

Orange Fruit Size

five-year study of small fruit size covered 429 groves in six counties

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Two outstanding causes of small fruit size in oranges are poor physical conditions of the soil and inadequate irrigation.

An orange fruit size survey started in 1944, covered 429 different groves—131 navel orchards and 298 valencia orchards—in Ventura, Los Angeles, Orange, San Diego, Riverside and San Bernardino counties.

Every factor over which a grower has control and which might conceivably have a bearing on the problem was examined. Eighty-eight different factors were listed for each grove.

Climatic factors such as distance from the coast, exposure to wind and frost hazard were observed, but they were not studied, being beyond growers' control.

Tree Condition

Age of tree is considered an important factor but, especially in navels, the survey did not confirm that view. In navels, the average age in the small fruit size group was 49.6 years, the medium, 49.3 years and the large fruit size group, 49.5 years.

In the Valencias, the average age of the small fruit size group was 33.1 years, the medium 34.3 years and the large group 27.1 years.

Tree condition reflected growing conditions. Trees producing large fruit were larger, darker green, the foliage more dense, and their roots were more widely distributed and in better health.

In the orchards surveyed, crowding of trees was not a factor in small sizes.

Scaly bark and gummosis did not affect fruit size in these orchards. Very little pruning was done in the orchards surveyed and the effect of pruning on fruit size can not be judged from this survey.

No benefit on size from covercrops was indicated. The small size group had more covercrops and heavier covercrops than the large size group.

Fertilization

Nitrogen was the only fertilizer material used by all growers. It did not appear to influence size. Growers in the small size group used an average of 277 pounds per acre per year, while the large size group used 270 pounds.

Phosphorus was used by 60 growers in the small size group, by 50 in the intermediate, and by 38 in the large size group. The amounts applied were not greatly different.

Potash was used by 57 growers in the small size group, 55 in the intermediate group, and 30 growers in the large size group. The average amounts used per acre in five years by the small, medium, and large groups were 208 pounds, 211 pounds, and 256 pounds of potassium oxide, respectively. The importance of the effect of potash is open to some question. The number of users in the large size group was only 30 out of 143, and the differences in the amounts used were not great. There were many heavy users in the small size group.

Manure can not be considered a factor in size in these orchards. It was used by 116 growers in the small size group, 107 in the medium, and 103 in the large size group. The effect of oil spray on tree growth and fruit size can not be judged from this survey and needs further study.

Yield, like tree condition, is a reflection of growing conditions. In this survey, large size and high yield went together. In the Valencia group the average yield in packed boxes per acre for the small, medium, and large size groups was 223, 262, and 298 boxes, and for the navel group, 269, 292, and 331 boxes. When large and small crops on the same orchard were compared, the sizes were generally larger in the light-crop year.

Soil

The physical condition of the soil rather than the depth or native fertility seemed important to fruit size. In the Valencia orchards the large size group included 10% more orchards on deep soil than the small size group. But in the navel orchards the large size group included 12% fewer orchards on deep soil than on shallow soil. When the two groups were combined there was practically no difference.

In the Valencia orchards, light and medium soils predominated in the large size group. In the navel groves the medium soils predominated in the large size group, and the light and heavy soils predominated in the small size group. The fact that navel orchards on light soil

produced small fruit may indicate inadequate moisture supply resulting from the low waterholding capacity of the soil and higher temperatures inland.

Physical conditions of the soil was evidently very important. This is indicated by the presence of plowsole, compactness of the general soil mass, and the tilth. The small size group included 3¼ times as many orchards on soils which have pronounced plowsole and compactness as did the large size group. The tilth of the soil was classed as poor in four times as many orchards in the small size group as in the large size group.

This condition was most likely a result of excessive tillage. The small size group was tilled more often and to a greater depth than the large size group but the difference is small. Since soils differ in the tendency to become compact, the number of times a soil is tilled can not be taken as a measure of the effect of tillage on soil structure.

Irrigation

Irrigation appears to be the most important controllable factor determining fruit size.

In a study covering a wide range of climate the actual amount of water used can not be compared. For this reason the water use was classified as light, medium, or heavy in relation to the prevailing practice in the community. On this basis, 16% of the small size groups and 36% of the large size groups were heavy users of water. This is only one measure of irrigation efficiency. An adequate water supply can be wasted by runoff, poor penetration, or uneven distribution.

In this study, difference in method of application and interval between irrigation did not appear to influence size.

Navel growers generally obtained satisfactory distribution and penetration of water. This was not true in the Valencia orchards where 39% in the small size group had good water penetration as compared to 83% in the large size group. Inadequate irrigation is often caused by poor physical condition of soil which restricts root and water penetration. The results of this survey do not necessarily indicate a need for more irrigation water. With few exceptions, the present supply would be adequate if properly used.

This survey leaves a number of unanswered questions. The effect of rootstock and bud source needs further study. Evidence on the effect of oil spray and potash fertilization is only suggestive. The effect of pruning on size also needs further study.

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