A COMPARISON OF TREE SHELTERS AND THEIR EFFECTS ON SEEDLING SURVIVAL AND GROWTH OF TWO BOTTOMLAND HARDWOOD SPECIES: FIRST-YEAR RESULTS

H. Christoph Stuhlinger, Jeffrey A. Earl, Rebecca A. Montgomery, and Buren B. DeFee II[1]

Poster Summary

Tree shelters can aid hardwood establishment by improving seedling survival and growth. Shelters are translucent plastic tubes that act as mini-greenhouses by maintaining a higher humidity environment. Can less-costly shelters achieve the same improved results as more expensive shelters?

This study was established in February, 2004, at two 2.5-acre sites in Hempstead County (HC) and St. Francis County (SFC), AR, to compare three types of tree shelters installed on green ash (*Fraxinus pennsylvanica* Marsh.) and cherrybark oak (*Quercus pagoda* Raf.) seedlings. The HC site is a former hay field on a silty clay loam and was disked twice before planting. The SFC site is a former crop field on silt loam soils and was ripped (subsoiled) before planting. The study is a replicated randomized complete block design.

Tree seedlings enclosed in 4-foot-tall BLUE-X®, Protex®, or Tubex® tree shelters (12 feet by 12 feet spacing) were observed monthly during the growing season and compared to unsheltered controls with respect to survival and height growth. The BLUE-X® shelter (blue) consists of a flat Poly film and sleeve which must be assembled. The Protex® shelter (blue) comes flat and must be rolled into a cylinder and secured with eight tabs. The Tubex® shelter (green) comes as a tube ready to install. Each shelter is held upright with a 4-foot bamboo stake.

Average tree shelter establishment times (assembly plus installation) were longest for the Protex® shelters (2.4 minutes per shelter) and shortest for the Tubex® shelters (1.2 minutes per shelter). Costs of purchasing and establishing each shelter were lowest for BLUE-X® ($1.26) and highest for Tubex® ($2.64). Shelters did not improve survival over unsheltered seedlings. Survival at SFC was 96 to 100 percent for all treatments. At HC, green ash survival was 98 to 100 percent, but cherrybark oak survival was only 79 to 85 percent. About 56 percent of the green ash control seedlings were browsed by deer at both sites, causing stunted growth but not mortality. Only a few cherrybark oaks (6 percent) were browsed. At both sites, height growth and emergence rate (when a seedling reached 4 feet in height) were greater for sheltered than unsheltered seedlings, but shelter type made little difference. Total heights at SFC averaged 4.1 feet for sheltered seedlings and 2.4 feet for controls. At SFC, 71 percent of the sheltered seedlings emerged, and 5 percent of the controls emerged. At HC, 11 percent of the sheltered seedlings emerged, compared to 0.6 percent of the controls. Some sheltered seedlings at SFC grew more than 0.5 foot per month. Sheltered seedlings more quickly outgrew weed competition and browse hazards. Protex® produced the greatest diameter growth. Further observation will reveal if the rapid height growth of sheltered seedlings will result in temporarily-reduced proportional diameter growth and if height growth will slow down after emergence.

GPS and GIS technology helped to illustrate spatial tree arrangement and to visually track treatment and intra-site differences. All three shelter types performed similarly regarding height growth. BLUE-X® shelters may provide the most cost-effective method of increasing early height growth in hardwoods.

[1] University System Forest Manager, Program Technicians, and Assistant Professor, respectively, Arkansas Forest Resources Center, University of Arkansas at Monticello, Monticello, AR 71656.

Citation for proceedings: Connor, Kristina F., ed. 2006. Proceedings of the 13th biennial southern silvicultural research conference. Gen. Tech. Rep. SRS–92. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 640 p.