

Fruit Size and Leaf Composition

concentration of potassium in orange leaves found to be associated with fruit sizes

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Evidence of the effect of potassium-supplying fertilizers on citrus fruit size in the long-term experimental orchard at Riverside was obtained by determining the concentrations of this and other elements in the leaves.

The concentrations were studied in relation to the sizes of the fruit harvested in 1946 to 1949.

A group of 30 fertilizer treatments was used for this study. A number of the treatments received applications of manure or other bulky organic materials. Others differed in respect to the use of covercrops, phosphate or potash fertilizers, agricultural minerals, sources and amounts of nitrogen.

Composite samples of spring-cycle leaves were harvested in December, 1948, for the analyses. The size of the fruits was highly correlated with the concentration of potassium in the dry weights of the leaves.

The relation of fruit size to potassium concentration was not at first clear. The sizes tended to be larger also when phosphorus was more abundant but smaller when nitrogen or calcium was high. The concentration of each element was found to be affected by the concentrations of the others but the concentrations of potassium were the only ones which were firmly associated with the fruit sizes.

The increases in fruit size due to greater potassium absorption were limited. Maximum fruit sizes in the 1946-1949 crops occurred when the potassium content was about 1.3% in the dry weight

of the December, 1948, leaf samples. In the crops of the individual years, maximum fruit size occurred at leaf concentrations which differed somewhat from this figure.

Large increases in the potassium content of the leaves resulted from the application of bulky organic materials. For example, a treatment which annually received 1.5 pounds of nitrogen per tree from dairy or feed-lot manure produced

fruit of relatively large size. The leaves of the trees which received this fertilizer contained 1.22% of potassium. About three pounds of potash per tree were applied each year in the manure. Supplementing this treatment with applications of sulfate of potash fertilizer did not increase the size of the fruit, although the extra potash considerably increased the potassium in the leaves.

The potassium in the December leaf samples ranged from 0.75% to 1.59% of their dry weights. All of the values are greater than those which have been reported by several investigators to be sufficient to prevent yield reductions and visible deficiency symptoms.

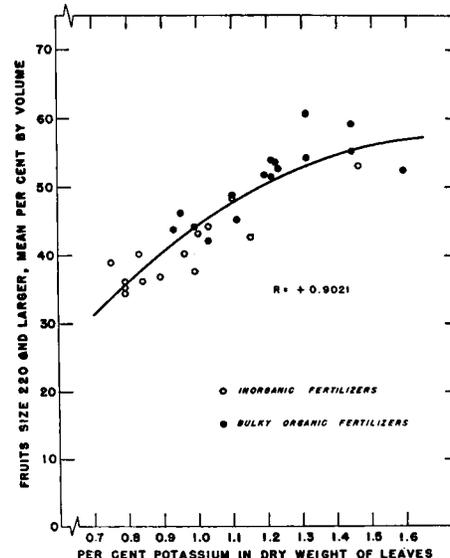
Other factors than potassium supply also influence fruit sizes. In these experiments, this is shown by the fluctuations from year to year in the size of the fruit from trees which have been consistently fertilized with the same materials. In any one year differences in fruit size also occurred when trees were fertilized with the same quantity of potassium.

Inadequate availability of irrigation water is also one factor which reduces the size of oranges. Orchard management practices which affect the penetration of water into the soil may therefore affect fruit sizes.

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Relations between the average size of the fruit—expressed as the percentage of fruits size 220 and larger, by volume—of the crops harvested 1946-1949 and the potassium content of the dry matter of leaves sampled in December, 1948. The data are for trees which have received various fertilizer programs.

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Continued from preceding page

cient change to weaken the cell walls and results in shrinkage under the right conditions. The heat denaturation of the whey proteins and particularly of the globulin fraction is another underlying factor in shrinkage. Addition to a standard mix of less than 0.05% of undenatured globulin markedly reduced the tendency to shrinkage.

Homogenized Milk

The temperature of milk increases as it is passed through a homogenizer. The Agricultural Code of California specifies

that milk pasteurized by the holding method shall not be heated above 145° F. In order not to exceed this temperature it has been found that the milk should not enter the homogenizer warmer than 137° F if this temperature of 145° F is not to be exceeded, using a homogenizing pressure of 2,000 lbs. per square inch. If higher pressures are used, lower temperatures must be employed.

Bacteriophage Studies

Dairy plant operators in California suffer from considerable loss at certain times because of the failure of bacterial cultures to coagulate milk satisfactorily for use in making several dairy products.

The findings of the last few months indicate that bacteriophage is of greater importance in California than has previously been suspected in causing slow culture development in dairy products. In nine cases of slow acid production during the past winter, bacteriophage was found to be the cause in each one. Studies of bacteria-bacteriophage relationships and of bacteriophage control are under way.

Quaternary Ammonium

The action of quaternary ammonium compounds on bacteria is sometimes considered temporary in effect and possible of reversal allowing organisms to grow

Continued on page 16