



Introduction

Surface mining reclamation has resulted in increasingly more stable land use post mining since the advent of SMCRA, or the Surface Mining Control and Reclamation Act, adopted in 1977. While land reclamation efforts have increased the stability considerably, current research suggests that soil compaction as a result of the implementation of SMCRA hinders the productivity of forests post-mining. The Forestry Reclamation Approach (FRA) was developed to improve forest health in the Appalachian region through a five-step process. This process emphasizes minimizing soil compaction and using proper tree planting techniques. The FRA has not yet been tested in the western Gulf Coastal Plain where the shrink-swell clay soils and severe droughts affect land reclamation practices.



This study used an adapted FRA method planting containerized loblolly pine seedlings on a mine demonstration site. The two-acre study site will consist of a randomized block design in triplicate comparing the conventional pan-scraper reclamation method with that of an unmined control and the FRA-style low compaction treatment. Consistent with intensively managed plantation forests in this region, no cover crops were planted. This will help to optimize tree growth and lessen herbaceous competition. It is hypothesized that the FRA-style low compaction treatment will result in higher survival rates and overall higher tree volumes.

Methods

A site was selected on the Gail Creek Property in east Texas. The site is relatively flat with a [very fine, smectic, thermic, Vertic Hapludalf]. Plots were hand planted using 8 x 9 foot spacing with two surrounding tree buffer rows on all four sides. Each plot was planted with 48 International Forest Company (IFCO) containerized genetically improved west Gulf provenance loblolly pine seedlings, totaling 432 observational units (seedlings).

Conventional pan-scraper methods were simulated on the site by using a Cat D6T dozer to push the soil back into the excavated pits. The heavy dozer trafficking resulted in substantial compaction and effectively simulated the topsoil replacement that occurs with pan-scrappers. A Cat excavator was used to simulate the FRA treatment by dropping full buckets of soil into the 1.3m deep pits. Minimal trafficking over the FRA plots and the use of soil dumping simulated end dumping typically used in FRA methods. The control plots were cleared of vegetation and were not trafficked on any further. Initially, herbicide was not applied; however, Sufometuron and Imazapyr may be used to control herbaceous and woody competitors.

Initial data collected will include survival rates, ground line diameters, and tree heights. Further soil sampling will be conducted to assess bulk density and infiltration rates. Vegetative sampling and hydrologic sampling will be conducted to further assess the FRA treatment method. Photosynthesis and respiration data will be collected to evaluate the health and productivity of the trees on all plots, and examine the impact of the FRA on seedling ecophysiology.

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