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.

Literature Cited

Butler, M. D. and R. E. Rush. 1994. Influence of gibberellic acid on sizing of 'Thompson Seedless' grapes in southwest Arizona. HortScience 19:546 (abstract).

Halbrooks, M. C. 1986. Use of gibberellic acid on 'Orlando Seedless' to enhance berry size and seedlessness. Proceedings of the Viticultural Science Symposium, Florida A & M University, Tallahassee. pp. 119-123.

Halbrooks, M. C. and J. A. Mortensen. 1988. Influence of gibberellic acid and various management practices on berry, seed and cluster development in 'Orlando Seedless' grape. Proc. of Fla. State Hort. Soc. 100:312-315.

Harrell, D. C. and L. E. Williams. 1987. The influence of girdling and gibberellic acid application at fruitset on 'Ruby Seedless' and 'Thompson Seedless'. Am. J. Enol. Vitic. 38:83-88.

Ledbetter, C. A. and D. W. Ramming. 1989. Seedlessness in grapes. Hort. Rev. 11:159-184.

Mortensen, J. A. and D. J. Gray. 1987. 'Orlando Seedless' grape. HortScience 22:327-328.

Varma, S. K. 1991. Effect of dipping flower cluster in gibberellic acid on fruit set bunch and berry size yield and fruit quality in grapes (*Vitis vinifera* L.). Indian J. Agric. Res. 25:54-58.

Zabadal, T. J. and B. P. Bordelon. 1993. Timing and concentration of gibberellic acid applications for berry thinning and sizing of 'Vanessa Seedless' grapes. HortScience 28:210 (abstract).

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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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of berries produced. This is important, since vines that underproduce are not as profitable, while those that over-produce can become stressed and may not be capable of sustained yearly yields (Kolbe and Harris, 1961; Winkler, 1959). For maximum yield, vines must be pruned each year. Many different pruning methods have been used. For muscadine grape varieties, maintenance of spurs on a cordon results in higher yields than cane pruning (Loomis, 1943). Dormant fruiting canes are pruned to short spurs, each containing a desired number of buds. The number of buds per spur influences fruit yield, particularly on young vines (Lane, 1977). Presumably, number of buds per spur is related to resulting berry number and/or size. In addition, bud number may affect other quality attributes that influence the commercial usefulness of a given variety.

The purpose of this study was to determine the effect of pruning on 'Alachua' muscadine grape in order to provide a recommendation for maximizing fruit yield and quality.

Materials and Methods

Vines of 'Alachua' were propagated from green wood cuttings in May 1990 at the Central Florida Research and Education Center, Leesburg, Florida and grown in pots until February of 1991 when they were planted into an experimental vineyard block. Vines were placed 12' apart in three rows, which were 10' apart, and single cordons were trained to a one-wire trellis 5' above ground level. Irrigation was supplied via hanging microjets and vines were subjected to standard vineyard management practices, which included fertilization and disease control.

The pruning experiment consisted of three 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 in December of 1992. During the second (12/93) and third years (12/94) bud numbers were increased to 2-3 buds (treatment 1), 5 buds (treatment 2) or 10 buds (treatment 3) per cordon. Data was taken at fruit ripening after the third year (August 1995) and consisted of the following: yield per vine (kg); berry weight (g); rotting (% berries with visible rot); berries with dry stem scar (%); ratio of green-to-ripe fruit (%); soluble solids in juice (%), titratable acidity and pH. All data were subjected to an analysis of variance and mean separation was accomplished with Student-Newman-Kuels (SNK) test.

Results and Discussion

With the exception of fruit yield, the factors tested, including berry weight, amount of rotting, dry stem scar and green fruit, as well as, juice soluble solids, titratable acidity and pH, did not show significant responses to pruning treatment (Table 1). However, pruning significantly affected fruit yield in that treatment 2 (5 buds per spur) produced more fruit per vine (167 lbs.) than treatment 1 (2-3 buds per spur) (125 lbs.), but the same as treatment 3 (10 buds per spur) (152 lbs.).

