

Apple, Granny Smith

Recommendations for Maintaining Postharvest Quality



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MATURITY INDICES

Average starch score for a sample of 30 apples equal to or greater than 2.5 on a 0 to 6 scale (California Granny Smith Apple Starch Scale), based on the percentage of the core and cortex areas stained dark blue when dipped in the iodine potassium iodide solution**.

** Preparation of Iodine-Potassium Iodide (I_2KI) Solution for Starch Staining: Dissolve 58.1 g of potassium iodide (KI) in about 150 ml of distilled water, then add 14.5 g iodine (I_2) and mix well until completely dissolved. Then complete the final volume to 2 liters with distilled water. Store in a brown bottle or aluminum foil covered bottle.

QUALITY INDICES

- Flavor, including soluble solids (12% or higher), titratable acidity (0.75% or lower) and flavor volatiles.
- For immediate marketing early season fruit can be conditioned with an ethylene treatment at 100 ppm for 24 hours at 20°C (68°F) to improve eating quality.
- Freedom from defects such as bruising, stem or blossom-end cracks, bitter pit, insect injury, and watercore.
- Deep green color and absence of blush and/or sunburn (yellow or brown spots).

OPTIMUM TEMPERATURE

0.5 ± 0.5°C (33 ± 1°F); highest freezing point is -1.5°C (29.3°F).

Some reports indicate that 0°C (32°F) can result in low temperature (chilling) injury in some seasons.

OPTIMUM RELATIVE HUMIDITY

90-95%

RATES OF RESPIRATION

2 to 4 ml/kg·hr at 0.5 °C (33°F)

To calculate heat production multiply ml CO_2 /kg·hr by 440 to get BTU/ton/day or by 122 to get kcal/metric ton/day.

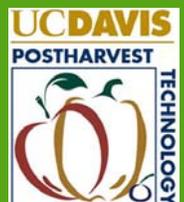
RATES OF ETHYLENE PRODUCTION

1 to 6 μ l/kg·hr at 0.5°C (33°F)

RESPONSES TO ETHYLENE

- Ethylene can accelerate senescence and loss of firmness.
- Removal of ethylene may reduce susceptibility to scald

Produce Facts



RESPONSES TO CONTROLLED ATMOSPHERES (CA)

The following atmosphere has been successful for Granny Smith apples: 1.5% oxygen + 1.0% carbon dioxide:

- Maintains firmness and titratable acidity
- Reduces susceptibility to bitter pit and storage scald

PHYSIOLOGICAL DISORDERS

Storage Scald. Granny Smith apples are very susceptible to storage scald especially when grown in hot, dry climates such as much of California. Diphenylamine (DPA) drench before storage is recommended, especially for storage beyond 3 months in air. CA storage can reduce scald incidence and severity, and reducing ethylene levels in storage also reduces scald development. The lower the oxygen concentration used, the better the scald control (be sure to determine fruit tolerance to low oxygen first). Early season or low maturity fruit is more susceptible to scald.

Bitter Pit. Granny Smith apples are very susceptible to bitter pit. Large fruit from young, vigorous trees are most susceptible. Preharvest calcium sprays are most effective to reduce bitter pit. Postharvest calcium dips are also beneficial.

Calcium Rates for Postharvest Dips

- 3 to 4% - solid flakes (77% CaCl₂)
- 2 to 3% - calcium chloride (CaCl₂)
- 0.7 to 1% - calcium ion (Ca⁺²)

Watercore. Develops when sorbitol transported to the apple from the tree accumulates between the cells. Apple lots with moderate to severe Watercore should not be CA stored, but marketed rapidly. Mild Watercore will disappear in storage.

PATHOLOGICAL DISORDERS

Gray Mold, Blue Mold. These decay-causing pathogens can be controlled by avoiding fruit injury, sanitizing water systems with chlorine and cooling fruit quickly.

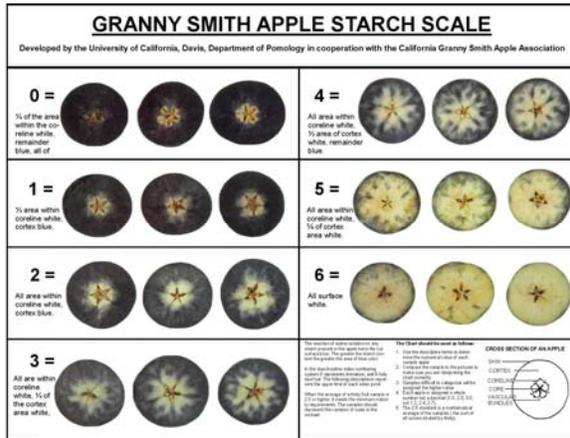
Mucor Rot. Some orchards have Mucor organisms in the soil. Sanitation to keep soil out of drench water is important. Do not place fruit from orchard floor into storage bins. Chlorine will not control this organism. Mucor continues to grow slowly even at 0°C (32°F).

