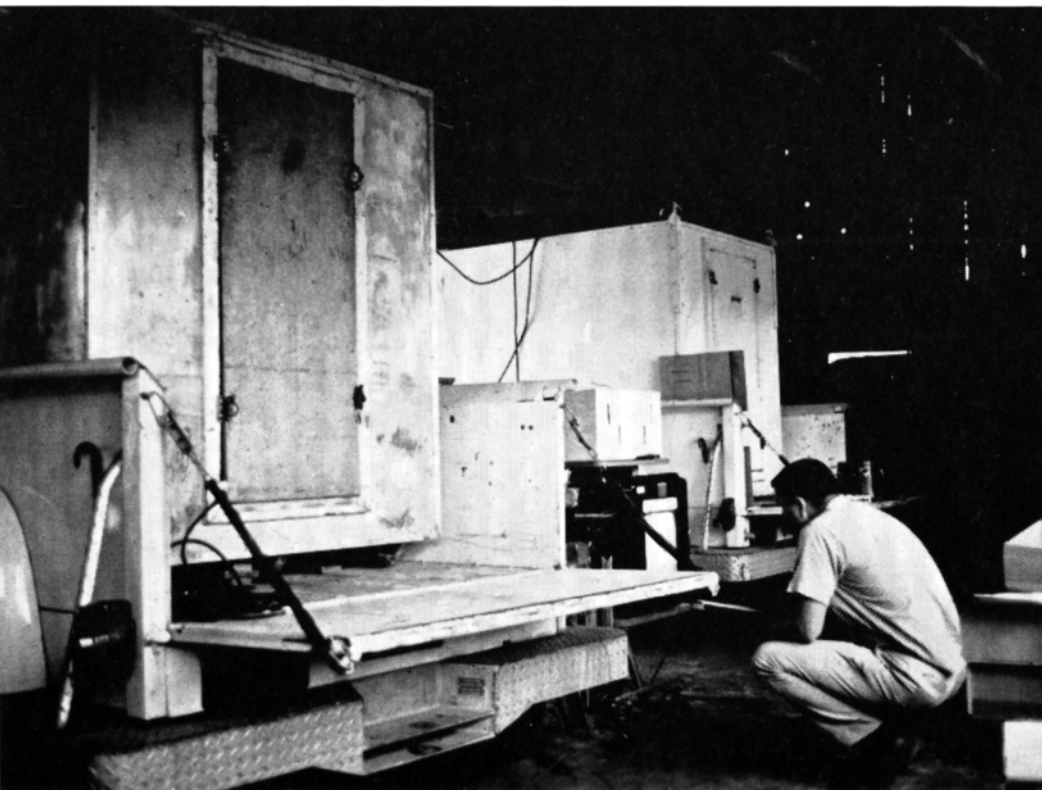


HANDLING

Sweet for Fresh

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The effects of delays before cooling on cherry quality and deterioration were studied in carefully controlled temperature chambers.

DURING THESE STUDIES the management of fruit temperatures was given careful attention—particularly delays before cooling harvested fruit and the resultant effects on fruit quality. Fruit respiration was measured as an index of the rate of deterioration.

Cherries in stacks of field boxes were often exposed to the sun during much of the day. Even though the season was relatively cool, high fruit temperatures were recorded. Less warming occurred in the top of the stack if fruit exposed to direct sunlight was covered. However, keeping cherries in the shade would more effectively prevent excessive fruit warming.

To demonstrate the effect of shading, fruit temperature readings were taken at various positions in containers placed both in the sun and in the shade (graph 1). Fruit exposed to the sun quickly reached 20° F above the temperature of the surrounding air. An increase of 36° F in the temperature of exposed fruit was noted within three hours. While shaded cherries remained cooler than the air, their temperature still rose as much as 17° F during the four-hour delay. These results clearly illustrate the desirability of shading fruit in the field, and of transfer

from the field to the cooler as rapidly as possible.

Delays between harvest and cooling were extremely variable with different lots of fruit. The interval at which fruit was hauled from the field to the packing house varied from about two to 12 hours. Delays between fruit arrival at the packing house and packing ranged from a few minutes to 24 hours. Holding cherries in field boxes overnight in the packing house appeared to be a common practice. Delays of four hours or more were noted between packing and cooling. Thus, the

total delay between harvest and cooling often amounted to one day or longer.

The effect of these cooling delays on fruit deterioration was studied. After harvest, fruit was held for various periods of time before cooling. Evaluations were made after a simulated transit and marketing period of nine days. Deterioration factors included weight loss, shrivel and fruit appearance, as well as discoloration and general appearance of stems. Deterioration could be detected in lots which had delays of only two hours between harvest and cooling and was severe with

Sweet cherries are among the most perishable of California stone fruits, and high losses sometimes result from serious fruit deterioration during marketing. The study reported here resulted from an industry request to determine how losses could be reduced and high quality maintained. A program designed to evaluate the effect of current handling methods on fruit quality was initiated in 1964. While much work remains to be done, certain results obtained during the first season are of immediate value to the cherry industry. For example, delays of only a few hours between harvest and cooling of the fruit caused noticeable deterioration of quality. An eight-hour delay before cooling was found to cause more deterioration in the fruit than nine days of subsequent holding under good transit and marketing conditions. Slowest fruit deterioration occurred when temperatures were kept just above the freezing point of the cherries.

