

Assessment of Low Chill Peach and Nectarine Cultivars in the Central Coast of New South Wales, Australia

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Abstract

Forty-two low chill peach and nectarine cultivars introduced to Australia from the University of Florida, Gainesville, were assessed in the Central Coast of New South Wales, Australia. 'Flordastar,' Fla. 82-3, 'Flordagem,' 'Flordacrest,' 'Desert Red,' 'Flordaglo,' 'Newbelle' and 'Tropic-Snow' peaches and 'Sundollar,' 'Sungem,' 'Sunbob,' Fla. 81-17N and 'Sunblaze' nectarines produced fruit of comparable or superior quality to that of the cultivars presently used.

Introduction

The low chill stonefruit industry in New South Wales began around the Sydney Metropolitan Area in the early 1900's, based on seedlings of white flesh cultivars introduced into Australia by British and Chinese settlers (3).

The white, aromatic and melting flesh of these early cultivars was too soft to allow for transportation to distant markets and limited the expansion of the industry to areas close to population centres.

As the industry developed, the search for improved cultivars continued. In 1934 Savage and Brereton (8) recommended the following peach cultivars for commercial planting in the Central Coast of New South Wales: 'Governor Rawson,' 'Watts Early,' 'Braddocks,' 'Aunt Becky,' 'Carman,' 'Greensboro,' 'Blackburn'*, and 'Le Vainquer.'

During the next thirty years, significant changes occurred in cultivar recommendations, and Holbeche (4) recommends 'Fairfax,' 'Rennie,' 'Clark's Seedling,' 'Watts Early,' 'W. H. Spinks,' 'Bell's Improved,' 'Early Beckie,' 'Grays,' 'Halehaven,'* 'Blackburn,'*

'Fragar' and 'Shanghai' for commercial use in 1964.

Further assessments in the 1960's of medium and high chill yellow flesh cultivars, originally considered suitable to the high chill districts in New South Wales led to the commercial introduction of 'Starking Delicious,'* 'Cardinal,'* 'Coronet,'* 'Redhaven'* and 'Loring'* peaches and the 'Nectared' series of nectarines (numbers 2, 3, 4, 6, 7, 9 and 10) to orchards in the Central Coast of New South Wales.

Due to the large seasonal variation of winter temperatures and the diverse elevations of coastal district orchards, from almost sea level to an elevation of 600 m at Bilpin in the Blue Mountains range, there are great variations in chilling conditions in the Central Coast of New South Wales. In some years, adequate chilling is recorded, and high chill cultivars can be grown successfully. In other years when chilling is inadequate, diverse symptoms of lack of chilling can be observed, from elongated fruit with protruding tip and prominent suture, to flower bud drop and total crop failure in some cultivars.

New South Wales Agriculture began introducing low chill peach and nectarine cultivars from the University of Florida breeding program in 1968 (3). These introductions have advanced the production of early fruit and facilitated development of a subtropical stonefruit industry in Australia (5). Due to this northerly expansion of

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*yellow flesh cultivars.

stone fruit growing, the Central Coast of New South Wales has become an early mid-season district. Previously it had been recognized as the earliest stonefruit growing district in New South Wales.

The low chill peach and nectarine cultivars in commercial production in the Central Coast of New South Wales include 'Sherman's Early,' 'Maravilha,' 'EarliGrande,' 'Sherman's Red' and 'Flordagold' peaches and 'Sundowner,' 'Sunred,' Fla. 3-4N, Fla. 5-14N, 'Sunlite' and 'Sunripe' nectarines (6). These cultivars begin maturing fruit in mid October and finish in mid December. The season continues until the end of February with mid to high chill cultivars, which show symptoms of inadequate chilling in some years.

This paper reports on the assessment of 42 low chill cultivars and clonal selections introduced from the breeding program at the University of Florida and released from Australian Quarantine in 1986.

Materials and Methods

The cultivars and breeding selections studied in this investigation were bred by Professor Wayne Sherman, Fruit Crops Department, University of Florida, Gainesville. They were introduced into Australia by New South Wales Agriculture, and their release from quarantine began in 1986. The

Table 1. Mean maximum and minimum temperatures-°C. Peats Ridge Weather Station (Lat. 33° 19' S, Long. 151° 50' E, Elevation 280 m) (Department of Science, Bureau of Meteorology).

