Growth and Yield Response of High Density Peaches and Nectarines from Annual Topping[1]

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Cultural methods to control tree size and increase fruit production in high density orchards have received much attention in recent years (1, 8, 10, 12, 13, 14). Summer and traditional winter pruning have been used to check vegetative growth and facilitate other orchard operations (3, 6, 7, 11). Higher tree densities are being used to maximize early bearing potential (3, 5, 9, 11). The chronic problem of short tree life in the South, lack of dwarfing rootstocks compatible with commonly grown scion cultivars (4, 11) and pest damage have necessitated examination of alternative cultural systems. A long period of favorable weather after fruit harvest in May and June permitted examination of effects of postharvest topping on growth, yield and pest problems.

Materials and Methods

Twelve 'Early Amber' peach and 12 'Sunred' nectarine trees budded on 'Nemagard' seedling rootstocks were planted in adjacent rows in 1973. An additional row of 12 'Flordagold' peaches was planted in 1974. Trees were spaced 1 m apart in and 2 m between the rows (4997 trees/ha). 'Sunred' and 'Flordagold' trees were headed at 30 cm and 'Early Amber' at 45 cm at time of planting. Topping treatments for the subsequent 3 years were made after fruit harvest. Relative times of defoliation and full bloom were estimated each year.

1974-1975 Season. Groups of 4 'Early Amber' and 3 'Sunred' trees were topped on May 1 and June 15, 1974 in a manner to simulate a horizontally oriented circular saw. About 5 cm of growth (2-3 vegetative buds) on each of 4 or 5 well spaced branches arising from the main trunk was left (Fig. 1). Approximately 4-week-old fruit were hand thinned the following spring. Fruit were removed on alternate days during harvest in late April.

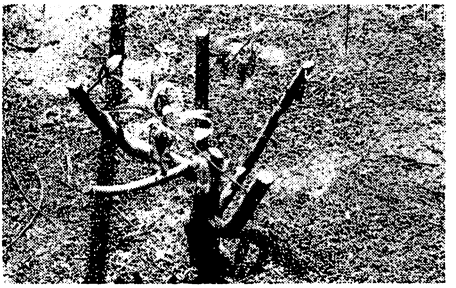

Fig. 1. 'Sunred' nectarine tree immediately after topping, June 1975.

1975-1976 Season. Groups of 3 'Sunred' and 4 'Flordagold' trees were similarly topped after fruit harvest on May 14, May 20 and June 11, 1975. Four-week-old fruit were hand thinned the following spring. Fruit were harvested in late May on alternate days.

1976-1977 Season. Groups of 6 'Sunred' and 6 'Flordagold' trees were topped after harvest on May 26 and June 9, 1976. Hand thinning was not required the following March because of fruit loss from spring frosts. Fruit were harvested in May.

Results and Discussion

Date of defoliation was delayed on both 'Early Amber' and 'Sunred' trees topped at successively later dates (Table 1). Topping date did not influence defoliation of 'Flordagold' trees. New growth on topped trees of 'Early Amber' and 'Sunred' had less

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Table 1. Effect of topping on % defoliation.

Cultivar	Nov. 25, 1974[1]		Dec. 2, 1975		
	May 1[2]	June 15	May 14	May 30	June 11
	(% Defoliation)				
Early Amber	75	50	—	—	—
Sunred	44	31	75	50	38
Flordagold	—	—	75	80	75

[1]Observation date.
[2]Date trees topped.

Table 2. Effect of topping date on date of full bloom.

(Date of full bloom)

Cultivar	Topping Date						
	1974-1975		1975-1976			1976-1977	
	May 1	June 15	May 14	May 30	June 11	May 26	June 9
Early Amber	2/26	3/2	—	—	—	—	—
Sunred	1/29	2/12	2/15	2/21	2/21	2/21	2/23
Flordagold	—	—	2/20	2/20	2/21	2/23	2/23

Table 3. Effect of topping date on fruit weight at harvest.

Cultivar	Topping Date						
	1974-1975		1975-1976			1976-1977	
	May 1	June 15	May 14	May 30	June 11	May 26	June 9
	(g/fruit)						
Early Amber	82	69	—	—	—	—	—
Sunred	38	47	40	47	45	32	48
Flordagold	—	—	91	77	83	62	78

Table 4. Effect of topping date on projected yield.

Cultivar	Topping Date						
	1974-1975		1975-1976			1976-1977	
	May 1	June 15	May 14	May 30	June 11	May 20	June 9
	(Kg [000's]/hectare)						
Early Amber	4.3	1.1	—	—	—	—	—
Sunred	16.3	4.6	15.4	19.6	7.8	10.4	5.2
Flordagold	—	—	19.6	19.8	17.8	17.0	14.3

rust. Rust disease [*Tranzschelia discolor* (G. Chl.) Trans and Litr.] causes early defoliation in Florida and requires several summer sprays for control (2); therefore, topping has potential in controlling this disease.

Postharvest topped 'Early Amber' and 'Sunred' trees bloomed later than winter-pruned trees the following year (Table 2). Thus, there was a positive relationship between time of defoliation and bloom the following year. This strongly suggests that chilling was not as effective before as it was after complete defoliation. A 14 day delay in bloom occurred on 'Sunred' trees topped on June 15th in 1974. Topping did not influence bloom of 'Flordagold'. A delay of several days in the bloom period is important in avoiding frosts which commonly occur during this period. Topping date did not influence time of fruit maturity.

A decrease in fruit bud set corresponding to later topping dates was observed with all 3 cultivars. Fruit set was smaller and the need for thinning reduced with fewer flower buds and a resulting lighter bloom. Fruit bud formation in particular was depressed by June topping so that little, if any thinning was necessary. Less fruit matured on June topped trees in every case. Size and weight would be expected to increase with fewer maturing fruit. Weight was not consistently influenced by topping date, however, except for 'Sunred' fruit (Table 3).

Topping at successively later dates resulted in decreased yields of 'Early Amber' and 'Sunred' trees (Table 4). 'Early Amber' is naturally a low fruit bud setting cultivar. This characteristic combined with decreased fruit set as a result of later topping resulted in unacceptably low yields and its exclusion from the study after the first year. Yields of 'Sunred' fruit were still quite high when trees were topped as late as May 30. Yields of 'Flordagold' were not influenced as much by later topping dates.

Yields of 'Sunred' and Flordagold' the year following topping in May 1975 were approximately twice those normally realized in commercial plantings in Florida. Reduction in yield from later topping was less for the larger fruited cultivar 'Flordagold' than for the small fruited 'Sunred' (Table 4). Thus, it appears that 2 important characteristics of cultivars suited to this system are (1) the ability to set a large number of fruit buds on young vigorous growth and (2) large fruit size.

Occurrence of scale insects and shot-hole borers was low on all topped trees, especially on new growth. Infestations were extensive, however, on non-topped trees.

The potential for topping closely planted trees annually includes several advantages. Complete top removal of low headed trees immediately after harvest could be mechanized. Disease and insect problems are generally less prevalent on young, strong wood and older wood which serves as foci for infection and infestations is almost completely removed. This system of severe postharvest topping would also invigorate trees sufficiently to reduce bud set, delay flowering and at least reduce the need for thinning.

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