EFFECTS OF PREHARVEST IRRIGATION ON CHERRY FRUIT SIZE

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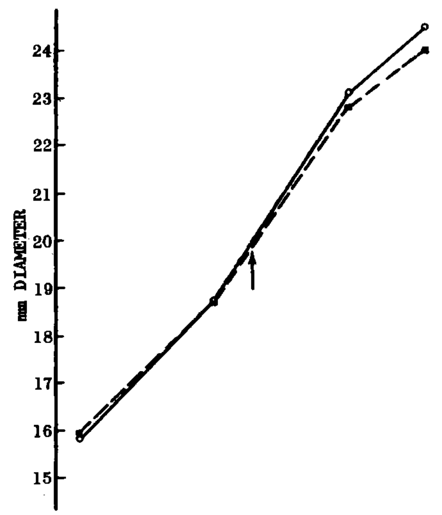
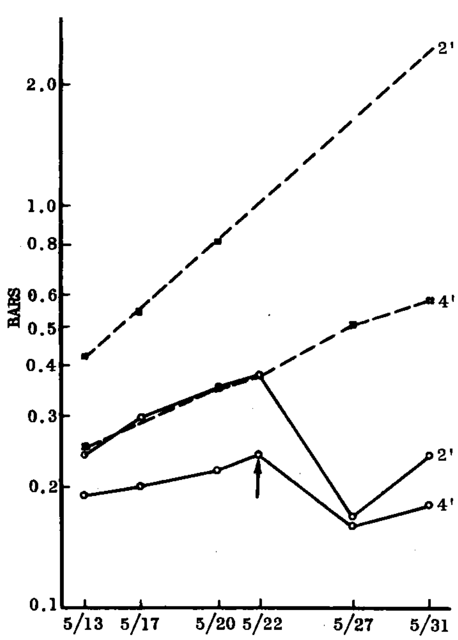


GRAPH 1. FRUIT GROWTH (TOP GRAPH) OF ROYAL ANN CHERRIES AS AFFECTED BY A PREHARVEST IRRIGATION ON MAY 22, 1963—SOIL MOISTURE TENSION AT 2- AND 4-FT LEVELS (BOTTOM GRAPH).

Solid lines indicate irrigated plots; broken lines indicate nonirrigated plots. Arrows indicate dates of irrigation.



Preharvest irrigation experiments for three years with cherries in San Joaquin County (using Bing and Royal Ann varieties) showed an increase of 0.5 mm in fruit diameter for irrigated as compared with nonirrigated plots.

Cherries are generally harvested early in the season at a time when moisture is still available in the soil. Consequently, a question that has been frequently raised is whether a preharvest irrigation is necessary for maximum fruit growth. To answer this question, experiments were conducted over a period of three years in the Stockton cherry area. In 1963 and 1964 the trials were carried out in an orchard on Wyman clay loam soil, and in 1966 in another orchard, on Ramada silty loam soil. Both soil types belong to the class of deep alluvial soil.

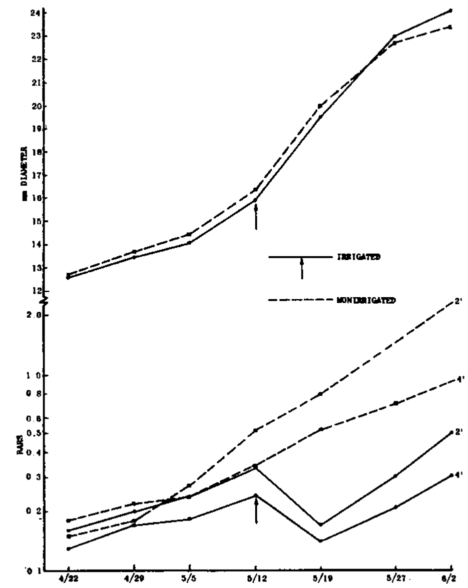
In 1963 and 1964 the tests were conducted with 12-year-old trees of Bing and Royal Ann varieties on Mahaleb rootstock; in 1966 they were with 12-year-old trees of the Bing variety on Mazzard rootstock.

Treatments

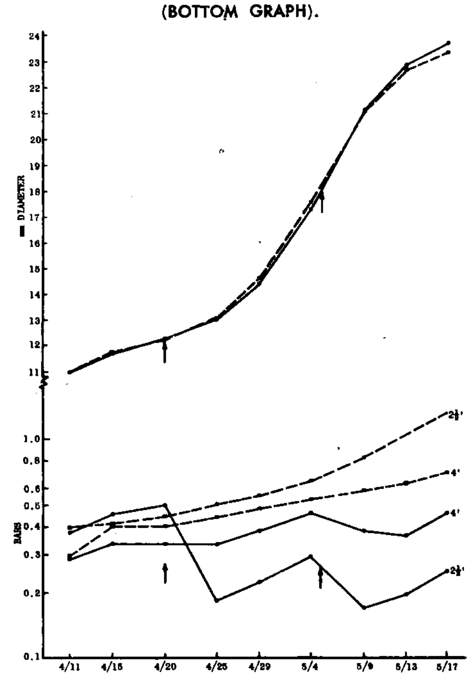
The differential treatment consisted of an irrigation whenever the soil suction at the 2- or 2½-ft level reached a value of 0.4 bar. This resulted in one preharvest irrigation in both 1963 and 1964 and two irrigations in 1966. Fruit growth was determined by frequent measurements of fruit diameter of tagged fruits at regular intervals (7 days in 1963 and 1964 and 5 days in 1966). In 1963 and 1964, 100 cherries were tagged and measured in each treatment; in 1966 the number was increased to 400. In addition, a sample of 200 fruits per experimental tree was gathered at harvest and the mean fruit weight determined.