Month	Maximum		Minimum	
	1988	1989	1988	1989
June	17.0	15.2	7.8	8.4
July	17.0	14.7	7.6	5.7
August	17.7	15.8	7.3	5.1
September	20.6	20.3	9.7	7.3
October	27.1	25.2	12.8	11.2

trees, budded on 'Okinawa' stock were spaced 2.5m within the row and 5m between rows at Mr. A. R. Patten's orchard at Arcadia, New South Wales.

The trees were trained as open vase and established under trickle irrigation. Vegetation was managed in the orchard by mowing the sod in the middle of the rows and by applying post emergent herbicides in strips along the tree row. Fruit was thinned according to tree vigour. Up to 3 fruits per lateral were left on vigorous, well developed trees.

Assessments were carried out during 1988-1990 at Arcadia, New South Wales, blossom dates were assessed when required, and fruit assessed weekly as they matured,

Results and Discussion

Arcadia, New South Wales, the site of the commercial orchard where the cultivars and clonal selections are planted, is located on the outskirts of the Sydney Metropolitan area, on the Central Coast of New South Wales.

Winter temperatures are highly variable from one season to the next season. Winter temperatures in 1988 were relatively high and in winter 1989 temperatures were relatively low resulting in a 234% variation in chill units between the two years (2).

Minimum and maximum temperatures for Peats Ridge Weather Station are listed in Table 1. The low chill peach and nectarine cultivars suitable for commercial growing in the New South Wales Central Coast are listed in Tables 2 and 3. Those not suitable for commercial use are listed in Tables 4 and 5.

'Flordastar' and Fla. 82-3 are the earliest peach cultivars to produce fruit of acceptable quality. The fruit of 'Flordastar' reaches acceptable size, with a similar pointed tip to Florida grown fruit (11). Its major drawback is its tendency to produce fruit with split stones. The clonal selection Fla. 82-3 produces a round almost symetri-

Table 2. Low chill peach cultivars suitable for commercial use in NSW central coast growing conditions.

Cultivar	Blossom type	F.D.P.	Fruit							Flesh		
			Maturity dates	Diameter (mm)	Weight (g)	Blush (%)	Ground colour	Shape	Appearance	Colour ^C	Pit ^D	Flavour ^E
Flordastar	Showy	81 ¹ 94 ²	10.26-11.6 ¹ 11.10-17 ²	58-67	118	60-90	Y-YO	Round	Very attractive	Y	Y	1
Fla.82-3	Showy	86 94	10.29-11.6 11.10-17	54-67	100	70-90	Y-YO	Round	Very attractive	Y	Y	3
Flordagem	Showy	112 122	11.17-24 11.24	65-72	135	60-90	GY	Round	Very attractive	Y	R	1
Flordacrest	Showy	98 98	11.17-24 11.24	59-72	160	60-80	GY	Round	Very attractive	Y	Y	3
Desert Red	Showy	116 112	11.24 11.24	62-76	175	80-100	GY	Round	Very attractive	Y	Y	2
Flordaglo	Showy	104 119	11.24 12.1	55-68	121	50-80	C-GC	Round	Attractive	W	R	3
Newbelle	Showy	131 130	12.9 12.8-15	66-80	200	30-70	YG	Slight squat	Unattractive	Y	R	1
TropicSnow	Showy	117 129	12.9 12.15-22	57-73	165	20-80	C	Round to flattened	Attractive	W	R	3

A F.D.P.

Fruit development period from full bloom to maturity and maturity dates: ¹1988-1989 season; ²1989-1990 season.

B GROUND

Ground colour: Y = yellow; YO = yellow orange; GY = golden yellow; YG = yellow green; C = cream; CC = greencream.

C FLESH COLOUR

Y = yellow; W = white.

D FLESH COLOUR AT PIT

Y = yellow; R = red.

E FLAVOR

1 = acceptable; 2 = good; 3 = very good.

Table 3. Low chill nectarine cultivars suitable for commercial use in NSW central coast growing conditions.

Cultivar	Blossom type	F.D.P. ^A	Fruit							Flesh		
			Maturity dates	Diameter (mm)	Weight (g)	Blush (%)	Ground colour	Shape	Appearance	Colour ^C	Pit ^D	Flavour ^E
Sundollar	Showy	82 ¹ 79 ²	11.11-17 ¹ 11.2-4 ²	53-67	103	70-100	Y	Round	Attractive	Y	Y	2
Sungem	Showy	85 84	11.11-17 11.17	50-66	100	90-100	Y	Round	Attractive	Y	Y	1
Sunbob	Showy	85 91	11.17-24 11.24	54-67	103	60-80	Y	Oval	Very attractive	Y	Y	3
Fla. 81-17N	Showy	126	11.24	52-59	105	95	Y	Round	Very attractive	Y	Y	3
Sunblaze	Not Showy	108 116	11.24 11.24-12.1	52-68	108	80-100	YG	Round	Attractive	Y	R	1

A F.D.P.

