

# Use of Calcium-Containing Coal Combustion Products and Organic Matter to Reduce Soil Erosion

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## ABSTRACT

Previous studies of FGD gypsum applied to soil showed it improved water infiltration, decreased runoff, and reduced soil erosion (Flanagan, Norton, and Shainberg, 1997a & b). A laboratory study was conducted to examine the two other types of CCPs, a reclaimed, class C fly ash marketed under the name Nutra-Ash and an organic sludge stabilized with alkaline Fluidized Bed Combustion (FBC) ash called SoilerLime. Natural gypsum (as a calcium source) and turkey compost (as an organic mulch) were also included for comparison.

Total measured runoff volume was reduced using Soilerlime (26.8%), gypsum (7.29%), Nutra-Ash (3.7%), but not turkey compost (-7.1%). Total sediment loss was reduced using gypsum (40.2%), SoilerLime (33.9%), Nutra-Ash (6.5%), and turkey compost (17.8%). A higher decrease in sediment loss but lower decrease in runoff is an indication of improved resistance to erosion but not an improvement in infiltration. The SoilerLime treatment reduced runoff more effectively than the Nutra-Ash, but it contained six times more calcium. Calcium ions are known to be effective at improving soil structure and increasing water infiltration. The effectiveness of the Nutra-Ash at reducing sediment yield peaked at 30 minutes, and then decreased to levels comparable to the control. This may indicate a limited concentration of soluble calcium containing minerals, not unexpected since the ash was reclaimed from a landfill and had been exposed to water.

The effectiveness of the SoilerLime at reducing both runoff and sediment loss may be due to a combination of both soluble calcium and organic matter. Organic matter broadcast as a surface mulch protects the soil particles from dispersion due to raindrop impact thus reducing soil erosion. Composted turkey litter reduced total sediment yield by 17.8%, but did not reduce total runoff, an indication that organic mulches do not necessarily increase infiltration rates. Based on this work, it appears that calcium-containing coal combustion products can be effective amendments for reducing soil erosion, but their effects are dependent on the concentration and the solubility of the calcium containing minerals. A combination of soluble calcium minerals and organic matter provided the best reduction in erosion.