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Managing Manure for Reduced Phosphorus Runoff: Residual Effects of Applied Manure and Deep Plowing

Continuous manure application often results in greatly increased soil P levels, especially in the surface soil in cases of surface application in no-till and conservation tillage systems. Manure application often result in improved soil physical properties leading to reduced runoff and erosion, and increased protection of soil P and C in soil aggregates. In this field study with natural runoff events, the residual effect of previously applied composted fieldlot manure was determined for 2001 to 2005. The compost had been applied annually from 1998 to 2000. Some of the compost-applied plots were plowed in the spring of 2004 to bury the high P surface soil. Compost application resulted in reduced sediment and runoff loss throughout these five years following application. Bray-P1 was 20 times higher in the surface 2.5 cm of soil with compost applied compared to no compost applied, and dissolved P, but not total P, loss was greater with compost applied. During the 18 months following plowing of some plots where surface soil Bray-P1 was extremely high due to the previous compost applications, runoff was reduced, sediment loss was not increased, and P loss was reduced compared with the comparable unplowed, compost-applied plots. While P loss was greater during the years following heavy composted manure application, the soil amendment effect of manure should be considered in assessing the risk of P loss to surface waters. One-time deep plowing to bury surface soil with extremely high Bray-P1 can be used to reduce P loss, but the potential for increased erosion should be considered.

Author: Charles S. Wortmann
University Affiliation: University of Nebraska
Co-Author(s): N/A