FOOD RESERVES OF TRANSPLANTED LOBLOLLY PINE SEEDLINGS AND ROOT GROWTH

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Nurserymen growing loblolly pine (Pinus taeda L.) seedlings usually run a lifting blade 8 inches below the soil surface to permit the removal of the seelings from the seedbed with as little damage as possible. Most of the fine rootlets and all roots more than 8 inches below the soil surface are lost during this operation.

Failure of the root systems of transplanted seedlings to elongate may be evidence of detrimental physiological conditions. If the root systems do not enlarge by elongation of present roots or by production of new roots, the seedlings probably will die of drought when the moisture content of the soil surrounding the roots approaches the wilting point (1).

Little work has been done on the root growth of transplanted pine seedlings, but several researchers have indicated that the rooting of plants may depend upon the carbohydrate

status of the plants. Therefore, experiments were conducted during the past 6 years to determine if root growth of loblolly pine seedlings depends upon the carbohydrates in the roots or the morphological features of the seedlings at the time of transplanting.

Methods

Obviously the entire root system of a plant which is to be tested for root growth cannot also be used for carbohydrate determination. From experiments involving various segments of the root system, it was determined that a satisfactory sample could be obtained by using an upper lateral root segment.

The chemical procedure used in the early studies of carbohydrate content was the Whitmoyer method as modified by Hassid (2). During 1963 the Heinze-Murneek (3) modification of the Shaffer-Somogyi method was used for carbohydrate determinations. In all studies, an upper lateral root segment of each 1-0 loblolly pine seedling to be tested was removed for chemical determinations.

In all tests, the length and diameter of each seedling stem were measured, and the seedling was then planted in a standard root growth chamber. Soil moisture was maintained near field capacity. Root growth was observed for 2 months; then the seedlings were removed from the chambers, and the new. roots were measured. The data was analyzed by multiple regression.

Results and Conclusions

In the earlier studies, a weak statistical correlation was found between root growth and the percentage of carbohydrates in the roots at the time of transplanting (table 1). In later studies, after techniques had been refined so that the smaller branched roots could be considered, no correlation was found between root growth and root carbohydrates.

The size of plant before transplanting was not correlated with subsequent root growth. Top growth of the plant after transplanting was not correlated with carbohydrate content of the root at time of transplanting.

From six independent tests conducted during the past 6 years, the writer has not been able to demonstrate any positive relationship between root growth of transplanted loblolly pine seedlings and total carbohydrate content of the roots before the seedlings were transplanted.

Literature Cited

(1) Stone, Edward C., and Schubert, G. H. 1959. Root regeneration by seedlings. Calif. Agr. 13 (2): 12.

(2) Joslyn, Maynard A. 1950. Methods in food analysis applied to plant products. New York: Academic Press Inc.

(3) Heinze, P. H., and Murneek, A. E. 1940. Comparative accuracy and efficiency in determination of carbohydrates in plant material. Missouri Agr. Expt. Sta. Res. Bul. 314.

TABLE 1.--Averages and ranges of morphological and chemical components of loblolly pine seedlings during 2 selected years

Year	Root growth				Top growth		Stem diameter		Stem length		Root carbohydrate content	
	In.	*In.*	*Grams*[2]	*Grams*[2]	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*Pct.*	*Pct.*
1957[1].....	21	0-63	--	--	--	--	0.146	0.106-0.189	6.4	4.5-9.5	6.0	3.0-8.6
1963.....	127	0-481	0.174	0-0.767	2.3	0.5-4.5	--	--	--	--	22.6	5.4-37.9

[1] The correlation coefficient "r" between root growth and root carbohydrate percentages was .375; this figure is significant at the 5-percent level.

[2] Ovendry weight.