Propagation of Red Alder (*Alnus rubra* Bong.) by Mound Layering

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*Mound layering using 2-year-old nursery-grown seedlings of red alder (*Alnus rubra *Bong.) produced about seven rooted sprouts per stump. Most survived separation from the parent plants, and all had strong, upright growth habits.* Tree Planters' Notes 37(4):21-23; 1986.

Red alder (*Alnus rubra* Bong.) is the most common hardwood in the Pacific Northwest. It is anticipated that the importance of this species for wood products or as a nitrogen fixer may reach a point where genetic improvement will be desirable. Because considerable variation exists in red alder (3), the genetic improvement potential seems high. Such genetic improvement could achieve immediate gains if the best trees could be cloned to produce numerous individuals for field planting (2,5).

Little information has been reported on the vegetative propagation of red alder. However, excellent rooting results with greenwood cuttings taken from 1- to 3-year-old seedlings have been achieved (7). Another method of vegetative propagation that we believe may show promise is mound layering. In mound layering, the stems of young plants are cut back to the ground and soil is heaped around the subsequent sprouts (6). It is commonly used to produce apple and quince root stocks (1).

Several sources of information led us to think that mound layering would work. For example, red alder planted in Hawaii, where the humidity is very high, showed a tendency to produce adventitious roots (4). In addition, from one of our own studies we found that the buried branches on some 2-year-old alder that were planted too deep had produced roots. We also knew from our frequent slashing of small alder reproduction out of research plots that each cut stem sprouted back vigorously each year with multiple stems.

We had good evidence, therefore, to believe that red alder could be vegetatively reproduced by mound layering. This technique can be carried out on a production basis in a nursery, without the use of greenhouses or special rooting beds. It has the potential to produce large plants in one growing season.

Methods

Red alder seed was sown in small outside nursery beds. After 2 years the plants had reached 2 meters in height and were 40 to 60 centimeters apart. The following January seven of these plants were cut back to 7 to 10 centimeters above ground. Many sprouts originated from each of the stumps and on June 1 when the sprouts were 20 to 25 centimeters tall the base of all the sprouts and the stumps were covered with 7 to 10 centimeters or more of nursery soil. The tips of the sprouts were never covered and none were pruned out to avoid crowding. Irrigation was provided during the summer on a regular basis. In March of the following year these 1-year-old sprouts were counted, measured for height, and examined for rooting.

Results

There were 71 exposed sprouts growing from the seven stumps at the start of the study. Of the 47 sprouts that survived the summer, all developed roots. The number of sprouts per stump ranged from 3 to 9, with an average of 6.7. Sprout heights ranged from 0.39 meters to 2.63 meters, with an average of 1.11 meters. The more sprouts in a clump, the greater the range in height.

The number of roots on each sprout varied considerably (figs. 1 and 2). Large sprouts lower on the same stump had more and larger roots, whereas the dominant sprout, which originated near the top of the stump, had the fewest roots. These uppermost sprouts were covered with less soil, so that they may have been too dry for good rooting. The sprouts were very limber at the time of mounding and some were forced down by the weight

