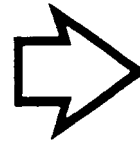
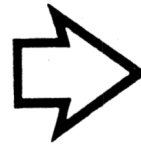
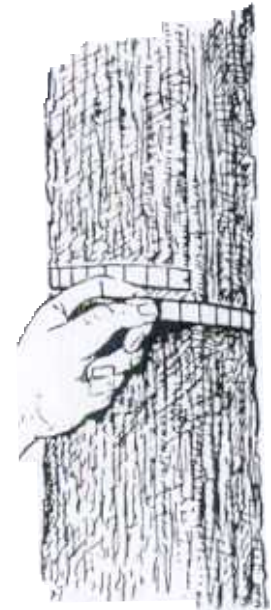


STRIPPING LATERAL ROOTS FROM LOBLOLLY DURING LIFTING



Virginia
Department of Forestry



STRIPPING LATERAL ROOTS FROM LOBLOLLY PINE SEEDLINGS DURING LIFTING--EFFECT ON FIELD PERFORMANCE

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ABSTRACT

Three classes of seedlings were planted:

1. roots not damaged
2. all lateral roots stripped off during lifting
3. Same as #2 plus tap root abraded

Survival was 82, 7, and 10 percent, respectively. The few seedlings that survived the loss of all lateral roots regenerated new root systems and grew reasonably well.

INTRODUCTION

During the 1987-88 planting season, some of our field foresters reported finding loblolly pine seedlings scattered through some of the seedling packages that had no lateral roots. After examining some of the damaged seedlings, it was obvious that the lateral roots had been stripped off, probably during lifting operations. On some of the seedlings, not only were the lateral roots stripped off, but the tap root was abraded so that the bark was gone in places. At the time, we were using lifting machines we built ourselves, which were similar to the Whitfield machine that lifts the entire bed. From observation of the lifting operation, we were quite sure that the damage was occurring when tap roots were not being severed by the undercutter (the undercutter blade was stationary, not reciprocating), and seedlings were being dragged through the soil. Lifting when the ground was partially frozen may have contributed to the problem, but it is more likely that loose, dry, sandy soil tended to permit this to happen. We were satisfied that it did not happen frequently, and that only a very small percentage of the seedlings lifted were affected in this manner.

PROCEDURE

Through the latter part of February and early March, the foreman of the lifting crew was on the lookout for seedlings like this. He usually spotted them "wrapped around" the undercutting blade when it was raised at the end of a seedbed that had just been lifted. He collected these seedlings and placed them in plastic bags. Whenever he collected damaged seedlings, he also collected an approximately equal number of undamaged seedlings that had just been lifted from the same seedbed. The seedlings were accumulated in cold storage until we had enough for a study.

On March 11, we went through the damaged and undamaged seedlings and selected seedlings to plant in the field. We decided on two classes of damaged seedlings. The most severely damaged seedlings we called "abraded". These seedlings not only had all the lateral roots stripped off, but the tap root was scraped and abraded. The second class of damaged seedlings we called "stripped", and these seedlings had all of the lateral roots stripped off, but none of the damage to the tap root as described above. We selected 60 seedlings from each of the two damage classes and the undamaged check seedlings, enough for three 20-seedling rows of each in the field. Tap roots were pruned to a length of 6 inches.

The seedlings were planted the following week on March 14, on the Appomattox-Buckingham State Forest in the central Piedmont of Virginia. A completely random design was used. The seedlings were measured for survival and height annually for three years.

DISCUSSION AND RESULTS

Table 1 shows average survival and height after three seasons in the field.

Table 1. Average survival and average height (in feet) after 3 seasons.

<u>Treatment</u>	<u>Survival %</u>	<u>Average Height</u>
Check	82	5.2
Stripped	7	3.5
Abraded	10	3.9

Survival did not change after the first season. The check seedlings survived satisfactorily, but most of the stripped and abraded seedlings died, and the stripped seedlings survived no better than the abraded seedlings (Table 2).

The check seedlings have grown considerably better than both classes of damaged seedlings (Table 1), but it is interesting to see how well the few surviving stripped and abraded seedlings have grown. During the fourth growing season, we dug up two of the seedlings that had abraded roots. We expected to see very unsymmetrical root systems, perhaps originating from a single new lateral root that originated from the tap root. The root systems we found, though one-sided, were surprisingly well developed. The seedlings in Figure 1 were 2.6 and 4.7 feet tall, respectively, at age 3. Callus growth tended to form a nub or button at the end of the pruned tap root, with several sinker roots forming at this point.

