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Peaches for Subtropical South Florida

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Abstract

Low-chill peach [*Prunus persica* (L.) Batsch] genotypes with commercial quality have been developed and are adapted to the subtropical conditions in south Florida. The yellow flesh cultivars recommended are 'Flordaprince', 'TropicBeauty' and "UFGold'. Additionally, 'Flordaglo' and 'TropicSnow' are white flesh cultivars with high sugar content and noticeably sweet taste. These cultivars require from 150 to 200 chill units, ripen from mid-April through mid-May, and have fruit size greater than five cm diameter (85 to 140g). Trees are vigorous, upright to spreading depending on the cultivar, and produce fruit within two years from field planting. Fruit have high exterior red blush with yellow or cream background for yellow and white flesh cultivars, respectively. Fruit quality is good and these peach cultivars are suitable for commercial shipment, local markets and commercial u-pick, and are also suited for the home garden and landscape. Commercial peach plantings have been established in south Florida by growers that produce and market other subtropical and tropical tree fruit crops.

The low-chill stone fruit breeding program at the University of Florida in Gainesville, has developed peach cultivars adapted to the subtropical climatic conditions of central and south Florida. Yellow flesh cultivars, 'Flordaprince', 'TropicBeauty', (9, 18) and white-flesh cultivars 'Flordaglo' and 'TropicSnow' (8, 15), are low-chill cultivars with melting flesh currently recommended for limited commercial plantings and home gardens of central and south Florida (7, 10, 22). Additionally, "UFGold' (16), a non-melting, yellow-flesh cultivar, was recently released and is expected to be the first of several new cultivars with extended shelf life following harvest.

Growing high quality peaches [*Prunus persica* (L.) Batsch] with good flavor and fruit size, and low-chilling requirement (less that 250 chill units) in central and south Florida is appealing to homeowners, landscapers, and commercial fruit growers. Peach production has caught the interest of commercial producers of tropical and sub-tropical fruit crops that have ready markets established. The addition of a deciduous fruit crop is appealing since tropical fruits are subject to occasional cold damage. Peaches with the above mentioned characteristics would command high prices in commercial u-pick and local markets because the fruit ripens in south Florida with commercial blueberries,

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blackberries, and raspberries. Commercial producers of avocado, mango, limes, carambola, and other tropical and subtropical fruits have shown interest in having an additional fruit crop available, such as peaches, when their packing facilities are not at capacity and when peaches are unavailable elsewhere. Peaches from Chile have disappeared in U.S. markets by early April, before cultivars from south Florida would mature. South Florida peaches would ripen before the earliest higher-chill peach cultivars from north Florida, Georgia, the Carolinas and California, and would be economically advantageous. It would be important to have several cultivars that mature fruit sequentially from mid-April to mid-May to fill the commercial or u-pick market window.

Sub-tropical peach trees, like other deciduous fruit trees, require cool temperatures during the winter for leaf and flower bud dormancy to be satisfied before growth will resume in the spring. This "chilling" requirement is measured in units: the maximum amount of chilling that can be satisfied in one hour at an optimum temperature (4). The optimum temperature for chilling in temperate zone peach cultivars is believed to be near 7.2°C (1, 20, 21). Low-chill, subtropical, peach cultivars acquire chilling a higher temperatures (3), and have performed satisfactorily without temperatures below 7.2°C when experiencing Winter cold of 14.5°C and above (12). Nevertheless, inadequate chilling can result in delayed and erratic flowering and foliation, reduced fruit set, and oblong-pointed misshaped fruit.

A number of low-chill peach cultivars have been suggested for south-central and south Florida based on presumed chilling unit accumulation calculated from winter temperature records. Many times a chilling requirement for a low-chill cultivar is determined in an area that receives more than adequate chilling for that cultivar (ie. Gainesville at 29°38' N, 82°21' W). The subtropical climate of southwest Florida allows the evaluation of cultivars at their extreme lower limits for acquiring chilling. Although selected cultivars at Gainesville may appear to be suitable for south Florida, they must be tested in any new location before final recommendations can be made (19). Climatic adaption, insect, and disease pressures vary at different locations. The objective of this study was to grow low-chill peach cultivars in southwest Florida, observe their adaptability to climatic conditions, and make observations that might encourage or limit their use in commercial specialty market windows, local markets and commercial u-pick operations.

