

Pest Control Sprays on Oranges

effects of oil and parathion sprays on orange fruit size and quality subject of three-year study in southern California

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Fruit size measurements—to compare the effects of oil and parathion sprays on orange fruit size and quality—were made in nine navel and six Valencia groves in southern California during the years of 1953 to 1956.

Ten single tree replications in randomized blocks were sprayed in two Valencia orange groves and eight single tree replications in a similar block were sprayed in one navel orange grove. In the remaining twelve groves, trees in an area sprayed with oil were selected at random for comparison with similar trees in an adjoining area sprayed with parathion. All sprays were applied according to recommended commercial practices. The oil sprays used were 1.75 gallons of light medium oil per 100 gallons of water and the parathion sprays consisted of 1.5 pounds of 25% wettable parathion per 100 gallons of water.

The timing of the spray applications was primarily to attain control of red and black scale. Therefore, the applications at the different orchards varied from early August to the first of November.

Data indicating an increased size of navel and Valencia oranges sprayed with light medium oil, as compared with oranges sprayed with parathion, are presented in the accompanying table. Representative groves in each of seven citrus areas are included. The division in fruit size was made between sizes 126 and 110—per carton of one-half standard box—because of the higher market value of the large-sized fruit and any increase

in volume of fruit in this category normally represents greater profits to the grower. The fruits of both Valencia and navel oranges sprayed with light medium oil were consistently larger than fruits sprayed with parathion, even though the differences were relatively small in the Redlands-Highland area.

Statistical analysis of the data showed that oil sprays increased the size of oranges while parathion spray caused a decrease in fruit size. This was shown in nonsprayed control plots maintained in a navel orange grove in the Upland area where the scale was not particularly heavy. Also, it was evident in similar plots in two Valencia groves in the Escondido area which were under a system of biological control. In these instances fruit size from nonsprayed trees was intermediate between oil and parathion sprayed trees. As an average—two years in the Valencia groves and one year in the navel grove—the trees sprayed with oil produced about 10% more of the larger-sized fruit than the trees sprayed with parathion.

It was difficult to determine the influence of the number of fruit per tree of navel oranges on fruit size because of the variability in crop load among trees. As an average of one year's data, the parathion sprayed trees produced 0.9 of a box more fruit per tree than the oil sprayed trees. However, in 1955 and 1956 the Valencia orange trees at Escondido and Placentia were quite uniform in number of fruit per tree. Trees sprayed with parathion produced an average of

0.6 of a box per tree less fruit than the trees sprayed with oil. The difference in yield in any one year may accentuate the effects of oil and parathion upon fruit size, but there is evidence that the effect on size is not dependent entirely upon the number of fruits produced per tree.

Concurrent with the increase in fruit size, the per cent total soluble solids in the juice of fruits sprayed with oil was consistently low compared with that of fruits sprayed with parathion and nonsprayed fruits. The reduction in percentage of soluble solids in fruits sprayed with oil was greatest in orchards where the greatest increase in average fruit size occurred and was least evident in orchards in the Redlands-Highland area where there was little difference in average fruit size.

The per cent total acid in the juice of the oranges was also significantly lower in fruits sprayed with oil as compared with that in fruits sprayed with parathion. However, the total acid in juice of nonsprayed fruits was not significantly different from that of fruits sprayed with parathion.

The juice content of fruits sprayed with oil was only slightly higher than in fruits sprayed with parathion and nonsprayed fruits. The differences were not statistically significant. The average rind thickness of oranges sprayed with oil was not significantly different from fruits sprayed with parathion. The only visible difference between the fruits of the two treatments was a delay in coloring and the absence of a wax bloom on oranges sprayed with oil. The delay in coloring was particularly noticeable in Valencia oranges and persisted until harvest in late August. To date, there has been no indication of direct injury to the orange trees caused by either of the spray materials.

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Size, Per Cent Soluble Solids and Per Cent Total Acid Content of Oranges as Affected by Spray Application of Oil and Parathion

Orchard location	Year harvested	Fruit size (Per cent 110* and Larger)			Per cent soluble solids in the juice			Total acid content (Expressed as % citric acid)		
		Oil	Parathion	No spray	Oil	Parathion	No spray	Oil	Parathion	No spray
NAVEL ORANGES										
Highland	1954	39	34	...	11.9	12.3	...	1.17	1.25	...
Charter Oak	1954	49	35	...	10.0	11.7	...	1.04	1.17	...
Upland	1956	65	53	62	11.1	12.5	12.6	...	...	...
Redlands	1955	57	53	...	12.0	12.1	...	1.18	1.37	...
Redlands	1956	45	44	...	11.1	11.0	...	...	...	...
VALENCIA ORANGES										
Olive	1955	61	45	...	10.1	10.6	...	...	...	...
Olive	1956	75	68	...	10.2	10.6	...	0.98	1.24	...
Escondido	1955	47	30	37	12.6	13.4	13.4	1.44	1.58	1.52
Escondido	1956	46	18	26	12.0	12.6	12.6	1.28	1.36	1.37
Placentia	1956	47	40	...	9.1	9.8	...	0.95	1.07	...

* The number of fruits required to pack a carton (1/2 standard box).