

GIBBERELLIN TIMING

important for table grapes

COACHELLA VALLEY Thompson Seedless grape growers have been applying a gibberellin spray to the fruit soon after bloom to increase berry size. Test plot work in previous years has shown that a variation of timing of this application by as little as a week can produce important effects on berry size, fruit maturity, shape of the berry, and density of the cluster. Better results have been obtained with two applications than were achieved with only one. Such tests in previous years have been made on commercial vineyards where the grower thinned and girdled at the time he thought best. This study was conducted to evaluate the effect of the timing of any one of these operations upon the results obtained from any other.

Interactions

A factorial experiment was set up to study possible interactions between the timing of the gibberellin application, the girdling, and the thinning. The tests were conducted at the Pawley Vineyard near Coachella during 1965. The vines were large and vigorous, and were trained on high, wide-topped trellises. Each process—girdling, spraying, thinning—was performed on three dates (April 30, May 5, May 12), using all combinations for a total of 27 treatments. Each plot was a single vine and there were 6 replications, for a total of 162 vines.

The University of California spray

recommendation for Thompson Seedless calls for one application of gibberellin "after shatter, following bloom (normal girdling time)." This corresponds to the mid-season timing used in this experiment, which was on May 5. The early timing was the previous week, April 30, when about 95% of the flowers in the plot area had opened. The late timing was a week after normal girdling time, on May 12, when the largest berries were about $\frac{3}{4}$ inch long.

Thinning

Thinning consisted of removing all clusters produced on spurs and shortening all remaining clusters to a length of $4\frac{1}{2}$ inches, measured from the top shoulder to the point where the cut was made. The bunch count ranged from 8 to 49 per vine with a mean of 25. Girdling was done with a standard cane girdler. Applications of 50 ppm gibberellin were sprayed directly at the clusters and the immediately surrounding leaves only.

Just before commercial harvest began on June 30, the fruit was sampled by removing one shoulder from each cluster of each vine. All these berries were stripped off the stems and mixed; 100 berries were then selected at random and weighed to give berry weight. The entire sample was then crushed for the refractometer reading. A count was made for each vine of the number of clusters, number of clusters too tight, and number

with water berries. Treatment effects were determined by analysis of variance and summarized in tables 1, 2, and 3.

Correlations

The following correlations were indicated:

1. Vines with more bunches were associated with lower refractometer readings and lighter berry weight, but there was no significant correlation with percentage of water berries.

2. Since both heavy berry weight and high refractometer readings were correlated with a low number of bunches, they showed an apparent correlation with each other. There was no evidence that the production of larger berries delayed maturity. There was no significant correlation between berry weight and water berries.

3. There was a significant correlation between higher refractometer readings and a higher percentage of water berries.

4. A higher percentage of tight bunches was correlated with heavier berry weight, with a lower percentage of water berries and lower refractometer readings.

No significant interactions were found among the three operations. This indicated that, at least within the two-week period studied, timing of girdling, spraying and thinning could be considered separately without concern for the effect of the timing of one operation on the results of another.

TABLE 1. EFFECT OF TIME OF GIRDLING ON THOMPSON SEEDLESS

| | Early | Mid-Season | Late |
|--|-------|------------|-------|
| Berry weight (grams/100 berries) | 302 | 310 | 302 |
| Refractometer (% solids) | 15.0 | 15.3 | 15.2 |
| Number tight bunches per vine | 9.4 | 7.1 | 5.6** |
| Number bunches with water berries/vine | 3.6 | 3.3 | 4.4 |

**Differences significant at 1%

TABLE 2. EFFECT OF TIME OF SPRAYING GIBBERELLIN ON THOMPSON SEEDLESS

| | Early | Mid-Season | Late |
|--|-------|------------|--------|
| Berry weight (grams/100 berries) | 297 | 302 | 315 ** |
| Refractometer (% solids) | 15.7 | 15.2 | 14.6** |
| Number tight bunches per vine | 5.5 | 6.6 | 10.1** |
| Number bunches with water berries/vine | 4.6 | 4.7 | 2.4** |

**Differences significant at 1%

TABLE 3. EFFECT OF TIME OF THINNING ON THOMPSON SEEDLESS

| | Early | Mid-Season | Late |
|--|-------|------------|--------|
| Berry weight (grams/100 berries) | 303 | 303 | 309 |
| Refractometer (% solids) | 14.7 | 15.1 | 15.8** |
| Number tight bunches per vine | 8.1 | 7.9 | 6.3 * |
| Number bunches with water berries/vine | 3.6 | 3.6 | 4.1 |

*Differences significant at 5%

**Differences significant at 1%

The timing of the gibberellin spray application significantly affected every factor measured. Apparently the grower should, in case of possible conflict, give the timing of this operation top priority. An early application can be expected to result in earliest maturity, smallest increase in berry size, and least trouble from tight bunches. However, if water berries are encountered, early applications can result in the most trouble from this cause, and there is no explanation known for this effect of spray timing on water berries. The problem had not been observed in previous plot work.

Early thinning resulted in more tight bunches and in a delay of maturity. The only benefit from early thinning was in labor savings. It was easier to find the bunches and to free them from the leaves at early thinning than it was later when the berries were large and the bunches more firmly intertwined with the leaves and trellis.

Time of girdling affected only the number of tight bunches. Early girdling increased the number of tight bunches which is an undesirable result.

Since a low percentage of tight bunches and larger berry size were both associated with high refractometer readings, it appears that the early maturity resulting from the bloom spray with gibberellin results from the thinning of the bunch rather than from the smaller berry size. An early spray to thin the bunches, followed by another a week later to further size the berry, produced the best combination of maturity and size for this early table grape area.

However, the amounts of gibberellin acid used in these tests have not been registered for use on grapes. The University of California does not recommend treatments at these rates at this time. Further research is necessary to provide data on rates of application and chemical residues.

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Thompson Seedless cluster sprayed with gibberellin at 95% bloom (early application). Cluster is loose, and berries are oval in shape with a high solids content.

Example of "too tight" cluster resulting from late application of gibberellin. Cluster is tight, berries are round and large, with lowest solids content.