Cherries

Shipment

longer delays. An eight-hour delay in cooling caused more deterioration than the nine days of subsequent holding under good transit and marketing conditions.

While Bing cherries have been recognized as a highly perishable commodity, the respiratory pattern at different temperatures was not available. Consequently, respiration measurements were made in 1964 (graph 2). The respiratory activity for the Bing cherry fits the pattern for other fruits, doubling with each 18° F temperature increase. The rate of respiration is inversely proportional to the shelf life of the fruit (excluding decay problems). Since respiration uses the reserve food in the fruits and shortens their postharvest life, the time interval between harvest and cooling should be kept as short as possible.

During the survey, four cherry coolers were studied in detail. The fastest rate of fruit cooling within a test stack at each

The temperature of cherries held in the field in direct sunlight will quickly exceed the temperature of the surrounding air.

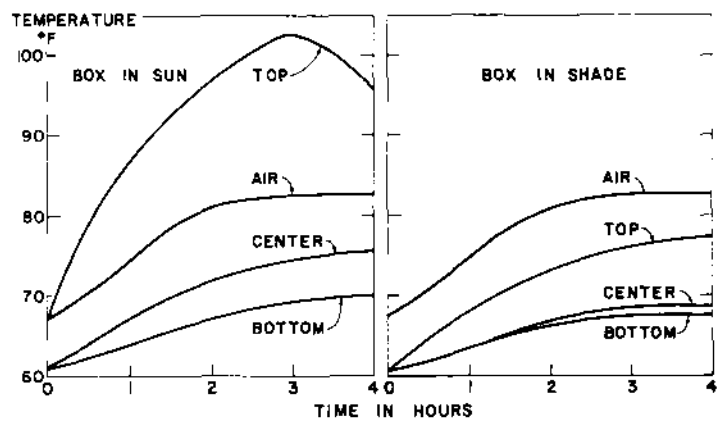
plant is shown in graph 3. In plants one and two, fruit temperature was reduced, to 45° F or less within four hours at the fastest cooling position; however, in plant two, very little fruit was in the cooler during this test. The cooling rates at different positions within a stack were also measured (graph 4). Reducing fruit temperature to 40° F required twice as much time in the lower part of the stack as in the top of the stack. Similar patterns were found between center and outside fruit in a container.

Although 40° F is close to in-transit temperature, it is not optimum for cherries. As with many other commodities, slowest deterioration occurs just above the freezing point of the fruit. Since only two of the four plants studied in detail reduced fruit temperature to approximately 40° F, many cherries are apparently shipped without adequate cooling.

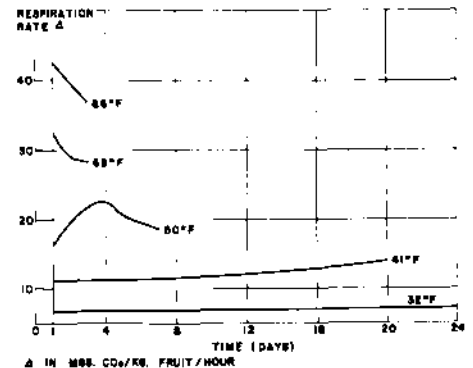
Methods of measuring fruit temperature are frequently faulty and lead to erroneous conclusions. Checking the temperature of fruit in top or outside boxes does not give a true picture of the extent of fruit cooling throughout the stack. Measuring the temperature of only the top or outside fruit in the box will result in even less accuracy. Fruit in other locations in the stack may often be at least 15° F warmer.

Fruit quality can be improved if attention is given to all details of cherry handling. It is essential that fruit not be allowed to warm excessively and that delays be reduced to a minimum. During fruit cooling, good management of air temperature, velocity, and relative humidity is very important.

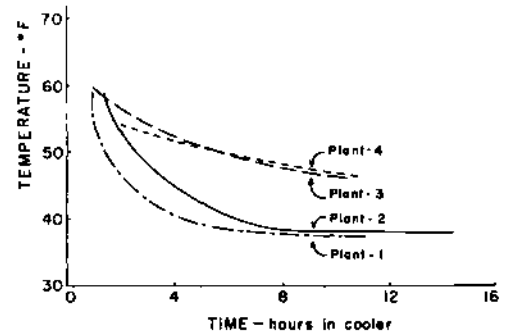
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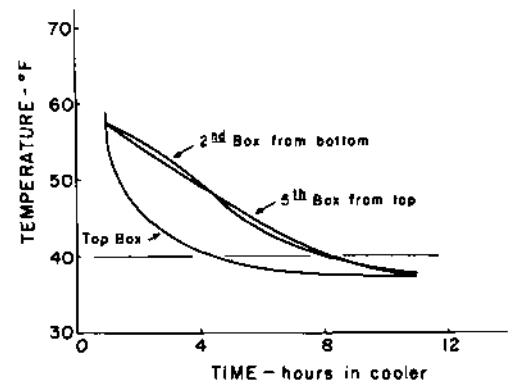
Graph 1, effect of exposure to warm air and sunlight on cherry fruit temperatures at various positions within a box.



Graph 2, effect of temperature on respiration rate of the Bing cherry. Respiration readings at each temperature were discontinued with the first evidence of decay.



Graph 3, comparative cherry cooling rates in test stacks in four coolers. The fastest cooling position for each plant is shown.



Graph 4, comparative cherry cooling rates at different positions within a stack.

