Timing Oil Spray on Valencias

study indicates influence of application timing on effect of pest control oil spray on yield and juice of Valencias

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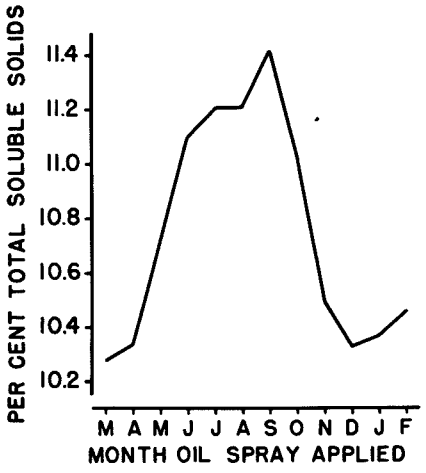
Reductions in Valencia orange juice quality or yield are less likely to occur from applications of pest control oil spray in the late summer than at any other time of the year, according to a three-year investigation conducted in Orange County. Potential reduction of juice quality following the use of oil spray on citrus has assumed increased economic importance recently because larger volumes of the crop are going to the juice concentrates market.

To study the various aspects of single applications of oil spray annually in each of the different months of the year a block of fairly uniform Valencia orange trees—each approximately 12′ in height—was selected for the investigation. The soil in the orchard is sandy loam. The tillage program—with irrigation, fertilization, and other factors of orchard care consistent with accepted practices for the area—was carried out as usual for the experimental block.

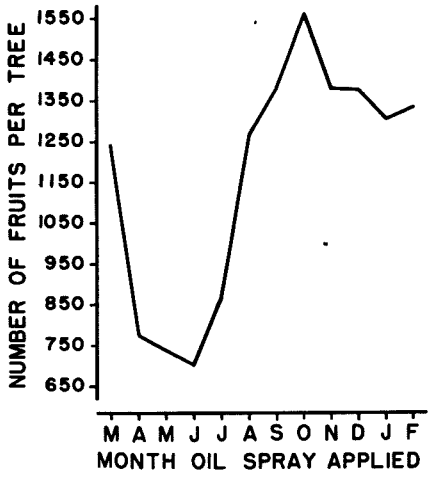
Sixteen single annual treatments were used: conventional oil-spray mixture applied about the mid-point of each month of the year; oil-spray mixture plus four parts per million of 2,4-D—the isopropyl esters of 2,4-dichlorophenoxyacetic acid in parts per million acid equivalent per total volume of spray mixture—applied in July, August, and September; and a combination of fumigation with hydrogen cyanide in December plus a spray treatment, as necessary, with a proprietary non-oil acaricide—Ovotran—a wettable powder formulation containing 50% *p*-chlorophenyl *p*-chlorobenzene sulfonate, at the rate of ¾ pound per 100 gallons of spray mixture. The experimental design used was a randomized block of two trees per plot, replicated eight times.



The relation of application timing to the effect of oil spray on the percentage of total soluble solids of the juice of Valencia oranges in a southern California orchard.

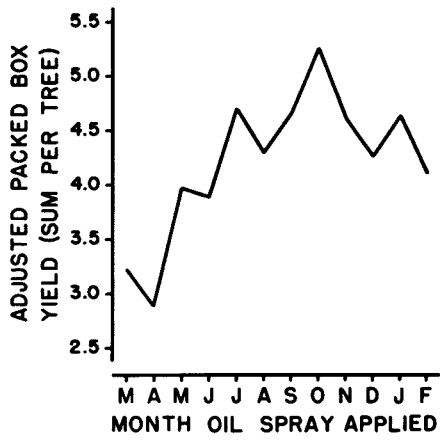
In the coastal plain of southern California Valencia orange trees bloom usually in April. More than a year is required for the crop to reach maturity, and the harvest takes place from 14 to 18 months after blossom. If oil spray is applied in the spring of each year, each crop of fruit will be sprayed twice during its development. To obtain information on the influence of such practice the series of monthly applications was started in March 1951 and continued through September 1953.

The relation of application timing to the effect of oil spray on the total number of fruits per tree for the 1953 crop of Valencia oranges in the experimental orchard.



The oil used was a proprietary California light-medium-grade emulsive spray oil having the following properties: average molecular weight, 284; unsulfonated residue, 92.5%; viscosity S.S.U.—Seconds Saybolt Universal—at 100° F, 67.0; composition, by weight: 2.4% aromatic carbon, 50.6% naphthenic carbon, and 47.0% paraffinic carbon; fractional distillation: 10% at 570° F, 50% at 623° F, 60% at 636° F, and 90% at 685° F. The oil was used in dilute aqueous emulsion at the rate of seven quarts per 100 gallons of spray mixture.

The relation of application timing to the effect of oil spray on the adjusted packed-box sum of Valencia oranges per tree for the experimental orchard at the time of harvest in October 1953.



Conventional orchard spray equipment was used for a full-coverage type application—inside and outside of trees—in sufficient volume to wet the foliage to the point of drip. Spraying was done as soon after irrigation as possible but not when the temperature was above 85° F, nor during a period of dry wind from the desert.

Fruit samples for juice-quality comparisons were taken July 23, 1951; July 21, 1952; June 9, 1953; and October 5, 1953. In July 1951, samples were taken only from the fumigated plots and from the plots which had been sprayed; on each of the other dates fruit samples were taken for each treatment.

Fruits for juice-quality determinations were taken at random around the periphery of the tree, within a zone 3′ to 8′ above the ground, in samples of 20 mature fruits from each tree. When samples were collected, a representative fruit size was chosen, the proper sizing-ring was used, and only fruits of the specified size were collected.

