, non-padded reed baskets, or large volume field containers will result in considerable fruit bruising and injury. Wooden crates or durable plastic containers are better field containers. Field containers that have a rough or uneven inside surface will scrape the skin and will result in uneven coloration of the skin as the fruit ripens.



Preparation for Market

Cleaning

If the fruit surface is not very dirty it can be cleaned with a damp cloth or cotton gloves. Washing may be required to remove latex stains or enhance the appearance for a particular market. The wash water should be clean and properly sanitized to reduce the spread of disease. A mild detergent may be added to the wash water to improve cleaning efficiency. Hypochlorous acid (household bleach) is commonly used as the wash water-sanitizing agent. It is effective against decay organisms when maintained at a concentration of 150 ppm and a water pH of 6.5. This is equal to 2 oz of household bleach (such as Marvex) per 5 gallons of water, or .3 liters of bleach per 100 liters of water. The fungicide thiabendazole (TBZ) should also be added to the wash water at a 500 ppm concentration for postharvest disease control. Follow manufacturer's instructions for using fungicides. Also, the wash water tank should be changed when necessary and filled with clean water containing hypochlorous acid and TBZ.

Grading

Fruit should be carefully sorted according to size, shape, and external colour. All fruit within the same market container should be identical in size, shape, and skin colour. Export fruit must not have bruises, latex burn, skin blemishes, insect damage, physical injury, surface scars, or disease. Shriveled and discoloured fruit should be discarded. The fruit should be firm and at the one-stripe stage to quarter-yellow in skin colour.



Waxing

Application of a surface wax will help reduce shrinkage and give the fruits a glossy appearance. Several types of waxes, generally carnauba or shellac based formulations, work well on papaya.

Packing

Fruit should be separated and packed according to size or weight, which will result in different fruit counts in containers. Papayas sold in the domestic market should be



packed in strong, well-ventilated wooden or fiberboard containers. They should be padded on the inside if the inner surface of the container is rough.

Export market fruit should be packed in strong, well-ventilated fiberboard cartons. North American and European markets usually prefer papayas packed in a single-layer carton with a net weight of 4 kg or 4.5 kg (9 lb or 10 lb). A thin cushion of foam or shredded paper is often put in the base of the carton to minimize surface scratching and injury during transport. Cartons of pear-shaped Hawaiian types are usually packed with 8 to 16 uniformly sized fruit per carton. Individual fruit are often wrapped in soft tissue paper to minimize surface damage during transport.

The following size classification, fruit weight range, and fruit count is typically used for a 4 kg net weight carton:

- Small; 260 - 360 g (½ lb to ¾ lb); 12 to 15 count,
- Medium; 360 - 550 g (¾ lb to 1 lb) ; 8 to 12 count,
- Large; 550 - 1000 g (1 lb to 2 lbs); 4 to 8 count.

Temperature Management

The best storage temperature for maximum shelf life of papaya is 10°C (50°F). Fruit stored above this temperature will ripen more quickly and become soft. Postharvest life depends on the stage of harvest maturity, but typically ranges from 1 to 3 weeks. Fruit harvested at the one-stripe stage and held under average conditions will ripen to 60% to 70% yellow colouration within four to six days. Fruit harvested at the one-stripe stage and held at 10°C will store for 14 to 21 days. When harvested at more advanced stages of ripening, the storage life will be significantly reduced.

Papayas are susceptible to chilling injury (CI) if held below 10°C (50°F) The amount of damage is greater at lower temperatures and longer durations of exposure. Typical CI symptoms include the development of sunken spots on the skin surface (pitting), discoloration of the peel and the flesh, incomplete ripening, poor flavor and increased vulnerability to postharvest decay.

Papayas are high in water content and can shrivel easily. During storage and transportation, the best relative humidity (RH) for papayas is between 90% and 95%.

Principal Postharvest Diseases

Papayas are vulnerable to a number of postharvest diseases. Decay can be controlled by good pre-harvest sanitation, careful harvesting and handling practices to minimize injury to the fruit, sanitized wash water, and maintaining the fruit at 10°C.

Anthracnose

Anthracnose disease symptoms begin as small water-soaked spots on ripening fruit. As the spots develop, they become sunken and turn brown or black and may enlarge to 0.5 cm (2 ins) in diameter.



Black Rot

The slightly sunken circular surface spots of black rot may appear anywhere on the fruit, eventually enlarging up to 4 cm in diameter. The outline of the spots is light brown and clear. As the spot surface dries and wrinkles with age, it turns black and becomes covered with fungal growth. The infected tissue usually remains firm. Another symptom of black rot is a dry, firm, dark rot extending into the fruit from the stem end.



Watery Soft Rot

A soft and watery rot that causes the collapse of the entire fruit but leaves the cuticle intact characterizes watery Soft Rot. The infected fruit is often covered by a coarse gray to black hairy fungal mass.

Technical bulletins are also available on waxing fruits and vegetables and hot bath treatment. Contact:

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87 Robb & Alexander Sts., Georgetown, Guyana
Tel: 226-8255, 226-2219

National Agricultural Research Institute (NARI)
Mon Renos, East Coast Demerara, Guyana: Tel 220-2950



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PAPAYA

Postharvest Care and Market Preparation Information Sheet



This information sheet provides growers and agriculture extension personnel with a summary of the recommended harvest and postharvest handling practices for papaya. A more technical and detailed bulletin is available from the New Guyana Marketing Corporation (NGMC) and the National Agricultural Research Institute (NARI).