

Harvest Time Affects Valencias

yield, fruit size and grade influenced by early, late, or midseason timing of orange harvesting

Winston W. Jones and Clarence B. Cree

Delayed harvest of Valencia oranges—if consistently delayed several weeks beyond the point of the legal fruit maturity of eight parts soluble solids to one part citric acid in the juice—seems to result in reduced fruit yield and reduced fruit grade.

In southern California, Valencia oranges require approximately 14 months to reach legal maturity, and then the fruit is left—stored—on the tree until harvest, which may be delayed for several months.

The effects of early, midseason, and late harvesting on yield, size, and grade of fruit were studied in a 14-year experiment at Riverside.

The trees used in the experiment were Azusa-strain Valencia orange budded on East Highland sweet orange root. They were planted on Ramona loam in 1917 and were uniformly managed—and yield records kept—for several years before experimental treatments of differential harvesting were started. The harvesting treatments were such that fruits in certain plots were picked at the beginning, those in other plots in the middle, and those in others at the end of the commercial picking season. Each treatment was replicated four times with five trees per plot and once with four trees per plot, so arranged as to allow for critical evaluation of the results. The picking dates for any given treatment vary slightly from year to year. The mean picking date for the early picking was June 4; for midseason, July 24; and for the late season picking it was September 21.

The treatments continued for a period of seven years and then—to learn whether the trends of the effect of the treatment were clear-cut—the order of the early and late harvest trees was reversed for a second period of seven years.

For each tree, the volume of fruit in field boxes was recorded and converted

to pounds. In the packing house, the number, the size, and the grade of the fruit were determined.

Consistent late harvesting clearly resulted in the production of less fruit than did consistent midseason or early harvesting. After the reversal of the early and late picking, it required only one year for the effects of the different times of harvest to become established in the different plots. The longer the harvest was delayed beyond the earliest fruit-maturity date, the lower was the yield that might be expected the following year. The reduction in fruit yield—in pounds—resulting from delayed harvesting was due in part to the smaller number of fruits produced.

Just why harvesting should reduce the number of fruits produced the following year is not clear, but drop records for the experiment indicated that, on the average, 2.75 times more fruit was lost by dropping from the late-harvest trees than from the early-harvest trees. This accounts for only approximately 6% of the difference in fruit count of the early and late harvests.

It appears that reduction in yields, because of late harvesting, is related to the flowering and fruit setting behavior of the trees. It is doubtful whether carbohydrates are limiting, since it is known that they build up in citrus trees during the winter months.

The data on fruit size—average number of fruits per packed box—for each year of the experiment are summarized in the table in the second column.

In this experiment, fruits of the midseason harvest were fewer in number and larger in size than those of the early harvest, but more in number and larger in size than those of the late harvest. The size of any specific fruit continues to increase as the fruit remains on the tree, but in this study, for trees that were con-

sistently harvested early or late, the mean average size of the fruit never became as large as that of the fruit harvested in midseason.

Oranges are packed as Fancy—top grade—and Choice—second grade. The remainder go into by-products. A few are discarded as rotten. The table in the third column shows the effect of time of harvest on the percentage of fruit packed as Fancy and Choice. There was no significant decrease in fruit grade from the early harvest to the midseason harvest, but there was a highly significant decrease from both of these to the late harvest. There was a gradual decrease in Fancy grade the longer the harvest was delayed, which might be expected, since fruit is down-graded largely because of blemishes and scars on the surface that tend to increase as long as the fruit hangs on the tree.

Information obtained in this study indicates that the yield—in packed boxes per tree—the size—in average number of fruits per packed box—and the set—in average number of fruits per tree—apparently are interrelated. Simple correlations show no significant relation between fruit yield and size, but they show highly significant relations between yield and set and between size and set. However, partial correlation coefficients show that yield and size are closely related. Thus the larger the number of fruits, the greater is the fruit yield but the smaller the fruit size.

The results reported here are for a single experiment at Riverside, and general application may not be warranted in other areas.

Winston W. Jones is Horticulturist, University of California, Riverside.

Clarence B. Cree is Principal Laboratory Technician, University of California, Riverside.

The late Dr. E. R. Parker initiated and directed the experiment almost to its completion.

Average Yields of Fruit Related to Time of Harvest in Valencia Oranges. Means for 12 Years.

Time of harvest	Lbs./tree	Packed boxes/tree	Number fruit/tree
Early	294	3.63	1017
Midseason	244	3.03	815
Late	204	2.47	707
LSD .05	21.4	0.29	82
LSD .01	29.1	0.40	112

Size of Valencia Oranges as Affected by Time of Harvest. Means for 12 Years.

Time of harvest	% size of 220 and larger	Aver. no. fruit/packed box
Early	30.8	278
Midseason	36.8	267
Late	31.2	281
LSD .05	4.49	7.97
LSD .01	6.11	10.83

Grade of Valencia as Influenced by Time of Harvest. Mean of 12 years.

Treatment	% Fancy by volume	% Fancy and Choice by volume
Early	70.81	82.99
Midseason	67.22	81.63
Late	56.38	72.61
LSD .05	7.13	6.06
LSD .01	9.69	8.24