Berry Size of Seedless Grapes

growth regulator alone or in combination with girdling increases berry size of seedless varieties

Robert J. Weaver

Berry size of Thompson Seedless and other seedless grape varieties was increased by spray application of a growth regulator.

The growth regulator, 4-chlorophenoxyacetic — para-chlorophenoxyacetic— acid, has been tested for the past four years. In 1952, this growth regulator was tested in plots in several counties.

Mature vines of Thompson Seedless and Black Corinth pruned to four to six canes were tested. The diethanolamine salt of 4-chlorophenoxyacetic acid was used, and the concentrations expressed as ppm—parts per million—were on an acid-equivalent basis. When necessary to insure complete coverage of the clusters, a wetting agent was added to the aqueous solution. In all cases the clusters—and usually much of the foliage—were thoroughly wetted. There were 10 or more vines per treatment.

Approximately 30 pounds of fruit were obtained from each treatment at the time of sampling, and one cluster was usually removed from each vine. Size of berry, degree Balling, and total acidity were determined.

Data for Thompson Seedless Grapes Sprayed with Diethanolamine Salt of 4-Chlorophenoxyacetic Acid.

Treatment, concentration of growth regulator (ppm)	Weight per berry (gm.)	Degree Balling	Acid %
Stanislaus County			
0 (not girdled)	2.30	20.5	0.68
5 (not girdled)	2.68	18.8	0.67
15 (not girdled)	2.88	17.6	0.75
25 (not girdled)	2.59	17.8	0.74
0 (girdled)	3.18	19.0	0.68
15 (girdled)	3.54	15.8	0.82
Fresno County*			
10 (not girdled)	2.49	13.9	1.70
20 (not girdled)	2.41	14.6	1.79
40 (not girdled)	1.68	13.8	2.03
0 (girdled)	2.49	15.3	1.48
10 (girdled)	2.66	13.8	1.81
20 (girdled)	2.87	13.6	1.76
40 (girdled)	1.51	10.1	2.01
Tulare County			
0 (not girdled)	1.92	17.6	0.69
5 (not girdled)	2.50	16.1	0.65
15 (not girdled)	2.57	14.8	0.73
25 (not girdled)	2.21	16.5	0.68
0 (girdled)	2.45	20.9	0.60
15 (girdled)	3.30	16.3	0.63
Kern County			
(Samples collected on July 23)			
5 (not girdled)	1.96	14.4	1.51
15 (not girdled)	2.26	13.2	1.70
25 (not girdled)	2.12	11.7	1.98
0 (girdled)	2.22	14.5	1.48
15 (girdled)	3.10	13.2	1.49
(Samples collected on Sept. 5)			
5 (not girdled)	2.86	20.7	0.76
15 (not girdled)	3.22	19.8	0.70
25 (not girdled)	3.21	18.8	0.73
0 (girdled)	3.14	19.6	0.72
15 (girdled)	4.29	18.6	0.76

* Average data from three replicate plots.

The data indicate that Thompson Seedless berries sprayed with growth regulator were larger than untreated controls, and that the largest berries were produced by girdling in addition to application of growth regulator.

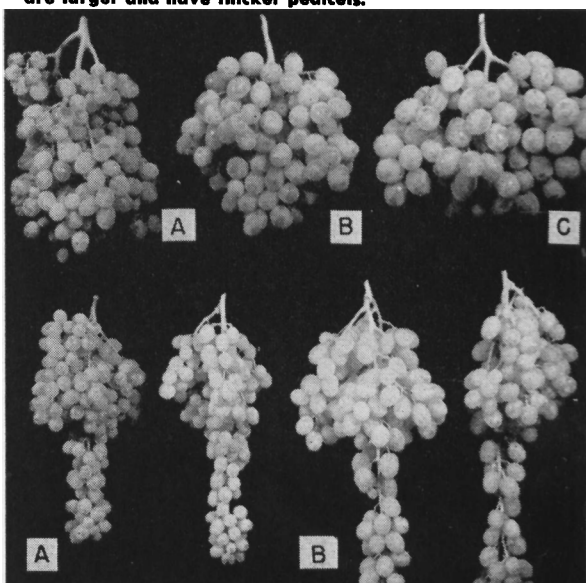
No single concentration of compound resulted in the greatest increase in size of berry in all plots. The range of concentration from 5 to 15 ppm usually resulted in maximum increase in size. Use of growth regulator at 25 ppm or less resulted in little or no injury to Thompson Seedless. Leaves on some shoots were stunted and showed abnormal venation similar to that resulting from 2,4-D. Berries on a few clusters sprayed with the compound at 25 ppm failed to enlarge normally, but the effect on amount of crop was negligible. However, the growth regulator at concentrations higher than 25 ppm is likely to result in severe injury to the vines.

Large clusters of Thompson Seedless resulting from combined girdling and application of growth regulator usually had a lower degree Balling than other treatments. This may have been due to the large amount of crop present, although there is a possibility that fruit from girdled and sprayed vines will mature more slowly and thus delay the time of harvesting.

Growth regulator increased the thick-

Continued on page 15

Upper: A, berry-thinned. B, berry-thinned and girdled. C, growth regulator, berry-thinned, and girdled. Berries of B and C are larger than those of A, berries of C being largest. Lower: A, controls. B, clusters 99 days after spraying with the growth regulator at 15 ppm; the sprayed berries are larger and have thicker pedicels.



