



'Rosigold', an Early-maturing Cultivar for the Florida Estate Farm

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'Rosigold' is a Florida mango cultivar selected by the United States Department of Agriculture in Miami, FL. The mango has an average weight of 400 g, with a pastel pink and red blush overlaying a lemon-yellow ground color. The flavor is mild, but highly appreciated by ethnic and traditional customers alike. 'Rosigold' has a low cold requirement for bloom initiation in South Florida. When grown at a proper level of nitrogen, that is, one conducive to high quality and responsiveness to environmental conditions, 'Rosigold' will bloom multiple times and ripen one, two, or even three distinct crops prior to the rains of summer in South Florida. Trees are readily available from local nurseries grafted on 'Turpentine' rootstock. These trees will remain small and manageable throughout the life of the orchard. Consumer acceptance and eating quality is excellent with 'Rosigold' and the fruit can be marketed to both ethnic and mainstream customers at attractive prices. The bloom and fruit are damaged by anthracnose and powdery mildew, but by producing during the dry season, the fruit can be grown sustainably, with little use of fungicides. 'Rosigold' is an excellent option for local growing of mangos for high-priced markets focused on quality.

Opportunities continue to increase for estate orchard mango production in Florida. Historically, this activity has only been considered viable in Miami-Dade, Monroe, Broward, Collier, and Palm Beach counties and within less than a mile of both coasts up to the center of the state; however, there is increasing interest in commercial mango production in locations further north and in the interior of the state. This interest is fueled by a series of warm winters, opportunities provided by the loss of citrus orchards due to huanglongbing (HLB), new cultivars and by more attractive land values in these locations. Estate orchards can produce high value alternatives to imported fruit and are highly saleable both on-farm and through specialty marketing outlets in the state. However, mango estate orchards require the use of new cultivars that match with technologies and production practices. The objective of this work is to describe one such mango cultivar, 'Rosigold', which is well suited for estate orchard production in Florida

Cultivar description

'Rosigold' arose from the seed of a 'Saigon' and an unknown paternal parent at the USDA-ARS Chapman Field station located in Miami-Dade County, FL. 'Rosigold' was selected and propagated by Robert J. Knight of the United States Department of Agriculture and given an accession number of MIA-13269. Propagation material (budwood) was distributed to the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) Tropical Research and Education Center in 1972, but was killed by Hurricane Andrew in 1992. It has since been replanted. 'Rosigold' was not officially released by the USDA and the original tree died in the 1980s at the Chapman Field station. 'Rosigold' was later recollected on Miami Beach in the early 1990s by Carl W. Campbell, grandfather and father (respectively) of the authors

and given to Fairchild Tropical Botanic Garden, where it has been promoted for nearly 30 years.

'Rosigold' is oblong in shape, with a length of 11.3 cm, breadth of 7.4 cm and thickness of 6.7 cm. Average weight is 400 g, which can vary by more than 100 g within the same tree and among fruiting seasons. The base is flattened and the stem is stout and squarely inserted in a shallow cavity. The apex is bluntly pointed and the fruit surface is smooth. The skin is yellow-orange with a pastel red blush and numerous white dots. The skin is thick, tender and adhesive. The flesh is soft and melting with ample juice and a deep orange color. The flavor is rich, aromatic, and sweet with no fiber. The fruit are mostly polyembryonic. Overall the quality is good to excellent.

The disease tolerance of trees is good for anthracnose and powdery mildew and moderate for bacterial diseases. The fruit are moderately tolerant of powdery mildew, but highly susceptible to anthracnose infection as the fruit ripen. The tree blooms easily with little cold induction and is semi-dwarf in nature with an upright, leggy growth habit if not properly pruned. Production is good, particularly when the tree is grown with lower nitrogen levels that enhance flowering and are conducive to multiple crops.

Orchard design and planting

The B.A. Campbell orchard was used for this study and consists of 0.2 hectare with 190 total trees with an average spacing of 4 m between rows and 3 m within the rows. The orchard was established in 2014 and is grown using a sustainable model based on traditional growing methods that have been practiced for mango in South Florida and the Bahamas for nearly two centuries (Campbell and Campbell, 2015). There are 20 cultivars within the orchard selected to provide eating quality and a production season of March through September.

