

Use of Poultry Litter, Swine Mortality Compost, and FGD Gypsum on Reclaimed Mine Soil in Mississippi¹

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Abstract: Knowledge of soil and plant responses to animal or industrial byproducts is needed for effective use of these potential amendments on reclaimed mine soils. This 4-yr study compared four treatments of 896 kg ha⁻¹ NPK fertilizer (13-13-13), 22.4 Mg ha⁻¹ poultry litter, 22.4 Mg ha⁻¹ swine compost, and poultry litter combined with 11.2 Mg ha⁻¹ FGD gypsum at a surface lignite mine in northeast Mississippi³. Treatments were applied to plots (3.7 x 12.2 m) of common bermudagrass in May and August each year. In 2013 and 2014, leachate water was sampled periodically at 60-cm depth from one lysimeter per plot. Experimental design was a randomized complete block with three replicates. In the analysis across years, forage yield was affected ($P < 0.01$) by the year by treatment interaction, but ranking of treatments was similar each year and values averaged greater in poultry litter than swine compost (6.47 vs. 3.37 Mg ha⁻¹). This response is credited to additional N, P, and K in poultry litter, as well as more C (approximately 35% in dry matter). In general, forage yield did not differ between poultry litter and standard NPK fertilizer treatment, which provides no organic matter. As compared to litter alone, co-application of FGD gypsum reduced soil bulk density by 9% and organic matter by 21%, and increased cation exchange capacity by 9% and soluble salts from 0.25 to 0.83 mmhos cm⁻¹. Among litter-amended plots, somewhat greater forage yield in 2013 than 2014 (4.8 vs. 4.3 Mg ha⁻¹) was associated with low leachate P content of 51 x 10⁻⁶ g on 18 June and 16 x 10⁻⁶ g on 25 July 2013, as compared with 130 x 10⁻⁶ g in June and 97 x 10⁻⁶ g in July 2014. Applying poultry litter improved plant growth and soil quality parameters in a respread area.

Additional Key Words: bermudagrass, fertilizer, leachate, manure, organic matter, respread soil.

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 3. Work reported here was conducted near 33° 18' N; 88° 0' W.