NUCELLAR

Continued from page 8

eight varieties. In two varieties there was some difference. In one of these, the Valencia, the average was one size larger in the young line than in the old, but this has not been true in every year. In the Mediterranean Sweet orange, fruit size in the young line was clearly larger in the two years covered in the table. In 1952—not shown in the table—fruit size was practically identical in the two lines of this variety, but this occurred with a light crop on the old-line tree and a heavy crop on the young line.

The yearly data for the 10 varieties show that fruit size in a young line sometimes averages larger than in the old line when yields are similar, and is usually at least equal when yields are moderately larger. In a few instances extremely heavy crops have reduced fruit size. Thus in 1950 the average yield of the old-line Paper Rind orange was 181 pounds per tree, and that of the young line, 417 pounds. The respective average packinghouse sizes were 288 and 344. Since the size of the sample used to determine fruit size was often small, final conclusions about fruit size in nucellar lines must depend upon future data. However, the data on the Valencia and Satsuma, based on the entire crop in most years, suggest that large differences in size between old lines and high-yielding young lines derived from them should not be expected.

Fruit Shape

Fruit shape has—with one exception—been practically identical in the two lines of each variety. The young line of the Mediterranean Sweet orange has consistently produced fruit of more elongated shape, which may represent a genetic variation.

Seeds

Seed counts were taken in the seven varieties that produce seed regularly. In two of these—the Mediterranean Sweet and the Marsh—fruit of the nucellar lines had fewer seeds than that of the old lines for the three consecutive seasons 1949–1951. Fruit of the nucellar Eureka, Lisbon, and Paper Rind showed lower seed counts than fruit of the old lines in two out of three years. The two remaining varieties, Ruby and Valencia, did not show convincing differences in seed numbers.

Juice

The young lines were slightly higher in juice in six varieties, essentially the same in the four others, and thus not markedly lower in any variety.

Soluble solids were nearly equal in most comparisons but distinctly higher in the young-line Satsuma, perhaps because this young line ripens earlier than its old line. In the Satsuma variety the four-year average was 11.9% solids in the old line and 13.2% in the young line. In each of the four years, the young line averaged at least 0.9% higher than the parent. Two other young lines, the Valencia and the Ruvel, averaged 0.6% higher than their old lines for four- and three-year periods, respectively, but an increase was not found in every year. In the remaining varieties there was even less average difference between lines.

The percentages of acid were similar in most of the comparisons between old lines and young lines. In two varieties there was some indication of a consistent difference between lines. In the Paper Rind orange, the average acid percentage, for a two-year period, was 0.91 in the old line and 0.76 in the young line. In the Marsh grapefruit, the three-year average was 1.63% acid in the old line and 1.48% in the young line. Acidity may decrease earlier or faster in the young line. If so, it may be of advantage, since grapefruit in some areas of California is high in acid.

The ratios of soluble solids to acid in the two lines of a variety were in most cases nearly equal, and in a few cases—Washington Navel, Paper Rind, and Satsuma—slightly higher in the young line. In the averages for all seasons, the ratio was not appreciably lower in any young line as compared with its related old line.

Other Fruit Characters

Size of navel structure is another fruit character that is affected by nucellar embryony. Some years ago, fruit of the

Continued on next page

GRAPES

Continued from page 7

ness of pedicels or cap stems. The cap stems of sprayed clusters were attached more firmly to the berry than those of corresponding unsprayed clusters. A preliminary experiment indicated that growth regulator decreased the amount of berry shatter.

Growers wanting to experiment with growth-regulator application to Thompson Seedless, should reduce the crop of vines as they would for girdling. Fruit of over-cropped vines will not respond to the compound. Spraying should be done immediately after the shatter of berries following flowering since delay in spraying lessens the beneficial effect on size of berry.

Before treating a large block of any variety of grape, growers should spray a few vines with several concentrations the first year—say 5, 10, or 15 ppm.

Other Seedless Varieties

Black Corinth vines sprayed at full bloom usually developed berries with hard seeds, which would make the fruit worthless for production of currants. When spraying was delayed for about one week, large berries of acceptable fruit containing no hard seeds developed.

Foliage was only slightly injured by the compound at 10 or 20 ppm, but some shoots on vines sprayed with compound at 40 ppm were killed. The growth regulator at 30 or 40 ppm killed or injured many clusters.

Experiments were performed with other seedless varieties. Clusters of Black Monukka, White Corinth, and Sultana were dipped into solutions of growth regulator. Size of berry was increased. No data were obtained on optimum concentrations to use for spraying.

There is no evidence that any benefits will be obtained with seeded varieties as a result of treatment with a growth regulator.

Robert J. Weaver is Associate Viticulturist, University of California College of Agriculture, Davis.

The following Farm Advisors co-operated in the trials—C. H. Beeman, Stanislaus; C. V. Carlson, Merced; B. S. Gould, Madera; R. A. Break, Fresno; F. L. Jensen, Tulare; and A. N. Kasimatis, Kern.

The above progress report is based on Research Project No. 1421.

Data at Time of Sampling for Black Corinth Grapes from Vines Sprayed with the Diethanolamine Salt of 4-Chlorophenoxyacetic Acid. Full Bloom was on May 17.

Treatment, concentration of growth regulator (ppm)	Time of treatment	Weight per berry (gm.)	Estimated % berries containing hard seeds	Degree Balling	Acid %
0 (not girdled)	May 17	0.18	0	19.7	1.48
10 (not girdled)	May 17	0.57	2	18.4	1.29
20 (not girdled)	May 17	0.60	85	21.4	1.25
10 (not girdled)	May 26	0.44	0	13.6	1.54
20 (not girdled)	May 26	0.41	0	19.2	1.52
0 (girdled)	May 17	0.37	0	16.8	1.43