Papaya

Revised 2024

Storage Conditions

	Temperature		Relative Humidity	Storage Period	Freezing Point	
	°F	°C			°F	°C
Partially Ripe	50 to 55	10 to 13	85 to 90%	1 to 3 weeks	29.9 to 30.3	-2 to -1
Fully Ripe	40 to 50	4 to 10	85 to 90%	2 to 3 days	29.9 to 30.3	-2 to -1

Papaya fruit are pyriform (pear-shaped), spherical or cylindrical. The pyriform, hermaphroditic fruit is the most common in commerce. Those produced in Hawaii belong to the 'Solo' group (such as the cultivars Kapoho, Rainbow, Sunup, Sunrise, and Sunset weighing from 300 to 700 g). Other types are produced in other countries, including the popular Maradol variety produced in Mexico and some countries in Central America. Sizes of other varieties range from 200 g to 10 kg, with flesh thickness from 0.06 to 0.16 inches (1.5 to 4 mm). Flesh is greenish white in immature fruit to pale orange-yellow, salmon pink, or red depending on cultivar when ripe.

Important quality characteristics include size, shape, color, smooth skin, and absence of blemishes. Consumers in Western countries also prefer fruit without a heavy musky, sweaty odor found in some Southeast Asian cultivars.

Papayas are popular in the areas in which they grow and are gaining popularity elsewhere due to availability of air and marine transportation, modified and controlled atmospheres, and quarantine treatments.

Papaya, a climacteric fruit, is commonly harvested on basis of color development, depending on the purpose of the fruit after harvest. Minimum harvesting stage should include some development of yellow color. In Hawaii, in addition to color development minimum grade standard requires 11.5% soluble solids content. Less mature fruit are lower in sugar and ripen poorly. Fruit are marketed as color break, ¼, ½, and ¾ skin color, and are normally ready to eat when they develop 75% or more skin color.

As a tropical fruit, papaya fruit is sensitive to chilling injury, but becomes less susceptible as it ripens. The optimum temperature for fruit shipping and storage is 45 to 55 °F (7 to 13°C), depending on fruit ripening stage. Optimum relative humidity (RH) is 90 to 95%. Fruit at colorturning (break) stage can be stored at 45°F (7°C) for 14 days and will ripen normally when transferred to room temperature, and ripe. Full color (fully ripe) fruit is least sensitive to chilling injury and therefore can be held for up to one week at 33.8 to 37.4 °F (1 to 3°C).

Mature-green papayas, most sensitive to chilling, begin showing injury symptoms after 10 days at 36°F (2°C) or 14 days at 41°F (5°C). Chilling injury (CI) can also occur in papayas that are less than half ripe when stored or shipped at temperatures less than 50°F (10°C) for extended periods. Papayas that are more than

half ripe (at least 50% yellow) can be stored or shipped at 40 to 50°F (4.4 to 10°C) without developing symptoms of chilling injury. Symptoms include skin scald, hard white areas in the pulp, and water soaking of internal tissues.

Fruit should not be stacked more than 2 or 3 deep in racks, and wicker baskets with uneven bottoms and sides should be avoided, or at least a layer of protection should be placed between racks and fruit. Diseased and bruised fruit should be routinely removed from display, and fruit in display should not be misted.

The optimum temperature for fruit ripening is 73 to 82°F (22.5 to 27.5°C), where it will take 10 to 16 days to reach full skin yellowing from the color-break stage. At temperatures higher than 82°F (27.5°C) severe weight loss can result.

Papayas are thin skinned and easily damaged if handled roughly. While in storage, fruit should be frequently examined for spoilage. Postharvest decay is a major problem and can be controlled by either dipping the papayas in a hot-water bath (120°F/49°C) for 20 minutes followed by a cool-water spray or by applying a carnauba wax containing thiabendazole (1 g/liter of wax).

A forced hot air treatment (quarantine procedure) is used for disinfestation of fruit flies for papayas shipped into the U.S., and a vapor-heat treatment (as a quarantine procedure) is used for disinfestation of fruit flies for papayas shipped into the U.S. and Japan. It involves a programmed heating/relative humidity regime as follows:

1. Heat treatment for 2 hours at 110°F (43.3°C), 40 to 50% relative humidity (RH).
2. Increase temperature to 115°F (46°C) at 70 to 80% RH until fruit center temperature is 113 to 114°F (45 to 45.6°C), which takes about 2 hours.
3. Increase temperature to 120°F (48.9°C) at 70 to 80% RH, and heat until the temperature reaches 116°F (46.7°C) at the fruit center, which takes about 1 hour.
4. RH increased to 90% and continue heating until the centers of all fruits reach 117°F (47°C), which takes about 30 minutes.
5. Spray cooling of the fruit with water at room temperature.

Ionizing radiation at 150 Gy (Gray) is also approved as a quarantine treatment for papaya.

Controlled atmospheres (CA) with 3 to 5% oxygen and 5 to 10% carbon dioxide can be used during marine transport to delay ripening of papayas and permit shipping at 55 to 60°F (13 to 16°C) to avoid chilling injury.

Freezing

A high-quality papaya puree can be made by first steaming the whole fruit for 2 minutes followed by cooling under water sprays. The fruit is sliced and crushed, and the pulp scraped mechanically from the skin. The peel and seeds are mechanically separated from the pulp through a centrifugal separator. The macerated pulp is acidified to pH 3.5 with citric acid and then further pulverized and screened to remove fiber and seed specks. Acidification adds to the quality of the puree by retarding enzymatic activity and inhibiting microbial growth. Final inactivation of enzymes and sterilization of microbes is accomplished by passing the puree through a heat exchanger at 205°F (96.1°C) for 2 minutes. The heated puree is cooled

and frozen at -10°F (-23.3°C). The puree is usually packaged in retail-sized containers, although some bulk-sized containers are also used for the ice cream trade.

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