

A Longleaf and Slash Pine at-planting Poultry Litter and Diammonium Phosphate Application Trial in Two Old-field Sites – Six Year Results

Cliff M. Riner, Reid L. Torrance, M.J. (Jeff) Cook, Bryan C. McElvany, E. David Dickens, David J. Moorhead, and Kris M. Irwin¹

INTRODUCTION AND OBJECTIVES

The two study sites (Fuquay soil series on site one and Bonneau soil series on site two) were located in Tattnall County, Georgia on former corn and soybean fields (old-fields) to determine (1) slash and longleaf pine survival and early growth effects of poultry litter (@ 1.4 or 2.8 tons/ac, Table 1 and 2) applied 4 months prior to planting compared to no fertilizer material and diammonium phosphate (DAP @ 200 lbs/acre) applied 6 months post-planting and (2) the growth rate of longleaf versus slash pine poultry litter or DAP versus no fertilizer material at planting. Pre- and first year post-plant herbicides were used to keep herbaceous vegetation to a minimum. Surface soil pH prior to treatments ranged from 5.5 to 5.8 and available P ranges from 75 to 110 lbs/ac on one site and 20 to 40 lbs/ac on the second site.

Table 1. Poultry litter macro- and micro-nutrient characteristic means (range) for the one-time, pre-plant application on the Durrenre and Tootle old-field sites in Tattnall County, Georgia.

Total-N	P ₂ O ₅	K ₂ O	Ca	Mg	S	Mn	B	Cu	Zn
----- lbs per ton -----									
70 (60-76)	65 (55-76)	58 (46-64)	41 (33-48)	8.4 (6.7-10.3)	10.5 (9-12)	0.51 (.41-.63)	0.068 (.06-.08)	0.57 (.44-.66)	0.42 (.33-.52)

Table 2. Poultry litter macro- and micro-nutrient levels for the two poultry litter treatments for the one-time, pre-plant application on the Durrenre and Tootle old-field sites in Tattnall County, Georgia broadcast, surface applied on 21 August 2000.

Poultry litter treatment	Total-N	P ₂ O ₅	K ₂ O	Ca	Mg	S	Mn	B	Cu	Zn
----- lbs per acre -----										
PL 1.4	98	91	81	57	12	15	0.71	0.095	0.80	0.59
PL 2.8	196	182	162	104	24	29	1.4	0.19	1.6	1.2
Treatments: PL 1.4 = poultry litter @ 1.4 tons/ac and PL 2.8 = poultry litter @ 2.8 tons/ac.										

SIX YEAR RESULTS

Longleaf pine

Mortality and stem canker incidence was not significantly affected by the DAP or poultry litter treatments. The DAP treated longleaf plots had significantly greater volume per tree (0.637 ft³) than the control (0.537 ft³) and the control had significantly greater volume per tree than the low (0.242 ft³) and the high (0.437 ft³) poultry litter treatments trees (Table 4).

Slash pine

There were no significant differences between the DAP, poultry litter, and control treatments on both the Durrenre and Tootle sites for d.b.h., total height, volume per tree, and mortality after six growing seasons. Mortality ranged from 5.9 (poultry litter @ 1.4 tons/ac) to 19.5 percent (poultry litter @ 2.8 tons/ac) on one site without reinforcement planting and 4.8 (DAP) to 8.6 percent (poultry litter @ 1.4 tons/ac) on the second site with reinforcement planting. Stem canker incidence did increase by treatment with 6 percent for the control, 8 percent of the poultry litter @ 1.4 tons/ac, 9 percent for the poultry litter @ 2.8 tons/ac, and 10 percent for the DAP on the first site. Stem canker incidence on the second site was approximately one-half of that on the first site (3 percent for the DAP and 4 percent for the control and poultry litter @ 1.4 tons/ac) as well as mortality (6.3 versus 13.7 percent).

Longleaf versus slash pine growth through six years

Longleaf pine mean (across the four treatments) d.b.h. (3.0 inches), total height (15.0 feet), and volume per tree (0.446 ft³) were 46, 48, and 191 percent less than the slash pine d.b.h. (4.4 inches), total height (22.2 feet), and volume per tree (1.30 ft³), respectively on the first site. Longleaf pine mortality (longleaf pines were re-planted after the first growing season in any spots where there was mortality, whereas there was no slash pine re-planting) averaged 6.3 percent while slash pine mortality averaged 13.7 percent on the first site.

SUMMARY

Based on stand conditions for both the longleaf and slash pine on these relatively fertile old-field sites through six years, pine straw could be raked at the end of the 7th or 8th year for slash pine and at the end of the 10th year for the longleaf pine. For longleaf, post-plant DAP seems to be the best fertilizer choice, where fertilization is warranted, as it had a significantly greater volume per tree than the poultry litter and control treatments (but not significantly greater d.b.h. and total height than the control). There were no fertilizer treatment (DAP or the poultry litter) that significantly improved slash pine growth through six years on both sites. Slash pine survival was reduced with the DAP and poultry litter @ 2.8 tons/ac on the Durrenre site and the poultry litter @ 1.4 tons/ac on the Tootle site.

RECOMMENDATIONS

On fertile old-field sites, fertilization is usually not recommended at planting for slash and longleaf pine. If soil test available P is greater than 12 lbs/ac (6 parts per million), which is almost always the case, and the N and K fertilization history has been consistent, then N, P, and K are not usually warranted until the stand has reached first thinning age or older. Using well established fertilization diagnostic tools: soil and foliage sampling (www.bugwood.org), leaf area estimation, growth rate estimates, and soils knowledge can aid in determining if the stand will respond to fertilization once the stand has occupied the site. Herbaceous weed control prior to and the first year after planting are more critical in maximizing survival and early growth on these sites by improving soil moisture and nutrient resources to the planted seedlings.

ABOUT THE AUTHORS

¹Tattnall Extension Agent and Coordinator, Taylor County Extension Coordinator, Treutlen County Extension Coordinator, College of Agriculture and Environmental Sciences; Associate Professor, Professor, and Public Service Associate, Warnell School of Forestry & Natural Resources, respectively.

CITATION

Riner, C., R. Torrance, J Cook, B.C. McElvany, E.D. Dickens, D.J. Moorhead, and K.M. Irwin. 2007. A longleaf and slash pine at-planting poultry litter and diammonium phosphate application trial in two old-field sites – six year results. Georgia Forest Productivity Series No. 006S-07. www.bugwood.org/productivity. 3 p.

Warnell School of Forestry & Natural Resources
Athens, Georgia 30602-2152

Phone: 706.542.6819 • fax: 706.542.5073

An Equal Opportunity/Affirmative Action Institution

In compliance with federal law, including the provisions of Title IX of the Education Amendments of 1972, Title VI of the Civil Rights Act of 1964, Sections 503 and 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990, the University of Georgia does not discriminate on the basis of race, sex, religion, color, national or ethnic origin, age, disability, or military service in its administration of educational policies, programs, or activities; its admissions policies; scholarship and loan programs; athletic or other University-administered programs; or employment. In addition, the University does not discriminate on the basis of sexual orientation consistent with the University non-discrimination policy. Inquiries or complaints should be directed to the director of the Equal Opportunity Office, Peabody Hall, 290 South Jackson Street, University of Georgia, Athens, GA 30602
Telephone 706-542-7912 (V/TDD). Fax 706-542-2822.