

HISTORICAL REVIEW, CULTIVARS, AND PROPAGATION OF THE BLACK SAPOTE (*Diospyros digyna* Jacq.) IN SOUTH FLORIDA.

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Abstract. The black sapote, commonly called "chocolate pudding fruit", is the family Ebenaceae. This fruit tree, native to Mexico, grows best in coastal areas from Jalisco to Chiapas, Veracruz and Yucatan. Black sapote has been cultivated in South Florida in home gardens and patios, in fruit collections, and to a small extent in commercial orchards. The tree is appreciated as an ornamental specimen and also produced a large quantity of fruit. The tree is usually dioecious, with small axillary flowers which have a persistent calyx. Propagation can be done by seed or by grafting. Grafting is the recommended way to guarantee the sex of the plants and the quality of their fruit. The methods evaluated here are cleft grafting and veneer grafting, using scions of 6 months of age. Most of the trees grown in the patios and gardens have been propagated by seed, but some superior selections have been grafted and sold by nurserymen. A selection named 'Merida' was made at the University of Florida Tropical Research and Education Center (TREC Homestead) and propagated by grafting. The information in this paper increases our knowledge of the economic viability of the black sapote in Tropical America.

Resumen. El sapote negro pertenece a la familia Ebenaceae, comúnmente conocido como 'fruta pudín de chocolate'. El sapote negro es un árbol frutal originario de México que crece a lo largo de las costas desde Jalisco hasta Chiapas, Veracruz y Yucatán. Esta especie se ha estado cultivando en el Sur de la Florida en los jardines y patios de las casas, en algunas colecciones de frutas y a pequeña escala comercial. Este árbol es apreciado como especie ornamental y soporta una gran producción de fruta. Es una especie generalmente dioica con flores axilares pequeñas de cáliz persistente. La propagación del sapote negro puede ser por semillas o por injertos. La más recomendable y exitosa es por injertos ya que además puede garantizar el sexo de la especie y la calidad de la fruta. Los métodos de injertos evaluados son el de púa y el de aproximación utilizando patrones de sapote negro de 6 meses de edad. La mayoría de los árboles que crecen en los patios y jardines del Sur de la Florida han sido propagados por semilla, además se han hecho algunas selecciones por diferentes viveristas. La universidad de la Florida TREC-Homestead realizó una evaluación sobre 'Merida' un cultivar temprano de sapote negro los cuales fueron propagados por injertos. Esta información aumentará nuestro conocimiento acerca de la viabilidad económica de esta fruta en la región Tropical de América.

The black sapote (*Diospyros digyna* Jacq.) is native to the coastal regions from Jalisco to Chiapas, Veracruz and Yucatan, and although it was introduced to other regions of the Caribbean and Central America, it never attained significant importance. The black sapote has been under evaluation in South Florida for more than 50 years, with multiple introductions by institutions and individuals. As is the case with many tropical fruit, the first introductions were as seed from the center of origin. From these seedling trees, various selections have been made, although specific clones are not commonly recognized in local nurseries in South Florida.

General Description of the Tree and Fruit

Tree. The black sapote is generally dioecious, but there are occasional polygamous trees (Rhuele, 1958). The sex of the tree cannot be distinguished until flowering commences from 5 to 10 years after germination of the seed. Both male and female trees grow rapidly and form a canopy with a height and spread of 12 to 10 m, respectively. Canopy size is highly dependant on the space provided to each tree and the pruning treatments applied. Even without regular pruning the canopy naturally spreads, forming a handsome landscape specimen and casting a deep shade. The leaves range from 12 to 18 cm in length and 6 to 10 cm in width, with a light green color upon emergence and a deep green color at maturity. Grafted trees generally come into bearing within 3 to 4 years after planting and guarantee the sex of the tree.

Flowers and pollination. Both pistillate and staminate flowers are borne in the leaf axils of 1- to 2-year-old shoots (Campbell and Malo, 1988). The flowers are from 2 to 3 cm in diameter, with a prominent green calyx and whitish petals. The petals fall 3 to 4 days after opening, while the calyx persists and remains prominent throughout fruit

development. It has been assumed that pollination from male trees was necessary to set a significant crop of fruit (Campbell and Malo, 1988); female trees of some cultivars will produce ample crops without manipulation while growing in isolation. The increased production and/or quality of the fruit due to the presence of a male tree is not known, and for commercial production the use of male pollinizers should be considered.