The fruit growth of one of the replicated plots for each experimental year is represented in graphs 1 to 3. Graph 1 (for 1963) shows that fruit growth in the nonirrigated treatment, in compari-

GRAPH 2. FRUIT GROWTH OF ROYAL ANN CHERRIES AS AFFECTED BY A PREHARVEST IRRIGATION ON MAY 12, 1963 (TOP GRAPH)—SOIL MOISTURE TENSION AT 2- AND 4-FT LEVELS (BOTTOM GRAPH).



GRAPH 3. FRUIT GROWTH OF BING CHERRIES AS AFFECTED BY PREHARVEST IRRIGATIONS ON APRIL 20 AND MAY 5, 1966 (TOP GRAPH)—SOIL MOISTURE LEVELS AT 2½- AND 4-FT LEVELS (BOTTOM GRAPH).



son with the irrigated, started to slow down during the period of May 20 to May 27, when soil suction at the 2-ft level increased from about 0.8 bar to 1.8 bars (extrapolated). At picking time there was a significant difference in fruit diameter of 0.5 mm between the two treatments. The 200 fruit samples showed a 5% increase in fruit weight for the irrigated plots.

By extrapolation it can be estimated that the soil suction at harvest had reached about 2.5 bars at the 2-ft level in the nonirrigated plots.

In 1964, irrigation water was applied on May 12 when the soil suction in the dry plot was only 0.5 bar. A response was not detectable until the week of May 19 to May 27 when the soil suction at the 2-ft level in the nonirrigated plot increased from 0.8 bar to about 1.5 bars (extrapolated). At harvest time the irrigated fruits had an average fruit diameter 0.7 mm larger than the nonirrigated fruits. At that time soil suction had reached about 2.4 bars at the 2-ft level in the nonirrigated plot, while in the irrigated plot soil suction was 0.5 bar.

In 1966, the first irrigation was given on April 20. A few weeks later it was apparent that the nonirrigated fruits were growing slightly faster than the irrigated ones. On May 9, soil temperature measurements revealed that the irrigation had either cooled the soil or delayed its warming.

SOIL TEMPERATURE IN DEGREES CENTIGRADE AT THE DRIP LINE ON MAY 9, 1966

Plot	6 inches	18 inches	30 inches	42 inches
Nonirrig. Rep. 1 ...	21	20.5	19	17.5
Nonirrig. Rep. 2 ...	21	20.5	19	17.5
Irrigated Rep. 1 ...	19	19	18.5	17.5
Irrigated Rep. 2 ...	19	19	18	17

As shown in the table, temperatures were lower in the irrigated plots to a depth of 30 inches. Evidently this decrease in temperature slowed the fruit growth process slightly.

A second irrigation, on May 5, did not delay fruit growth further. Instead, it was accelerated—while fruit growth in the nonirrigated plots was slowed because of soil moisture stress. Soil suction readings on May 9, in the nonirrigated plots, were (on the average) 3 bars at the 1-ft and 0.8 bar at the 2½-ft level. At harvest time soil suction at the 1-ft level was about 4.5 bars and at 2½ ft, about 1.5 bars, five feet from the trunk. However, in the middles, considerably lower stresses were encountered. In spite of this, the fruit diameter at harvest was 0.4 mm larger in the irrigated than in the nonirrigated trees.

Conclusions

The average of the three years of testing showed that fruit size was increased 0.54 mm by irrigation. This means an increase of ¼ to ½ size grade. Preharvest irrigation is more critical on the heavier soil series of the district, such as Wyman, than on the lighter Ramada, Columbia, and Honcut soils. In all cases, irrigation in May about two to three weeks before harvest resulted in more rapid fruit growth during the final swell. An irrigation before May could result in a cooling effect which might slow fruit growth temporarily.

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Selection for canning quality in CALIFORNIA DARK RED KIDNEY BEANS

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Certified seed of a new dark red kidney bean selection will be available for growers to replace the older California Dark Red Kidney bean within two years. The new selection, tested for the past four years, has shown less splitting, comparable canning quality, and yields as good or better than either the California or Michigan variety of dark red kidney bean.

RED KIDNEY BEANS have been grown in California since 1857. About thirty years ago, a dark red kidney variety was introduced in California for the purpose of supplying disease-free seed for Michigan. This variety was named Michigan Dark Red Kidney and was earlier, less vegetative, and lower yielding than California Red Kidney. To increase the yields, Michigan Dark Red Kidney was crossed with Maui Red Kidney, a late vigorous variety from Hawaii. The hybrids were selected for plant vigor, erectness and maturity; for seedcoat color, and for yield. A selection from the F_7 generation was released to growers as California Dark Red Kidney.

In the meantime, some canners in the state began to use the Michigan Dark Red Kidney for a canned salad bean. With two outlets—seed for Michigan and beans for the canners—the popularity of the dark red kidney increased to about one-third of the red kidney bean acreage in the state.

Soon after its release, canners called attention to one serious fault of the California Dark Red Kidney. Canning tests showed that the California Dark Red Kidney had more split beans than the Michigan variety. Since the Michigan variety was one of the parents of the new variety and no selection had been made for splitting, it seemed reasonable to assume that the California version of dark red kidney may have some genetic variability for canning quality. If so, it should be possible to select lines with low splitting percentages.

The splitting in the canned beans may be cross-sectional, longitudinal or both, ranging from small breaks in the seed coat to full length splits. In the more severe cases, the cotyledons are partially to completely separated. To grade the splitting according to the severity of the splits proved to be too cumbersome; therefore, it was decided to divide the