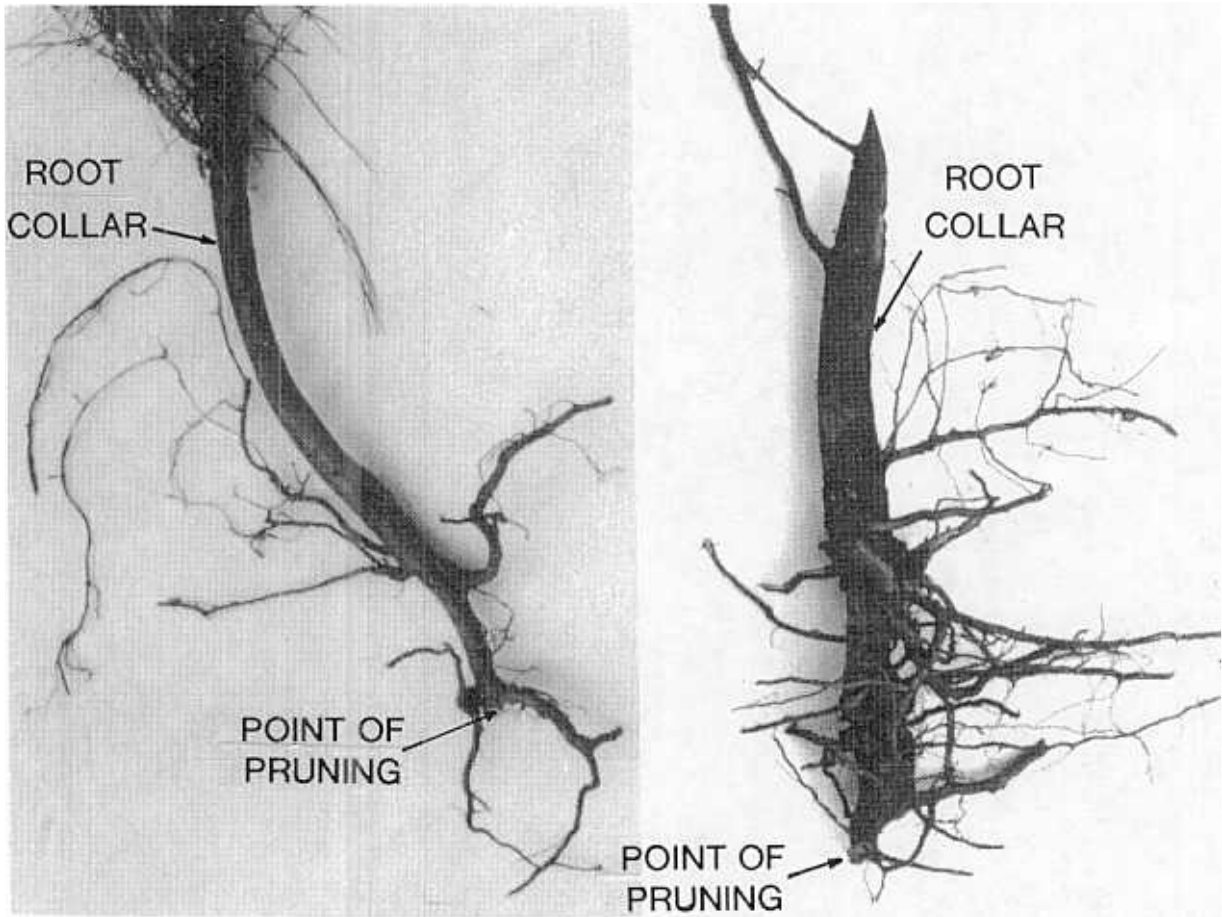


Figure 1. Seedling root systems after three seasons in the field, showing the approximate root collar and original length of the tap root when planted.

Table 2. Analysis of variance of survival percents transformed to arc sine.

<u>Source</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Treatments	2	2,500.415	46.9
Error	6	53.276	

Orthogonal comparisons were made to compare the check with the average of stripped and abraded (probability of a larger $F = .000072$), and to compare stripped with abraded (probability of a larger $F = .34$).