Weather Effects on Oranges

fruit size and yields influenced by temperature, blossoming date and age of trees

G. M. Kuznets

Heat, blossoming date, and age of trees are factors affecting size of Navel and Valencia oranges in San Bernardino County.

The higher the average temperature from March 16th to 31st, the larger do oranges tend to be.

The later the blossoming date, the larger the oranges, other factors being constant.

A third important variable affecting size of oranges was time or maturity and age of trees. When trees get old, they produce higher yield but smaller fruit. Younger trees produce larger oranges.

Records used for these findings were those kept since 1911 at East Highlands. The records cover, beside the chief cultural practices followed, the crop yields by orchards.

Dates of full blossom, rainfall, high and low daily temperatures, daily observations on cloudiness and monthly fruit measurements are also included in the data.

The site covered by the records consists of about 450 acres of Navels and 250 acres of Valencias. Most of the Navels are 50 to 55 years of age. The Valencia acreage has been constantly expanded and very few orchards are as old as 50 years.

Size

For both Navels and Valencias the size data consist of monthly measurements of diameters of 10 to 16 oranges per tree on a few trees in different orchards. Fruit marked for measurement was tagged. An effort was made to use the same trees from year to year.

For Navels the number of trees from which oranges were measured ranged from four to 14. The number of trees used for Valencia size tests was a few less.

Sizes on March 15th were taken as an average for Navels for the year. April 15th measurements were used for Valencia oranges.

Because of the small number of measurements made on Valencias, the data on their size are less reliable than those for Navels.

Temperatures were noted each day on precision thermometers housed in a government-type shelter located centrally within the property.

Conditions of overcast were noted by casual observation. Each day was recorded as either clear, partly cloudy, or entirely cloudy. Daily humidity readings were obtained from Redlands, four miles from the orchards.

In processing the daily weather records, nearly every condition which might affect yield and size of Navels was considered. Each factor was studied in detail by using 15-day periods throughout the winter, spring, summer and, in some cases, early fall.

Little effect on size was shown by total rainfall of the year before. Rainfall during 15th to fourth days preceding full blossom also had little effect.

The number of entirely cloudy days from December 16th to February 15th preceding blossom was not important.

Average humidity from 46th to 60th days after full blossom had no significant influence.

Temperatures during four 15-day periods had no marked effect. These were the last 15 days of February, first 15 days of March, 46th to 60th day and 61st to 75th day after full blossom.

With Valencias, average humidities in July, August, September, and October were considered. They proved unimportant. Average maximum temperature one to 30 days after full blossom also showed no effect on size of Valencias. For both Navels and Valencias, current yield and yield the preceding year were tested as factors related to average size, but neither proved significant.

Yield

In addition to variables already mentioned current average size and average size the preceding year were tested as factors in estimating yields.

Several variables were found to have a positive or negative effect upon the yield of Navel oranges. Variation in the ages of the trees made the measurement of representative yield unreliable for Valencias.

The total yield of Navel oranges appeared to be related positively to four factors:

1. Number of entirely cloudy days, December 16th to February 15th preceding blossom.
2. Average temperature, February 13th to March 15th.
3. Date of peak of full blossom.
4. Time trend.

The total yield of Navel oranges appeared to be related negatively to:

1. Average maximum temperature, 46th to 60th day after full blossom.
2. Average maximum temperature, 61st to 75th day after full blossom.

In all tests the variable time is a proxy. It is the sum of several factors whose effect is to change average size or yield over a given period. It has reference to the maturing and aging of trees.

The findings of these tests are specific to the San Bernardino County orchards studied. Other groves in other parts of the state might show different facts.

The results point the way to additional study of the effects of weather on size and yield of oranges.

G. M. Kuznets is Associate Professor of Agricultural Economics, Associate Agricultural Economist in the Experiment Station, and Associate Agricultural Economist on the Giannini Foundation.

This study was made possible by the cooperation of Robert F. Jennings, East Highlands, Orange Co. A more complete technical report of this study may be obtained by writing to the Giannini Foundation of Agricultural Economics, University of California, Berkeley 4.

CALIFORNIA AGRICULTURE

Progress Reports of Agricultural Research, published monthly by the University of California College of Agriculture, Agricultural Experiment Station.

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Agricultural Information

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141