Phosphorus Reactions in Manure Amended Alkaline Soils. (S11-hansen124334-Oral)

Authors:

- J.C.Hansen University of Idaho, Moscow, ID
- D.G.Strawn University of Idaho, Moscow, ID
- B.Cade-Menum Stanford University, Stanford, CA

Abstract:

Loss of phosphorus from agricultural systems to surface water leads to eutrophication and severe deterioration of water quality. The goal of this project is to compare the geochemistry of P-cycling in alkaline soils amended with liquid lagoon manure and solid manure. To accomplish this goal we measured desorption kinetics and used P-NMR to speciate P in the treated soils. The P desorption rate from the soils was initially fast followed by a slower reaction as the apparent equilibrium was reached after 8 days. When applied to various kinetic models it was found that the data were best fit with a modified Elovich equation. Desorbed P was found to be primarily inorganic with little soluble organic P being desorbed. Total organic P in the soils amended with solid manure was 17% (surface) and 33% (subsurface). Soils amended with liquid lagoon manure had 13% (surface) and 7.5% (subsurface) total organic P. Using P-NMR spectroscopy (NaOH-EDTA extracts) the P was found to be primarily orthophosphate, with smaller amounts of phosphate monoesters. These findings provide new insight into P reaction mechanisms in manure amended alkaline soils. This information can be used to accurately predict P availability for leaching and runoff into ground and surface waters.

Corresponding Author Information:

Jeremy Hansen University of Idaho University of Idaho, PO Box 442339 Moscow, ID 83844-2339 phone: (208) 885-2713 fax: (208) 885-7760 e-mail: jeremyhansen70@hotmail.com

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