

Vegetative Propagation of Aspen by Greenwood Cuttings¹

Abstract. Greenwood stem cuttings taken from root suckers of *Populus tremuloides* and *P. grandidentata* were rooted in coarse sand under both intermittent mist and polyethylene sheeting in a greenhouse and under mist in an outdoor propagation bed. Pre-rooting treatment of cuttings with aqueous solutions of IBA (20-100 p.p.m.) stimulated rooting. *P. grandidentata* cuttings were more difficult to propagate than those of *P. tremuloides*. Fungal and bacterial infection accounted for high mortality of cuttings in some experiments.

Although most members of the genus *Populus* may be propagated vegetatively with ease, section *Leuce* species (aspens) are difficult to regenerate. In the United States only a few reports have been published (1, 6, 7). European

foresters, on the other hand, have devoted considerable attention to propagation of *P. tremula* and have developed several techniques currently in use on a commercial scale (2, 3, 4, 5, 8). In the experiments reported here, greenwood stem cuttings taken from young root suckers of *P. tremuloides* and *P. grandidentata* were rooted using an adaptation of a European technique described by Muhle Larsen (4).

Newly initiated aspen suckers were obtained from (1) 4- to 6-inch-long root cuttings (Fig. 1) cultured in sand under greenhouse conditions and (2) clones clearcut near Pellston, Mich. Greenwood cuttings (Fig. 2) were made from the suckers and treated with aqueous solutions of indolebutyric acid (IBA) ranging in concentration

from 0 (control) to 100 p.p.m. (Bases of cuttings were placed in solutions for 24 hours.) After IBA treatment, cuttings taken from cultured root sections were rooted under polyethylene sheeting or intermittent mist in a greenhouse. Field-collected cuttings were propagated under mist in an outdoor bed located near their source. A coarse sand medium was used in all the rooting trials.

Approximately 2,000 *P. tremuloides* and 1,600 *P. grandidentata* cuttings were used in a series of small-scale experiments conducted during 1959 and 1960. In each trial, cuttings from one or more clones were divided into equal lots, each of which received a prerooting IBA treatment. These clonal lots were planted in adjacent rows with bases of cuttings set 0.7 to 1.5 inch in the medium. Individual experiments lasted two weeks in the greenhouse and three to four weeks in the outdoor bed. During this time, weekly checks were made to determine the general condition of cuttings and the degree of root formation. After the allotted rooting period, rooted cuttings were transferred to clay pots filled with loam soil and exposed to gradually decreasing atmospheric humidity over a one- to three-week period.

Under greenhouse conditions, as high as 87 percent of the untreated *P. tremuloides* cuttings developed roots, while 94 percent of those treated with 20 p.p.m. IBA rooted. Fungal and bacterial infection ac-

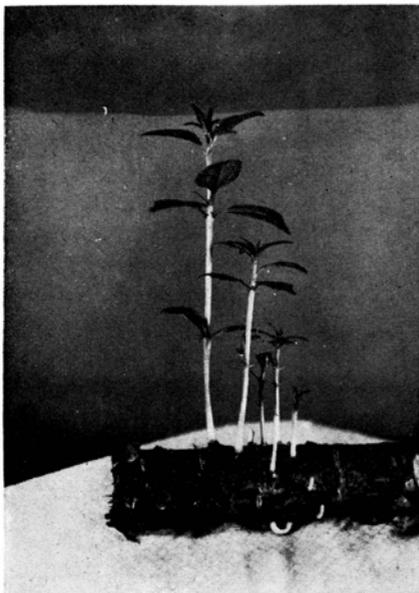


FIG. 1.—Three-inch-long root cutting of *Populus tremuloides* with suckers.

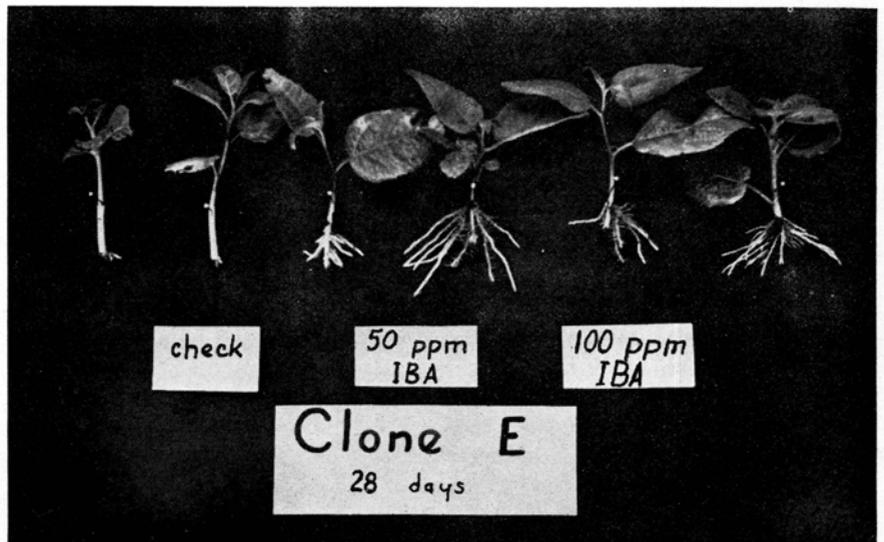


FIG. 2.—Greenwood cuttings of *Populus grandidentata* rooted under mist in an outdoor propagation bed.

counted for considerable mortality, however, and several experiments were failures for this reason. In the outdoor bed, the following average rooting response for quaking aspen was observed during the summer of 1960:

Treatment	Number cuttings	Percent rooted
Control	627	27
20 p.p.m. IBA	320	54
50 p.p.m. IBA	402	62
100 p.p.m. IBA	50	72

P. grandidentata was more difficult to propagate than *P. tremuloides*, but as high as 67 percent of the cuttings treated with 20 p.p.m. IBA rooted in the greenhouse under polyethylene; 37 percent of the control cuttings developed roots. In the outdoor trials with bigtooth aspen during the summer of 1959, three IBA treatments (10, 20, 50 p.p.m.) stimulated 60 to 70 percent rooting, while 29 percent of the controls rooted. However, during the following season only 20 to 30 percent of the treated *P. grandidentata* cuttings rooted due to a high incidence of fungal infection and subsequent mortality.

Well-rooted cuttings of *P. tremuloides* hardened off easily and could be transferred from the outdoor bed to a low humidity environment within two weeks after potting. *P. grandidentata* cuttings rooted in the outdoor bed required more gradual removal from the mist to avoid desiccation. Cuttings of both species which were rooted in the greenhouse survived well under greenhouse conditions after one week in a polyethylene enclosure. IBA-treated cuttings of both species typically had more numerous and better developed roots than controls (Fig. 2), and consequently they had better survival.

Propagation of the American aspens by the above methods is not recommended at present for commercial use. The techniques may be of considerable utility, however, in propagation programs associated with tree improvement or tree physiology research.

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