Rooting Black Walnut Cuttings with Ethephon

Soaking for 6 Hours in High Concentrations Was Most Successful Treatment

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Introduction

Black walnut *(Juglans nigra L.)* has been propagated by budding, grafting, and layering. In addition, several investigators have successfully rooted cuttings with indolebutyric acid (1,2), but these studies utilized juvenile wood of etiolated or adventitious origin. Rooting of adult wood is more difficult. However, recent results indicate that Ethephon (2-chloroethyl phosphonic acid) can be used successfully to root cuttings of adult wood from mature trees. This study reports on the successful use of Ethephon to root adult wood from mature black walnut trees.

Methods

Apical cuttings of approximately 20 cm. in length were taken from the lower and middle portions of the crowns of dominant and co-dominant black walnut trees growing near Lexington, Kentucky. They were taken in March 1973 before shoot growth began and in April 1973 after shoot growth began. Initially, cuttings were taken from wood produced during the 1972 growing season. Additional cuttings were taken from older wood and the 1972 apical tip was removed. Cuttings were immediately placed in an ice chest and transported to the laboratory. Within 2 hours of collection, 20 cuttings were treated as shown in table 1. Cuttings were then planted in individual peat pots 3 inches in diameter, filled with vermiculite, and placed under intermittent mist.

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Softwood cuttings t were collected in August 1973 in the same manner. One-half of these cuttings were treated with wilt-proof, and the

'Cuttings prepared from soft, succulent, new spring growth.

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TABLE 1.—Ethephon soaking treatments applied to twenty black walnut hardwood cuttings in March and April 1973

Treatment	Rooting success for cuttings collected on		
	March 2	*March 22*	*April 27*
		Percent	
2-Hour Soak of Basal End			
500 ppm	–	0	20
1,000 ppm	–	20	20
5,000 ppm	–	40	20
4-Hour Soak of Basal End			
500 ppm	–	0	–
1,000 ppm	–	0	–
5,000 ppm	–	0	–
6-Hour Soak of Basal End			
500 ppm	20	40	30
1,000 ppm	60	20	50
5,000 ppm	60	60	70
24-Hour Soak of Basal End			
500 ppm	60	40	10
1,000 ppm	40	0	10
5,000 ppm	40	0	40
6-Hour Soak of Entire Cutting (Terminal Bud Present)			
500 ppm	–	40	–
1,000 ppm	–	20	–
5,000 ppm	–	0	–
6-Hour Soak of Entire Cutting (Terminal Bud Removed)			
500 ppm	–	–	0
1,000 ppm	–	–	0
5,000 ppm	–	–	0
Ethephon Soak (1,000 ppm) + IBA Quick Dip (5,000 ppm)			
Soak Period—2 Hours	40	–	–
Soak Period—6 Hours	10	–	–

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leaves were removed from those remaining. Twenty cuttings from each group were treated in Ethephon soaks of 500 ppm for 24 hours and 100 ppm for 6 hours. Cuttings were examined for root initiation and callusing at 30-day intervals.

Results

Effects of treating the March and April cuttings are shown in table 1. The most successful treatment was 5,000 ppm ethephon with a soaking period of 6 hours. Cuttings soaked at concentrations of 500 ppm and 1,000 ppm were less successful than the 5,000 ppm treatment.

Shortening the soaking period from 6 hours to 2 and 4 hours decreased rooting success at the abovementioned concentrations. and in creasing the concentrations for 2and 4-hour periods did not give consistent results. But it was found that rooting success at lower concentration levels was increased by lengthening the soaking period to 24 hours. Ethephon concentrations above 500 ppm decreased rooting success during the 2.4-hour soaking treatments.

Rooting success was highest in early spring and in most cases the treatments were less effective as time for bud burst approached. Previous small tests by the author have shown that rooting could be achieved after chilling requirement of the buds had been met.

Other treatments attempted as shown in table 1 were not successful. There appeared to be no benefit in soaking the entire cutting in Ethephon. Treatments were most successful when only they I-a-al end was soaked. Also there was no benefit achieved by removing the terminal bud. Combining the Ethephon soak with quick dip treatments in IIIA was not beneficial.

Rapid shoot elongation was difficult to obtain following treatment of hardwood cuttings with Ethephon. Although not used in this series of tests, treatment with gibberellic acid aids in the initiation of shoot growth after rooting i 11. Treatments applied to softwood cuttings were not successful.

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over seedlings and (2) the deeper planting over the more shallow planting, are indicative of degree of establishment and should result in accelerated growth for at least the first few years.

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TABLE 2.—Lateral root diameter for sycamore cuttings and seedlings by five-inch taproot sections

Planting depth and stock	Mean root diameters in 32nd of an inch by five-inch taproot sections			
	1	2	3	4
10″ sycamore seedling ..	8[1]	6	–	–
20″ sycamore seedling ..	10	7	6	5
10″ sycamore cutting ...	8	7	–	–
20″ sycamore cutting ...	12	7	7	6

[1] Means based on roots greater than ⅛″ diameter.

TABLE 3.—Lateral root length for sycamore cutting and seedlings by five-inch taproot sections

Planting depth and stock	Mean root length in inches by five-inch taproot sections			
	1	2	3	4
10″ sycamore seedling ..	24[1]	20	–	–
20″ sycamore seedling ..	29	24	19	13
10″ sycamore cutting ...	24	21	–	–
20″ sycamore cutting ...	29	24	18	9

[1] Means based on roots greater than ⅛″ diameter.

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