Fruit Varieties Journal 43(2)52-57 1989

Peaches and Nectarines for Texas' Subtropical Lower Rio Grande Valley

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Abstract

Low-chill peaches and nectarines, possessing characteristics acceptable in U.S. markets and maturing in April and May, are being evaluated for adaptation to subtropical climatic conditions. Cultivars developed in the 1980's as 'EarliGrande,' 'Flordaprince,' 'FlordaGrande,' 'TropicSweet,' 'TropicBeauty,' and 'TropicSnow' have high fruit quality not previously available and require 200 or less chilling units making them adapted to subtropical environments. These cultivars are being commercially produced in the Lower Rio Grande Valley for fresh market.

Introduction

Low-chill subtropical peach cultivars (less than 200 chill units), introduced from South China have been available for many years, however, their fruit has been of limited commercial value because of small size, soft flesh, poor shape, late maturity or other undesirable characteristics. Peach breeding to improve low-chill cultivars began in California in the early 1900's and later in Florida and Texas (1, 10, 11).

Subtropical peach trees (like other deciduous fruit trees) require cool temperature during the winter for leaf and flower bud dormancy to be satisfied. This "chilling" requirement is measured in units. A chill unit is the maximum amount of chilling that can be satisfied in one hour at an optimum temperature (5). The optimum temperature for chilling in most peach cultivars is usually thought to be near 7°C (3, 16, 17). Subtropical, short-cycle, low-chilling peach cultivars acquire chilling at higher temperatures (4), and have performed perfectly well without any temperatures below 7° when experiencing some winter cold in the range of 13°(11).

New Peach Industry in South Texas

The 200 or less chilling units normally occurring during the winter in the Lower Rio Grande Valley are too few to satisfy the 400 to 1,200 chill units required by most peach cultivars grown in the United States (7). The Texas Agricultural Experiment Station, Weslaco, has been testing low-chill peaches and nectarines for adaptation in the Lower Rio Grande Valley where no peach industry was previously successful.

Subtropical climatic regions need peach and nectarine cultivars with chilling requirements not exceeding 200 chill units. Peach cultivars developed since 1980 which meet this chill unit requirement are being commercially produced in the Lower Rio Grande Valley of Texas (2, 6, 7, 8, 9, 15), Central Florida, and areas around the world with similar subtropical climates (12, 13, 14). Approximately 700 acres of low-chill peaches have been established in the Lower Rio Grande Valley since 1984. The success of the 1988 crop has stimulated growers to increase their planting. Indications are that additional acreage (300 in 1989) will be planted in the next few years as the potential for this new crop is demonstrated.

Research Project at Weslaco

The objective of the program at the Texas Agricultural Experiment Station, Weslaco, is to test and develop low-chill peach, nectarine, and plum selections adapted to the subtropical climate of the Lower Rio Grande Valley. Selection emphasis is based on fruit size and large crops of 5.7 cm diameter

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(95 to 100 g) fruit that mature in April and early May. The programs goal is to recommend cultivars that have demonstrated commercial potential in this environment and to make these superior selections available through cultivar releases. Selections found to be adapted here should also be adapted to similar climatic areas of the world's subtropics and tropical highlands. Four cultivars ('FlordaGrande,' 'TropicSweet,' 'TropicBeauty, and 'TropicSnow') of the six recommended to growers since the project began in 1980, are releases made possible by this research project.

Materials and Methods

Selections for testing have been obtained from the breeding programs at Texas A&M University, University of Florida, University of California, and other sources of suitable germplasm. In addition, selected crosses are being made in cooperation with the peach breeding program on the main campus of Texas A&M at College Station.

The criteria for evaluating each selection include: chilling requirement, flower bud set and thinning requirements, tree form and structure, bloom dates and fruit characteristics. Chilling requirements are determined by comparing bloom and leaf bud break dates with that of known cultivars. Flower density and bud set data indicate the production potential of the selection. Tree growth habit identifies those trees that require extensive pruning to achieve desired tree shape due to a 330 day growing season and may experience limb breakage with heavy fruiting. Thinning is necessary with all cultivars to produce marketable size fruit. Fruit shape, firmness, peel and internal color, taste, and resistance to flesh browning are 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 receive highest ratings. Fruit which mature unevenly or lack firmness at the time of harvest as evaluated by ground color change from green to yellow receive low scores because they are unacceptable for commercial use. Red peel color is desirable in U.S. markets and usually receive the best prices, so cultivars with bright red color receive a high rating. Fruit taste is subjectively scored highest for high aroma, high acid, high sugar, and a balanced sugar/acid ratio. Cultivars that bruise easily or have flesh that brown and darken easily when exposed to air are unacceptable and are rated lower. Bacterial spot is not being evaluated as this disease has not been identified as a problem in the Lower Rio Grande Valley. Although white flesh color is not currently desired in U.S. markets, selections with fruit characteristics equal to the best yellow flesh cultivars are being evaluated.