Fruit. The fruit shape is generally oblate, although among selections there is variation from rounded to oblong. Mature fruit have a prominent, persistent calyx and range from 200 to over 900 g per fruit, depending on the selection considered and the crop load and age of the tree. The surface of the developing and mature fruit is smooth and light to dark green. Some fruit have raised, corky lenticells. Fruit will ripen on the tree, turning to a dark green or dull brown color and softening completely. Unripe fruit have a tan to golden yellow color and are not edible, being astringent and acrid to the taste. When ripe the flesh turns completely soft with a deep chocolate color. The flavor is pleasant and sweet and there is no aroma. Seeds are from 2 to 3 cm in length, brown and hard. The number of seeds per fruit ranges widely, from less than 4 to over 15 in different selections.



Cultural Requirements

Climate. The black sapote is best adapted to a hot lowland tropical climate. It grows well in climates with well-distributed rainfall and areas with distinct wet and dry seasons. In arid regions of Israel and northern Africa the black sapote grows well and is highly productive if provided with ample water through irrigation.

Soils. The tree prefers a highly drained soil and will not tolerate flooding. In South Florida it grows and anchors itself well with a minimum of available rooting depth. It is highly adapted to calcareous soils, with a minimum of chlorosis associated with micronutrient deficiencies. The application of chelated irons and general micronutrient sprays is beneficial, however, to the overall health and bearing of the tree.

Temperature. As stated earlier, the black sapote is best suited to lowland tropical climates, although it tolerates extreme heat of 40 to 42C in some regions. Cold temperatures of -1 to -2C for even a short duration will result in leaf, twig and cambial damage. Temperature of -4 to -5C will kill small and medium sized trees, and result in dieback of the major scaffold limbs on older trees.

Cultivars

Although the black sapote has been cultivated for centuries in its native range, there has been little progress made in the identification and selection of superior clones. A wide range of fruiting seasons, fruit sizes, shapes and yield potential exists throughout its native range and in select locations in the Caribbean and the United States. The cultivar 'Merida' was described by the University of Florida in 1988 (Campbell et al., 1988) as an early-maturing, high-quality and productive clone. 'Merida', often referred to by the name 'Reinecke' after the man that introduced the original

seeds from Mexico, is propagated in South Florida to a limited extent, but is not common in local nurseries and is unknown outside of South Florida.

Other selections are recognized in Mexico and in the limited regions of production of the black sapote. Although many of these selections possess superior attributes of size, quality and productivity, they are not rarely clonally propagated and are by-in-large only locally available.

Propagation

The dioecious nature of the black sapote dictates that clonal propagation should be used to produce the trees, thus guaranteeing that a pistillate tree of known identity is obtained. Graftage has been the predominant method of producing the black sapote in South Florida, although it is often considered a difficult species to graft.

Rootstocks. Rootstocks are obtained from healthy seed of local selections in the area. Seeds are planted in a well-drained mix of 1:1:1 of peat:sand:pine bark. Germination is in, with graftable plants obtained in Weeks.

Grafting Methods: The most effective method of grafting has been a cleft graft on scions of 2 cm thickness with Leaves. The size of the rootstock is important in providing sufficient energy to force the graft to grow. A cleft graft is done leaving a few leaves (cut in half) on the scion and all the leaves on the rootstock. The entire graft is either placed under intermittent mist or covered with a plastic bag to reduce water loss. The scions begin to grow within 2 weeks and the bags can be removed in 3 or 4 weeks. This method has given better than 80% during the warm months of the year.



Literature Cited

Campbell, C.W., J. Popenoe and S. Malo. 1988. 'Merida', and early-maturing black sapote cultivar. Proc. Fla. State Hort. Soc. 101:245-246.

Rhuele, G.D. 1958. Miscellaneous tropical and subtropical Florida fruits. Fla. Agr. Ext. Serv. Bul. 156A:48-49.