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APPLICATION OF GIBBERELLIC ACID ON GRAPE CULTIVAR 'ORLANDO SEEDLESS'

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Abstract. **Gibberellic acid, a plant growth regulator commonly used for berry enlargement of seedless grapes, was used to spray on 'Orlando Seedless', the only seedlessness bunch grape cultivar with Pierce's disease resistance grown in Florida. 50 mg·L^{-1}, 100 mg·L^{-1}, 150 mg·L^{-1}, 200 mg·L^{-1}, and 300 mg·L^{-1} were sprayed on the leaves and flower/fruit clusters. For each treatment, GA_3 was applied twice with the first spray at full bloom and spray again a week later. Water was sprayed to serve as a control. The average cluster and berry weight of the sprayed vines increased significantly over the non-sprayed vines, and the largest berries were found in the treatment with the highest concentration of GA (300 mg·L^{-1}). On the other hand, weight of seed trace decreased as the GA concentration increased, and no difference was observed for the number of seed traces per berry. Based on this result, a 100 mg·L^{-1} GA_3 is recommended for spraying on the 'Orlando Seedless'.**

'Orlando Seedless', the only seedless bunch grape cultivar grown in the southeastern United States, was released by the University of Florida in 1986 (Mortensen and Gray, 1987). It is resistant/tolerant to the Pierce's disease (PD), a limited factor to grow major seedless grapes in this region. In addition, the cultivar possesses acceptable fruit quality for table consumption. The characteristics of PD resistance apparently inherited from the parents of native species, such as *Aestivalis*, while the seedlessness was derived from *V. vinifera*. 'Orlando Seedless' also has large cluster compatible to other seedless table grapes. However, compared to standard seedless grape cultivars, such as 'Thompson Seedless' and 'Flame Seedless', 'Orlando Seedless' has relatively smaller berry size and large seed trace that limits its acceptance by consumers.

Gibberellic acid (GA) has been routinely used for seedless bunch grape production (Ledbetter and Ramming, 1989). For example, it has been used to increase berry and bunch size (Butler and Rush, 1994; Harrell and Williams, 1987; Varma, 1991; Zabadal and Bordelon, 1993), and reduce the size of seed trace (Halbrooks and Mortensen, 1988). Halbrooks (1986) treated 'Orlando Seedless' with various GA concentrations in different time after blooming, and found that the best response was 150 mg·L^{-1} applied 7 days after full bloom and 300 mg·L^{-1} applied 14 days after full bloom.

The objectives of this study were to investigate the effects of GA_3 on berry and cluster size, size of seed trace and number of seeds per berry in cultivar 'Orlando Seedless', and to figure out the most suitable GA_3 concentration for spraying. Information generating from this study may have potential application to other seedless grapes should new seedless cultivars be released in the future.

Materials and Methods

Four to five-year old vines of cultivar Orlando Seedless were used in this study. The plants were grown on a single wire trellis system in the experimental vineyard at Florida A & M University, Tallahassee. The source of the gibberellic acid was ProGibb 4% (Abbott Laboratories, North Chicago, IL). GA_3 of 50, 100, 150, 200, and 300 mg·L^{-1} was sprayed on the leaves and flower/fruit clusters. The first spray was at full bloom, followed by a second spray a week later (berries were ~4 mm in diameter at this stage). Water was sprayed as a control. Three vines were used for each treatment. After fruits were fully matured, ten clusters were randomly harvested from each vine to determine the cluster and berry weight, number of seeds per berry, and seed weight.

Results and Discussion

The vines treated with GA_3 in 100 mg·L^{-1} or higher concentration produced larger cluster than the control (Table 1), while no statistic difference was found between the 50 ppm treatment and the control. The 100 and 150 mg·L^{-1} treatments produced the largest cluster while the cluster weight decreased as the GA_3 increased to 200 and 300 mg·L^{-1}. This might be due to the thinning effect since the number of berries per cluster decreased when 200 and 300 ppm GA_3 were applied (Table 1).

The GA_3 treated vines also produced significantly larger berries than the control (Table 1). There was a tendency that the higher the GA applied, the larger the berry produced. The largest berry was found in 300 mg·L^{-1} treatment. It produced berries over 70% larger than the control.

The seed trace became significantly smaller when GA_3 at 100 ppm and higher was used (Table 2). No difference was found between the 50 ppm treatment and the control, while there was no statistic difference of seed weight from 100 to 300 mg·L^{-1} treatments. The number of seeds per berry was slightly over one, and similar among all the treatments. Since the non-sprayed vines produced relatively smaller berries and larger seed traces, the difference of the percentage of seed trace in each berry (w/w) was even greater between the GA_3 treated vines and the control (Table 2).

