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From Forest Nursery Notes, Summer 2008

90. © Survival of longleaf and loblolly pines planted at two spacings in an East Texas bahiagrass silvopasture. Oswald, B. P., Farrish, K. W., and Beierle, M.-J. Southern Journal of Applied Forestry 32(1):44-45. 2008.

Survival of Longleaf and Loblolly Pines Planted at Two Spacings in an East Texas Bahiagrass Silvopasture

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ABSTRACT

The practice of combining intensive timber and forage production on the same site, a silvopasture system, offers landowners the potential for diversification of income. The establishment of such a system in a pasture setting offers unique challenges compared with traditional timber or forage systems. In 2003, a silvopasture demonstration was established south of Carthage, Texas, in a pasture dominated by bahiagrass (*Paspalum notatum*). Four replications of treatments composed of open pasture, longleaf (*Pinus palustris*) and loblolly (*Pinus taeda*) pine planted at a traditional spacing, and longleaf and loblolly pine planted at a silvopasture spacing were established. Due to high mortality rates, replanting of trees occurred in 2004 and 2005. Third-year seedling survival was highest for loblolly pine in both planting systems, and forage production levels did not significantly differ among treatments. Wild hog damage contributed to the low longleaf pine seedling survival rates.

Keywords: *Pinus palustris*, *Pinus taeda*, plantations, agroforestry

Silvopasture is an intensive, multiple resource management practice that integrates forest and forage production. This integration allows landowners to have management and economic diversity across the same land unit. Livestock, timber, and even recreational opportunities may offer cash flow opportunities for an operational silvopastoral system (Harwell and Dangerfield 1991). Overall increases in financial return and economic diversity have been noted from silvopasture systems compared with either pine plantations or forage systems alone (Clason 1988, Dangerfield and Harwell 1990, Harwell and Dangerfield 1991, Lawrence and Hardesty 1992, Zinkhan 1996).

A silvopasture system may be established in either an existing plantation or, more commonly, an existing pasture (Clason 1999). The variety of options (i.e., tree spacing, tree species, and forage species) provides landowners tremendous flexibility for management. East Texas traditions of forage, livestock, and timber production and an established infrastructure of watering systems, fencing, and livestock handling facilities make the region an ideal setting for their integration. A common question is the ability of tree seedlings to successfully establish within a well-established pasture without unacceptable mortality caused by competition from the forage crop. Another common issue for those managing pastures is the impact of tree establishment on forage production. In addition, data are lacking on what forage or tree species to use, what spacing to be used, and what possible pitfalls may hinder the establishment of a silvopasture system in East Texas. The objective of this case study was to explore the establishment success of a silvopasture system in a bahiagrass pasture using loblolly pine (*Pinus taeda*) and longleaf pine

(*Pinus palustris*) and two tree spacings (traditional plantation and a common silvopasture spacing).

Site Description

The study site is located south of the city of Carthage in Panola County, Texas, approximately 80 km southwest of Shreveport, Louisiana, and 241 km west of Dallas, Texas. The regional climate is classified as subtropical, permanently humid climate with mean rainfall of 112 cm and an average growing season of 240 days (USDA Natural Resources Conservation Service 2004). The site contains several soil types: Bowie fine sandy loam, Sacul fine sandy loam, Nahatche complex, Cart-Erno complex, and Wrightsville-Cart complex (USDA Natural Resources Conservation Service 2004).

Methods

In 2003, four replicates were laid out in a bahiagrass pasture. Within each replicate, 5 planting arrangements were randomly assigned: bahiagrass open pasture, no trees; longleaf pine or loblolly pine on traditional plantation spacing (2.1 × 3.7 m spacing for 1,282 trees ha⁻¹); and longleaf pine or loblolly pine on silvopasture spacing (1.8 × 9.1 m for 598 trees ha⁻¹), each within a 4.1-ha treatment block. A banded application of Arsenal (glyphosate) at 4 oz A⁻¹ was applied in the fall of 2003, and the rows were ripped prior to container-grown seedlings being planted in the winter. Oust Extra (56.25% sulfometuron methyl and 15% metsulfuron methyl) at 3 oz A⁻¹ was applied the following spring to further control herbaceous competition. A fertilizer application of 20-8-15 at 68 kg ha⁻¹ (375 lbs A⁻¹) was applied in the summer of 2004.

Received November 13, 2007; accepted November 27, 2007.

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