Liming and Tillage Effects on the Activities of Fifteen Enzymes in Soils. (S03-tabatabai143458-Oral)

Authors:

- M.Ekenler* *Iowa State University*
- M.A.Tabatabai Iowa State University

Abstract:

In this study, we assessed the effect of lime application and tillage practices on the activities of 15 enzymes involved in C, N, P, and S cycling in soils of four long-term replicated field experiments. The sites are located at the Northeast Research Center, Southeast Research Center, Northwest Research Center, and Armstrong Farm in Iowa. The sites were established in 1984, 1989, 1992, and 1995, respectively, with lime application rates ranging from 0 to 17920 kg ECCE ha-1. The tillage treatments were initiated in 1992 as notill, chisel, and ridge till. Surface samples (0 to 15 cm) were taken and analyzed for organic C, N, pH; and microbial biomass C and N. The activities of the enzymes were assayed at their optimal pH values and substrate concentrations. Results showed that organic C and N were not significantly affected by lime application at each site, whereas the soil pH varied markedly. With the exception of acid phosphatase, which decreased linearly with increasing soil pH, in general, the activities of all the other enzymes assayed significantly increased with increasing soil pH. (delta) enzyme activity/(delta) pH varied markedly among the enzymes and sites; indicated that more than one enzyme activity can be used for monitoring ecosystem health and soil quality. The activities of all enzymes were greater in soil treated with chisel compared with those obtained for soils under no-till and ridge till.

Corresponding Author Information:

M. A. Tabatabai Iowa State University Department of Agronomy, Iowa State University Ames, IA 50011-1010 phone: 515-294-7848 fax: 515-294-3163 e-mail: malit@iastate.edu

Presentation Information:

Presentation Date: Wednesday, November 13, 2002 Presentation Time: 1:30 pm

Keywords: Soil Enzymes, Soil pH, Microbial Biomass C, Microbial Biomass N