
Gypsum effects on percolated water characteristics at various soil P status

Liisa Pietola*, Ulla Kulokoski

Yara International ASA / Yara Suomi Oy, Mechelininkatu 1a, 00181 Helsinki, Finland,

*liisa.pietola@yara.com

Recently, the use of gypsum, i.e calcium sulphate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), has shown significant potential to decrease turbidity (NTU) or particulate phosphorus (PP) discharge in Finnish agricultural soils. Effects of the soil amendment on dissolved phosphorus (DRP) losses have also been detected. The focus of this paper is on DRP in percolate waters from soils having similar texture and pH but varying soil P-indices.

The test soils, originating from same catchment and owning similar barley cropping history at minimum tillage in the past 10 years, were sampled from 7 different locations to 0–10 cm depths after harvest. Soil P-indices close to 5, 10, 15, 20, 40 mg/l soil were analyzed by acid ammonium acetate (AAC), indicating medium (10–15 mg/l) and high (20–40 mg/l) soil P status. These soils were treated by mixing 2 g gypsum (moisture 18% v/v) per 0.5 liter soil and kept close to saturation in plastic pots of 10 cm height, perforated at bottom. After 2 or 5 days incubation, 150 ml water was applied to the soils. The percolated water was analyzed for DPR, NTU, electrical conductivity (EC) and sulphate (SO_4^{2-}).

Without gypsum, DPR (mg/l, y) depended on soil P_{AAC} (mg/l, x) typically by $y=0.0127x-0.0232$ (R^2 0.85). The gypsum treatment corresponding 4 ton/ha, however, changed this relationship to $y=0.0084x-0.583$ (R^2 0.90), indicating significant change in DPR concentrations at high soil P-status. Also NTU was remarkably decreased by gypsum but independently on soil P. Similarly, EC and SO_4^{2-} increased by gypsum.

Accordingly, the gypsum application has potential to control P leaching from soils of high P status in the intermediate period when high soil P indices are being driven lower. Because gypsum use as soil amendment is, according to other studies, easily applicable to farm management practices and does not harm crop growth, the measure would allow normal cultivation during P mining of most risky high P soils.