Fruit development period from full bloom to maturity and maturity dates: ¹1988-1989 season; ²1989-1990 season.

B GROUND

Ground colour: Y = yellow; YG = yellow green.

C FLESH COLOUR

Y = yellow; W = white.

D FLESH COLOUR AT PIT

Y = yellow; R = red.

E FLAVOR

1 = acceptable; 2 = good; 3 = very good.

Table 4. Low chill peach cultivars not suitable for NSW central coast growing conditions.

Cultivar	Full ^A bloom	Harvest ^A	Average Weight (g)	Fruit Diameter (mm)	Comments
Floradawn	1.88	23.10	95	50-55	Small fruit. Abundant split stones.
Fla. 9-4	10.8	7.11	117	55.67	Soft flesh. Dull colour. Abundant split stones.
Fla. 82-2	16.8	7.11	66	49-54	Small fruit. Softens very quickly.
Fla. M2-3	28.8	13.11	95	51-63	Small fruit. Split stones. Unattractive.
Fla. 82-12	14.8	24.11	183	55-76	Soft flesh. Tip too prominent. Soft skin.
Fla. 82-8	13.8	24.11	126	55-68	Very soft fruit.
Fla. 8-6	21.8	1.12	121	61-73	Very deep cavity. Superior alternative.
Fla. 3-2	3.8	1.12	127	58-71	Fruit softens too quickly. Superior alternative.
Fla. 82-21	21.8	5.12	180	60-81	Very susceptible to bacterial spot.
Fla. 7-11	16.8	5.12	144	64-73	Fruit ripens too quickly. Superior alternative.
Flordagrande	1.8	13.12	157	64-72	Fruit is too soft. Superior alternative.
Fla. 9-14	10.8	15.12	144	64-73	Fruit is unattractive and unpalatable.
Fla. 81-8N	8.8	15.12	169	64-76	Labeled as a nectarine. Lacks colour. Soft flesh.
Fla. 81-9N	8.8	17.12	173	68-79	Labeled as a nectarine. Lacks colour. Misshapen.
Fla. 8-14	15.8	17.12	177	66-80	Unattractive. Poor taste.
Flordabeauty	13.8	20.12	190	62-84	Unattractive, misshapen fruit.
Fla. 9-20c	18.8	20.12	80	51-58	Fruit and crop are too small.

^AFull bloom and harvest dates (average 1988-1989, 1989-1990 seasons).

cal fruit, slightly smaller than 'Flordastar,' but without split stones. In northern New South Wales the fruit of 'Flordastar' and Fla. 82-3 lack size (3). The fruits of 'Flordastar' and Fla. 82-3 mature in the same season as 'Sherman's Early' and are more attractive. 'Sherman's Early' is the earliest cultivar in commercial use; all three are small, their future importance is doubtful, as they have to compete in the market with superior quality fruit from earlier districts. Their future in this area will depend mainly on direct sales at the orchard door. The cultivars 'Flordagem,' 'Flordacrest' and 'Desert Red' ripen within a 7 day period. They all produce fruit of outstanding quality during 'Flordagold' season. 'Flordagold' is now the most widely planted peach cultivar in New South Wales.

'Flordacrest' develops over a significantly longer period than in Florida, reaching a correspondingly larger size

(10), when grown in the north coast of New South Wales, the fruit is misshapen (3).

'Desert Red' is quoted as bacterial spot susceptible (13), but it is still symptomless in our plots. Under the same climatic conditions, Fla. 82-21 develops extensive bacterial spot on leaves and fruit.

The white flesh cultivars 'Flordaglo' and 'TropicSnow' produce high quality fruit. Both cultivars have longer fruit development periods when grown in Arcadia compared to Florida (7, 12). 'Flordaglo' fruit size is similar in both areas but 'TropicSnow' fruit is significantly larger in New South Wales. Because 'Flordaglo' ripens 10 days after 'Maravilha,' the earliest white flesh cultivars in commercial production, it is not a candidate to replace it, 'Flordaglo' fruit is larger, more attractive and better shaped than 'Maravilha.' 'TropicSnow' ripens 10 days after 'Flordaglo,'

Table 5. Low chill nectarine cultivars not suitable for NSW central coast growing conditions.

