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Use of Sludge as an Alternative Pasture Fertilizer

By Dr. Martin Adjei and Dr. Jack E. Rechcigl
Extension Agronomist and Professor of Soil Science, UF-IFAS

For questions or comments regarding this publication contact
Dr. Martin Adjei or Dr. Jack E. Rechcigl

Diminishing landfill space, increasing landfill costs, and concern over air pollution from incineration of domestic wastes have generated strong interest in the alternative use of municipal sludge as fertilizer on pasture grasses. The concept of using organic wastes for fertilizer is not new. Prior to the introduction of inorganic fertilizer in the 1940's, organic wastes were the major means of fertilizing crop land around the world.

Ungrazed field plot and greenhouse trials were conducted at the Range Cattle Research and Education Center at Ona, to compare organic with inorganic sources of nitrogen (N) fertilizer on bahiagrass forage yield, quality, tissue minerals, and on concentrations of nitrates, phosphates and trace metals in groundwater. A 3-year (1998-2000) field study on Pomona Fine sand has shown that annual bahiagrass forage yield from lime-stabilized liquid sludge was similar to ammonium nitrate fertilizer at similar rates of N application. However, annual forage yield from lime-stabilized cake biosolid was consistently 65 to 75% the yield from ammonium nitrate fertilizer. This was due to a slower rate of N mineralization from the cake as compared to liquid sludge or ammonium nitrate fertilizer. The rapid N-release rate from ammonium nitrate induced a flush of growth, and a higher crude protein (CP) content and digestibility of forage only during early spring after application, thereafter, forage CP and digestibility were similar for the organic and inorganic fertilizers. Plant tissue minerals, especially phosphorus (P), potassium, iron and zinc, were higher in bahiagrass fertilized with organic residuals.

After three years of repeated use, lime-stabilized liquid sludge and cake biosolid increased pH in the surface 6" of soil to 5.6 as compared to 5.0 for the no fertilizer control, whereas, ammonium nitrate fertilizer decreased soil pH to 4.7. There was no marked difference in groundwater P level attributable to fertilizer treatments, including the no fertilizer control. The P concentration in groundwater above the spodic horizon (hardpan) was 10 times the concentration below the hardpan. Thus, P runoff, and not

leaching, is the likely avenue of P loss from pastures or sod regardless of fertilizer source, or if no fertilizer is applied at all. Groundwater nitrate and trace metal concentrations were similar for organic and inorganic fertilizers. There was no increase in weed incidence on bahiagrass plots from repeated use of organic residuals.

Several precautions should be observed in using organic residuals for fertilizer. Nutrient loading limits (now 200 pounds of N/A for pasture) should be observed. Fermented sludge from recirculating tanks is not suitable for permanent pasture because residuals must be turned under the soil immediately after application. Lime-stabilized sludge (which has its pH raised to 12 for a minimum of two hours) is a class B material in terms of pathogen and vector attraction reductions. Following field application of a class B residual, pasture cannot be grazed for 30 days and sod cannot be lifted and sold for 12 months. Class AA residuals, which is treated with heat or radiation to reduce pathogens and vector attraction, has no restrictions on grazing or sod lifting. The Environmental Protection Agency has imposed limits on trace metal concentrations in organic residuals for land application and cumulative soil limits on trace metals. Finally, one should test soil pH every couple of years when using lime-stabilized sludge and not exceed a pH of 7 which reduces availability of micro nutrients to bahiagrass pasture. For more information on trace metal limits call the author at 863-735-1314.