Thai Tiger™ Series of Low-chill Peaches for the Subtropics

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Abstract. The Thai Tiger series of low-chill peaches are being released for use in subtropical or tropical highland regions and particularly for use in the northern highlands of Thailand to expand the harvest season of the present low-chill variety grown, ‘EarliGrande’. The Thai Tiger series are yellow-fleshed acid-sweet peach varieties that produce excellent yields of firm peaches and will allow a continuous harvest from early April until early May in the northern highlands of Thailand.

These peach trees [*Prunus persica* (Bastch) L.] originated in the Stone Fruit Breeding Program at the Department of Horticultural Sciences at Texas A&M University, located in College Station, TX. The seed parent of three of these (TXW1C4, TXW1490-1, and TXW1491-1) was ‘TropicBeauty’, a nonpatented variety released by the University of Florida in cooperation with Texas A&M University in 1988 (Rouse and Sherman, 1989). This peach was selfed to produce a population of 500 seedlings, which were planted in a high-density fruiting nursery at the Texas A&M University Citrus Center in Weslaco, TX. The fourth selection, TXW1193-1, is from unknown parentage and was grown in the same high-density fruiting orchard. These seedlings were selected for good productivity, good fruit size, yellow ground color, round shape, high red overcolor, and excellent firmness. They were propagated asexually by budding and have been evaluated in Texas (Weslaco), California (Fowler), Florida (Immokalee), Mexico (Sonora), and Thailand (Angkhang).

Geographic areas of adaptation. TXW1193-1, TXW1C4, TXW1490-1, and TXW1491-1 were selected for adaptation in the subtropical zone of the Lower Rio Grande Valley of Texas [lat. 26.2° N; mean monthly average temperature of December is 62 °F (16.7 °C) and of January is 59 °F (15 °C)]. The peach selections are adapted in areas where ‘EarliGrande’ (Bowen, 1980) and ‘TropicBeauty’ can be grown commercially. These low-chill regions normally receive less than 200 chilling units as calculated by the mean temperature of the coldest month(s) (Sharpe et al., 1990). The mean temperature

of the coldest months in these areas is generally between 60 °F (15.5 °C) and 64 °F (17.8 °C). These can also be grown in higher chill areas in the absence of temperatures below 29 °F (1.7 °C) during flowering and fruit development. The experimental plot was a completely randomized design with two replications of single-tree plots planted at 3 m × 4 m and trained as an open-center tree.

These four genotypes have subsequently been fruited in two highland tropical sites in northern Thailand. Angkhang (lat. 19°45′ N, long. 99°10′ E) is at 1400 m elevation and in December (the coldest month) has a mean daily maximum temperature of 20 °C and a mean daily minimum temperature of 6 °C. Khuwang (lat. 18°40′ N, long. 98°40′ E) is at 1300 m elevation and in December has a mean daily maximum temperature of 18 °C and a mean daily minimum temperature of 12 °C. In the highlands of Thailand, the coldest period is normally between end of November and early January. Suitable areas for peach production are where there are 60 d when the mean daily minimum temperature is not greater than 12 °C and the mean daily maximum temperature is not greater than 20 °C. The research plot was a completely randomized design with four replications of single-tree plots planted at a 4 m × 4-m distance and trained to an open-center system.

Fruit and Tree Characteristics

These new and distinct peach varieties fruit well under subtropical mild winter conditions as well as highland tropical conditions. These require ≈100 to 200 chilling units to flower and fruit normally. The trees have vigorous spreading growing habits. The genotypes bloom together in late January or early February in south Texas (Table 1) and over 5 weeks from late December to late January in Angkhang, Thailand (Table 2).

In the highlands of Thailand, TXW1C4 and TXW1193-1 bloom together (last week of December to first week of January) followed by TXW1491-1 (first week of January to mid-January) and by TXW1490-1 and ‘TropicBeauty’, which bloom together (second week of January to third week of January), and finally by ‘EarliGrande’, which blooms last (third week of January to last week of January). All of the selections have showy flowers and reniform leaf glands.