Results and Discussion

Subtropical Adapted Cultivars

Currently used and recently released peach cultivars considered promising and adapted to the subtropical climate of the Lower Rio Grande Valley are shown in Table 1. The cultivars possess fruit quality and shipping characteristics acceptable in U.S. markets and ripen in April or May. Flower bud-set in cultivars 'Flordaprince,' 'TropicSweet,' 'TropicBeauty,' and 'TropicSnow' is high and fruit thinning to 15-20 cm apart is necessary to obtain 6-8 cm diameter fruit. Intensive fruit thinning and older trees have not increased fruit size of 'Flordaprince' much above 5.0 cm. Fruit 5.7 cm diameter and above of this cultivar are produced in areas as Hermosillo, Mexico and Imperial Valley of California. Fruit of 'Flordaglo' and 'TropicSnow' are firm white flesh with acceptable size and high quality, but may be limited to local markets until large retail markets accept white peaches.

Differences have been noted when comparing fruit and tree characteris-

Table 1. Peach cultivars adapted to the subtropical climate of the Lower Rio Grande Valley, Texas.

		Flower			Fruit					Flesh				
							Color							
Cultivar	Estimated chill units	Type	Bud set[z]	FDP[y] (days)	Size (g)	Pit[x]	Red (%)	Ground[w]	Shape[z]	Firm[z]	Taste[z]	Texture[z]	Browning[z]	Color
Earligrande	200	nonshowy	6	75	98	SC	40	Y	7	6	7	7	8	yellow
Flordaprince	150	showy	10	78	85	SF	80	Y	9	8	8	7	7	yellow
FlordaGrande	75	showy	9	100	98	F	60	DY	8	8	8	8	8	yellow
Flordaglo	150	showy	10	87	127	SC	80	CW	9	9	9	8	9	white
TropicBeauty	150	showy	10	89	110	SF	80	Y	10	10	8	8	9	yellow
TropicSnow	175	showy	10	93	140	F	90	CW	7	9	9	8	10	white
TropicSweet	175	showy	10	95	111	F	70	DY	9	9	9	9	9	yellow

[z]Ratings in Texas on a 1 to 10 scale where 10 is most desirable.
[y]Fruit development period from full bloom to maturity.
[x]F = free, SF = semifree where pit is loose when soft ripe, SC = semicling where pit is not loose when ripe, but not genetic cling.
[w]Y = yellow, DY = dull yellow, GY = greenish yellow, CW = cream white.

Table 2. Peach cultivars currently obsolete or not suitable to the subtropical climatic area of the Lower Rio Grande Valley, Texas.

		Flower			Fruit					Flesh					
							Color								
Cultivar	Estimated chill units	Type	Bud set[z]	FDP[y] (days)	Size (g)	Pit[x]	Red (%)	Ground[w]	Shape[z]	Firm[z]	Taste[z]	Texture[z]	Browning[z]	Color	Comments[u]
Desertred	175	nonshowy	10	90	88	SF	90	Y	10	9	8	8	9	yellow	2
Flordabelle	150	showy	8	105	135	F	70	GY	7	8	8	9	8	yellow	1, 4
Flordagem	250	showy	9	90	140	SC	80	BY	6	8	9	8	10	yellow	5
Flordastar	200	showy	10	69	80	SC	70	BY	8	9	5	7	10	yellow	2
Hermosillo	200	showy	10	106	97	SF	80	GY	9	8	7	8	8	yellow	1
Maravilha	200	showy	8	80	70	SF	90	CW	10	8	8	9	6	white	2
McRed	225	showy	7	90	80	SF	70	Y	7	6	7	7	6	yellow	3
Newbelle[v]	150	showy	6	110	140	F	70	Y	8	8	8	7	9	yellow	1
Rayon	150	showy	10	105	100	SC	80	DY	8	8	7	7	10	yellow	1
San Pedro	200	showy	6	88	130	SF	60	Y	7	7	7	7	7	yellow	3

[z]Ratings in Texas on a 1 to 10 scale where 10 is most desirable.
[y]Fruit development period from full bloom to maturity.
[x]F = free, SF = semifree where pit is loose when soft ripe, SC = semicling where pit is not loose when soft ripe, but not genetic cling.
[w]Y = yellow, BY = bright yellow, DY = dull yellow, GY = greenish yellow, CW = cream white.
[v]Name given selection Fla. 1E-138, similar to Flordabelle but without green ground color and uneven fruit ripening.
[u]Code for comments: 1 = late maturing, 2 = fruit too small, 3 = not shippable, 4 = green ground color, 5 = superior cultivars available.

