AL LOWENFELS: When do you take the cuttings?

JOHN VERMENLEN: In July. Roughly around the second week in July. The wood is just about sturdy.

MODERATOR HESS: Thank you very much, John, for a paper which stimulated much interest. Our next paper on the propagation of *Carya illinoensis* will be given by Booker T. Whatley. Booker is the head of the Horticulture Department at Southern University and, I am proud to say, a Ph.D. graduate from Rutgers University.

PROPAGATION OF CARYA ILLINOENSIS (PECAN) FROM CUTTINGS

BOOKER T. WHATLEY, STANLEY O. THOMPSON
AND JACK H. JEFFERSON
Southern University — Baton Rouge, Louisiana[1,2,4]

The pecan, *Caryo illinoensis,* is propagated commercially by budding or grafting on seedling rootstocks. There are three major disadvantages encounted when one grafts or buds varieties onto seedling rootstocks:

1. Considerable time and expense are involved and often with only moderate success.
2. Seedling rootstocks have a tap root with a few lateral fibrous roots. This characteristic has been associated with poor survival of transplanted trees.
3. Each seedling rootstock has the potential of being genetically different.

The need for an improved method of propagation of pecan has, therefore, been recognized for some time.

There appears to be only three published reports in American Horticulture literature that deal with the propagation of pecans by cuttings. Stoutemeyer (5) rooted dormant Greenriver pecan cuttings by pre-callusing and treatment with indolebutyric acid (IBA); no report was given on whether the rooted cuttings were transplanted. Gossard (1) reported the rooting of pecan softwood cuttings under continuous mist. None of the rooted cuttings survived when transplanted (2). Sparks and Pokorny (4) studied the effects of wound treatments and root-inducing chemicals on rooting of terminal pecan cuttings taken at four different dates. These investigators reported that:

1. Rooting was inversely related to the maturity of the terminal.
2. IBA plus a light wound gave the highest rooting percentage.

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[3]The authors express gratitude to Dr Robert J Herschler, Crown Zellerbach Corporation, Camas, Washington for the supply of DMSO and the Bark Paint

[4]Appreciation is expressed to Mr Simuel W Austin, Assistant Professor of Photography, Southern University, for photographic assistance

3. Root quality was poor.

It seems that no method has been developed for growing rooted pecan stem cutting or rooted layers into trees (2).

This paper is the first in a series dealing with the rooting and survival of pecan cuttings as they are affected by various chemicals including the solvent Dimethyl Sulfoxide (DMSO), (3).

MATERIAL AND METHODS

A randomized block experimental design with eleven treatments replicated five times and ten cuttings per treatment per replication was employed in this study.

The cuttings used were terminal softwood, six inches in length and twelve to fifteen mm in diameter at the base, with five leaves. The cuttings were taken from eight year old stock plants of the Stuart variety. The rooting medium was vermiculite, in 2¼ inch round jiffy pots. The potted cuttings were placed on the propagation bench and watered in, and propagated under intermittent mist without bottom heat. The treatments were:

01 Girdled shoot six inches from apex
02 Bark Paint — The paint consisted of:
1.5 parts NAA
50.0 parts DMSO
40.0 parts Acetone
10.0 parts glycerine
03 Simpson Dip — Consisted of:
5 grams IBA
500 ml ethyl alcohol
100 ml of the above solution diluted with 100 ml of ethyl alcohol and 200 ml of distilled water. Cuttings soaked in this solution for one minute.
04 Fifteen minutes soaking in a solution containing 1000 ppm IBA and 0.5% DMSO
05 Thirty minutes soaking in a solution containing 1000 ppm IBA and 0.5% DMSO
06 Forty-five minutes soaking in a solution containing 1000 ppm IBA and 0.5% DMSO
07 Control — no treatment
08 500 ppm IBA in talc
09 5,000 ppm IBA in talc
10 10,000 ppm IBA in talc
11 20,000 ppm IBA in talc

The data were obtained by counting the number of roots that penetrated each jiffy pot and transferred to punch cards and computer analyzed. An analysis of variance and orthogonal comparisons were used to determine differences among treatments.

