

Effect of Low Temperature Storage on Mamey Sapote (*Pouteria sapota*) Fruit Quality

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Florida currently has about 196 ha of mamey sapote worth an estimated \$6.5 million annually. The scurfy fruit surface of mamey sapote is sometimes infested with a mining scale (*Howardia biclavis*), and for some market areas of the U.S. (e.g., California) the scurfy fruit surface must be free of scale, which can be removed by brushing with a paint-stripping pad. The recommended storage temperature for mamey sapote is 13 °C. Thirty-five ‘Pantin’ mamey sapote fruit were harvested very late season (11 Nov. 2006) and stored at 10 °C for 4 days. Subsequently, one-half the fruit had the scurfy fruit surface removed; fruit were then either placed at room temperature to ripen (22 to 26 °C) or re-stored at 10 °C for 3 more days, then placed at room temperature to ripen. In general, the stored fruit at 10 °C for 4 days with or without the scurfy fruit surface or stored at 10 °C for 7 days without the scurfy surface ripened normally. Fruit with the scurfy surface left intact and stored for 7 days at 10 °C showed symptoms of chilling injury. In general, the mean number of days for fruit to ripen was not influenced by the presence or absence of the scurfy fruit surface but by days stored at 10 °C. The number of days to ripen after treatment was not significantly different among treatments and ranged from 3.7 to 4.3 days.

Mamey sapote is indigenous to the lowlands of Central America and southern Mexico (Martin et al., 1987). The species has been distributed throughout the subtropical and tropical world and is popular in Central America, North America (USA and Mexico), and the Caribbean region (Balerdi and Shaw, 1998). Southern Miami–Dade County has about 196 ha of mamey sapote worth an estimated \$6.5 million annually (Degner et al., 2002).

The postharvest storage characteristics of mamey sapote are not well defined. Previous recommendations include storing fruit at 13 to 18 °C and 85% to 90% relative humidity; however, this has not been well investigated (McGregor, 1989). ‘Pantin’ mamey sapote with the scurfy peel surface removed (called brushed or brushing), dipped in commercial wax and stored at 13 °C for 7 d, then transferred to 20 °C to ripen, lost less weight and resulted in more even pulp ripening than non-waxed fruit and waxed fruit stored at 20 °C (Sargent et al., 1999). More recently, brushing or no brushing, waxing or not waxing the peel, and/or treating fruit with 1-MCP and then storing fruit at 13 °C, then ripening fruit at 20 °C, resulted in little difference in the postharvest storage life of ‘Magaña’ fruit harvested at various stages of horticultural maturity (Ergun et al., 2005).

The minimum temperature at which mamey sapote may be safely stored is assumed to be 13 °C (McGregor, 1989). Seedling mamey sapote fruit stored at 10 to 15 °C for 7 to 24 d, then transferred to 27 °C to ripen, showed irregular ripening and lighter pulp color than fruit stored at 20 °C (Diaz-Perez et al., 2000).

The effect of short-term storage at 10 °C with the peel brushed or not brushed on subsequent mamey sapote ripening at ambient temperatures is not known.

Materials and Methods

Late season ‘Pantin’ mamey sapote were harvested on 11 Nov. 2006 and stored at 10 °C for 4 d. Subsequently, on the fourth day, fruit were assigned to one of four treatments: 1) removed from 10 °C storage, peel left intact (non-brushed), and placed at 22 to



Fig. 1. Non-brushed mamey sapote fruit (left) and clean fruit (right) after brushing.

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Table 1. Mean number of days to ripen at room temperature and aroma and flavor ratings.^z

Treatment	Mean no. of days to ripen	Off-aroma ^y	Flavor ^x	Overall ripening impression
(Intact peel) 4 d at 10 °C, then 22 to 26 °C	3.5 a	3.0 a ^x	4.0 a	No off-odors or off-flavors detected; fruit ripened satisfactorily.
4 d at 10 °C, brush peel, then 3 d at 10 °C, then 22 to 26 °C	4.3 a	3.0 a	4.0 a	No off-odor detected; most fruit ripened satisfactorily although one of six fruit did have some pulp discoloration near seed.
(Intact peel) 7 d at 10 °C, then 22 to 26 °C	4.3 a	2.2 b	2.0 b	Abnormal aroma and ripening from about 50% of the fruit. Some fungal rot.
4 d at 10 °C, brush peel, then 22 to 26 °C	3.7 a	3.0 a	3.8 a	In general, no off-odors detected, although two fruit had fair to off-flavor. Some gray pulp discoloration.

^zValues in column followed by the same letter are not significantly different by the Waller–Duncan K-ratio *t* test.

^yOff-aroma rating: 3 = none; 2 = noticeable; and 1 = significant off-odor.

^xFlavor rating: 5 = excellent; 4 = good; 3 = fair; 2 = noticeable off-flavor; and 1 = significant off-flavor after ripening (softening).

26 °C to ripen; 2) removed from 10 °C storage, peel brushed, and placed at 22 to 26 °C to ripen; 3) removed from 10 °C storage, peel brushed, then placed back into 10 °C storage for an additional 3 d (7 days total), then placed at 22 to 26 °C to ripen; and 4) fruit peel non-brushed, left in storage at 10 °C for an additional 3 d (7 d total), then placed at 22 to 26 °C to ripen. There were five to six brushed and non-brushed fruit per treatment (Fig. 1). Fruit were randomly selected for each treatment.

Quality measurements included recording the days to ripen (noticeable softening) after removal of fruit from storage and rating the fruit pulp for off-aroma (3 = none; 2 = noticeable; and 1 = significant off-odor) and flavor (5 = excellent; 4 = good; 3 = fair; 2 = noticeable off-flavor; and 1 = significant off-flavor) after ripening (softening). Treatments were laid out in a completely randomized design and data were analyzed by GLM and mean separation by Waller–Duncan K-ratio *t* test (SAS, 2007).

Results and Discussion

Very late season ‘Pantin’ mamey sapote were harvested and stored at 10 °C for 4 d prior to treatment. There was no significant difference in the mean number of days to ripen for any treatment (Table 1). Symptoms of chilling injury, i.e., off-aroma and poor flavor, were significantly more noticeable in fruit non-brushed, stored for 7 d at 10 °C, and then ripened at room temperature than all other treatments. Some of the fruit had discolored pulp (dark reddish brown).

Interestingly, storing fruit for 4 d at 10 °C, then brushing the peel, and re-storing at 10 °C for another 3 d only resulted in one of six fruit not ripening satisfactorily. Why this treatment did not result in chilling injury similar to storing non-brushed-peel fruit for 7 d at 10 °C is not known. Several factors may have affected

the results observed in this preliminary trial: 1) the ‘Pantin’ fruit used were very mature and so may not have behaved like fruit harvested during the main season (July–August); 2) the lack of instrumentation leaves unanswered the effect of these treatments on CO₂ and ethylene generation and; 3) the sample size was very small. Short-term storage of ‘Pantin’ mamey sapote at 10 °C may not result in chilling injury, although this needs further investigation.

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