

CAN LOW-WATER SOLUBILITY PHOSPHORUS FERTILISERS DECREASE PHOSPHORUS LOSSES FROM AN ORGANIC SOIL?

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Abstract

In areas of frequent surface runoff, the risk of P loss can be decreased by using low-solubility forms of P fertiliser (e.g. reactive phosphate rock; RPR). It is unclear if the same is true of leachate where P forms must first interact much more with the soil before being lost in, for example, artificial drainage to surface waters. RPR contains apatite which increases in solubility in low pH environments. Our hypothesis was that dissolved P losses in leachate from soils receiving RPR would be similar to those receiving superphosphate at low pH, but at higher pH, RPR losses would be lower.

An acid mesic Organic soil was collected from a single paddock, sieved (8 mm), and packed into lysimeters at field bulk density. Lysimeters received treatments of superphosphate or RPR (equivalent to 0, 50, 100 or 200 kg P/ha) and applications of lime to maintain an initial pH of 4.5, 5.5 or 6.5. Lysimeters were seeded with ryegrass, watered over 12 months with the equivalent mean annual rainfall volumes and rates as at the collection site and leachate was collected.

Loads of filterable reactive and unreactive/organic P (< 0.45 µm; FRP and FUP) in leachate were greatest from the pH 4.5 treatment, with pH 6.5 treatments losing the least P over the trial. There were no significant differences in FRP or FUP loads lost from the RPR and superphosphate treatments at pH 4.5 and 5.5. However, at pH 6.5 the load of FRP and FUP lost from soils receiving superphosphate was greater than the equivalent RPR treatment. The results illustrate that the application of RPR to an acid Organic soil can result in FRP losses in leachate that rival those of superphosphate if soils are not limed sufficiently.