

# Challenges for High Tunnel Production of White Guava in Southern Virginia

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Guava, *Psidium guajava* L. is a tropical and subtropical fruit with many varieties grown in different countries. The traditional pink-flesh guava is mainly used for processing purposes and has yet to cross over to American consumers. The white-flesh guava, a mildly sweet fruit with a crunchy texture is eaten when fruit color reaches a yellowish green stage, and has attracted attention in recent years. In southern Florida, the white guava variety is appreciated among some American consumers. Growers in Virginia are always looking for new crops with market potential. In response to this, a study was conducted to evaluate the possibility of growing white guava under high tunnel conditions in southern Virginia. One-year-old trees were planted in Nov. 2007 and Jan. 2008. Trees initiated blooming in Apr. 2008 and fruits were harvested starting the last week of Sept. 2008.

Guava (*Psidium guajava* L.) is indigenous to the American tropics. Its origin is most likely an area extending from southern Mexico into or through Central America (California Rare Fruit Growers, 1996). It is currently grown in many countries. In the United States, guava is commercially grown in Florida, Hawaii, and Puerto Rico. Menzel (1985) and Amin and Jaiswal (1992) classified guava varieties into three types: 1) *Dessert* type with mostly white flesh, which includes ‘Allahabad Safeda’, Sardar, and ‘Tathem White’; 2) *Processing* type, usually with red or pink flesh, which includes ‘Ka Hua Kula’; and 3) *Dual purpose* type, which includes fruits for both processing and the dessert types like ‘Oakey Pink’ and ‘Fanretief’. The white flesh cultivars successfully grown in Florida include ‘Asian White’, ‘Lotus’, ‘Crystal’, and ‘Supreme’ (Crane and Balerdi, 2005).

Numerous health benefits of guava have been described. Guava consumption has been reported to significantly reduce serum total cholesterol, triglycerides, and blood pressure, with the opposite effect (an explicit increase) in high-density lipoprotein (HDL) or “good” cholesterol (Singh et al., 1992). Yan and Lim (2006) reported that guava contain relatively higher amounts of antioxidant, with total phenolic and ascorbic acid contents, than oranges.

White flesh guava is relatively new in the U.S. and it is mainly consumed by Asians and Indians living in the U.S. It is one of the few exotic fruits, however, that is beginning to cross over to mainstream markets (personal communication with Peter Pith, a guava grower). Market information indicates that there is considerable demand for white guava in the U.S. Figure 1 shows the weekly wholesale guava prices per pound as reported by the

USDA Market News from Baltimore Terminal Market. During the 2007–08 season, the wholesale market prices for guava did not go below \$2.00/lb from November to June, indicating a fairly stable niche market for this specialty fruit.

Young guava trees are sensitive to cold temperatures. Older trees, on the contrary, can recover from exposure to 29 °F even though the tree may be completely defoliated (California Rare Fruit Growers, 1996). Southern Virginia is considered to be in climate zone “7a,” representing an average annual minimum temperature of 0 to 5 °F. Therefore, it would not be possible to grow guava under field conditions. It is possible to grow guava under a protected structure, however, commonly known as a high tunnel. A high tunnel is a simple unheated, inexpensive greenhouse-like structure that modifies the climate to create favorable growing conditions for crop production and allows growers to extend their production season (Lamont and Orzolek, 2005). The rise in consumer expectations for locally grown healthy foods, the noticeable health benefits associated with guava, and the growers’ need for alternative crops stimulated the current experiment with high tunnel production of white guava under southern Virginia conditions.

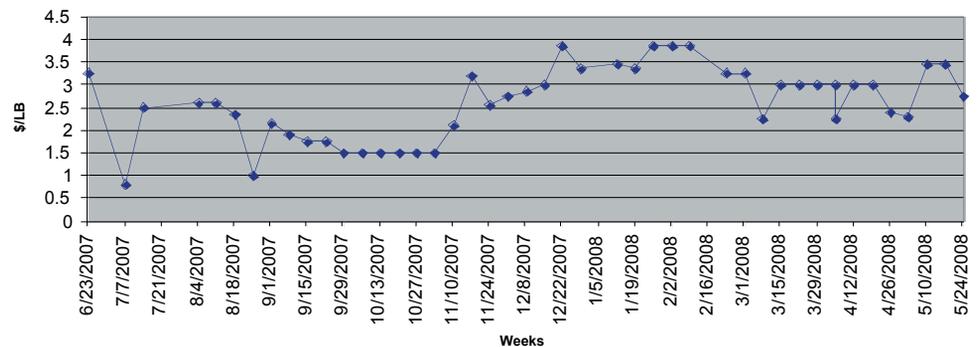


Fig. 1. Weekly wholesale market prices per pound for Florida-grown guava at the Baltimore Terminal Market reported by USDA Market News, May 2007–08.

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## Materials and Methods

In Nov. 2007, a set of seven 1-year-old white guava plants, variety 'Asian White,' was planted in a high tunnel in a row 21 ft wide, 48 ft long, and 12 ft tall at the peak. Side wall height for ventilation was 5 ft 6 inches. Plants were placed 6 ft apart within rows that were 7 ft apart. In Jan. 2008, a second set of seven additional plants was planted in an adjacent row of equivalent dimensions. After the first set of plants was planted, a few cold nights of temperatures below 19 °F defoliated the plants. When the second set was planted, ¾-inch PVC pipes 10 ft long were bent over the rows to hold a single layer of plastic and make a smaller tunnel within the larger structure. These two structures combined increased the temperature by 12 °F. When the outside temperature dropped to 20 °F, an electric office-type heater was used to increase the internal temperature in the smaller tunnel. From Jan. to Mar. 2008, the heater was used on a total of 14 occasions for various lengths of time, mostly in the evening. In Apr. 2008, all the trees initiated and continued blooming. To maximize the vegetative growth of the young trees and to allow the fruit to reach marketable size, only one fruit per tree per month for 4 months was allowed to mature, while the rest were manually removed. Currently, no market standard exists for guava fruit size. However, market preference is for large size fruit. When the fruit reached golf ball size, they were bagged to protect them against potential insect damage and scratching due to contact with branches. No insect or disease damage was observed. The plants were irrigated, using a typical greenhouse drip irrigation system with a pressure compensating emitter and spray stake at each plant (Netafim, Fresno, CA). The spray stakes supplied each plant with 3.2 gal/h as needed and 20–20–20 soluble fertilizers were injected with the irrigation once every 2 weeks.

## Results

The period from bloom to the harvest in the guava plants was approximately 5 months. The first set of fruit (one fruit per tree) from April flowering was harvested the last week of Sept. 2008. Another set of fruit from May flowering was harvested in mid October of the same year, and the third set was harvested in Dec. 2008. The average fruit weight for the September harvest was 14 ounces, and 16 ounces for the October harvest. Observations will be made to determine how long into colder weather conditions and under high tunnel conditions the guava fruits will grow and mature. As the trees mature, production will increase during the following years. This study indicated that it is possible to produce guava under southern Virginia conditions and will be continued to determine the feasibility of high tunnel guava fruit production under southern Virginia conditions.

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