RESULTS AND DISCUSSION

The mean number of roots that pentrated the jiffy pots for the respective treatments varied from 0.3 for treatment

TABLE 1 ANALYSIS OF VARIANCE

Source of Variation	d./f.	S S.	M S.	F
Total	549	34,486		
Replications	4	44	11	
Treatments	10	29,769	2977	162.85**
7 vs others	1	1,675		90.14**
1 vs (2-6 & 8-11)	1	396		21.67**
2 vs (3-6 & 8-11)	1	743		40.62**
3 vs (4-6 & 8-11)	1	35		1.95 N.S.
(4-6 vs (8-11)	1	644		35.25**
4 vs 5 & 6	1	13,200		722.12**
5 vs 6	1	25		1.37 N.S.
8 vs (9-11)	1	2,709		148.22**
9 vs 10 & 11	1	192		10.50**
10 vs 11	1	10,201		588.04**
Experimental Error	40	731	18.3	
Sampling Error	505	3942	7.8	

06, soaking for forty-five minutes in a solution containing 1000 ppm IBA and 0.5% DMSO, to 23.3 for treatment 10, 10,000 ppm IBA in talc. Highly significant differences were found among the various treatments (Table 1). When the cuttings were soaked from 15 to 45 minutes in a solution containing 1000 ppm IBA and 0.5% DMSO, the mean number of roots for the 15 minute soaking period was 20.7 and highly significant when compared to the thirty and forty-five minute soaking periods with 1.3 and 0.3, these being no different from control (Table 2). Bark Paint, Simpson Dip and girdling hav-

Table 2 Effects of Soaking Treatments on Rooting of *Carya illinoensis* Cuttings in Solution Containing 1000 ppm IBA and 0.5% DMSO

Time (Min)	Number of Roots
15	20.7**
30	1.3 N.S.
45	0.3 N.S.
Control	3.2 N.S.

Table 3 Effect of Girdling, Bark Paint and Simpson Dip on Rooting of *Carya illinoensis* Cuttings

Treatments	Number of Roots
Control	3.2 N.S.
Bark Paint	13.2**
Simpson Dip	9.9**
Girdling	6.6**

Table 4 Effect of Levels of IBA in Talc on Rooting of *Carya illinoensis* Cuttings

IBA (ppm)	Number of Roots
20,000	3.2 N.S.
500	3.8 N.S.
5,000	10.7**
10,000	23.2**
20,000	3.0 N.S.

ing a mean number of 13.2, 9.9 and 6.6 roots per plot respectively, (Table 3), were significantly better than the control. The effects of levels of IBA in talc as indicated in Table 4 shows that 5000 and 10,000 ppm were significantly better than the control while 500 and 20,000 ppm were not different from the control. Level of 10 000 ppm was significantly better than 5,000 ppm (Table 4).

Rooting was first observed forty-five days after the start of the experiment and all cuttings were completely defoliated at that time. The absence of leaves appear to have little or no effect on rooting.

SUMMARY

A randomized block experimental design with eleven treatments, replicated five times with ten cuttings per treatment per replication was employed to study the effects of these treatments on rooting of *Carya illinoensis* terminal cuttings. Highly significant differences were found among the treatments. A level of 10000 ppm IBA in talc was found to be best, having a mean number of 23.2 roots per plot. Fifteen minute soaking in a solution containing 1,000 ppm IBA and 0.5% DMSO was the second best treatment having a mean number of 20.7 roots per plot. Treatment with Bark paint, 5,000 ppm IBA, Simpson Dip, and Girdling having a mean number of 13.2, 10.7, 9.9 and 6.6 roots per plot, respectively, were significantly better than the control. Thirty, and 45 minutes soaking in solution of 1,000 ppm IBA and 0.5% DMSO, and 500 and 20,000 ppm IBA in talc with a mean number of 1.3, 0.3, 3.8 and 3.0 roots per plot, respectively, were no better than the control which had a mean number of 3.2 roots per plot.

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MODERATOR HESS: Thank you, Booker. Our next speaker is Joseph Cesarini who has a very fine collection of dwarf and rare plants in Long Island. Joe will talk to us about the propagation of dwarf conifers.