

# **Guava**

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## **Scientific Name and Introduction**

The guava (*Psidium guajava* L.) is round or oval and can be eaten as a fresh fruit at two stages: mature green when it has white flesh and tastes like a sweet apple, or fully ripe when it has white to bright-red flesh, light-yellow skin, tastes very sweet, and is quite fragrant.

## **Quality Characteristics and Criteria**

Skin color is used to measure maturity and ripeness. Size and shape are other important quality criteria. Fruit should be free of defects, decay, and insect damage. Some varieties have only a few seeds, while others have a large cavity full of seeds. Fruit range from 9 to 12 cm (3.5 to 4.7 in) in size.

## **Horticultural Maturity Indices**

Harvest stage depends on variety and the stage at which the fruit are to be eaten. If eaten green, guava fruit should be harvested at the mature, firm stage without any signs of ripening. Fruit to be consumed soft and ripe are harvested when they show some sign of color change from green to yellow, as well as initial softening. Later harvesting, when fruit are riper, can lead to a high number of fruit fly stings and, later, larvae in the flesh. Soluble solids content (SSC) can vary from 3% in green fruit to over 10% in ripe fruit, and total acidity (TA) from 0.2 to 1.5%; cultivars vary greatly in sweetness and acidity. There is also seasonal variation in acidity in some cultivars.

## **Grades, Sizes, and Packaging**

Guava fruit are commonly shipped in 4.5-kg (10-lb) single-layer cartons with foam sleeves or wrapping to prevent injury.

## **Precooling Conditions**

Room, forced-air, or hydrocooling should be used to about 10 °C (50 °F).

## **Optimum Storage Conditions**

Mature green and partially ripe fruit can be held for 2 to 3 weeks at 8 to 10 °C (46 to 50 °F). Ripe, soft fruit can be held about 1 week at 5 to 8 °C (41 to 46 °F). RH of 90 to 95% is recommended (Kader 1999). Shelf-life is about 7 days when stored at 20 °C (68 °F).

## **Controlled Atmosphere (CA) Considerations**

Short-term treatment (24 h) with 10% O<sub>2</sub> in combination with 5% CO<sub>2</sub> before storage in air at 4 °C (39 °F) for 2 weeks delays color development and reduces chilling injury compared with fruit held in air (Bautista and Silva 1997). Modified atmosphere packaging (MAP) in polyethylene bags and use of wax coatings delay ripening and softening. Skin blackening is a problem when some wax coatings are applied (McGuire and Hallman 1995).

### **Retail Outlet Display Considerations**

Display guava fruit chilled if fruit are fully ripe. Display guava fruit at 8 to 10 °C (46 to 50 °F) if fruit are green and if ripening is to be avoided.

### **Chilling Sensitivity**

Symptoms include skin scald, pitting, and a failure to ripen if fruit are mature green or partially ripe when chilled. Browning of the flesh can occur. Decay incidence and severity increase with chilling injury. Ripe, soft fruit can be held at 5 °C (41 °F), as they are less sensitive to chilling injury.

### **Ethylene Production and Sensitivity**

Production rates vary from 1 to 20 μL kg<sup>-1</sup> h<sup>-1</sup> at 20 °C and show a climacteric pattern of respiration. Rates vary with variety and stage of ripeness. Ripening is accelerated by exposure to ethylene (100 μL L<sup>-1</sup>, 24 h). Immature fruit do not ripen properly and develop a “gummy” texture (Reyes and Paull 1995).

### **Respiration Rates**

Temperature	mg CO <sub>2</sub> kg <sup>-1</sup> h <sup>-1</sup>
10 °C	8 to 60
20 °C	18 to 130

To get mL CO<sub>2</sub> kg<sup>-1</sup> h<sup>-1</sup>, divide the mg kg<sup>-1</sup> h<sup>-1</sup> rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg<sup>-1</sup> h<sup>-1</sup> by 220 to get BTU per ton per day or by 61 to get kcal per tonne per day.

### **Physiological Disorders**

Postharvest desiccation is a major problem, along with mechanical injury. Desiccation leads to a dull yellow, sometimes wrinkled, skin, while mechanical injury leads to browning that can extend into the flesh. Mechanically injured areas of the skin and flesh are very susceptible to decay.

### **Postharvest Pathology**

Most diseases have preharvest origins and are sometimes latent infections such as anthracnose (*Colletotrichum gloeosporioides*). Other diseases are associated with entry of pathogens via

wounds from insect stings or mechanical damage; for example, aspergillus rot (*Aspergillus niger*), mucor rot (*Mucor hyemalis*), phomopsis rot (*Phomopsis destructum*), and rhizopus rot (*Rhizopus stolonifer*). Orchard sanitation and effective postharvest management, such as avoiding mechanical injury and prompt cooling, can reduce disease incidence.

### **Quarantine Issues**

Guava is a preferred host for fruit flies. Flies begin to sting fruit at the mature green color break stage, but infestation is a problem as softening begins to occur. Heat treatments and irradiation are both potential disinfestation procedures.

### **Suitability as Fresh-Cut Product**

Sliced mature green fruit are available in many Southeast Asian countries and are eaten like apple slices. Ripe fruit are also prepared as slices with both the skin and seeds removed. Both types are sold in trays with an overwrap.

### **References**

Bautista, P.B., and M.E. Silva. 1997. Effects of CA treatments on guava fruit quality. *In* A.A. Kader, ed., 7th International Controlled Atmosphere Research Conference, University of California, Davis, July 13-18, 1997, Abstract 113. University of California, Davis, CA.

Kader, A.A. 1999. Guava—produce facts. University of California, Davis, Perishables Handling Quarterly 97:19-20.

McGuire, R.G., and G.J. Hallman. 1995. Coating guavas with cellulose- or carnaba-based emulsions interferes with postharvest ripening. *HortScience* 30:294-295.

Reyes M.U., and R.E. Paull. 1995. Effect of storage temperatures and ethylene treatment on guava (*Psidium guajava* L.) fruit ripening. *Postharv. Biol. Technol.* 6:357-365.

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