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Grape Notes

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IMPROVING MATURITY OF THOMPSON SEEDLESS FOR RAISIN PRODUCTION

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The rate of maturity of Thompson Seedless is affected by many factors: vineyard location, crop load, irrigation management, canopy damage by leafhopper and mite populations, nitrogen and potassium nutrition, and growth regulators. The following research covers the effect of gibberellin timing and concentration on fruit maturity, raisin grade, and yield.

Gibberellin (GA_3) is commonly applied to Thompson Seedless during bloom to loosen clusters and improve raisin grade in the San Joaquin Valley. In recent years, an increasing number of growers have been applying GA_3 at berry set to improve raisin yield, and there have been inquiries on what response would occur applying GA_3 during the 14 day period between bloom and berry set. We conducted a detailed study evaluating the effect of applying GA_3 at different stages of berry development to determine which timing and concentration is most appropriate to maximize yield and raisin quality. We applied two rates of GA_3 and at four different stages. Fresh and raisin yield, raisin quality, berry and raisin characteristics, drying rates, and vine fruitfulness were measured. The experiment was conducted over a two year period.

GA_3 was applied to a mature Thompson Seedless vineyard in the Kingsburg area. Applications were made at 8 and 16 grams per acre and at four stages of fruit development.

Timing of GA_3 applications were as follows:

- Stage 1: 50% bloom;
- Stage 2: between bloom and berry set;
- Stage 3: berry set;
- Stage 4: berry set plus fourteen days.

Stage 1 (50% bloom): GA_3 applied at bloom advanced maturity with a corresponding improvement in dry down ratio (pounds fresh fruit per pound raisins), raisin grade, and raisin yield. Eight grams of GA_3 per acre was just as effective as 16 grams. The B & B grade was increased 24 points in 1999 and 9 in 2000. The application of GA_3 reduced the number of berries that set about 20%. Berry fresh weight, on the other hand, was increased about 20%. Consequently, fresh yields were not significantly different from the control. Raisin yields, however, were higher than the control because of the increase in maturity and improved dry down ratio. See Figures 1 and 2 and Tables 1 through 5.

Stage 2 (Between Bloom and Berry Set): GA_3 applied seven days after full bloom did not advance maturity and, subsequently, there was no improvement in dry down ratio or raisin grade. GA_3 did not thin berries but did increase fresh berry weight. Clusters were on the tight side greatly increasing the potential for rot, but rot was not a problem. Berry weight was

increased about the same as when gibberellin was applied at bloom. Applying gibberellin seven days after bloom substantially increased fresh weight and raisin yields. Raisin yield and fresh weight yield increased more with 8 grams per acre than 16 grams. The 16 gram per acre rate reduced berry set compared to the lower rate and this contributed to the yield difference.

Stage 3 (Berry Set): GA_3 applied at berry set, about 14 days after full bloom, delayed maturity but dry down ratio and raisin grade were not different from the control. GA_3 did not thin berries but did increase fresh berry weight. Clusters were on the tight side greatly increasing the potential for rot, but rot was not a problem. Both fresh and raisin yields were substantially increased and the increase tended to be greater with the 16 gram rate, although statistically there was no significant difference.

Stage 4 (Berry Set + two weeks): This time of application was the least desirable of all the timing treatments. Berries were less responsive to sizing. The 8 gram per acre rate did not increase raisin and fresh weight yields although the 16 gram rate did.

Summary

Berries were thinned when GA_3 was applied at bloom, but no thinning occurred when applied seven days after bloom or later. Bloom application tended to advance maturity. Applications made seven days after bloom or later did not advance maturity and late applications tended to delay maturity. Bloom time application improved raisin quality while applications seven days after bloom, berry set, or two weeks after berry set had no effect. Raisin yield and fresh weight yield were greatest when GA_3 was applied seven days after bloom or at berry set (14 days after bloom). Late application, 28 days after bloom, was the least desirable of all the timing treatments. This research suggest that raisin growers should apply gibberellin during bloom in heavy crop years and when poor raisin quality is a concern, but applications should occur after bloom in light crop years to increase yields, but no later than berry set. The 8 gram per acre rate was just as effective, if not more effective, as the 16 gram per acre rate. Clusters were more exposed and easily sprayed during bloom or between bloom and berry set than with later applications.

Figure 1. Effect of GA_3 applied at different stages of fruit development on fresh yield (1999 + 2000 Combined Data).