Cultivar	Full ^A bloom	Harvest ^A	Average Weight (g)	Fruit Diameter (mm)	Comments
Fla. 81-6N	18.8	14.11	113	55-70	Abundant sugar spots and split stones.
Fla. 8-2N	16.8	14.11	105	55-62	Extensive skin cracking.
Fla. 7-3N	21.8	16.11	92	55-62	Soft tip, skin damage, abundant sugar spots.
Fla. 9-6N	6.8	21.11	110	55-70	Abundant sugar spots, too dark colour.
Sunhome	10.8	24.11	77	53-57	Ornamental nectarine, tip cracking.
Fla. 8-7N	11.8	24.11	125	60-80	Abundant sugar spots. Better selections ripen at that time.
Fla. 82-12N	3.8	24.11	94	55-62	Attractive fruit. Better selections available.
Fla. 9-11N	4.8	24.11	119	51-68	Attractive fruit, better selections available.
Fla. 9-12N	6.8	26.11	110	57-71	Abundant sugar spots, better selections available.
Fla. 8-8N	13.8	1.12	111	55-60	Extensive skin cracking.
Fla. 82-25N	3.8	14.12	140	58-70	Soft flesh and abundant sugar spots.
Fla. K5E 15N	16.8	12.12	134	52-69	Skin cracking, abundant sugar spots, stone splitting.
Fla. 82-23N	—	12.12	149	60-72	Fruit is too dark, too small and abundant sugar spots.

^AFull bloom and harvest dates (average 1988-1989, 1989-1990 seasons).

during the second and third weeks of December, without competition from another white flesh cultivar. The economic impact of these two white flesh cultivars in the Central Coast of New South Wales might well be influenced by the Sydney market's preference for yellow flesh fruit.

'Newbelle' fruit is large, unattractive and likely to be of value only in low chill areas, where 'Flavorcrest' is not adapted, and only suitable for local sales.

The two earliest nectarines in the Arcadia planting, that produced fruit of acceptable quality are 'Sundollar' and 'Sungem.' The two cultivars ripened at the same time and together with 'Sundowner' and 'Sunred,' during the second half of November. 'Sunred' season extends to the beginning of December. 'Sungem' fruit has a fruit development period of 85 days, 10 to 15 days longer than in Florida and is correspondingly larger (11). 'Sungem,' 'Sundowner' and 'Sunred' fruit have the same dark red over green yellow

colour typical of Florida nectarines. This colour contrasts with the brilliant red over yellow colour of 'Sundollar,' which was introduced because of its attractive colour (1).

Another selection, labelled as Fla. 8-13N, selected in Australia and named 'Sunbob'* shares the attractive colouring of 'Sundollar' and ripens in the middle of 'Sunred' season. Dr. W. Sherman describes Fla. 8-13N as being pollen sterile.** The flower of 'Sunbob' is not pollen sterile, its correct identity was most likely lost during transit between Florida and Australian Quarantine. The fruit is as attractive as 'Sundollar' and ripens in the middle of 'Sunred' season. 'Sunblaze,' follows 'Sunbob' in the same production season as Fla. 3-4N, is an attractive nectarine with abundant sugar spots.

*Named Sunbob to acknowledge the contribution made by Mr. A. R. Patten to the low chill stone fruit industry in New South Wales.

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Acknowledgements

The authors gratefully acknowledge Mr. P. Malcolm's contribution to cultivar assessment in 1989-90 and Mr. C. Weale's comment on the manuscript.

Fruit Varieties Journal 46(2):124-127 1992

Peaches and Nectarines Developed But Not Released by the University of Florida¹

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Abstract

Sixteen peach and seven nectarine selections originating from the University of Florida breeding program have been introduced and named elsewhere. These varieties are reported to recognize them and to help avoid duplicate names. A brief description, based on Florida records, is given for each cultivar.

The University of Florida low-chill peach breeding program was initiated in 1953 to develop high quality, early ripening cultivars adapted to the climatic areas of central and north Florida. The nectarine character was introduced into the program in 1956. Twenty-one peach and ten nectarine cultivars have been released by this program (8). The success of this program continues to fuel widespread

interest in producing these fruits in regions of the subtropics and tropical highlands and in colder regions in the absence of spring frosts. Successful commercialization in some of these regions has meant new industries, and in others, an extension of the early harvest season.

Peach and nectarine cultivars released by the University of Florida and about 150 advanced selections have been sent to 81 countries and territories over the past 30 years to evaluate for potential commercialization. Information on adaptation, such as chill units (cu) based on time of flowering and leafing, generated from testing around the world has benefitted

¹Florida Agricultural Experiment Station Journal Series No. R01863.