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Research Note

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ROOTING STEM CUTTINGS FROM ASPEN SEEDLINGS

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ABSTRACT

*Stem cuttings from two types of shoots on 2-year-old aspen (*Populus tremuloides *Michx.) seedlings were successfully rooted--spring shoots and shoots induced to develop by defoliation. Rootone F significantly increased rooting response in both types of cuttings. Only those cuttings from spring shoots treated with Rootone F rooted. There were significant differences between seedlings (genotypes) in rooting ability of cuttings from spring shoots.*

KEYWORDS: *Populus tremuloides,* Quaking aspen, adventitious roots, rooting stem cuttings, vegetative propagation.

The standard method for vegetatively propagating aspen (*Populus tremuloides* Michx.) is by rooting cuttings taken from young, succulent suckers (adventitious shoots) that arise from excised roots (Schier 1978). This method is used because of the difficulty in rooting aspen stem cuttings (Hicks 1971); however, a considerable amount of time and expense is involved in collecting roots and culturing suckers. It would be desirable if a procedure could be found for rooting stem cuttings.

Probably the best chance of success in rooting aspen stem cuttings is to obtain the cuttings from newly emergent shoots on seedlings. It is well known that cuttings from juvenile trees can be rooted much more readily than cuttings from older or adult trees. In this study, cuttings from two types of shoots on seedlings--shoots elongating after spring bud break and shoots induced to develop by defoliation--were tested for rooting ability.

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METHODS

Stem cuttings used in this study were obtained from 2-year-old aspen seedlings [mean height, 32 inches (82 cm)] growing in 1 gallon pots in a lathhouse (50 percent shading).

On April 21, 1978, 10 cuttings 1.38 to 2.76 inches (3.5 to 7 cm) in length were removed from the tops of elongating lateral shoots of each of 12 seedlings. All but the top three to five leaves were removed from each cutting. Five of the 10 cuttings from each seedling were treated by dipping 0.39 inch (1 cm) of the basal ends in Rootone F (Amchem Products, Inc.),[2] a commercial rooting powder containing four root promoting growth regulators[3] and a fungicide (Thiam[2]). The other five cuttings, the controls, were dipped in talc. The base of each was randomly inserted to a depth of 0.59 to 1.18 inches (1.5 to 3 cm) in a moist mixture of perlite and vermiculite (1:1) in a large tray. The tray was placed on a misting bench with heating coils [temperature of rooting medium, 80° ± 2°F (27° ± 2°C)] in a greenhouse, 66° to 79°F (18° to 26°C). The misting schedule ranged from 1 min every 5 min during the warmest part of the day to 1 min every 20 min during the night. After 28 days, the cuttings were lifted and number and length of roots on each were recorded.

A second flush of growth was induced in 30 aspen seedlings by defoliating them on June 30, 1978. On July 21, two to five cuttings were removed from the tips of elongating lateral shoots of each seedling. The cuttings had the same range in sizes and were treated in the same manner as the first experiment. Rooting methods were also the same. In this experiment, however, cuttings from all seedlings were combined and 60 randomly selected for treatment, 30 with Rootone F and 30 with talc. In the rooting tray rows of five cuttings treated with rooting powder were alternated with rows of five control cuttings. Root numbers and lengths were recorded after 4 weeks.

RESULTS AND DISCUSSION

Adventitious roots developed only on those cuttings from spring shoots that were treated with Rootone F (table 1). There was a significant difference (0.05 level) in rooting ability among cuttings from the 12 seedlings (genotypes) as shown by the variation in rooting percentages, numbers of roots, and root lengths. Variation in root lengths could have been due to time of root initiation and/or rate of root growth. The only evidence of vegetative growth on control cuttings was development of a callus at the cut ends.

The failure of untreated stem cuttings to root contrasts with the relatively high rooting capacity of untreated sucker cuttings from root segments. Of the more than 50 clones I have tested for rooting ability of sucker cuttings, rooting percentages of less than 25 percent were unusual. In no case did a clone fail to initiate roots.

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[2]The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others which may be suitable.

[3]Napthylacetamide, 0.067%; 2-methyl-1-naphthylacetic acid, 0.033%; 2-methyl-1-napthylacetamide, 0.013%; and indole-3-butyric acid, 0.057%.

Table 1.--*Rooting of Rootone F treated cuttings taken on April 21, 1978, from elongating lateral shoots on 2-year-old aspen seedlings*

Seedling	Rooting	Mean roots per rooted cutting	Mean length of longest root
	Percent		*mm*
1	20	6.0	67
2	20	1.0	16
3	80	3.5	20
4	80	3.8	106
5	100	5.4	39
6	60	1.3	19
7	80	1.8	65
8	40	4.5	97
9	100	8.0	112
10	100	2.4	117
11	100	7.4	88
12	60	3.7	109
Mean	70	4.36	77.0

Roots were initiated on control cuttings from induced summer shoots but cuttings treated with Rootone F had a significantly greater rooting percentage and mean number of roots (table 2).

There was no evidence of plagiotropic growth, characteristic of branches, in the rooted cuttings. When the cuttings were transferred to individual containers, they gave rise to straight, well-proportioned seedling-like plants.

This study has shown that cuttings from newly emergent shoots on juvenile aspen can be rooted. The next step will be to determine the rooting capacity of shoots from branches of mature trees. Generally rooting ability declines with ontogenetical aging (Fortanier and Jonkers 1975).

Table 2.--*Rooting cuttings taken from elongating lateral shoots stimulated by defoliating 2-year-old aspen seedlings on June 30, 1978*

Treatment	Rooting**	Mean roots per rooted cutting*	Mean length of longest root N.S.
	Percent		*mm*
Control	23.0	1.57	76.2
Rootone F	63.3	5.58	73.8

*significantly different at 0.05.
**significantly different at 0.01.
N.S. not significantly different.

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