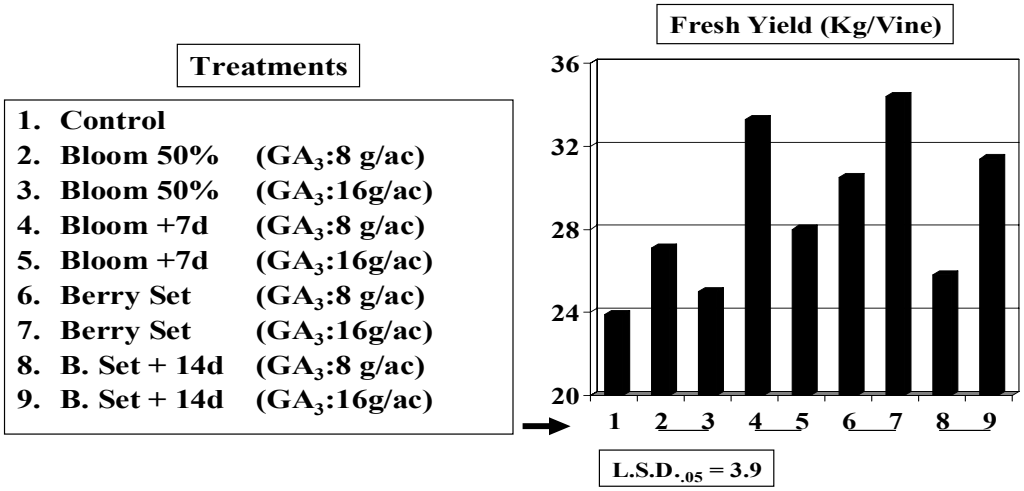

Figure 2. Effect of GA_3 applied at different stages of fruit development on raisin yield (1999 + 2000 Combined Data).

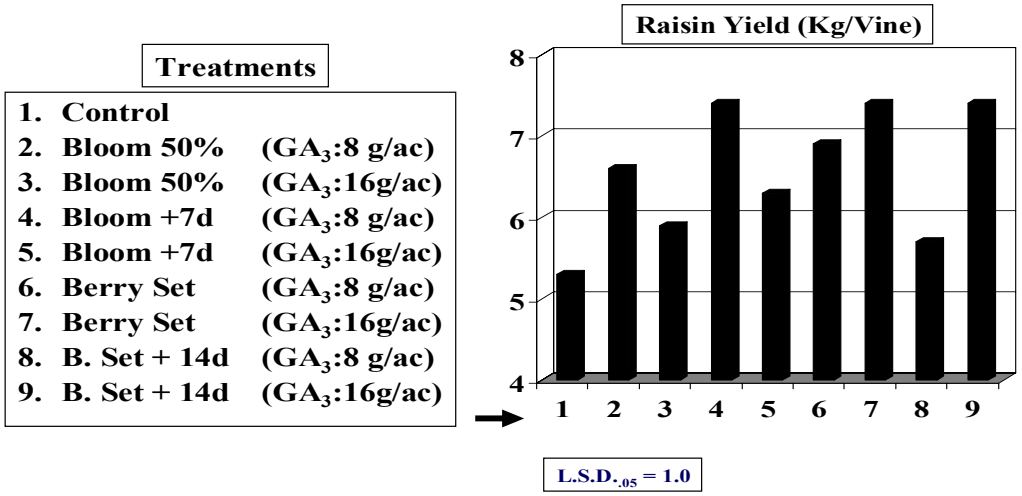

Table 1. Berry weight, sugar, raisin weight, and drying ratio as affected by GA_3 in 1999.

Treatments	Berry Wt. (g)	Sol. Solids (°Brix)	Raisin Wt. (g)	Fresh/ Dry Ratio
Control	1.9	20.1	0.42	4.4
Bloom 50% (GA_3: 8 g/ac)	2.4	21.6	0.53	4.0
Bloom 50% (GA_3: 16 g/ac)	2.5	21.6	0.51	4.0
Bloom +7d (GA_3: 8 g/ac)	2.2	19.5	0.45	4.5
Bloom +7d (GA_3: 16 g/ac)	2.6	19.7	0.47	4.4
Berry Set (GA_3: 8 g/ac)	2.5	19.8	0.51	4.3
Berry Set (GA_3: 16 g/ac)	2.3	19.6	0.46	4.6
B. Set +14d (GA_3: 8 g/ac)	2.3	19.7	0.43	4.3
B. Set +14d (GA_3: 16 g/Ha)	2.3	19.7	0.45	4.4
$L.S.D._{.05}$	(0.21)	(1.20)	(n.s.)	(0.28)

Table 2. Berry weight, sugar, raisin weight, and drying ratio as affected by GA_3 in 2000.