SANITATION OF WATER SYSTEMS

Sanitation of water systems used to handle apples is important. Chlorine at 50 to 100 ppm is very effective but the level of residual chlorine and solution pH (7.0) must be monitored frequently and adjusted. Sodium will accumulate when liquid sodium hypochlorite is used and can burn apple tissues. We recommend water systems be changed once a day to prevent burn to apple skins. Granny Smith is moderately sensitive to sodium burn.

POSTHARVEST PHOTO GUIDE

MATURITY AND QUALITY



STARCH CONTENT CHART

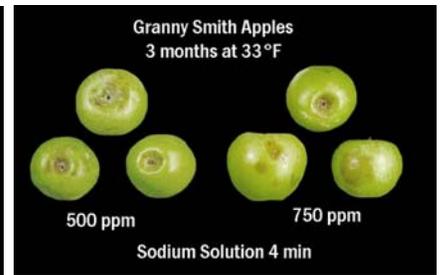
DISORDERS



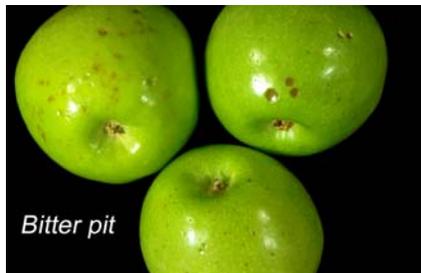
STORAGE SCALD



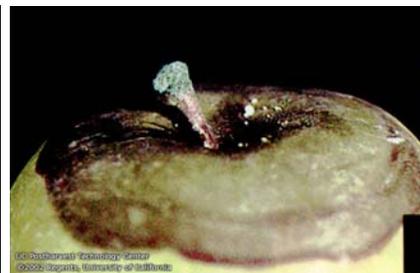
GRAY MOLD



BURN TO APPLE SKINS



BITTER PIT

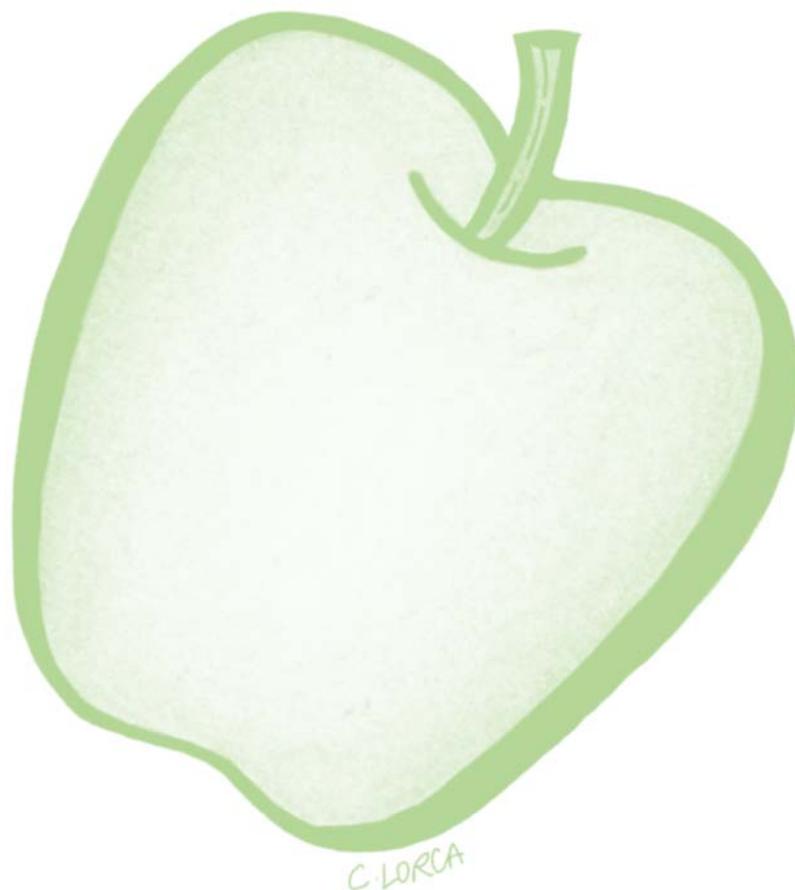


BLUE MOLD



WATERCORE





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