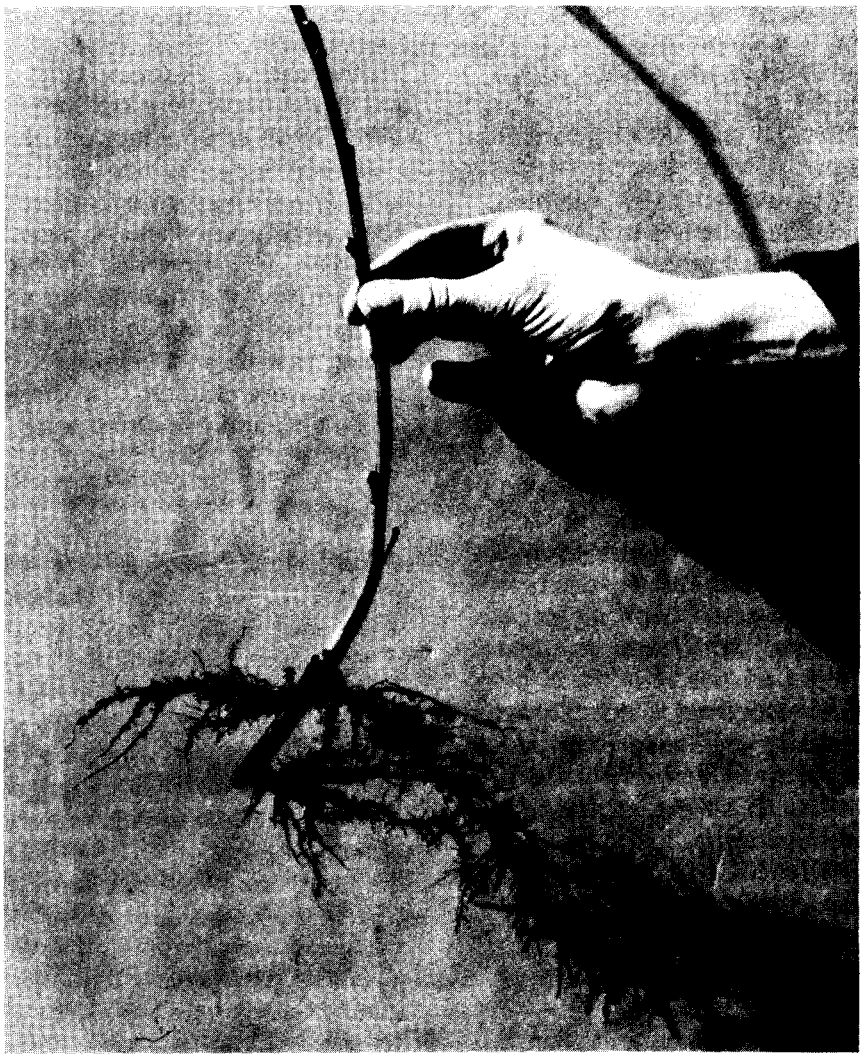

Figure 1—*A small red alder sprout with adequate rooting, held in its natural position.*

of the soil. These sprouts were covered over a greater length than the others, in one case a full 12 inches, and rooted well along the entire buried length.

Each clump of sprouts was dug up and examined. Most of the sprouts were well rooted and had well-developed mycorrhizae. Red alder is a nitrogen-fixing species and the roots on the new sprouts were also well nodulated. The rooted sprouts were easily cut from the parent stump and transplanted. If the stumps are left in place for annual production it may be more difficult to separate the rooted plants because of the heaped soil. However, heaping the soil on the sprouts so that they lay out and away from the parent stump may promote easier separation.

The transplanted rooted sprouts were grown for 1 year in a nursery bed and were regularly irrigated. With the exception of a few poorly rooted sprouts, all survived the growing season. Most were vigorous, and all were strongly orthotropic. Though not tested further, these rooted sprouts appeared to have excellent potential for continued growth and development.

Conclusions

Most of the sprouts were well rooted and vigorous and showed an upright growth habit. We therefore concluded that mound layering is an excellent method of reproducing selected clones of red alder. Established stumps spaced 2 feet apart should produce 5 to 8 sprouts per year at least 1 meter tall.