Records of yield and size were made at the time of harvest designated by the packing house according to the usual procedure for the orchard.

Results of single annual applications of oil spray at each month of the year on the percentage of total soluble solids of Valencia orange juice are illustrated

Concluded on page 12

EWES

Continued from preceding page

reason for the latter is that it is considered that the production per acre of land is of greatest interest. This depends on the number of ewes that can be run which in turn depends on the size of the ewes.

The total or gross production was calculated from estimated average values for the various grades of wool and dividing by the value of a pound of lamb—18¢ was used as an appropriate average figure for the area. This was then used to convert the wool production of each ewe according to grade, to an equivalent in pounds of lamb. This was added to each ewe's actual lamb production. Conversion factors ranged from 2.3 pounds lamb per pound wool for 3/8 blood clothing wool to 3.2 for fine staple and 3/8 staple. Whether this difference is a real one to the producer depends on whether the wool can be sold at a price which depends on the grade.

The index in column *15* is an attempt to express the ability of the type of ewe to produce total income per acre.

The index averaged in column *16* is calculated the same way as Index *No. 1* except that instead of using average yield figures in figuring the wool-to-lamb conversion factors, the actual average yield figures for each cross for 1952 were used—thus giving the Romeldale and Border Leicester crosses credit for higher yielding fleeces. Whether this is a better method than Index *No. 1* depends on whether the wool can be sold at prices reflecting both grade and clean yield.

For both indexes the Corriedale cross is highest and the Columbia cross is next, the Romeldale cross being lower than the Border Leicester cross for *No. 1* and higher for *No. 2*.

It is too early to tell with certainty, but it appears that the Border Leicester cross will be the shortest lived as they are being lost from the flock faster than the others. Very few ewes of the other crosses have been lost. This criticism, if valid, is applicable only to conditions on the particular type of country represented by Hopland Field Station. It is a thin country and sheep living on it have a rugged existence, particularly during the winter and early spring months. Under other conditions or areas a difference in longevity might not be found.

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VALENCIAS

Continued from page 3

in the graph in column 1 and show the relation of application timing as a relatively smooth curve with the highest points in late summer and the lowest points in March or April. Statistical data show that the mean values for the percentage of total soluble solids for oranges from plots sprayed with oil in the late summer do not differ significantly from those for plots receiving the non-oil treatment. However, they do indicate that the percentage of total soluble solids of Valencia orange juice may be reduced significantly by oil spray application during the period of November through June.

It is preferable to pick mature Valencia fruit prior to applying oil spray to the orchard. That practice avoids inhibition of degreening in the fruit rind either on the tree or during the packing process and avoids any deleterious effect on the quality of the juice of nearly mature fruit. Data obtained in this study indicate that the juice quality of the 1951 crop was not reduced by spraying the trees as the fruit neared maturity. But comparison of the two sets of samples taken in 1953 shows that total soluble solids increased more in fruit from the non-oil plots from June to October 1953, than in comparable fruit from the plots in which the crop of fruit had been sprayed with oil twice.

Differences in percentage of acid were not significant for the 1952 crop, and the single significant difference in the ratio of soluble solids to acid seems to be associated more with the reduction in soluble solids than with the effect of oil spray in April on the percentage of acid. The data for 1953 show that significant reductions of the percentage of acid occurred in fruit treated with oil in the winter months and particularly in treatments in which the application timing was such that oil spray was applied twice during the development of the crop; however, the various ratios of soluble solids to acid did not differ significantly from the value for the non-oil treatment.

Percentage of juice does not seem to be influenced appreciably by varying the application timing of oil spray.

Differences in fruit yield between the non-oil plots and those sprayed with oil during the period from August through December are not significant for the total number of oranges per tree for the 1953 crop. However, the curve presented in the graph in column 2 shows a progressive decline from the high for late summer to the low for oil spray applications in June, and by January the mean number of fruits for plots treated with oil spray was significantly lower than that for plots given the non-oil treatment.

The practical importance of the influence of fruit size on yield is indicated by the values for adjusted packed box sums. The shape of the curve in the graph in column 3 is similar, in general, to that of the curve in the graph of the number of fruits per tree. There is a progressive decline from a high for late summer to a low for the month of April. However, the adjusted packed-box sums for plots sprayed with oil in March and in April were the only values lower than that for the non-oil treatment. Even these differences are not significant, whereas the mean values for the number of fruits per tree for seven of the months and for field boxes per tree for six of the months are significantly lower than the mean values for the non-oil treatment.

The addition of 4 ppm of the isopropyl esters of 2,4-D to dilute aqueous oil spray mixtures applied in the summer appears to offer some advantage as a means of reducing the drop of mature fruit during the succeeding crop season, but the advantage was not sufficient to be reflected as an increase in any of the expressions of yield. The addition of 2,4-D did not provide any benefits with respect to the percentage of total soluble solids or to the number of fruit borne by the tree.

The data for percentage of fruit in size classes show that oranges from trees sprayed with oil are larger than those from trees which received the non-oil treatment. Also, the data indicate that the presence of spray oil on the Valencia orange tree in the spring affects the function of the tree in some way which culminates in a much smaller number of larger oranges; however, the net result in terms of yield is less.

Since oil spray is applied to citrus trees for pest control, timing of the application should be governed primarily by pest populations to obtain the maximum control efficiency. Experience with the scale insect and mite pests currently in citrus orchards of the coastal plain of southern California indicates that late summer is likely to be favorable for control of these pests by means of oil spray.

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