Materials and Methods

Peach cultivars 'Flordastar' (14), 'Flordaprince', 'TropicBeauty', 'UFGold', 'Flordaglo', 'FlordaGrande' (11), 'TropicSnow', 'TropicSweet', and 'Rayon' (2, 17) were budded to Flordaguard peach rootstock and planted in southwest Florida near Fort Myers (26°39' N, 81°45' W) and Immokalee (26°27' N, 81°26' W) between 1993 and 1996. Although cultivars 'Flordastar' and 'Rayon' may be considered obsolete due to the availability of more recent cultivars, they were included because they satisfy the low-chill requirement and provide a comparison to other cultivars (5, 7). Trees were spaced 4.6 meters apart in a row and 6.7 meters between rows, fertilized with a dry soluble complete blend 3 to 5 times/year, irrigated with microsprinklers, and maintained weed free beneath the canopy with contact/systemic herbicides. Trees were pruned to establish open centers and topped to maintain a maximum height of 3.0 meters. Fruit were lightly thinned and some overcropping occurred as a result of inexperienced personnel.

Bloom and fruit maturity dates were noted. Fruit shape, firmness, skin and internal color, taste, and resistance to flesh browning were all subjectively rated on a scale of 1 to 10, with 10 being the highest value for most desirable. Round fruit without protuberances or suture bulges received highest ratings. Fruit which matured unevenly or lacked firmness at the time of harvest, as evaluated by ground color change from green to yellow, received low scores because they are less ac-

ceptable for commercial use. Red peel color is desirable in U.S. markets and usually receives the best price, so cultivars with bright red color received a high rating. Fruit taste was subjectively scored highest for high aroma, sweetness, and a balanced sugar:acid ratio. Cultivars that bruise easily or have flesh that browns and darkens easily when cut and exposed to air are unacceptable and are rated low. Although white flesh color is not currently a major segment in U.S. markets, two selections with fruit characteristics equal to, in our opinion, the best yellow flesh cultivars were included.

Observations were made of insect and disease pressures to fruit and trees. Bacterial spot disease resistance is desired in Florida due to the driving rainstorms associated with the summer wet season.

Results and Discussion

Trees of all observed peach cultivars yielded good crops most years from 1997 to 2001 in southwest Florida. Table 1 shows tree and fruit characteristics of these cultivars. All cultivars had fruit with diameter exceeding 5.0 cm. 'Flordastar' and 'Flordaprince' were the first each season to mature fruit in mid-April. Fruit harvest of each cultivar lasted only 5 to 7 days after fruit becoming firm ripe. Cultivars matured fruit sequentially as listed in Table 1.

Flowering usually occurred in early February and the first fruit, depending on cultivar, matured 75 to 110 days later. Although there was some flowering in the fall and during warm periods in December or January, most premature flowers did not persist to produce fruit, and sufficient flower buds remained to produce a full crop.

The chilling requirement for these subtropical cultivars is relatively low, estimated at 75 to 250 chill units, making them suitable for the mild winters and subtropical climate conditions of south Florida. All cultivars except 'Flordastar' and 'TropicSweet' received adequate chilling each winter they were evaluated and produced excessive fruit that required thinning to get adequate size fruit. Trees experience limb breakage due to heavy fruiting if not thinned. The current chilling models, including the Mean Temperature Model using January mean temperature as an indicator of chilling received, do not seem adequate for determining chilling in these low-chill cultivars requiring about 150 chill units. The fact that the recommended cultivars near 150 chill units in Table 1 produced excessive crops but did not always receive the calculated adequate chilling (Table 2) supports previous findings (3, 12, 13) that low-chill clones are effectively chilled at progressively higher temperatures than high-chill clones, effectively to temperatures near 15°C (13). Some areas around the world can fruit peaches even though half or less of the number recommended hours below 7.2°C are received (13). 'Flordastar' and 'TropicSweet' (250 chill units) was marginal in receiving adequate chilling in the mild winters of 1997-98, 1998-99, 1999-00, and 2000-01 in south Florida, and may be better suited to central Florida and areas north of Orlando.

These cultivars are all self-fruitful and require no pollenizer. Trees required extensive pruning to achieve desired tree shape due to a 300 day growing season.