They ripen from late April to mid-May in south Texas and from early April until early May in Thailand. In the subtropics of Texas, TXW1193-1 fruits after ‘EarliGrande’ and ‘Flordaprince’ (Sherman et al., 1982) but before ‘TropicBeauty’, TXW1C4 fruits with ‘TropicBeauty’, TXW1490-1 begins fruiting toward the end of the ‘TropicBeauty’ harvest and ends after it, and TXW1491-1 fruits after ‘TropicBeauty’ and TXW1490-1 (Table 1). In the highlands of Thailand as a result of the changed order of bloom, the selections ripen in a different order as well. In Angkhang, TXW1193-1 and TXW1C4 ripen in early to mid-April. Both of these ripen before ‘EarliGrande’, which ripens with ‘TropicBeauty’ in late April along with TXW1490-1. TXW1491-1 ripens after ‘EarliGrande’ in late April to early May (Table 2).

These trees bear crops of peaches that are firm and medium to large in size for the season (Tables 1 and 2). The fruit is round with a flattened tip, has a yellow ground and flesh color, 60% to 80% red overcolor, melting type flesh, and are clingstone (Tables 1 and 2). The fruit flesh does not brown readily nor has it shown a tendency to develop split or shattered pits during the final stage of fruit swelling. All these selections have similar or better firmness, blush, shape, and appearance than ‘EarliGrande’, the major commercial peach cultivar used in northern Thailand. In addition, they are similar or better in firmness, blush, shape, appearance, and total soluble solids and have greater titratable acidity than ‘TropicBeauty’ (Tables 1 and 2), a major commercial low-chill variety commonly grown in other low-chill zones in the world. The production of TXW1C4, TXW1490-1, and TXW1491-1 has yields similar to ‘TropicBeauty’ (20 to 25 kg/tree), whereas TXW1193-1 has a yield similar to ‘EarliGrande’ (15 to 18 kg/tree). These are being released to extend the peach harvest season 2 weeks before and 1 week later than the currently used peach variety, ‘EarliGrande’, with peach varieties well adapted and productive in northern Thailand.

Reaction to Prevalent Disease and Insect Problems

These selections are moderately susceptible to the common pathogen problems such as bacterial leaf spot [*Xanthomonas campestris* pv. *pruni* (E. F. Smith) Dows.] and peach

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Table 1. Performance of low-chill peach selections and varieties in south Texas (Weslaco) from 1990 to 1996.

Variety	Full bloom	First ripe	FDP (days) ^z	Crop ^y	Wt (g)	Firmness ^x	Blush ^w (%)	Shape ^x	Appearance ^x
Flordaprince	30 Jan.	16 Apr. d ^v	74 c	3.8	81 cd	5.9	59	5.9	5.6
EarliGrande	27 Jan.	19 Apr. cd	78 c	4.4	115 ab	7.2	79	7.3	7.1
TXW1193-1	4 Feb.	24 Apr. bcd	91 b	2.8	90 bcd	7.7	75	8.3	8.0
TropicBeauty	2 Feb.	1 May bcd	89 b	4.1	110 b	7.9	69	7.4	7.6
TXW1C4	27 Jan.	3 May abc	93 ab	5.0	70 d	7.0	80	8.0	8.0
TXW1490-1	5 Feb.	8 May ab	91 b	4.3	105 bc	7.7	74	8.2	7.8
TXW1491-1	5 Feb.	16 May a	104 a	2.3	139 a	7.6	75	7.4	7.6
Significance ^v	NS	***	***	NS	***	*	NS	**	**

^zFDP = days from full bloom (60% bloom opened) until first ripe (20% fruit ready to harvest).

^yCrop: 2 = 40%, 5 = full crop, 7 = overcropped by 50%, the tree is considered to have a full crop when the fruit are spaced ≈15 cm apart on the branch.

^xFirmness, shape, and appearance: 3 = poor, 5 = fair to acceptable, 7 = good, 9 = excellent.

^wBlush = percent red overcolor.

