



*Left: Two clusters of Thompson Seedless grapes from ungirdled vine. Fruit was not thinned. Right: Two berry-thinned clusters from girdled vines. This table grape is the leading variety of California, grown under widely divergent climatic conditions.*

# Table Grapes

## relation of heat summation to time of maturing and palatability

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DETERMINING THE MATURITY of the table grape accurately without the eating has been, and still is, a problem.

A study of the relations of the heat summation was initiated in the early 1930's following four seasons of work with organoleptic and chemical analyses.

Two significant periods of heat summation have been disclosed: 1. From blooming to the legal minimum degree Balling—or other defined degree of maturity. 2. The ripening period of the variety being studied.

By effective heat summation, as used here, is meant the summation of the mean daily temperature above 50° F. The summation is expressed as degree-days. A degree-day is one degree F above 50° F for 24 hours. For example, if the mean temperature for a day was 70° F, the summation would be 20 degree-days, and if the mean for June was 65° F, the summation would be 450 degree-days.

The ripening period varies with the variety. An early-maturing sort will have a relatively short ripening period as compared to a late-maturing one.

In a hot region, all processes concerned with fruit development go forward more rapidly, and the ripening period is shorter. For instance, the fruit of the variety Thompson Seedless develops from blooming to a maturity of 18° Balling in

the Coachella Valley—a hot desert region—in approximately 68 days, and the ripening period covers about 21 days. At Davis—a moderately warm region—90 or more days are required from blooming to 18° Balling, and the ripening period covers 30 days.

Fruit was collected of each of the table grape varieties at approximately the beginning of the commercial harvest from each of the principal producing regions.

During the first four years, organoleptic analyses by a jury of at least six individuals preceded the chemical analyses of each sample of fruit. The organoleptic analyses of these samples not only indicated their palatability, but along with the degree Balling and acidity determinations they made it possible to fix a definite minimum degree Balling plus a Balling-acid ratio at which the fruit of each variety would be sufficiently mature to be eaten with satisfaction.

Some 4,000 samples were run in this fashion, while degree Balling and per cent acid determinations were made on several times this number of additional samples.

### Thompson Seedless

The leading table grape of California—Thompson Seedless—is grown under widely divergent climatic conditions.

Samples were collected from Coachella Valley, the hottest region in which grapes are grown in California, and from Kern County, Fresno County, and Davis, regions of less heat, the temperature decreasing in the order named.

The summation of heat from full bloom to a maturity of 18° Balling for the Thompson Seedless during 12 years, in the Coachella Valley, varied from 1,930 to 2,081 degree-days. For 15 years, in Kern County, it varied from 1965 to 2065 degree-days. For 14 years, in Fresno County, it varied from 1958 to 2054 degree-days. At Davis, it varied through an eight-year period, from 1974 to 2025 degree-days.

When one considers that the daily heat accumulation in mid- and late summer in these regions lies between 20 and 40 degree-days, it is apparent that the rounded average figure of 2000 degree-days fixes the date within  $\pm 2$  days, which is about as close as it can be determined with limited random degree Balling determinations.

Although the figure of 2000 degree-days following full bloom definitely indicates the degree Balling of the fruit, it does not insure satisfactory eating quality. This quality of the fruit is influenced more by the summation of heat during the ripening period.