

EFFECTS OF INDUSTRIAL BY-PRODUCTS ON LEACHING LOSSES OF BROILER LITTER NUTRIENTS APPLIED TO MINE SOILS AS RECLAMATION TECHNIQUE IN MISSISSIPPI¹

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Abstract: Surface coal mining in Mississippi results in the mining and reclamation of approximately 40 to 49 ha a year. Initially, reclaimed lands are low in organic C. In the same region, concentrated broiler production facilities generate approximately 1.1 million tones of broilers litter per year which is in excess of crop needs and can be used as good source of organic matter for mine soil reclamation. The use of large quantities of manure for mine soil augmentation may lead to nutrient discharge to the environment in the form of leached nutrients. Several industrial by-products such as Flue Gas Desulfurization (FGD) gypsum sourced from coal combustion byproducts, short fiber paper mill sludge from paper mills or sawdust from furniture companies, and other C-rich materials have shown the potential to minimize nutrient and heavy metal leaching losses; however, these effects have not been studied in reclaimed coal mine soils. A greenhouse study was conducted to determine the effects of broiler litter application, alone or in combination with industrial by-products, to coal mine soils on nutrient leaching losses. Small columns of mine soil amended with treatments were collected into 30 cm long and 10 cm wide PVC pipe. Treatments include inorganic fertilizer and lime which represent normal reclamation treatment as a control, fresh manure 5 kg m⁻² (50 Mg ha⁻¹), compost at the rate of 10 kg m⁻² (100 Mg ha⁻¹), fresh manure plus sawdust or paper mill sludge 3 kg m⁻² (30 Mg ha⁻¹) and combination of manure and compost with FGD gypsum at 1 kg m⁻² (10 Mg h⁻¹). Treatments were replicated 3 times. Columns were periodically leached using deionized water and the leachate was collected and analyzed for nutrients and microbial concentrations. Detailed information on leaching losses of nutrients and leachate microbial concentrations will be presented and discussed.

Additional Keywords: Flue Gas Desulfurization, Water Holding Capacity, Manure

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