1964

Acrylic Resin Tubes for Studying Root Growth in Tree Seedlings

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Note by M. Victor Bilan

Abstract. A new method was designed to study root growth of intact tree seedlings grown in acrylic resin tubes filled with soil.

Colorless acrylic resin tubes filled with soil facilitated the study of root systems of intact pine seedlings grown in an air-conditioned greenhouse for more than 2 years. This method eliminates destructive root sampling and makes possible continuous observation and periodic tracing of undisturbed root systems of the same plants.

Acrylic resin is a glass-like thermoplastic, resistant to temperature extremes and to chemical concentrations normally encountered in the life cycle of plants. It can be cut or bored without difficulty; yet it is rigid and lighter than glass. Acrylic resin tubes are available in a variety of diameters and wall thicknesses, but those used were 4 inches in diameter, 50 inches long, and had a wall thickness of 0.125 inch. A disc of stainless steel screen, resting on two transverse ⅛-inch steel rods extending through holes in the wall 1 inch above the rim, provided support for the soil at the bottom of each tube. The screen

The author is Associate Professor, Dept. of Forestry, Stephen F. Austin State College, Nacogdoches, Texas. Study supported by the National Science Foundation, Grant GB-118. Manuscript received Mar. 19, 1964.

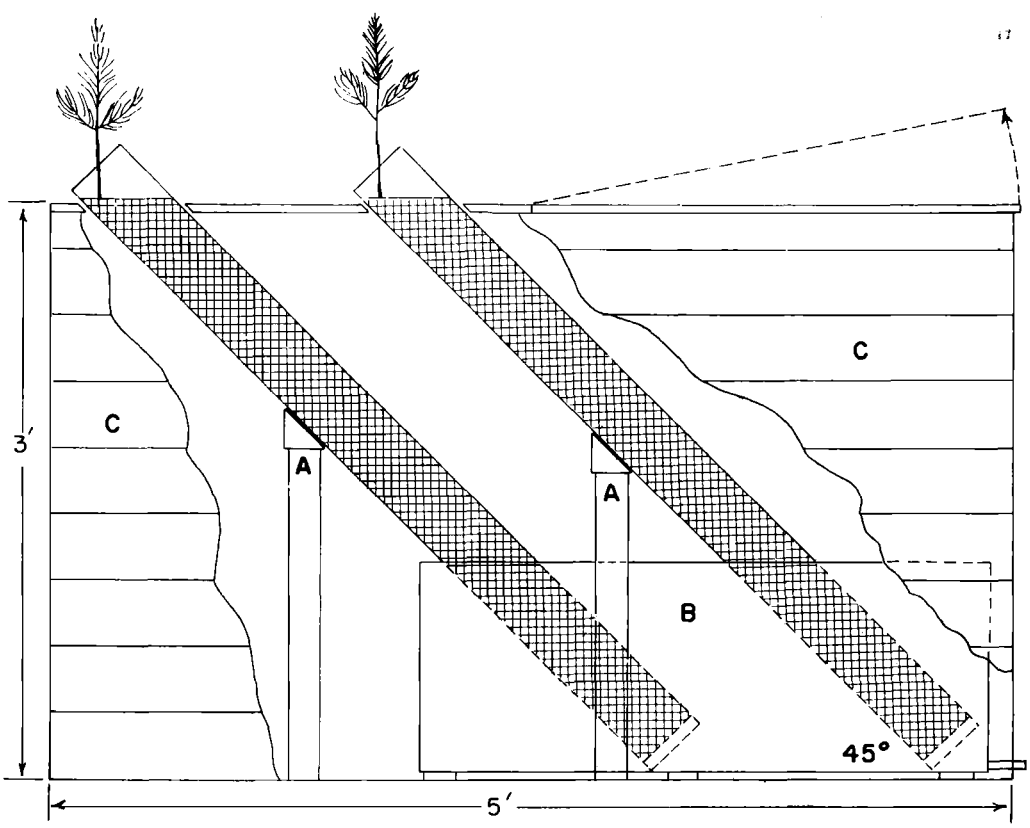

FIGURE 1. *Arrangement for root growth study of tree seedlings grown in acrylic resin tubes.*

also facilitated soil drainage and aeration in the lower portion of the tube.

The freshly filled tubes were kept in an upright position and watered daily for 1 week to allow settling of the soil. Soil was added as needed to maintain a level 1 inch from the top of tubes. After one week 12 tubes, comprising 1 unit, were arranged in 2 rows with 1-foot intervals between the rows and 10 inches between the tubes in rows. The tubes were positioned at the 45° angle, each row supported by a transverse wooden rack (Fig. 1A). The tubes rested in a 14-inch-high galvanized tank (B) to facilitate watering from below. A wooden box built around each unit was provided with cut-outs on the top to expose the upper inch of tubes to the light (C). A removable section in the top of each box provided for observation of the entire tubes.

One seed of loblolly pine (*Pinus taeda* L.) was planted close to the wall on the lower side of the surface slope of each tube. Geotropism and tube inclination forced the developing roots to grow along the lower side of the tube thus making them visible through the plastic.

For periodic tracing of root extension, each tube was laid horizontally and wrapped with a sheet of transparent acetate marked for identical subsequent positionings. Acetate ink was used to trace the root extension. Each periodic tracing was made with a different coded color, thus simplifying the dating of the formation of individual root sections.

When the roots approached the bottom of a tube, a 4-foot acrylic resin extension was added by using tubing wide enough to fit tightly over the original. The extensions were also fitted with screen bottoms and filled with soil. After removing the screen and rod bottom from the old tube, it was slipped into the extension, allowing about 5 inches of overlap. Holes were drilled in the extension section to coincide with those in the original tube, and the 2 cylinders were fastened together with 4 metal screws.

This technique, permitting constant and direct observation of developing root systems without destroying any roots or modifying their environment, is probably suitable for a number of plants.

North Carolina Lands

By Kenneth B. Pomeroy and James G. Yoho. xx + 372 pp. The American Forestry Association, Washington, D. C. $6.

Third and persumably last, in a series of state land ownership studies by the American Forestry Association, this book reports on the ownership, use, and management of forest and related lands in North Carolina. After an introductory chapter on resources and industries, the book covers in considerable detail the evolution of land ownership from colonial days to the present; state, county, and municipal ownership; federally owned lands; and private lands. Pointed out is the fact that in this state small, non-industrial forest properties predominate. A concluding chapter gives recommendations. Presented in an appendix is a report on a specific research survey of approximately 6,000 rural land ownerships. This reveals why a large proportion of owners of small woodlands do not practice intensive management.