

Crop growth and phosphorus loss in a clay loam soil amended with Enviropig low-P manure

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Genetically enhanced pigs, Enviropigs™, that use efficiently phytate P in cereals and excrete manures with up to 75% reduction of P contained, provide an excellent option for reduction of P loading to water resources from agricultural farm lands. Understanding both the agronomic and environmental impacts of Enviropig low-P manure (ELPM) is essential to validate this innovative technology and to develop BMPs for best use of the manure. Studies were conducted to determine crop (rye grass) growth and soil P leaching loss in a Brookston clay loam soil amended with Enviropig manure, in comparison with the conventional pig manure (CPM). With the same amount of P added, rye grass growth and development and consequently the dry matter performed identically in the soil added with ELPM, relative to CPM. Soil P leaching was conducted using an undisturbed large soil core (30 cm d by 70 cm h) technique. Treatments included manures from four combinations of two pig genotypes (conventional pig - CPig and transgenic pig - TPig) with two diet formulas (conventional diet - CD and low P diet - LPD), and a control. All manures were added at a rate equivalent to 100 kg P ha⁻¹.

Manure application increased concentrations of all forms of P in soil leachate, regardless of pig genotype and diet formula. Compared with the soil amended with manure from CPig that was fed with CD, contents of leachate total P decreased by 29% in the soil amended with manure from TPig that was fed with LPD, but increased by 3% in the soil amended with manure from TPig that was fed with CD, an indication of excessive P supply. Content reduction of leachate total P was predominately accounted by dissolved reactive P (72% reduction), with a small portion by particulate P (6% reduction). Adoption of the Enviropig technology can be an environmental friendly approach, but has to be in combination with low P diet.