

# THE EFFECT OF ROOT SYSTEM AND DEPTH OF PLANTING ON THE SURVIVAL AND GROWTH OF SCOTS PINE WHEN PLANTED IN A HIGHWAY RIGHT-OF-WAY

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During the highway beautification program of 1966, large quantities of pines were planted along the Interstate Highway System in Michigan. But, unfortunately, by the spring of 1967 it was obvious that many of these pines were dead and others were in poor physiological condition. Some nurserymen believed that the situation was caused by the pines not having been rootpruned prior to planting or the plants having been improperly planted.

To determine what type of root system and which planting depth was most desirable for the planting of pines along the highway, an experiment, utilizing 4- to 5-foot Scots pines, was planted in the spring of 1967 on a part of the median strip on U.S. Highway 127 a few miles south of the 1-96 interchange.

All the plants were obtained from a commercial nursery in southwestern Michigan. One-third of the pines used in the experiment had been rootpruned the year previously and had developed a fibrous root system. These plants were balled and burlapped according to the recommended standards for nursery stock. The nonrootpruned plants were also dug according to the standards, but one half of the group was potted whereas the remainder were balled and burlapped. This was done to determine if potting had any effect on the survival rate.

To study the effect of soil type, depth of planting, and their interaction on survival and ultimate growth, two soil types and three planting depths were selected. The soil types were a clay loam and a sandy loam. And the planting depths were 4 to 5 inches above grade, and 4 to 5 inches below grade.

Three randomized blocks were used on each site to remove anticipated variation due to the slope of the land. Data collected, in the fall of 1968, on the survival and terminal growth were subjected to analysis of variance and where significant differences were found, they were separated by Duncan's multiple range test.

## Results

Of the fifty-four plants used in this pine planting experiment, only three failed to survive through the fall of 1968. All three plants that died were nonroot-pruned plants, and two of these were located in one replication, situated in a depression on the clay site.

Analysis of the main effects within this experiment indicate that rootpruned plants made better growth than did nonroot-pruned plants and that the growth of potted, nonroot-pruned plants was equal to the growth of balled and burlapped nonroot-pruned plants (table 1).

The effect of planting depth was significantly different at the 5-7 percent level (table 2) and indicates, in general, that the pines made their best growth when planted at grade level or 4 to 5 inches below grade. They did not grow as well when the surface of the ball was planted 4 to 5 inches above the grade of the planting site.

Although the pines in this experiment did make the best growth on the sandy site, no positive conclusion may be drawn because there was only one

TABLE 1.—Effect of root pruning and method of packaging on the terminal growth of Scots pine

Treatment	Growth Cm.
Root pruned, balled and burlapped .....	272 a
Nonroot pruned, balled and burlapped .....	151 b
Nonroot pruned, potted .....	165 b

TABLE 2.—Effect of planting depth on the total growth of Scots pine trees

Treatment	Growth Cm.
At grade level .....	230 a
4-5 inches below grade .....	212 a
4-5 inches above grade .....	146 b

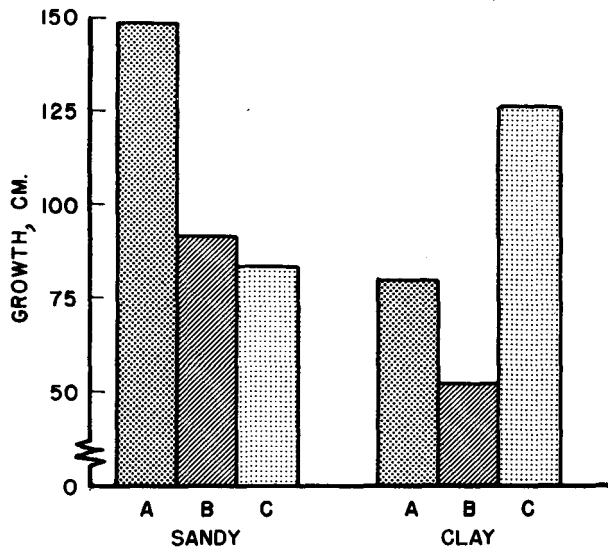


Figure 1.—Effect of depth of planting, at two sites, on the growth of Scots pine: A, at grade; B, above grade; C, below grade.

degree of freedom for testing this effect. However, an interesting interaction was that of soil type and depth of planting. On the sandy site, the pines made their best growth when planted at grade level. But when they were planted on the clay site, the best growth was made when they were planted 4 to 5 inches below the grade. The poorest growth was made when the pines were planted 4 to 5 inches above grade, in the clay site (fig. 1).

A second significant interaction was that of soil type and root system (fig. 2). Although, on sandy sites there was only a slight difference in favor of the root-pruned plants; on clay sites the difference was highly significant: the root-pruned plants made almost three times as much growth as did nonroot-pruned plants.

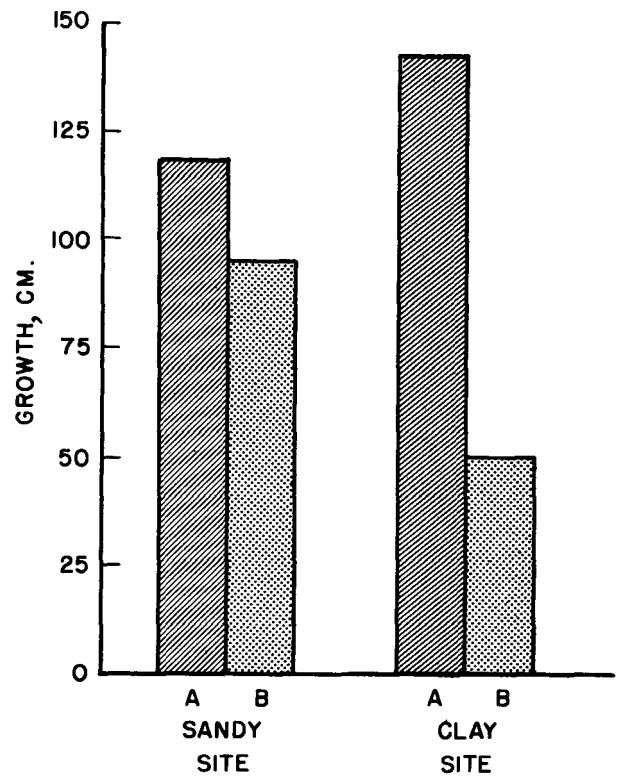


Figure 2.—Effect of root system and planting site on the growth of Scots pine: A, root pruned; B, nonroot pruned.

The results of this experiment indicate that Scots pine trees, 4 to 5 feet in size, can be successfully transplanted, with minimum loss, from nurseries to a highway right-of-way. Root-pruned plants grew better than nonroot-pruned plants, especially on the clay site. And potted nonroot-pruned plants functioned as well as nonroot-pruned balled and burlapped plants.