EARLY GROWTH OF PLANTED LONGLEAF PINE SEEDLINGS IN RELATION TO LIGHT, SOIL MOISTURE, AND SOIL TEMPERATURE

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Poster Summary

Drastic reductions in longleaf pine (*Pinus palustris* Mill.) acreage have led to an increased focus on regeneration of the longleaf pine ecosystem. Many areas require artificial regeneration for establishment, and site preparation techniques may be implemented to increase regeneration success. The objectives of this study were to determine differences in growth of first-year longleaf pine seedlings based on various site preparation treatments and to determine differences in microsite conditions (available light, soil moisture, soil temperature, competition) due to site preparation treatments.

METHODS

The study was conducted on Marine Corps Base, Camp Lejeune, in Onslow County, NC. The study area was on a poorly drained, Leon fine sand soil. A randomized complete block design consisting of five blocks and eight treatments was implemented in the summer of 2003. The eight site preparation treatments used were flat/chop (FC), flat (F), flat/herbicide (FH), bed/chop (BC), bed/herbicide (BH), bed/chop/herbicide (BCH), mound/chop (MC), and mound/herbicide (MH). Containerized longleaf pine seedlings were planted in December 2003, and growth and microsite measurements were taken during August 2004. Growth was monitored by measuring the root collar diameter of selected seedlings on each plot. Microsite measurements included soil moisture, soil temperature, percent full sunlight reaching each seedling, and amount of competing vegetation. Differences in treatment results were analyzed using SAS software.

RESULTS AND DISCUSSION

The growth measurements resulted in differences in root collar diameter among the treatments ($p<0.0001$), with FC (11.7 mm) and F (12.1 mm) having the smallest diameters. There were no statistical differences between BC, BCH, BH, FH, MC, or MH. The soil moisture results showed significantly more moisture on F (38.1 percent), FH (38.3 percent), and FC (35.1 percent) treatments than any other treatments, except no difference between FC and MC (26.2 percent). There were no differences in soil temperature. The percent of full sunlight reaching the seedlings was least on F (73.1 percent), FC (86.8 percent), and FH (89.4 percent), although only F was statistically different from any other treatment. Finally, the height of competing vegetation was greatest on F (25.8 cm), FC (17.8 cm), FH (11.7 cm), and BC (10.4 cm). The results of the growth and micro-environment measurements display a trend in the impact of site preparation on seedling growth. The treatments that had the least amount of growth (F and FC) are also among the treatments with the most soil moisture, least sunlight reaching the seedlings, and most competing vegetation. How these factors specifically affect the seedlings is not yet understood; however, competition for light, moisture, and nutrients may all contribute in varying degrees depending on site and year. Bedding and mounding increase drainage on these poorly drained sites, altering moisture levels within the root zone. These treatments also control competing vegetation, a necessity for longleaf pine seedling success. The competition for light is not considered an important factor at this stage of seedling growth, as the treatment with the lowest light levels reaching the seedling (F with 73.1 percent) still has adequate light for photosynthesis.

CONCLUSION

Site preparation treatments impacted the growing conditions of longleaf pine seedlings, resulting in growth differences by treatment. Continued research will clarify the effect of site preparation treatments on the growth of longleaf pine seedlings.

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