

Animal manures applied to soil: Phosphorus bioavailability, losses to water and erosion

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Phosphorus (P) is a non renewable resource which highlights the significance of developing and using alternative sources of P for a sustainable agriculture. Animal manure is an option but its application to soils to meet crop nitrogen needs requires careful management practices to minimize freshwater eutrophication. The aim of this work was to evaluate the partitioning of applied P between plant uptake, losses to water, and erosion losses when using different animal manures and a mineral P fertilizer. A field trial was conducted at an erosion experimental station. The treatments were: Control (0 kg P/ha); cattle manure; solid fraction of pig and duck slurry and superphosphate, each applied at a rate of 50 kg P/ha after *Lolium* sp was sown. Soil samples from each trial were collected over the 9-month study and the water extractable soil P determined. It was found that desorption of P from all additions rapidly increased soon after P application (2 weeks). After that water extractable soil P remained fairly constant. While duck slurry desorbed the largest concentration of P, all sources have the potential to desorb P that could accelerate eutrophication. Plant uptake of P was greater with cattle manure added and released the least amount of P to water compared with the other sources of P. The partitioning of applied P between plant uptake and losses to runoff and sediments ranged between 5-12 % with the higher values in Duck treatment. Animal manures significantly increased soil Olsen-P, plant production and P uptake relative to mineral fertilizer. Animal manures can be considered as a source of available P nevertheless to avoid eutrophication risks increase plant P use efficiency is also important.