tics of a particular cultivar, for several seasons, grown at Weslaco, Texas (26°09'N, 97°58'W) in the subtropical Lower Rio Grande Valley and at Gainesville, Florida (29°38'N, 82°21'W). Many times the chilling requirement for a low-chill cultivar is determined in an area that receives more than adequate chilling. The subtropical climate at Weslaco allows for evaluating selections at their extreme lower limits for acquiring chilling. 'EarliGrande' was released in 1980 as a peach requiring 275 chill units, but after testing at Weslaco it was identified as only requiring 200 chill units. The optimum temperature for chilling in low-chill peaches has been shown to be near 13°C (4), and cultivars 'TropicSweet,' 'TropicBeauty,' and 'TropicSnow' have flowered and fruited well at Weslaco in an environment sometimes lacking in winter temperatures below 7°. It has also been observed that trees will set and mature a full crop after receiving only about half the required number of chilling units.

Fruit development time in the Lower Rio Grande Valley is normally 5 to 10 days less than Gainseville, depending on the year. This has been attributed to warmer daily mean temperatures from bloom to fruit harvest resulting primarily from less cooling off during the nights. Fruit of 'FlordaGrande' grown in Gainesville will have a small blossom-end protuberance (point) which is absent when grown in the Lower Rio Grande Valley. This characteristic protuberance, observed in every season since 1983, is believed to be associated with the cooler climate during fruit development at Gainseville and absent under the rapidly warming temperatures following bloom that remain warm during fruit development in the Lower Rio Grande Valley. External red color is enhanced in the warm subtropical climate in the Lower Rio Grande Valley. The red blush normally observed on a particular cultivar will be 10 to 20% greater.

Cultivars Less Suitable

Table 2 gives the characteristics of several cultivars that are now considered obsolete or have been evaluated less suitable for the subtropical climate of the Lower Rio Grande Valley. The comments column is number coded for specific reasons the cultivars were not found suitable. Some of these cultivars are being grown successfully in other areas. Among these are 'Desertred' which is too small and ripens too late in the market window for the Lower Rio Grande Valley. Cultivars 'Rayon' and 'Hermosillo,' 'Newbelle,' and 'Flordabelle' have acceptable size but mature in late May which also is too late for marketing. 'Newbelle' (Fla. 1E-138) is similar in most respects to 'Flordabelle' except for the uneven ripening and green ground color of the latter. Cultivars 'McRed' and 'San Pedro' are too soft for commerical shipments. Recent releases are superior to 'Flordagem' which has a large suture bulge and 250 chill unit requirement that is not satisfied in some years in the Lower Rio Grande Valley. A 1988 Florida release, 'FlordaStar' looked good in Gainesville, Florida, but did not size well or develop good taste in Texas.

Nectarines and Plums

There is not a commercial quality nectarine adapted to the subtropical climate of the Lower Rio Grande Valley. Several are being tested and some offer promise for future release (Table 3). Presently only 'Sunred' is available and only considered suitable for home landscape planting. The same basic criteria for evaluation of peaches are being used for evaluating necatrines. Stylar-end scaring by thrips has been a problem in every year with nectarines. Preliminary data indicate insecticide sprays during bloom may control the problem.

A subtropical adapted plum cultivar suitable for the commercial market has not been found. Two selections from

Table 3. Nectarine test selections being evaluated for adaptation to the subtropical Lower Rio Grande Valley, Texas.

		Flower			Fruit					Flesh				
							Color							
Cultivar	Estimated chill units	Type	Bud set[z]	FDP[y] (days)	Size (g)	Pit[x]	Red (%)	Ground[w]	Shape[z]	Firm[z]	Taste[z]	Texture[z]	Browning[z]	Color
Fla. 9-6N	225	showy	8	86	110	SC	100	yellow	10	10	10	8	10	yellow
Fla. 9-8N	250	showy	5	93	90	SC	70	yellow	9	10	6	8	10	yellow
Fla. 9-11N	175	nonshowy	8	95	92	SC	100	yellow	9	10	9	8	10	yellow
Fla. 9-12N	250	nonshowy	8	91	85	SC	100	yellow	9	10	9	8	10	yellow
Fla. 9-15N	275	nonshowy	7	97	92	SC	100	yellow	8	10	8	8	10	yellow
Fla. 81-17N	125	showy	8	95	90	SF	100	yellow	9	9	9	8	10	yellow
Fla. 81-24N	250	showy	8	94	103	SC	70	yellow	10	8	7	8	10	yellow
Fla. 82-5N	200	nonshowy	8	84	115	SC	100	yellow	10	9	9	8	10	yellow
Fla. 82-23N	250	showy	8	89	100	F	100	yellow	10	9	10	9	10	yellow

[z]Ratings in Texas on a 1 to 10 scale where 10 is most desirable.
[y]Fruit development period from full bloom to maturity.
[x]F = free, SF = semifree where pit is loose when soft ripe, SC = semicling where pit is not loose when ripe, but not genetic cling.

the Florida breeding program (Fla.8-2 and Fla.3-4) have been given the local names 'Gulfruby' and 'Gulfgold,' respectively. More recent promising selections from the University of Florida breeding program are being tested. Low-chill plums being evaluated are hybrids of the American plum (*Prunus domestica* L.) with the Japanese plum (*P. salicina* Lindi.). Problems to overcome with low-chill subtropical plums are small size, bitter skin, self-incompatibility, susceptibility to damage by thrips, windscar, bacterial leaf spot, and plum leaf scald.

