

Propagation Treatment Effects on Rooting of 'Cynthiana' Grape Hardwood Cuttings

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Introduction

Cynthiana (Norton) is an American cultivar of grape (*Vitis aestivalis*) that was found in 1835 near Richmond, Virginia. 'Cynthiana' has shown promise as a wine grape in adapted regions of the lower Mississippi river valley and appears to have potential as far north as southern Iowa (Saenz, 2001). The grape berries are blue-black and in clusters that are medium sized. This cultivar is fairly disease resistant and is reported to have some tolerance to black rot (*Guignardia bidwelii*) (Southwest Missouri State University, 2000).

Because of its appeal in the wine industry, 'Cynthiana' vines have become more sought after by grape growers. However, 'Cynthiana' is difficult to propagate from cuttings, which is the most common propagation method used for Iowa-adapted grape cultivars. Treatments with plant growth regulators, such as indole-3-butyric acid (IBA), applied to the base of the cuttings, have shown some improvements in root initiation (Barickman *et al.*, 2003; Enderton *et al.*, 2002). Studies have shown that root development must precede bud break to successfully propagate a new vine (Avery, 1999). A technique to promote root development before the buds begin to grow has been warming of the propagation media. Previous research at Iowa State University has shown that bottom heat as a pre-treatment in cold storage was beneficial to initiate root development, but when transferred to the field, there was no significant difference in surviving rooted cuttings (Barickman *et al.*, 2003; Enderton *et al.*, 2002).

Auxins (indole-3-acetic acid, IAA) are plant hormones produced in meristem tissues that move downward. They are active in inhibiting axillary bud break on developing shoots, and stimulating root initiation (Hartmann *et al.*, 1997; Raven *et al.*, 1999). Since IBA is similar to IAA and is active in stimulating root initiation, IBA might also delay bud break on 'Cynthiana' cuttings, allowing better root development before bud break occurred. To test if IBA could delay bud break and thereby improve the rooting of 'Cynthiana' cuttings, a study was established to compare all combinations of plus or minus IBA rooting compound, storing IBA treated and untreated cuttings prior to sticking in the field in an upright or inverted position, and sticking the cuttings in bare ground or through a clear plastic soil mulch.

Materials and Methods

The 'Cynthiana' prunings were collected on 10 April 2004 from Dr. Bill Brown's vineyard, near Leon, IA. The cuttings were then stored at the ISU Horticulture Station cold storage unit (approximately 40°F) until 5 May. They were then cut into three to four bud cuttings that were approximately a foot long. Distal cuts were about 1 to 1½ inches above the top bud and the bottom cut was about ½ inch below the basal bud. The cuttings were then bundled in groups of 50, soaked in tap water over night, placed in moist wood shavings and returned to cold storage. A week later growth regulator treatments were applied. Fresh cuts were made about ¼ inch

below the basal bud and the cuttings were dipped in either a 1% solution of IBA dissolved in 50% ethyl alcohol or in 50% ethyl alcohol with no IBA. After dipping, the treated cuttings were re-bundled in groups of 50 and re-packed in wood shavings. For each IBA treatment, half were set upright and the other half were inverted, and returned to cold storage for 10 days before planting in the field.

On 26 May the cuttings were stuck in bare soil or soil covered with a clear plastic mulch. All combinations of plus or minus IBA, upright or inverted storage, and plus or minus clear plastic mulch were replicated 7 times in a randomized complete block design with 50 cuttings per replication/block.

Trickle irrigation was installed for each row. To control weeds, Treflan herbicide was applied before planting and tilled in, and additional hand weeding was done as needed. During the first week of November, the grape plants were dug and labeled according to treatment. The rooted plants were then packed in moist wood shavings and placed in cold storage prior to grading. Plants were graded based on standard nursery grading guidelines based on length of shoots and root vigor.

Results & Discussion

When analyzed for total percentage rooting by main effect, IBA increased rooting over treatment without IBA (Table 1). This effect was evident for 1-X and 1-1, and 1-2 grades, but not the 1-3 grade. When analyzed for total percentage rooting by main effect, treatment without plastic mulch increased rooting over plastic mulch treatment (Table 1). This effect was evident for the 1-3 grade, but not in the 1-X and 1-1 or 1-2 grades. The clear plastic degraded several weeks after application which made it less effective.

The main effect of storage position (upright or inverted) was not significant (Table 1). However, in the absence of IBA, there was a higher percentage of rooted 1-3 grade cutting when stored in the upright position (data not shown).

For total percentage rooting, there was an interaction between IBA and mulch treatments (Table 2). IBA in combination without plastic produced a higher number of rooted cuttings, compared to when plastic mulch was used with IBA or without IBA. This trend continued through the grades.

Compared to previous years, percentage of total rooting was lower in this study than that reported by Barickman, *et al.* (2003) and Enderton, *et al.* (2002). Temperatures in late May and June were cooler than recorded in 2002 and 2003 and may have reduced the over all rooting of the cuttings.

Table 1. Percentage rooting of 'Cynthiana' grape cuttings as affected by IBA application, clear plastic soil mulch, and storage position.

Treatment	Percentage of total rooted	Percentage of rooted plants in each grade ^z		
		1-X and 1-1	1-2	1-3
IBA applied	15.7	4.6	3.5	7.5
No IBA applied	10.7	0.6	1.8	8.3
<i>Pr</i> ≤ <i>T</i> .05	*	*	*	<i>NS</i>
Clear plastic mulch	10.4	2.1	2.3	6.1
No plastic mulch	16.0	3.1	3.1	9.8
<i>Pr</i> ≤ <i>T</i> .05	*	<i>NS</i>	<i>NS</i>	*
Upright position	15.0	3.0	2.7	9.4
Inverted position	11.4	2.2	2.7	6.5
<i>Pr</i> ≤ <i>T</i> .05	<i>NS</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>

^z 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 2. Percentage rooting of 'Cynthiana' grape cuttings as affected by all combinations of IBA x clear plastic soil mulch.^z

Treatment	Percentage of total rooted	Percentage of rooted plants in each grade ^y		
		1-X & 1-1	1-2	1-3
IBA/Plastic	9.4 b	3.3 ab	2.0 b	4.1 b
IBA/No Plastic	22.0 a	6.0 a	5.1 a	10.9 a
No IBA/Plastic	11.4 b	0.9 b	2.6 ab	8.0 ab
No IBA/No Plastic	9.9 b	0.3 b	1.1 b	8.6 ab

^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.

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