Conclusion

Positive response to GA_3 was found when 100 mg·L^{-1} or higher concentration was sprayed at full bloom and a week later. Very little effect was found when the GA_3 concentration was reduced to 50 mg·L^{-1}. The average berry weight of the

Table 1. Average cluster weight, number of berries per cluster and berry weight of 'Orlando Seedless' grape in various GA_3 treatments.

GA_3 mg·L^{-1}	Cluster weight (g)	Berries per cluster	Berry weight	
			Average	10 largest
0 mg·L^{-1}	164.68 c[z]	193.2 bc	0.84 c	1.29 c
50 mg·L^{-1}	170.71 c	138.1 d	1.20 b	1.74 b
100 mg·L^{-1}	287.05 a	246.7 a	1.15 b	1.75 b
150 mg·L^{-1}	250.97 a	217.9 ab	1.20 b	1.78 b
200 mg·L^{-1}	240.94 ab	197.2 bc	1.23 b	1.73 b
300 mg·L^{-1}	217.37 b	153.9 cd	1.45 a	2.44 a

[z]Duncan's multiple range test, means with the same letter are not significantly different at 5% level.

Table 2. Average number of seeds and seed weight per berry, and percentage of seed trace per berry (w/w) of 'Orlando Seedless' grape in various GA_3 treatments.

GA_3 mg·L^{-1}	Seed weight (mg) per berry	Seed weight (mg) per seed	No. of seeds per berry	% seed weight per berry
0 mg·L^{-1}	9.70 a[z]	7.53 a	1.25 a	0.83 a
50 mg·L^{-1}	9.00 a	7.06 a	1.26 a	0.49 ab
100 mg·L^{-1}	2.56 b	2.23 b	1.13 a	0.15 b
150 mg·L^{-1}	2.31 b	1.93 b	1.23 a	0.13 b
200 mg·L^{-1}	2.09 b	1.95 b	1.07 a	0.12 b
300 mg·L^{-1}	4.75 b	4.42 ab	1.10 a	0.21 b

[z]Duncan's multiple range test, means with the same letter are not significantly different at 5% level.

sprayed vines increased significantly and the largest berries were found in the treatment of 300 mg·L^{-1}. Thinning effects in 200 and 300 mg·L^{-1} treatments were observed as they had less berries per cluster than the 100 to 150 mg·L^{-1} treatments. Berries in the GA_3 treated vines also contained smaller seed trace than the control. Increase of berry size and decrease of seed trace should make the 'Orlando Seedless' better accepted by consumers. Based on this study, 100 mg·L^{-1} GA_3, 2 times a week interval started full bloom, is recommended for spraying on the 'Orlando Seedless' grape.

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EFFECT OF PRUNING ON QUALITY OF 'ALACHUA' MUSCADINE GRAPE

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Abstract. **A study was conducted to determine the effect of pruning on fruit production. Vines were planted 12' apart in three rows, which were 10' apart, trained to a single cordon and maintained with microjet irrigation, standard fertilization and disease control. There were three pruning treatments, each composed of three randomly-located five-vine replicates. For the first year, the three treatments consisted of pruning to either one-bud spurs along the cordon, two-bud spurs or three-bud spurs. During the second and third years bud numbers were increased to 2-3 buds (treatment 1), 5 buds (treatment 2) or 10 buds (treatment 3) per cordon. Data were taken after year three. Pruning significantly affected fruit yield in that treatment 2 produced more fruit per vine (167 lb.) than treatment 1 (125 lb.), but the same as treatment 3 (152 lb.). However, all other factors tested, including berry weight, amount of rotting, dry stem scar and green fruit, as well as, juice soluble solids, titratable acidity and pH were not significantly affected by the treatments. Pruning 'Alachua' to 5 buds per spur is recommended, since yield is increased while other quality factors are not compromised.**

'Alachua' muscadine grape (*Vitis rotundifolia* Michx.) was released by the CFREC, Leesburg in 1990 as a productive self-fertile, black variety with high disease resistance (Mortensen and Harris, 1990). It has medium-sized berries (7.5 g) when compared to other black varieties like 'Albemarle' (5.8 g) and 'Nesbitt' (9.8 g). It is characterized by having a dry stem scar and very uniform ripening; these traits, in particular, make such varieties good candidates for use of mechanical harvesting (Balerdi and Mortensen, 1973).

Maximum sustained yield in grapes is due to a number of factors, including pruning (Winkler, 1959). Pruning is used not only to shape a young vine in order to maximize support and make management easier, but also to control the number

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