Treatments		Berry Wt. (g)	Sol. Solids (°Brix)	Raisin Wt. (g)	Fresh/ Dry Ratio
Control		1.7	21.5	0.37	4.3
Bloom 50%	(GA_3: 8 g/ac)	1.9	21.8	0.39	4.1
Bloom 50%	(GA_3: 16 g/ac)	1.9	21.6	0.43	4.3
Bloom +7d	(GA_3: 8 g/ac)	2.0	21.4	0.43	4.5
Bloom +7d	(GA_3: 16 g/ac)	2.0	21.2	0.46	4.4
Berry Set	(GA_3: 8 g/ac)	2.0	20.1	0.48	4.5
Berry Set	(GA_3: 16 g/ac)	2.1	20.1	0.45	4.6
B. Set +14d	(GA_3: 8 g/ac)	2.0	21.2	0.40	4.7
B. Set +14d	(GA_3: 16 g/ac)	1.9	21.2	0.37	4.1
	$L.S.D_{.05}$	(0.16)	(1.10)	(0.03)	(0.28)

Table 3. Berry Length, Width, Cluster Tightness, and Rot as Affected by GA_3 in 1999.

Treatments		Berry Length (cm)	Berry Width (cm)	Cluster Tight (b./cm.)	Cluster Rot (Kg/Vine)
Control		1.64	1.34	4.6	0.2
Bloom 50%	(GA_3: 8 g/ac)	1.82	1.44	3.6	0.6
Bloom 50%	(GA_3: 16 g/ac)	1.88	1.39	2.9	0
Bloom +7d	(GA_3: 8 g/ac)	1.80	1.42	5.5	0
Bloom +7d	(GA_3: 16 g/ac)	1.80	1.43	4.2	0.5
Berry Set	(GA_3: 8 g/ac)	1.74	1.42	4.6	1.1
Berry Set	(GA_3: 16 g/ac)	1.82	1.47	4.8	0
B. Set +14d	(GA_3: 8 g/ac)	1.85	1.43	5.3	0.6
B. Set +14d	(GA_3: 16 g/ac)	1.72	1.51	5.5	0
	$L.S.D_{.05}$	(0.15)	(n.s.)	(1.0)	(n.s.)

Table 4. Berry length, width, cluster tightness, and rot as affected by GA_3 in 2000.

Treatments		Berry Length (cm)	Berry Width (cm)	Cluster Tight (B./cm)	Cluster Rot (Kg/Vine)
Control		1.62	1.35	4.6	0.9
Bloom 50%	(GA_3: 8 g/ac)	1.76	1.39	3.8	0.4
Bloom 50%	(GA_3: 16 g/ac)	1.79	1.33	3.5	1.2
Bloom +7d	(GA_3: 8 g/ac)	1.76	1.37	4.2	3.2
Bloom +7d	(GA_3: 16 g/ac)	1.77	1.35	4.1	0.4
Berry Set	(GA_3: 8g /ac)	1.76	1.40	4.4	1.3
Berry Set	(GA_3: 16 g/ac)	1.74	1.40	4.2	0.2
B. Set +14d	(GA_3: 8 g/ac)	1.73	1.41	4.3	0.6
B. Set +14d	(GA_3: 16 g/ac)	1.70	1.39	4.1	0.4
	$L.S.D._{.05}$	(0.08)	(n.s.)	(0.65)	(n.s.)

Table 5. Raisin quality based on air stream grade for 1999 and 2000.

Treatments		1999 B&B	1999 S.Std.	2000 B&B	2000 S.Std.
Control		65	10	73	3
Bloom 50%	(GA_3: 8 g/ac)	91	2	81	3
Bloom 50%	(GA_3: 16 g/ac)	84	3	60	6
Bloom +7d	(GA_3: 8 g/ac)	57	10	65	4
Bloom +7d	(GA_3: 16 g/ac)	68	8	65	6
Berry Set	(GA_3: 8 g/ac)	83	6	65	5
Berry Set	(GA_3: 16 g/ac)	61	11	59	7
B. Set +14d	(GA_3: 8 g/ac)	76	6	60	7
B. Set +14d	(GA_3: 16 g/ac)	68	9	72	4
	$L.S.D._{.05}$	(22)	(n.s.)	(n.s.)	(n.s.)

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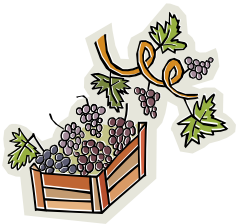

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