

## ROOTING SOFTWOOD CUTTINGS OF LARCH

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Traditionally, it was almost impossible to get cuttings of larch to strike root and the method was considered to have no practical application for the vegetative reproduction of PLUS trees. But, a decade ago, Dr. Clyde Chandler of the Boyce Thompson Institute developed a workable technique based on the use of a mist chamber. The results were reported in Contributions of the Boyce Thompson Institute in 1959 (20:231-238) and 1967 (23:319-326). These reports set us to wondering how the technique would work on some of our own material and with the mist chamber that was available at the Saratoga Nursery of the New York State Conservation Department. We decided to give it a trial.

On July 4 and 5, 1965, a third of the way through the period of terminal elongation, Cook pruned off some low limbs at about breast height from four trees growing at Cooxrox Forest, in Rensselaer County, New York: tree 40-3-1, an F-1 Dunkeld hybrid planted in 1954; trees 41-1-1 and 41-3-1, F-2 Dunkelds planted in 1955; and the Volunteer, a European wilding from 1954.

The cut ends were placed in water and the material was stored in dim light until July 6, when it was delivered to Frommer, who immediately made and set the cuttings in a rooting medium of sharp sand, under intermittent mist. Each of the four clones were divided into three groups. The first was rooted with a heel of second-year wood at the base of the cutting. The second had no heel and the needles on the basal two inches were removed. The third group had no heel and all the needles were left on.

After 4½ months (on November 18, 1965), the cuttings were removed from the rooting medium and transplanted to pots.

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Here are the results of this test:

Clone	Treatment	Cuttings No.	Survival at time of potting		Survival at time of field planting	
			No.	Percent	No.	Percent
40-3-1	heel	10	8	80	7	70
	needles off	6	6	100	6	100
	needles on	6	6	100	4	100
41-1-1	heel	16	16	100	15	94
	needles off	14	11	79	8	57
	needles on	14	12	86	6	43
41-3-1	heel	15	14	93	5	33
	needles off	12	12	100	7	58
	needles on	12	11	92	7	58
Volunteer	heel	16	12	75	7	44
	needles off	14	11	79	5	36
	needles on	14	12	86	5	36

Average survivals by treatments were as follows:

Treatment	Survival at time of potting	Survival at time of field planting
with heel	88 percent	60 percent
with needles on	87 percent	51 percent
with needles off	89 percent	63 percent
Average	88 percent	55 percent

It would appear that survival is not related to the presence or absence of a heel of second-year wood.

The needles left on the bases of the cuttings appear to have been a distinct detriment. Perhaps, as these needles deteriorate, they harbor fungi and create a micro-environment harmful to the cuttings.

For convenience, all the cuttings were removed from the rooting medium on the same day. Had the weaker cuttings been left longer, the survival might have been higher.

Average survival also varied with clone:

Clone	Survival at time of potting	Survival at time of field planting
40-3-1	93 percent	85 percent
41-1-1	89 percent	76 percent
41-3-1	95 percent	46 percent
Volunteer	80 percent	40 percent

The heavy mortality between potting and field planting may have been due in part to the shock of disturbance, in part to lack of proper after-care.

Whether the poor showings of 41-3-1 and the Volunteer are due to slow starting or to some genetic difficulty, we do not know.

All of these plants were over-wintered in a cool greenhouse and were set out in the nursery under lath shade ( $\frac{1}{2}$ ) on June 1, 1966. The particular location was unfortunate, being much exposed to both wind and soil drifting. By the fall of 1966 the inventory had dropped from 73 to 54.

Measurements made at the end of the 1967 season showed average increments of 19, 13, 19, and 15 inches, for the four clones as listed above, for cuttings grown for 2 $\frac{1}{2}$  years. Tree 40-3-1, a very fine and vigorous specimen, shows great promise as a parent, with good survival and strong growth.

Unfortunately, all of these cuttings had the "side-branch" psychology, tended to grow horizontally. While this might have been cured by staking, it indicates one undesirable characteristic. As of mid-July, 1968, many of the plants were making a real effort to grow straight up.

On the basis of this limited and rather informal test, it would seem that the rooting of softwood larch cuttings is a workable technique and that it could cheaply produce at least small quantities of stock, on its own roots, from selected parent trees.

In the field of human error, three things could have been done better. The material might better have been collected from younger branches nearer the tops of the trees, where the psychology was still "onward and upward." It would have helped if each cutting had been set in its own pot, so that it could have been grown to field size without root disturbance; and we should have cared for them better, and perhaps applied fertilizer.

With all the difficulties, we did produce a respectable showing of sturdy plants that will be three feet tall by the end of the 1968 season.

To see if we could do better, we have just tried it over again. Tree 41-5-1 is a sibling to 41-1-1 and 41-3-1 used previously, 31 feet tall and 5.7 inches d.b.h. at 15 years from seed. On July 7, Cook took a three-year-old branch from about ten feet from the top. Thirty softwood cuttings, each the whole of the current 1968 growth, were dipped in rootone, set in sharp sand in individual plastic pots and placed on a greenhouse bench with intermittent mist, five seconds every five minutes.

As of August 7th, after a month in the mist chamber, only one cutting seems to be in trouble, but it is too early for this to be meaningful.

Realistic selection of PLUS trees of larch can be made when they are no more than 12-15 years from seed, and softwood cuttings will produce plants on their own roots with no risk of stock-scion interaction. Even limbs from relatively low in the crown -- in the zone where flowering is already taking place -- will root with workable certainty.

Currently, Tree 41-5-1 has more than a hundred well-formed cones!

Chandler's technique offers a practical approach to the production of material for seed orchard establishment, especially where the plants are to be grown on arbors, a situation where upright tree-form would be of no consequence.