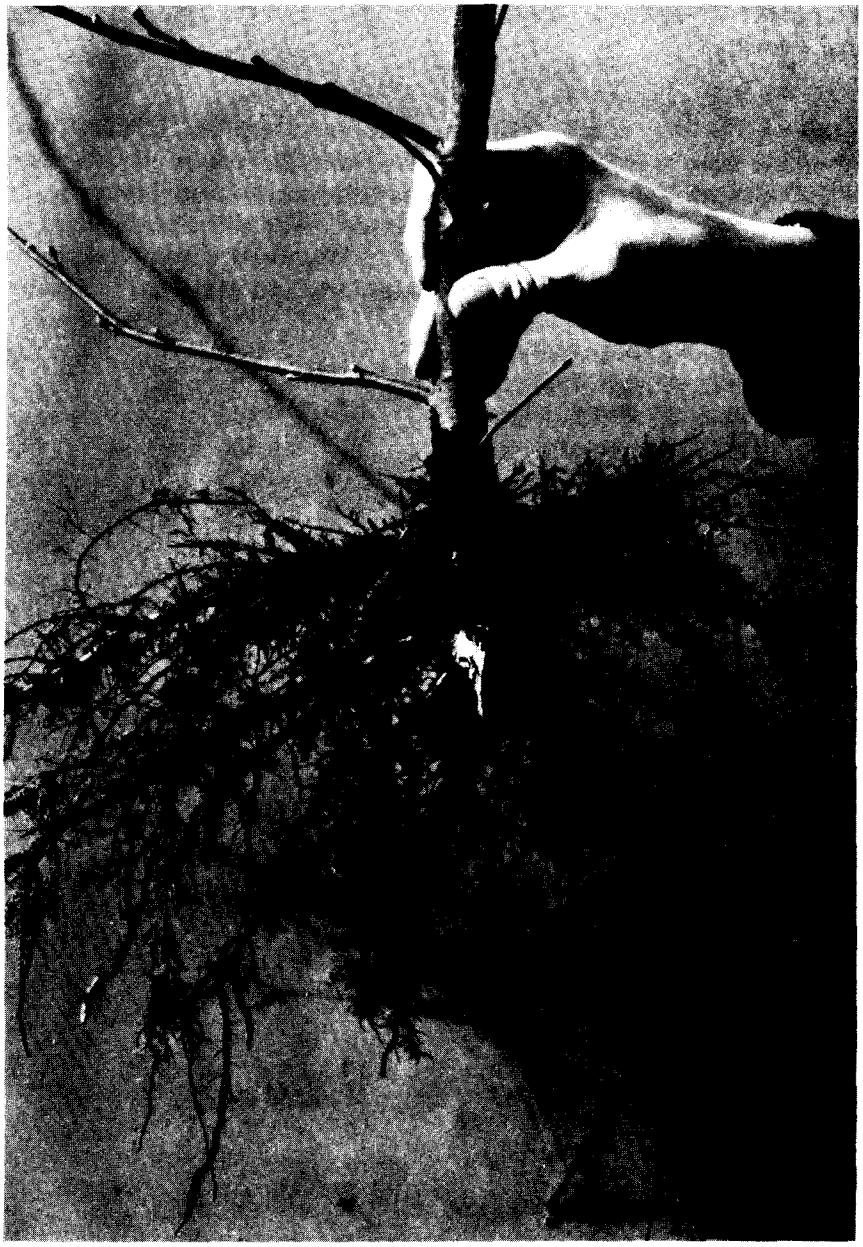

Figure 2—*One of the largest and best rooted red alder sprouts.*

Literature Cited

1. Adriance, G.W.; Brison, F.R. Propagation of horticultural plants. New York: McGraw-Hill Book Co.; 1955.
2. Brix, H.; Van den Driessche, R. Use of rooted cuttings in reforestation. Can. For. Serv. Joint Rep. 6. Vancouver, BC: British Columbia Forest Service; 1977.
3. DeBell, D.S.; Wilson, B.C. Natural variation in red alder. In: Briggs, D.G.; DeBell, D.S.; Atkinson, W.A. (comp.). Utilization and management of alder. Gen. Tech. Rep. PNW-70. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1978.
4. Lanner, R.M. Adventitious rooting: a response to Hawaii's environment. Res. Note PNW-54. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station; 1964. 3 p.
5. Libby, W.J. Rooted cuttings in production forests. In: Proceedings, Fourteenth Southern Forest Tree Improvement Conference, Gainesville, FL. Publ. 36. Southern Forest Tree Improvement Committee; 1977. [Available from USDA Forest Service, National Tree Seed Laboratory, Dry Branch, GA].
6. Mahlstede, J.P.; Haber, E.S. Plant propagation. New York: John Wiley & Sons; 1957. 413 p.
7. Monaco, P.A.; Ching, T.M. Ching; K.K. Rooting of *Alnus rubra* cuttings. Tree Planters' Notes 31:22-24; 1980.