^vKruskal-Wallis nonparametric test for significance done for categorical data of crop, firmness, blush, shape, and appearance. Other data were analyzed using an analysis of variance followed by a mean separation with a Duncan's multiple range test at a 0.05 level of significance. Means with different letters are significantly different at the 5% level.

NS,*,**,*Nonsignificant and significant at the 0.05, 0.01, and 0.001 levels, respectively.

Table 2. Performance of low-chill peach selections and varieties in Angkhang, Thailand, from 2003 to 2005.

Variety	Full bloom	First ripe	FDP ^z	Crop ^y	Wt (g)	Firmness (N)	Blush ^x (%)	Shape ^w	Tip ^v	Ground ^u	TSS ⁱ (%)	TA ^a (%)
EarliGrande	17 Jan.	18 Apr. b ^r	90	6	107 b	10.6 c ^v	60	3.5	3.5	7.4	10.1 ab	0.9 b
TXW1193-1	1 Jan.	9 Apr. c	99	7	82 c	12.9 c	78	1.0	6.2	7.9	9.9 ab	1.3 a
TropicBeauty	7 Jan.	19 Apr. b	101	8	108 b	15.6 bc	72	1.5	6.8	6.9	9.1 b	0.9 b
TXW1C4	1 Jan.	9 Apr. c	98	8	108 b	20.9 b	73	1.1	7.2	7.6	11.6 a	1.5 a
TXW1490-1	7 Jan.	14 Apr. bc	95	8	83 c	15.9 bc	73	1.4	7.4	6.6	11.3 a	1.4 a
TXW1491-1	1 Jan.	27 Apr. a	117	9	126 ab	29.4 a	67	2.5	6.7	7.6	10.1 ab	1.3 a
Significance ^f	NA	**	NA	NA	**	***	NS	***	***	NS	**	**

^zFDP = days from full bloom (60% bloom opened) until first ripe (20% fruit ready to harvest).

^yCrop was rated on scale of 1 to 9: 1 = less than 10% of full crop, 3 = 30% of full crop, 5 = marginal, 7 = good crop, 9 = full crop. The tree is considered to have a full crop when the fruit are spaced ≈15 cm apart on the branch.

^xBlush = percent red overcolor.

^wShape: 1 = flat round, 2 = round, 3 = round-oblong, 4 = ovate, 5 = oblong.

^vTip: 1 = very large resulting in off-shape fruits, 3 = large or pointy, 5 = marginal, 7 = little, 9 = no tip.

^uGround: 1 = very green, 3 = green, 5 = light green, 7 = greenish yellow, 9 = yellow.

ⁱTSS = total soluble solids as measured by a handheld refractometer.

^aTA = titrable acidity, percent malic acid.

^fKruskal-Wallis nonparametric test for significance done for categorical data of blush, shape, tip, and ground color. Other data were analyzed using an analysis of variance followed by a mean separation with a Duncan's multiple range test at a 0.05 level of significance. Means with different letters are significantly different at the 5% level.

NS,*,**,*Nonsignificant and significant at the 0.05, 0.01 and 0.001 levels respectively.

NA = only 1 year of data available so the data were not statistically analyzed.

rust [*Tranzschelia discolor* (Fuckel) Transchel & Litv.] as are the parents 'TropicBeauty' and 'Flordaprince'.

Release Implementation

These new low-chill varieties are being released for use by the Royal Project Foundation in their efforts to develop alternative crops for northern Thailand as well as

for other potential peach production areas in the tropics and subtropics. Budwood is available through the Royal Project Foundation (U. Boonprakob) and from Texas A&M University (D. Byrne).

Literature Cited

Bowen, H.H. 1980. 'Earligrande' peach. HortScience 15:207.

Rouse, R.E. and W.B. Sherman. 1989. 'TropicBeauty': A low-chilling peach for subtropical climates. HortScience 24:165-166.

Sharpe, R.H., W.B. Sherman, and J.D. Martsolf. 1990. Peach cultivars in Florida and their chilling requirements. Acta Hort. 279:191-197.

Sherman, W.B., P.M. Lyrene, J.A. Mortensen, and R.H. Sharpe. 1982. 'Flordaprince' peach. HortScience 17:988.