Literature Cited

1. Bowen, H. H. 1971. Breeding peaches for warm climates. HortScience 6:153-157.
2. Bowen, H. H. 1980. 'EarliGrande' peach. HortScience 15:207.
3. Chandler, W. H. and W. P. Tufts. 1934. Influence of the rest period on opening of buds of fruit trees in spring and on development of flower buds of peach trees. Proc. Amer. Soc. hort. Sci. 30:180-186.
4. Gurdian, R. J. and R. H. Biggs. 1964. Effect of low temperatures on terminating bud dormancy of 'Okinawa,' 'Flordawon,' 'Flordahome,' and 'Nemaguard' peaches. Proc. Fla. State Hort. Soc. 77:370-379.
5. Richardson, E. Arlo and David R. Walker. 1974. A model for estimating the completion of rest for 'Redhaven' and 'Elberta' peach trees. HortScience 9:331-332.
6. Rouse, R. E. 1985. Peach cultivars for the subtropical Lower Rio Grande Valley of Texas. J. Rio Grande Valley Hort. Soc. 38:31-35.
7. Rouse, R. E. and W. B. Sherman. 1987. 'TropicSweet': A freestone peach for subtropical climates. Hort Science 22:169-170.
8. Rouse, R. E., W. B. Sherman and R. H. Sharpe. 1984. 'FlordaGrande': A peach for subtropical climates. HortScience 20:304-305.
9. Sauls, J. W. 1985. Potential for commercial peach production in the Lower Rio Grande Valley. J. Rio Grande Valley Hort. Soc. 38:27-30.
10. Sharpe, R. H. 1961 Developing new peach varieties for Florida. Proc. Fla. State Hort. Soc. 74:34352.
11. Sharpe, R. H. 1969. Subtropical peach and nectarines. Proc. Fla. State Hort. Soc. 82: 302-306.
12. Sherman, W. B., J. Soule and C. P. Andrews. 1977. Distribution of Florida peaches and nectarines in the tropics and subtropics. Fruit Var. J. 31(4):75-78.
13. Sherman, W. B., R. J. Knight, Jr. and T. E. Crocker. 1978. Peach and nectarine breeding and testing in parts of the world. Proc. Trop. Reg. Amer. Soc. Hort. Sci. 22:103-117.
14. Sherman, W. B., J. Rodriguez and E. P. Miller. 1984. Progress in low-chill preaches and nectarines from Florida. Proc. Fla. State Hort. Soc. 97:320-322.
15. Sherman, W. B., P. M. Lyrene, J. A. Mortensen and R. H. Sharpe. 1982. 'Flordaprince' peach. HortScience 17:988.
16. Weinberger, J. H. 1950. Chilling requirements of peach varieties. Proc. Amer. Soc. Hort. Sci. 56:122-128.
17. Weinberger, J. H. 1956. Prolonged dormancy trouble in peaches in the southeast in relation to winter temperatures. Proc. Amer. Soc. Hort. Sci. 67:107-120.

Summary of 1987 Apple Variety Trial

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An apple variety trial which was started at the Lewis-Brown Horticultural research farm, Corvallis, in 1985, with 65 varieties from 11 nurseries, has expanded to include 98 accessions, including a few numbered selections. In 1987, over 250 fruit samples were tested at harvest or after storage.

Results of fruit tests should be taken as preliminary, since this was the first year of production for all varieties. As the trees mature, the fruit will probably become smaller, firmer, more regular in shape, have less bitter pit, water core, sunburn, and breakdown. Keeping quality should improve.

Early varieties which looked promising were: 'Earligold,' a 'Lodi' lookalike; 'Redfree,' and 'Paulared,' both in the 'Gravenstien' season. In future years we will make careful comparisons between 'Paulared' and 'Akane.'

Late varieties which looked promising: Among the 'McIntosh' types, 'Liberty,' and 'Empire.' 'Hawaii' may be a good 'Golden Delicious' substitute. 'Melrose'/M.26 was highly productive with excellent eating quality.

Very late varieties, 'Braeburn' and 'Fuji,' looked promising. 'Braeburn' appeared to mature ahead of 'Fuji.' 'Braeburn' is sweet/tart; 'Fuji' is sweet.