

# Water soaking pretreatment improves rooting and early survival of hardwood cuttings of some populus clones

Larry A. Petersen and Howard M. Phipps

Research Forester (Volunteer), and Associate Plant Physiologist, North Central Forest Experiment Station, Institute of Forest Genetics, Rhineland, Wisconsin.

The success of plantation establishment using hardwood cuttings depends to a large extent on the ability of the cuttings to develop early and vigorous root systems. Where large numbers of cuttings are closely spaced (in maximum fiber yield plantations, for example) early survival and growth is critical because replanting fail-stops is costly and the new trees probably would not achieve their growth potential in competition with the older trees. If rooted cuttings are used, especially those planted by machine, their survival may be poor because of desiccation or mechanical damage to the roots.

De Philippis (1) found that rooting success of field planted cuttings of cottonwood (*Populus deltoides* Bartr.) could be improved by pre-soaking them in water for at least 48 hours. McKnight and Biesterfeldt (2) stored cottonwood cuttings in water-filled trenches before planting and reported that rooting and sprouting after planting was excellent. In 1974, therefore, we initiated a study to determine the effects of water soaking on rooting behavior and on early field establishment using cuttings of three *Populus* clones.

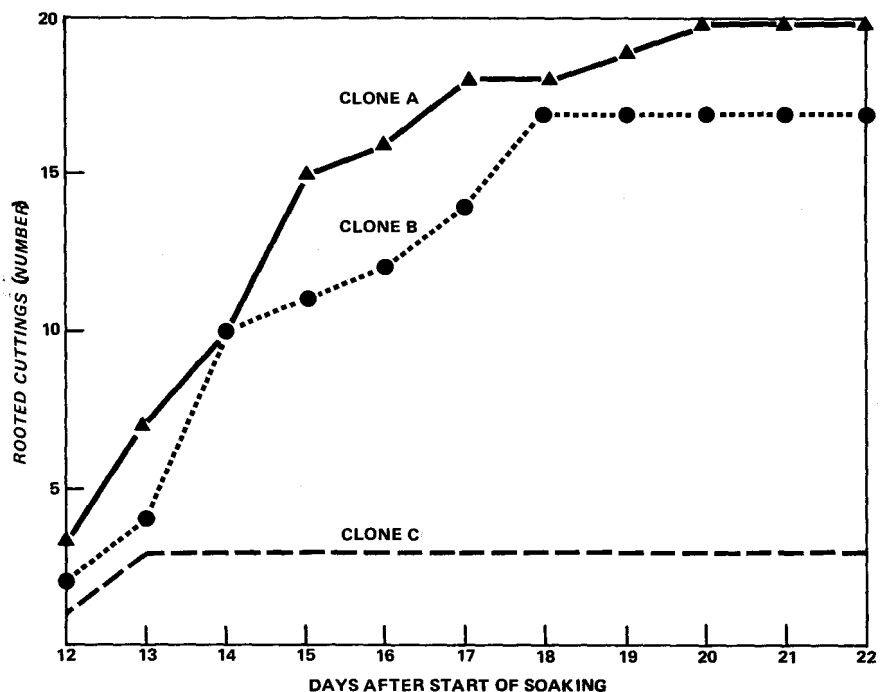


Figure 1.—Effect of water soaking on the rooting of hardwood cuttings of three *Populus* clones.

## Rooting Behavior

In January we took cuttings approximately 8-inches long and 3/8- to 5/8-inches in diameter from 1-year old branches of (A) *Populus* cv. *Betulifolia* x *P. trichocarpa* Torr. & Gray; (B) *Populus tristis* Fisch. x *P. balsamifera* L. (cv. *Tristis* #1; and (C) *Populus* x *euramericana* (Dode) Guinier (cv. I-214). After storing them in plastic bags at about 0°F for about 3 months, 30 cuttings from each clone were separated into groups of 10, each of which was placed in a sterilized quart jar 6

inches full of distilled water. At least two lateral buds of each cutting were above water level. These jars were kept in a dark cabinet in a completely random arrangement for 3 weeks, during which they received a complete change of water every 3 days. The cabinet temperature was about 70°F. Daily examinations were made to record the time of bark swelling and rupture associated with developing root primordia, the number of rooted cuttings, and the average number of roots per cutting for each clone.

(Continued on Page 22)

(Continued from Page 12)

On all cuttings, bark swelling was noticeable on the fifth day after the start of soaking. Bark rupture occurred between the seventh and ninth days; root emergence about 5 days later. After 20 days, clone A had produced 20 (67 percent) rooted cuttings; clone B, 17 (57 percent); clone C only 3 (10 percent) as shown in figure 1. Of the cuttings that rooted, clone A produced an average of 4.8 roots per cutting; clone B, 2.2; and clone C, 1.3. Bud flushing began at about the same time as root emergence.

### Field Establishment

An additional 10 cuttings of each of the same clones were soaked using the same procedures. After 7 days (when maximum root initial swelling was apparent but before leaf buds began to flush), the cuttings were planted in a nursery along with 10 unsoaked cuttings. The plots were watered periodically to prevent desiccation. The flushing of leaf buds was used as the criterion for cutting establishment.

Of the unsoaked cuttings, none survived except some from clone A (figure 2). However, clone B is known to root fairly readily when given sufficient moisture. Therefore, the watering of the field plots may not

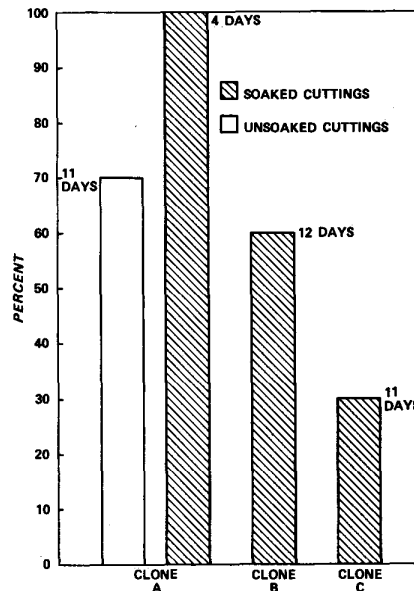


Figure 2.—Percent of soaked and unsoaked cuttings that flushed leaf buds and number of days to reach maximum bud flushing after outplanting. (Unsoaked cuttings of clones B and C failed to flush buds.)

have been adequate for rooting the unsoaked cuttings.

Several of the soaked and unsoaked cuttings were dug up and examined for root system development. All cuttings with flushed leaves had rooted; those without did not.

### Discussion

Presoaking stimulates rooting of hardwood cuttings of some *Populus* clones and can increase early plant-

ing survival. It may be especially advantageous when large numbers of cuttings are machine planted and where cuttings may not receive adequate moisture for root initiation. Planting cuttings that have been soaked long enough to induce maximum root primordia initiation but not root emergence could reduce root damage during the planting process and promote development of vigorous root systems soon after planting. However, cuttings must be kept moist during planting and some watering may be necessary after planting until adequate root systems have formed. Individual clones may not respond significantly to soaking; therefore, unfamiliar clones need to be tested for their response to this soaking pretreatment.

### Literature Cited

1. Philippis, A. de  
1966. Factors affecting the difficult rooting of cuttings in some poplars. Centro Di Sperimentazione Agricola E. Forestale C.P. 9079—Roma Istituto Di Sperimentazione Per La Piopicoltura C.P. 24—Casale Monferrato No. F.G. It. 122. E.N.C.C.—Rome.
2. McKnight, J. S., and R. C. Biesterfeldt.  
1968. Commercial cottonwood planting in the southern United States. J. For. 66(9) : 670-675.