Enzymatically Hydrolysable Organic Phosphorus in Sequentially Extracted Fractions of Swine Manure and Soils. (S08-he083544-Poster)

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Abstract:

Organic phosphorus (Po) exists in many chemical forms that differ in their susceptibility to hydrolysis and, therefore, bioavailability. In this study, we improved the enzymatic hydrolysis approach we previously proposed for characterization of Po in animal manure, and tested its applicability for investigating Po in soils, recognizing that soil and manure differ in numerous physico-chemical properties. We applied 1) acid phosphatase from potato, 2) acid phosphatases from both potato and wheat germ, and 3) both enzymes plus nuclease P1 to identify and quantify simple monoester P, phytate-like P, and polynucleotide-like P, respectively, in 100 mM sodium acetate (pH 5.0). This systematic hydrolysis procedure released Po in sequentially extracted H2O, NaHCO3, and NaOH fractions of swine manure, soils with different cultivation histories, and soils amended with animal manure. The stepwise addition of enzymes minimizes potential errors arising from enzymatic hydrolysis of overlapping substrates. The single pH/buffer conditions reduced background error associated with different pH and buffer systems used in previous research. Additional fine-tuning of the systematic approach may provide a universal tool for evaluating hydrolysable Po from a wide range of sources.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 4:00-6:00 pm

Poster Board Number: 2233

Keywords:
animal manure , soil P, organic P, phosphatase