

Effect of Several Herbicide Systems on Weed Control and Yield of Muscadine Grapes¹

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Abstract. Diuron at 2.2, 4.4, and 8.9 kg/ha was ineffective in controlling grass and broadleaf weeds in a muscadine grape (*Vitis rotundifolia* Michx.) vineyard while diuron at 4.4 or 8.9 followed by dalapon at 5.5 kg/ha gave effective weed control with no visible phytotoxicity. Yields were significantly reduced at the 2.2 and 8.9 kg/ha diuron rates and by diuron at 8.9 in combination with dalapon at 5.5 kg/ha. A simazine, dalapon, and 2,4-D system also controlled weeds in the vineyard with no influence on yield. Herbicide treatments had no effect on soluble solids of the fruit.

Weed control has been obtained by mechanical means in muscadine grape vineyards; however, the vertical trellis system made mechanical weed control laborious and expensive. Recently, a nontillage system with herbicides used in vine rows and a close-mowed sod maintained between rows has been adopted in muscadine production areas (1). In addition to better weed control, the herbicide-sod system reduces soil erosion, soil compaction, and labor requirements.

Continued use of a single herbicide increased the no. of persistent weeds in vineyards. The work reported herein was undertaken to measure the effects of various herbicide systems applied in vine rows on weed control and subsequent effect on yield and soluble solids of the fruit.

This study was conducted in a mature muscadine grape vineyard selected for uniform vine vigor and diversity of weed infestation. The soil type was Lloyd sandy clay loam with enough slope to require contour planting. Paraquat (1,1'-dimethyl-4,4'-bipyridinium ion) at 1.1 kg/ha was applied to all plots, including check plots, 14 days prior to application of the treatments to eliminate existing weeds. Rainfall of 0.9 cm occurred in the 2-day period preceding treatment and a total of 2.4 cm rainfall was recorded for the 4 days immediately following herbicide application. On June 17, 1971, differential treatments replicated 6 times on adjacent vineyard rows were applied in 0.9 m bands for a distance of 9.1 m along the row to include 3 vines in each plot. Data were collected from the center vine of each plot.

The treatments included diuron (3,3,4-dichlorophenyl)-1,1-dimethylurea at 2.2, 4.4, and 8.9 kg/ha; a diuron plus dalapon (2,2-dichloropropionic acid) system with the above

diuron rates followed by a 5.5 kg/ha dalapon application 41 days later; and a 2.2, 4.4, and 8.9 kg/ha simazine (2-chloro-4,6-bis(ethylamino)-S-triazine) plus dalapon mixture followed by treatment with an 18% 2,4-D (2,4-dichlorophenoxyacetic acid) wax bar after 8 days. Check plots beneath the trellis and the middles of rows were kept in sod and mowed closely during the test.

Weed control ratings were made with 1 indicating no control and 10 complete control. Ratings were made after harvest in October and weeds not controlled were recorded. The primary weeds present were crabgrass (*Digitaria sanguinalis* L. Scop.), common ragweed (*Ambrosia artemisiifolia* L.), redroot pigweed (*Amaranthus retroflexus* L.), goosegrass (*Eleusine indica* L. Gaertn.), prickly sida (*Sida spinosa* L.), bermudagrass (*Cynodon dactylon* L. Pers.), blackberry (*Rubus* sp.), and buckhorn plantain (*Plantago lanceolata* L.).

Prior to harvest, the amount of premature fruit drop was recorded. Soluble solids were determined with a Bausch & Lomb refractometer using free-run juice of 5 ripe berries for each determination and 2 readings per plot.

Diuron alone exhibited ineffective grass and broadleaf weed control but used at rates of 4.4 and 8.9 kg/ha in combination with dalapon applied 41 days later effectively controlled grasses and broadleaf weeds. Diuron at the 2.2 kg/ha rate in combination with dalapon resulted in effective grass control but inadequate pre-emergent broadleaf weed control (Table 1). The addition of

dalapon to the diuron systems significantly increased weed control ratings by controlling bermudagrass.

The simazine systems resulted in effective weed control for both broadleaf weeds and grasses. The addition of the 2,4-D bar to the simazine systems improved the broadleaf weed ratings over the diuron plus dalapon systems by controlling blackberries and plantains which were not controlled by the diuron systems.

Yield was significantly reduced by diuron at 2.2 and 8.9 kg/ha alone and diuron at 8.9 kg/ha in combination with dalapon. In the first case, 2.2 kg/ha diuron was an insufficient rate for adequate weed control (Table 1) and the yield decrease resulted from weed competition. At the 8.9 kg/ha diuron rate yield was reduced from fruit shatter prior to harvest. Fruit shatter was not consistent in all replications at the high rate of diuron but occurred in some plots in amounts great enough to reduce the treatment mean. At the rates employed, the simazine, dalapon, and 2,4-D system gave significantly better weed control than the mowed check with no significant differences in yield. No evidence of simazine or diuron phytotoxicity of the type described by Lider et al. (2) on *V. vinifera* grown in sand culture was observed. Very little foliar injury was observed in the plots treated with the 2,4-D wax bar; whereas, liquid formulations of 2,4-D have resulted in leaf injury in muscadine grape vineyards (unpublished data).

Soluble solids content of the free-run juice was not significantly affected by herbicide treatment.

Literature Cited

1. Fry, B. O. 1962. Muscadine grape vineyard. *Ga. Expt. Sta. Press Bul. Rev.* 603.
2. Lider, L. A., A. H. Lange, and O. A. Leonard. 1966. Susceptibility of grape, *Vitis vinifera*, L., varieties to root application of simazine and diuron. *Proc. Amer. Soc. Hort. Sci.* 88:341-345.

Table 1. Effect of several herbicide systems on weed control, yield, and fruit soluble solids of muscadine grapes.

Treatment	Rate (kg/ha)	Date (1971)	Weed control ²		Mean yield (kg/vine)	Soluble solids (%)
			Broad leaf	Grass		
Diuron	2.2	June 17	5.3 a ²	5.3 a	6.7 bc	15.0 a
Diuron	4.4	June 17	8.0 c	7.2 b	13.7 abc	14.5 a
Diuron	8.9	June 17	8.0 c	7.2 b	8.0 bc	16.4 a
Diuron	2.2	June 17				
+ Dalapon	5.5	July 28	6.1 b	9.2 c	13.6 abc	14.0 a
Diuron	4.4	June 17				
+ Dalapon	5.5	July 28	8.2 d	9.6 d	17.8 a	15.3 a
Diuron	8.9	June 17				
+ Dalapon	5.5	July 28	8.4 d	9.4 d	4.8 c	15.5 a
Simazine	2.2	June 17				
+ Dalapon	5.5	June 17				
+ 2,4-D bar		June 25	9.1 ef	9.2 c	14.9 ab	15.5 a
Simazine	4.4	June 17				
+ Dalapon	5.5	June 17				
+ 2,4-D bar		June 25	8.6 e	9.4 cd	12.5 abc	15.5 a
Simazine	8.9	June 17				
+ Dalapon	5.5	June 17				
+ 2,4-D bar		June 25	9.2 f	9.6 d	11.0 abc	15.0 a
Mowed check			8.0 c	7.2 b	17.8 a	13.5 a

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²Rating scale: 1 (no control) to 10 (complete control).

³Means separation in columns by Duncan's multiple range test, 5% level.