Pest problems were primarily due to diseases. The widely distributed disease bacterial spot [*Xanthomonas campestris* pv. *pruni* (Smith)Dye] was present on leaves of all cultivars, but did not cause excessive leaf loss until late in the growing season. Another disease, known as peach leaf rust [*Tranzschelia discolor* (Fuckel) Tranzschel & Litvinov], is more likely to be limiting to peach production in south Florida and was observed to cause early fall defoliation. Rust builds up quickly after harvest when the summer rainy season begins in mid-June in south Florida. All cultivars appeared susceptible. It was not uncommon for the trees to defoliate in late August or September and produce some bloom with partial re-foliation before winter.

Insect pests, although present, were not observed to be an uncontrollable problem. Plant bugs (*Leptoglossus spp.*) like the leaf-footed bug (*Leptoglossus phyllopus*

Table 1. Tree and fruit characteristics of low-chill subtropical peach cultivars grown in southwest Florida. Ratings compiled from observations during four years (1997-98 - 2000-01). Recommemded cultivars in bold.

Peach cultivar	Estimated chill units[Z]	Fruit wt. (g)	Pit[Y]	Flesh color[X]	Firmness[W]	Taste[W]	Bacterial spot resistance[V]	Browning[W]	Ripe Date[U]
Flordastar	250	73	SC	Y	9	7	9	8	mid-April
Flordaprince	150	85	SC	Y	8	8	4	7	mid-April
TropicBeauty	150	110	SF	Y	10	8	6	9	mid-April
UFGold	200	100	C	Y	10	8	8	9	late-April
Flordaglo	150	124	SC	W	9	9	8	9	late-April
FlordaGrande	75	100	F	Y	8	8	9	8	early-May
TropicSnow	175	140	F	W	9	10	9	10	early-May
TropicSweet	250	111	F	Y	9	10	6	9	mid-May
Rayon	175	130	F	Y	7	8	9	8	late-May

[Z]One chill unit = one hour of chilling at an optimum temperature near 7.2 C.
[Y]F=free, SF = semifree where pit is loose when fruit is soft ripe, SC = semicling, C = cling.
[X]Y = yellow, W = white.
[W]Rated on a 1 to 10 scale where 10 is most desirable.
[V]Rated on a 1 to 10 scale where 10 is functional immunity.
[U]Fruit mature when firm ripe based on full bloom occurring early February.

L.), citron bug *(L. Gonagra* Fabricius), and stink bug (*Nezara viridula* L.) were observed in the spring during fruit development. Plum curculia (*Conotrachelus nenupar* Herbst) was not observed. Sap beetles were only observed in overripe fruit still hanging on the tree. Caribbean fruit fly (*Anastrepha suspensa* Loew) known in south Florida and in dooryard peaches along the coastal areas, has not been observed in April and May ripening peaches grown interior in the state in southwest Florida. Caribbean fruit fly has been observed in guava and loquat that ripen later during the summer.

The peach cultivars found adapted and most suitable for commercial production are described. '**Flordaprince**' trees require about 150 chill units and fruit ripen in mid-April. Fruit are attractive, having a bright red blush over a yellow background. Yellow flesh is semicling to the pit when fully mature. Fruit have highly aromatic flavor giving them an excellent taste and are consistently 5.0 cm or larger when properly thinned. '**TropicBeauty**' trees require about 150 chill units, fruit ripens at the end of April and holds on the trees better than most other cultivars. Fruit have a high percentage red overcover on bright yellow background with very short fuzz, making the fruit highly attractive. The round, firm fruit have melting, deep-yellow flesh that frees from the pit at soft ripe. Fruit size is about 5.7 cm to 6.4 cm diameter. '**UFGold**' is the first of a series of non-melting flesh cultivars that can fully ripen on the tree for maximum flavor and yet have the desirable qualities of low-chill melting flesh cultivars of good taste, and great external appeal (more firmness and longer shelf life). Trees require about 200 chill units with fruit ripening in late April. Fruit are 5.7 cm diameter and larger. '**Flordaglo**' is a white flesh peach requiring about 150 chill units. Fruit have high red overcolor on melting white flesh with a semicling pit. Fruit size is 5.7 cm to 6.4 cm diameter and it ripens late April to early May. '**TropicSnow**' fruit are white fleshed, freestone, and trees require about 175 chill units. Taste is tart, but sweet, and aromatic. Fruit are large for the season at 5.7 cm or larger diameter and ripen early May to mid-May.