With only a few exceptions, commercial production of muscadine grape in Florida has been restricted to U-pick operations. This is because large scale production for jelly, juice, wine and/or fresh fruit is prohibitively expensive due to the following problems: 1) Muscadine berries are produced singly (not on large bunches) so that they must be harvested individually. 2) Berries often have a wet stem scar, which allows juice to leak from the berry when it is picked. This limits storage. 3) Fruit usually ripens unevenly so that uniformly ripe fruit is not present at a given time. 4) Fruit rot occurs. These are major contributing factors to the high cost of production, since the additional work needed to select uniformly high-quality berries is accomplished by hand. Mechanical harvesting might reduce costs if these problems could be solved. Mechanical harvesting of muscadine grape is accomplished by agitating the vine to cause berries to release from their pedicels so that they can be collected in catch frames. However, the aforementioned traits cause the recovery of high-quality berries to be unacceptably low, since unevenly-ripened berries, with oozing juice and an unacceptable percentage of fruit rot often results. Improved cultivars, such as 'Alachua', are being tested for their ability to overcome these problems. Currently, 'Alachua' has the best overall combination of traits suitable for mechanical harvesting. For example, when compared to 'Albemarle', another even-ripening variety, 'Alachua' has a significantly larger berry (7.5 g vs. 5.8 g) and a higher yield (10.5 ton/ha vs. 8.5 ton/ha) (Mortensen and Harris, 1990). When compared to a similar, but larger variety ('Nesbitt'), which has 9.5 g berries, 'Alachua' had a higher dry stem scar percentage (75% vs. 32%).

Table 1. Effect of pruning treatment on yield and quality of 'Alachua' muscadine grape.

	Treatments		
Parameter tested	2-3 buds	5 buds	10 buds
Fruit yield (kg/vine)	275b[z]	367a	334ab
Berry weight (g)	7.2b	7.1a	7.1a
Rotting (%)	0a	3.3a	3.3a
Dry stem scar (%)	66.7a	74.4a	57.8a
Green fruit (%)	2.2a	2.2a	4.4a
Soluble solids (%)	15.9a	15.8a	15.6a
Titratable acidity	0.38a	0.39a	0.40a
pH	3.6a	3.5a	3.5a

[z]Within rows, means followed by the same letter were not significantly different at P = 0.05 according to SNK test.

The present study was designed to explore pruning, one of the key management practices that must be followed to optimize production. These results show that most quality traits in 'Alachua', with the exception of berry size, are not affected significantly by the pruning treatments tested. Although pruning to ten buds per spur produced an optimum berry size that was significantly similar to the five bud treatment (Table 1), it is possible that it would lead to over-bearing and eventual decline of production as has been shown for other varieties (Winkler, 1959). Thus, pruning 'Alachua' to five buds per spur is recommended, since yield is increased while other quality factors are not significantly compromised.

Literature Cited

Balerdi, C. F. and J. A. Mortensen. 1973. Suitability of mechanical harvest in cultivars of muscadine grapes (*Vitis rotundifolia* Michx.). Proc. Fla. State Hort. Soc. 86:342-344.

Kolbe, M. and J. H. Harris. 1961. Pruning and training muscadine grapes. North Carolina Agr. Ext. Folder 156.

Lane, R. P. 1977. Yield of young muscadine grapes as affected by cane pruning. J. Amer. Soc. Hort. Sci. 102(4):379-380.

Loomis, N. H. 1943. The influence of time and method of pruning on yields of muscadine grapes. Amer. Soc. Hort. Sci., 42:418-420.

Mortensen, J. A. and J. W. Harris. 1990. Alachua muscadine grape. Univ. Fla. Agr. Exp. Stn. Circular S-373.

Winkler, A. J. 1959. Pruning grapevines. Calif. Agri. Exp. Stn. Ext. Serv. Circ. 477.