Evaluating the Suitability of a Reforestation Growth Medium Prepared by Tractor Pulled Scraper Pans at an East Texas Lignite Surface Mine

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**Introduction**

Luminant has planted over 38.7 million trees on its reclaimed lignite surface mine operations in East Texas since 1974. The Luminant Oak Hill Mine has shifted its reclamation method of operation with the use of tractor pulled scraper pans for the transport and placement of the oxidized growth medium used in reforestation. However, there is a lack of information regarding the effects of scraper pans on mine soil compaction and tree establishment. This study is assessing the impacts of the scraper pan reclamation methodology and different tillage techniques in terms of mine soil properties and vegetative response.

**Methods**

Four soil tillage techniques (Fig. 2) were installed and planted with loblolly pine (*Pinus taeda*) seedlings. ANOVA is being used to assess:
1. Tree seedling volume index, survival, and above and below ground biomass
2. Above ground herbaceous biomass (1 m x 1 m quadrants) & % cover (Daubenmire method)
3. Soil bulk density (slide hammer method)
4. Soil strength (cone penetrometer)
5. Saturated hydraulic conductivity (surface only)
6. Soil pH, texture, water & nutrient content

**Objectives**

Development of new reclamation methodologies offers opportunities to improve tree seedling growth and ultimately long term productivity at the Luminant Oak Hill Mine (Fig. 1). Study objectives include:
1. Evaluate and compare soil physical and chemical properties between four tillage treatments at three soil depths (0-30, 30-60, 60-90 cm)
2. Investigate the influence of tillage treatments on above ground herbaceous cover and biomass and tree seedling survival and growth after one growing season

**Results**

- Above ground herbaceous biomass production was highest on the ripped treatments (Fig. 3)
- Differences existed in soil strength among treatments when water content was used as a covariate (Fig. 4)
- Higher percent cover was observed on the tilled plots when compared to the control
- No differences were detected for saturated infiltration
- Water content was highest in cross-rip + disk treatment
- Soil test pits will be used to investigate mine soil physical and chemical properties in July 2016
- First year survival, growth, and biomass of loblolly pine seedlings will be measured in October 2016

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