Cynthiana Grape Cultivar Propagation Study – 2003

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'Cynthiana' (Norton) grape cultivar, thought to be pure *Vitis aestivalis,* is a promising wine grape for Iowa's winery business. Studies have found that rooting 'Cynthiana' cuttings has been difficult throughout the nursery industry. Research has shown that rooting cutting can be improved by treating the cuttings with rooting hormones such as indole-3-butyric acid (IBA), and base heating to stimulate root development. Root development before bud break has also been shown to be beneficial. In 2002, Enderton, *et.al.* evaluated a pre-treatment of bottom (base) heat in combination with IBA on the rooting of 'Cynthiana' cuttings. Experiment 1 in is study repeated the 2002 work by Enderton. One of the properties of natural auxins in plants is the inhibition of vegetative bud break. Experiment 2 was set up to determine if the base heat pretreatment could be avoided by raising the soil temperature in the nursery with a clear plastic mulch and treating the tops of 'Cynthiana' with IBA to delay bud break.

'Cynthiana' prunings were collected in April from Bill Brown's vineyard near Leon, IA. The canes were sectioned, bundled, soaked in tap water over night before placing in moist sawdust, and kept in humidified cold storage with periodic wetting until treatments were initiated. Canes were sectioned into 3-4 bud cuttings with a fresh cut made on the base of the cuttings prior to treatment.

Experiment 1:
Rooting hormone treatments consisted of 0, 0.5, 1.0, and 2.0 % IBA, dissolved in 50% ethyl alcohol, using ethyl alcohol as a mixture with IBA causes less burning to plant tissue. Each treatment consisted of four replications of 50 cuttings. Treatments were dipped in an IBA solution and were inserted in 6-inch deep portable sand beds that were moistened, before placement in a walk-in cooler. One half of the cuttings received base heat from heating coils placed at the bottom of the portable sand bed. The temperature of the heated bed was maintained at approximately 80º F and the unheated bed was maintained at a room temperature of approximately 56º F. In 2002, Enderton had difficulty maintaining the heated beds at 80º F. To avoid this problem, a one-inch thick foam board was placed under each of the sand beds in 2003. Two weeks later the cuttings were removed from the sand and were examined for root development. On June 6, the cuttings were transplanted in a nursery on a Clarion loam soil. The design of the experiment was a randomized complete block arranged as split plot with rooting bed temperature as whole plots and IBA treatment split plots replicated four times. Trickle irrigation was used to maintain adequate moisture throughout the growing season. Urea fertilizer was injected into the irrigation water to stimulate growth of the cuttings. On November 7, the cuttings were dug from the nursery with an under-cutting implement pulled by a tractor. The cuttings were then rated by root size following standard nursery grading guidelines.

Following the pre-treatment, base heat increased the percentage of root initials on the cuttings but not the percentage of roots compared to no base heat (Table 1). The IBA treatments had no effect in stimulating roots or root initials, whereas in 2002 the percentage of roots initials

increased with increasing IBA rates. By the end of the season, base heat had increased the percentage of rooted cuttings, but there was no difference between IBA treatments (Table 2). However, higher rates of IBA increased the percentage of rooted cuttings in Grades 1-X and 1-1. In 2002, there was a response to IBA rate for total rooted cuttings.

Experiment 2:

This study was initiated to determine if the base heat pre-treatment could be avoided by raising the soil temperature in the nursery with a clear plastic mulch and whether there was a benefit in treating the tops of 'Cynthiana' cutting with IBA to delay bud break. The base of 3 to 4 bud 'Cynthiana' cuttings were first dipped in a 1 % IBA in 50% ethyl alcohol solution. After the rooting dip had dried, the tops to the first bud were dipped in IBA solution of 0, 25, 50, 100 or 1000 ppm. The cuttings were then transported to the nursery and either stuck through clear plastic mulch or into bare soil on June 6. The clear plastic was remained on the row for 3 weeks. Trickle irrigation and fertilizer were applied throughout the growing season to maintain normal growth. On November 7, the cuttings were dug from the nursery with the under-cutting implement. Results were obtained by grading the cuttings by root formation following standard nursery grading guidelines. Clear plastic mulch increased the total percentage of rooted cuttings, but did not improve the percentage of premium grade plants (Table 3). The IBA top dip had no effect on rooting.

Literature cited:

Enderton, D., C. Dilley, P. Domoto, and G. Nonnecke. 2003. *Cynthiana grape cultivar propagation study – 2002*. Annual Fruit/Vegetable Progress Report 2002. ISU Ext., FG-601:60-61.

Table 1. Percentages of 'Cynthiana' grape cuttings showing roots or root initials after two weeks in temperature regulated rooting beds, 2003[z]

Temp / IBA (%)	Percentage with					
	Roots		Initials		Total	
Base heat:						
0.0	1	a	52	a	53	a
0.5	6	a	50	a	56	a
1.0	8	a	52	a	60	a
2.0	7	a	38	a	45	a
No Base heat:						
0.0	0	a	0	b	0	b
0.5	0	a	0	b	0	b
1.0	0	a	0	b	0	b
2.0	0	a	0	b	0	b

[z] Mean separation by Tukey's HSD (P=0.05).

Figure 1. Roots and root initials.

Table 2. Effect of base heat and IBA concentration on root rooting and quality of 'Cynthiana' grape cuttings, 2003. [z]

Temp / IBA (%)	Total % Rooting		Percentage of rooted plants in each grade [y] 1-X + 1-1		1-2		1-3	
Base heat:								
0.0	47	a	29	b	8	a	10	a
0.5	58	a	36	a	11	a	11	a
1.0	56	a	33	a	16	a	7	a
2.0	51	a	36	a	8	a	7	a
No Base heat:								
0.0	29	a	2	c	7	a	20	a
0.5	31	a	3	c	8	a	20	a
1.0	32	a	10	bc	5	a	17	a
2.0	39	a	14	bc	14	a	11	a

[z] Mean separation by Tukey's HSD (P=0.05).

[y] 1-X = one year, premium grade, 1-1 = one year, number 1 grade, 1-2 = one year, number 2 grade, 1-3 = two year nursery candidate.

Table 3. Effect of bud inhibition and IBA concentration on distal bud and quality of 'Cynthiana' grape cuttings, 2003. [z]

Temp / IBA (%)	Total % Rooting		Percentage of rooted plants in each grade [y] 1-X + 1-1		1-2		1-3	
Clear Plastic Mulch:								
No Mulch	1.8	b	.0	a	.0	a	1.8	b
Mulch	13.0	a	2.3	a	2.0	a	8.8	a
IBA Top Dip Rate:								
0 ppm	6.3	a	.6	a	.0	a	5.6	a
25 ppm	6.9	a	.6	a	1.3	a	5.0	a
50 ppm	7.5	a	.0	a	1.3	a	6.3	a
100 ppm	9.4	a	1.3	a	1.3	a	6.9	a
1000 ppm	6.9	a	3.1	a	1.3	a	2.5	a

[z] Mean separation by Tukey's HSD (P=0.05).

[y] 1-X = one year, premium grade, 1-1 = one year, number 1 grade, 1-2 = one year, number 2 grade, 1-3 = two year nursery candidate.