



## Guava: Postharvest Quality-Maintenance Guidelines

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**G**uava are round or oval and are eaten as a fresh fruit at two stages: mature green, where the taste is like a sweet apple, having white flesh, or fully ripe. At the fully ripe stage, the flesh can be white to bright red, with light to bright yellow skin.

### 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 fruit are to be eaten. If eaten green, 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. SSC can vary from 3% in green fruit to > 10% in ripe



Guava, (*Psidium guajava* L.)

fruit, and the TA from 0.2 to 1.5%; cultivars vary greatly in sweetness and acidity. There is seasonal variation in acidity in some cultivars.

### Grades, Sizes, and Packaging

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

### Pre-Cooling Conditions

Room-, forced-air, or hydro-cooling 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 Atmospheres (CA) Consideration

Short-term treatment (24 h) with 10% O<sub>2</sub> + 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 to fruit held in air (Bautista and Silva 1997). MAP in



Types of guava



Bagged guava in the orchard

polyethylene bags and use of wax coatings delays ripening/softening. Skin blackening is a problem when some wax coatings are applied (McGuire and Hallman, 1995).

### Retail Outlet Display Considerations

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

### Chilling Sensitivity

Symptoms include skin scald, pitting, and a failure to ripen if mature green or partially ripe when chilled. Browning of the flesh can occur. Decay incidence and severity increases 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

Rates vary from 1 to 20  $\mu\text{L kg}^{-1} \text{h}^{-1}$  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 ppm, 24 h). Immature fruit do not ripen properly and develop a “gummy” texture (Reyes and Paull 1995).

### Respiration Rates

See Table 1. To get  $\text{mL kg}^{-1} \text{h}^{-1}$ , divide the  $\text{mg kg}^{-1} \text{h}^{-1}$  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  $\text{mg kg}^{-1} \text{h}^{-1}$  by 220 to get BTU per ton per day or by 61 to get kcal per metric ton 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 pre-harvest origins and are sometimes latent infections such as anthracnose (*Colletotrichum gloeosporioides*). Other diseases are associated with 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 promptly cooling, reduces 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 both are potential disinfection procedures.

### Suitability as Fresh-Cut Product

Sliced mature green fruit are available in many South East Asian countries and are eaten like apple slices.



**Fruit fly damage**

Ripe fruit are also prepared as slices with both the skin and seeds removed. Both types are sold in trays with an over-wrap.

### Special Considerations

None

*An earlier version of this article was originally published at the USDA website: [www.ba.ars.usda.gov/hb66/contents.html](http://www.ba.ars.usda.gov/hb66/contents.html)*

**Table 1. 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

### References

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