As detailed in the previous work of Campbell and Campbell (2015) the orchard is maintained without the use of herbicides

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to provide the best edaphic and environmental environment for the mango trees in the orchard. Nitrogen applications are kept to a bare-minimum and are always from organic, non-ammonia sources with an emphasis on potassium fertility and the avoidance of chlorides. No insecticides are used, relying instead on predators and avoidance (Campbell and Campbell, 2016). Fungal disease management has thus far been through pruning, air movement and organic fungicide applications. There is an increasing emphasis on systemic acquired resistance (SAR) or whole plant resistance technologies and products to manage disease.

Performance in estate orchard production

Within the test orchard we have trialed many cultivars for their suitability in this system. 'Rosigold' has responded exceptionally well because of its small stature, precocity, heavy production, disease-avoidance by bearing early in the season, overall eating quality and consumer acceptance. Within the test orchard the age range of trees is from the third leaf stage to 10-year-old trees that were moved to the site in 2014.

Tree size

Given the small stature of 'Rosigold' trees, the 3 x 4 m orchard spacing has been ample to allow for proper tree growth and fruiting. With mango, we have no universal size-controlling rootstock; therefore, every mango cultivar has a functional size that is required to bloom and fruit consistently. If the cultivar is naturally large, the tree can be pruned back to the desired size each year, but the tree will not flower consistently. These inherently (genetically) large cultivars respond to severe pruning with excessive vegetative growth and inconsistent, poor flowering (Campbell, 2009). 'Rosigold', in contrast, responds to pruning with consistent control of size and vigor, and consistent flowering and fruiting. 'Rosigold' grafted on 'Turpentine' rootstock will often bloom in the first year after planting. Usually fruit are removed, but this precocious blooming and fruiting aids in size control and the overall productivity of this cultivar.

Even with the relatively small size of the tree, pruning for size control, proper air flow and health of the tree and fruit is critical. Without early formative pruning, the branches are leggy and weak, and when the tree produces fruit they tend to rest on the orchard floor, allowing for loss due to the feeding of snails and slugs and due to disease. Trees were routinely tipped to 50 cm of shoot length and additional branch shortening was done during the summers (Campbell, 2004).

Fruiting season and production

One of the key factors that suits the 'Rosigold' for estate orchard production is its season of production. When grown with no irrigation and low nitrogen inputs, the blooming of 'Rosigold' is highly responsive to weather conditions. The trees will flower following extended dry periods or following cold fronts that drop night temperatures near or below 9°C for three consecutive nights. For the past three seasons the 'Rosigold' trees in our orchard have produced successive blooms from before Christmas and continuing into April. These bloom, when protected from powdery mildew and anthracnose, have resulted in multiple, marketable crops that have reached harvestable maturity before the monsoon. The fruiting season has been from the middle of March through the middle of June. Production on transplanted trees reached 45 kg per tree in 2017 and we are working to attain 60 kg when the trees reach their maximum size in two years.



Fig. 1. Typical 'Rosigold' fruit ripening later in the season.

Fruit quality

'Rosigold' fruit have been highly accepted by novice consumers and by consumers with experience in good quality mangos (Campbell and Zill, 2009). Brix levels range from 17–22 depending on the health of the tree, rainfall, and the time of the fruit ripening. Fruit that ripen in March have lower brix levels due to cool night temperatures. Fortunately, even at the lowest brix levels, there are no other local mangos available in this season and 'Rosigold' can easily out compete most imported fruit for brix levels and flavor. As the temperatures increase with the season, so too do the brix levels, until the rains start. These later season fruit have more skin imperfections, but better overall flavor (Fig. 1). We have also been successful in increasing size, firmness, brix and skin color using potassium applications throughout the year, in conjunction with lower nitrogen levels. Low nitrogen, combined with high potassium and no irrigation has thus far allowed us to increase the yield, improve the external and internal quality and the postharvest life of 'Rosigold'.

Conclusion

'Rosigold' has thus far been a highly successful cultivar for estate production in Miami-Dade County, FL. The trees are small in stature, productive, ripen over an extended season and avoid the monsoon in South Florida. The fruit are highly acceptable and are desirable due to their early fruiting season. When properly managed, 'Rosigold' trees can easily produce more than 50 kg per tree of high quality fruit. Their habit of multiple cropping extends the fruit season and allows for marketing across an extended season. Trees are readily available in South Florida nurseries and offer a viable option for estate orchard planting.

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