

USE OF ANIMAL WASTE AND FLUE GAS DESULFURIZED GYPSUM TO IMPROVE FORAGE PRODUCTION ON RECLAIMED MINE SOIL IN MISSISSIPPI¹

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Abstract: Knowledge of plant responses to animal or industrial byproducts is needed for effective use of these potential amendments on reclaimed mine soil. For example, soils amended with flue gas desulfurized (FGD) gypsum may tolerate higher levels of animal waste, and would therefore be more productive in the long-term. This paper presents results from a reclamation study in 2011 established at Red Hills Mine, a surface lignite mine in northeast Mississippi. Reclamation in the first year typically involves applying 560 - 840 kg ha⁻¹ fertilizer as 13-13-13 and production of bermudagrass (*Cynodon dactylon* L.) and browntop millet (*Urochloa ramosa* L.). The present study determined plant responses to 896 kg ha⁻¹ NPK fertilizer, 11.2 Mg ha⁻¹ FGD gypsum, 22.4 Mg ha⁻¹ poultry manure (litter); 22.4 Mg ha⁻¹ composted swine mortalities, NPK fertilizer + gypsum, litter + gypsum, and compost + gypsum. Each plot was 3.7 x 12.2 m and experimental design was a randomized complete block with three replicates. In May, the seven treatments were broadcast by hand and incorporated to 15-cm depth using a tandem disc, and seeds were planted using a Brillion cultipacker. Percent plant cover in August was similar among treatments. A single harvest on 30 September indicated the litter + gypsum amendment produced 4.3 Mg biomass ha⁻¹, similar to values obtained with litter only (4.2 Mg ha⁻¹), NPK fertilizer (3.3 Mg ha⁻¹), and NPK fertilizer + gypsum (3.4 Mg ha⁻¹). Plant growth was stimulated by amendments that provided N and other nutrients, as gypsum alone resulted in the least biomass of approximately 1.7 Mg ha⁻¹. Similarly, plants were approximately 8 cm taller in the litter than gypsum treatment (25 vs. 17 cm). Growth response to litter appeared to be associated with higher levels of P, K and Na in the 30-cm soil depth, as compared to other amendments.

Additional Key Words: Bermudagrass, Browntop millet, Composted pig mortalities, Fertilizer, Nitrogen, Poultry manure.

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