Peach cultivars found unsuitable were 'Flordastar', 'Flordaguard', 'TropicSweet', and 'Rayon'. Cultivars 'Flordastar', and 'TropicSweet' failed to set full crops due to lack of chilling. Cultivar 'Rayon' matured fruit too late for the market window and was in competition with

Table 2. Hours at or below 7.2, 10, 12.8, and 15.5°C recorded in December and January during four Winters at Immokalee, Florida, January mean temperature, and chilling units calculated according to Byrne[Z], and Sharpe and Sherman[Y].

Season	Cumulative hours equal or below (°C)			
(month-year)	7.2	10	12.8	15.5
1997-98				
Dec. 1997	25	78	126	220
Jan. 1998	15	34	122	220
Jan. mean	18.8			
Chilling units[Z]	0(-6)			
Chilling units[Y]	80			
1998-99				
Dec. 1998	11	38	62	91
Jan. 1999	32	72	114	214
Jan. mean	18.9			
Chilling units[Z]	0(-22)			
Chilling units[Y]	50			
1999-00				
Dec. 1999	47	88	128	183
Jan. 2000	53	120	182	297
Jan. mean	17.3			
Chilling units[Z]	134			
Chilling units[Y]	150			
2000-01				
Dec. 2000	54	102	195	300
Jan. 2001	129	239	333	435
Jan. mean	14.1			
Chilling units[Z]	447			
Chilling units[Y]	450			

[Z]Chilling calculated according to the Mean Temperature Model using the Jan. mean temperature as described by Byrne (webpage http://aggie-horticulture.tamu.edu/stonefruit/).

[Y]Chilling as described by Sharpe and Sherman using the mean January temperature (12).

early maturing fruit during late May and early June in north Florida and south Georgia. Cultivar 'FlordaGrande' has been replaced with newer cultivars, and fruit ripened unevenly with a blossom-end point making it unsuitable for shipping.

In summary, low-chill peach cultivars can be successfully grown and fruited in south Florida. They have fruit of good size, appearance and firmness, and warrant further use in the development of fruit cultivars for the landscape and for commercial and u-pick operations. Trees of most of these cultivars are available from commercial nurseries in Florida that grow peaches. A few commercial plantings have been established in south Florida and will begin producing fruit in 2001. Plantings range between 10 and 80 acres. There are also smaller peach plantings with commercial u-pick operations that specialize in blueberries and blackberries.

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Pomological Traits of Apricots (*Prunus armeniaca* L.) Selected from Bitlis Seedling Population

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Abstract

The native apricot (*Prunus armeniaca* L.) germplasm of Bitlis province and its districts situated in the East Anatolia of Turkey was examined during 2000 and 2001. From the native genotypes twenty-eight genotypes were selected for breeding efforts, and their fruit and flowering traits were recorded with compared to those of standard cultivars 'Hacihaliloglu', 'Kabaasi' and 'Hasanbey'. Selected genotypes had fruit weight between 29.1 g and 60.3 g, soluble solids between 8.2% and 21.6% and acidity between 0.54 % and 1.77 %. Three standard cultivars had fruit weight between 30.7 g and 43.1 g, soluble solids between 20.2% and 22.4% and acidity between 0.21 % and 0.62 %. The fruit weight was over 45 g in five selections (BTL-20, BTL-45, BTL-49, BTL-50 and BTL-51) that had higher fruit weight than standard cultivars. The content of soluble solids was higher than 20% in two selections (BTL-49 and BTL-51). Standard cultivars usually had higher soluble solids and lower acidity than selected genotypes. The majority of genotypes had acidity lower than 1%. The fruit size ranged from small (fruit weight between 29.1-37.6 g) to medium (fruit weight between 45.1-60.3 g). The first bloom in late April and full bloom in early May occurred. In March of both years, extreme temperature fluctuations caused damage to flower buds and subsequent yield reductions. The harvest season usually was mid-August. The results indicated valuable native apricot germplasm of the district.

Introduction

Turkey is one of the centers of origin of apricot in the Near East of Central Asia (7). Seed propagation for centuries has lead to rich genetic resources of apricot. Local apricots in Turkey have been included in the Irano-Caucasian group (21). Mehlenbacher et al. (21) reported that inadequate information is available on apricot genetic variability and the information on Irano-Caucasion apricots. Developing well adapted cultivars to local conditions is high priority of apricot breeding programs (7, 21). It has been pointed out that Turkey is rich in native apricot genetic resources (17).

In the areas where late spring freeze injury occurs like Turkey, apricot production fluctuates considerably from year to year. Turkey is the leader country in the world's dried apricot trade, and meets 20 % of the world production. Annual production

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