

## ENVIRONMENT

**Title:** Land application of animal manure and phosphorus cycling in soil.  
**NPB# 99-109**

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**Date Received:** 8/2/200

### Abstract

Repeated land application of animal manure at rates to satisfy N requirements for crops may increase soil P to levels that cause environmental concern. Biochemical and microbiological parameters are important factors dictating P transformations in soil. Studies were conducted to investigate effects of animal manure application on activities of enzymes involved in P cycling in soils under a long-term continuous wheat experiment. Treatments included manure, P, NP, NPK, and NPK plus lime. Animal manure was applied every four years at 269 kg N ha<sup>-1</sup> (approximately 103 kg P ha<sup>-1</sup>) for over a century and chemical fertilizers were applied every year at 67 kg N, 14.6 kg P, and 28 kg K ha<sup>-1</sup> for 69 years. The highest Mehlich-3 extractable P was found in soils treated with P, followed by NP, NPK, NPKL, and manure. The activities of enzymes involved in phosphorus transformations in soil, including alkaline phosphatase, inorganic pyrophosphatase, and phosphodiesterase, were significantly higher in soils treated with manure. Microbial biomass C and total microbial activities were also the highest in manure-treated soils. Results suggested that long-term application of manure at 269 kg N ha<sup>-1</sup> every four years promoted biological activities and P cycling, but did not result in accumulation of excessive Mehlich-3 extractable P in soil.

*These research results were submitted in fulfillment of checkoff funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer reviewed*

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