**RESTORING PRODUCTIVITY TO COGONGRASS-INFESTED LAND THROUGH REFORESTATION.** W.H. Faircloth, M.G. Patterson, J.H. Miller, and D.H. Teem. Auburn University, Auburn, AL, and U.S. Forest Service-Southern Research Station, Auburn, AL.

ABSTRACT

Cogongrass (*Imperata cylindrica*) is an invasive grass that is rapidly colonizing the Gulf coastal plain, with potential to spread well into the interior of the Southeastern U.S. Cogongrass is particularly harmful to forested land. In such situations, cogongrass hinders plantation establishment, may contribute to crowning fires in young stands, decreases wood and fiber production, and displaces native plants and animals. Of particular interest are options that landowners/managers may have when faced with cogongrass-infested land. A study was implemented by Auburn University researchers in cooperation with researchers from the U.S. Forest Service, Southern Research Station, to investigate establishment options for loblolly pine (*Pinus teada* L.). A site was selected near Theodore, AL (Mobile Co.), within 10 miles of the original introduction point of cogongass. The study site, previously in row crop agriculture but fallowed since the late 1980s, was heavily infested with cogongrass and an overstory of chinese privet (*Ligustrum sinense*), wax myrtle (*Myrica cerifera*), tallowtree (*Triadica sebifera*), and yaupon (*Ilex vomitoria*). Brushy overstory was cut and removed in spring 2001, leaving a continuous stand of cogongrass. The study site was a sandy loam soil (pH 5.6) with high site index (90) for loblolly pine.

Treatments were a factorial arrangement of mechanical site preparation (SP), chemical SP, and pine release in an RCB design with four replications. A complete control plot was also included as a positive control, for a total of nine treatments. Chemical SP applications were made Oct. 2001 and consisted of imazapyr (0.42 kg ai/ha) plus glyphosate (4.48 kg ai/ha) plus surfactant (0.5% v/v). Mechanical SP was performed Dec. 2001 with a trailing fire plow which removed the top 10-15 cm of the cogongrass rhizome mat. "Super" seedlings (2.5 gen) were planted in January 2002 on a 2.5 x 2.5 m spacing (1605 trees/ha). Pine release treatments were made in May or Oct. 2002 and consisted of various combinations of imazapyr, sulfometuron, and metsulfuron applied on a 2.5m band over the row. Complete control plots were treated with a double rate of site prep herbicides and released with the three-way tank-mix mentioned previously; these plots were not mechanically site prepared. Experimental units consisted of 100 trees in a 10x10 square, with the center 36 trees serving as the measurement plot. Response variables included pine tree survivability, growth, as expressed by ground-line diameter (GLD) and height, and plant biomass. Trees were measured immediately after planting and again in January of 2003. Biomass measurements were partitioned into three categories: live cogongrass, dead cogongrass (thatch), and all other species. Collections were made by removing the aerial portions of each category from a 25x25 cm square. Ten such samples were collected in each measurement plot in the summers of 2002 and 2003. Samples were dried at 63 C for 72 h then weighed. Data were analyzed using SAS Proc Mixed with non-orthogonal contrasts and estimates at the 0.05 level. The main effects of mechanical SP, chemical SP, and release will be presented until further data are obtained from the study which will facilitate an in-depth review.

Pine survivability was greatest in the mechanically site prepared treatments. A maximum mortality of 6.25% was found in the complete control plots one year after planting (YAP). Increase in mortality could be directly attributed to release herbicides or lack of cogongrass control, as the non-treated plots averaged 6% mortality. Loblolly pine height increase (1 YAP) was highest for the chemical SP only and chemical SP + release treatment (44 cm/yr). When combined, mechanical and chemical SP treatments clearly stunted growth versus other treatments as these plots showed increases 1 YAP of only 24 to 27 cm/yr. Mechanical alone or mechanical SP plus release resulted in a 33-35 cm/yr increase. Stunting in mechanical SP plus chemical SP plots can be explained by increased herbicide uptake by trees due to removal of organic matter by scalping. Ground-line diameter increase 1 YAP was greatest in the complete control plots (6.1 mm/yr). Mechanical SP, chemical SP, and release all resulted in greater increases in GLD versus the non-treated (2.6 mm/yr).

The presence of a release treatment consistently resulted in GLD equivalent to the complete control.

Initial biomass measurements from 2002 may only be used to compare chemical and mechanical SP treatments, as release treatments were not applied until Oct. in all plots. Live cogongrass biomass ranged from 10 kg/ha (mechanical SP plus chemical SP) to 1960 kg/ha (non-treated). Both mechanical and chemical SP reduced biomass from the non-treated. Cogongrass thatch was completely removed in the mechanical SP plots and was greatest in the chemical SP plots (1760 kg/ha), as expected. Other species were most present in the complete control plots where cogongrass was suppressed (2880 kg/ha). Mechanical SP also greatly reduced the occurrence of other species (270-800 kg/ha). Biomass measurements from 2003 reflect the aggressive nature of cogongrass, as regrowth occurred in all plots. Least cogongrass regrowth was found in the mechanical SP plus chemical SP plus release plots (790 kg/ha). All factors reduced live cogongrass biomass versus the non-treated (7410 kg/ha). Thatch measurements reflected live measurements. Much as in 2002, the complete control plots suppressed cogongrass and resulted in the greatest amount of biomass from other plant species (8310 kg/ha).

In summary, loblolly pine was successfully established with minimal mortality. Pine growth (both height and GLD) was consistently highest with chemical SP alone or combined with release treatment. Mechanical SP alone was acceptable, however, when combined with chemical SP, stunting of growth 1 YAP was evident. Cogongrass control summer 2003 was best with the combination of mechanical SP, chemical SP, and release.