

Spreading gypsum for P adsorption

The research indicated improved adsorption of dissolved phosphorus by gypsum as soil amendment.

Effects of gypsum use as soil amendment to enhance phosphorus (P) trapping by agricultural soils have been indentified in laboratory and field conditions in large catchment (100 ha)¹⁾. To understand more closely why gypsum controls also dissolved phosphorus leaching, the soils amended by different gypsum rates were incubated by different P rates for Q/I analyses.

Materials and methods

The clay of low-medium P status (9,6 mg/l PAAc) was treated in laboratory by 0, 2, 4, 6 and 8 g/l gypsum and kept close to saturation in 0,5 litre pots perforated at bottom. The used gypsum originated from Siilinjärvi phosphogypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) containing 0,07% water-soluble P. As anticipated from previous studies, turbidity and concentration of dissolved phosphorus were decreased along with elevated electrical conductivity. The samples were determined with Q/I-plot technique at a soil-to-solution ratio of 1:50 using P additions of 0; 0,05; 0,1; 0,2; 0,3; 0,4; 0,5; 0,8; 1,0 and 1,5 mg/l were prepared

from KH_2PO_4 . Net adsorption or desorption was calculated from the difference in the P concentration in the solution before and after the equilibration. A modification of the Freundlich adsorption equation was used to calculate equilibrium phosphorus concentrations (EPC).

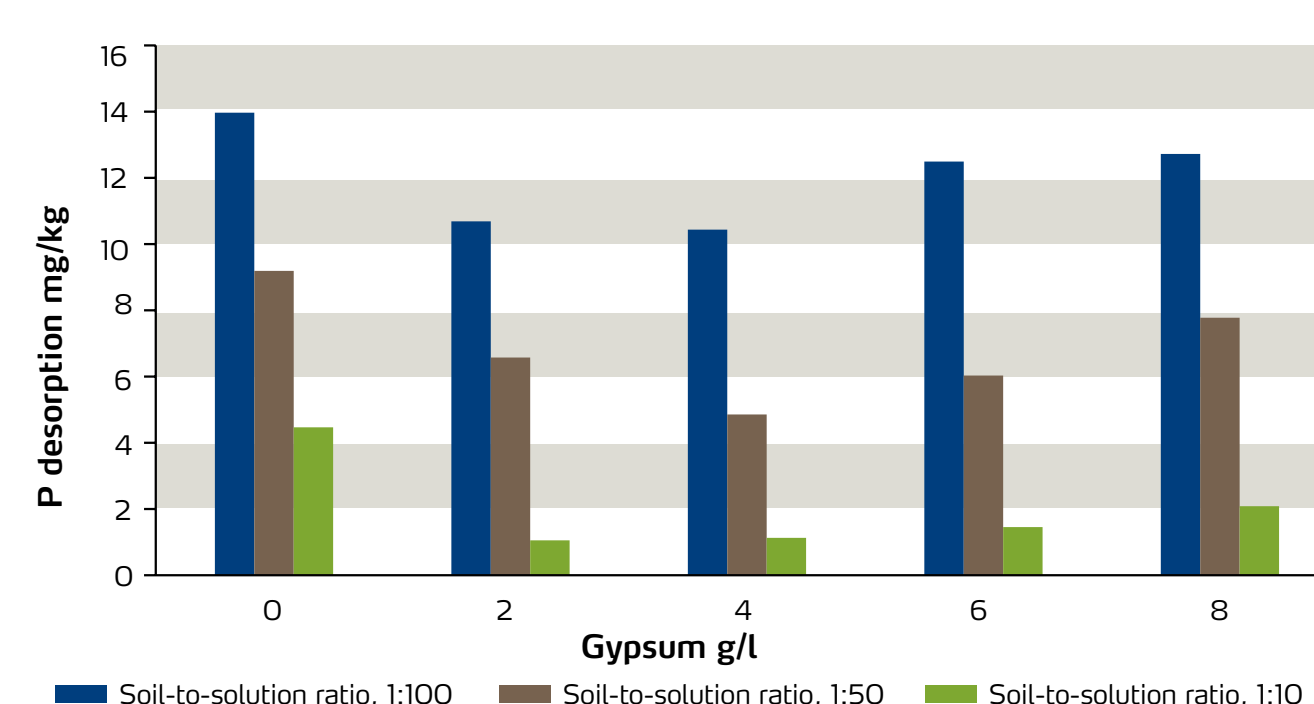
Results

Gypsum increased ionic strength which enhanced dissolved P adsorption, most efficiently at gypsum rate 4 g/l soil (Figure 1, Figure 2). The growing amount of ws P in phosphogypsum (rate 6 and 8 g/l) reduced the effects of ionic strength on the rate of P sorption (Figure 3).

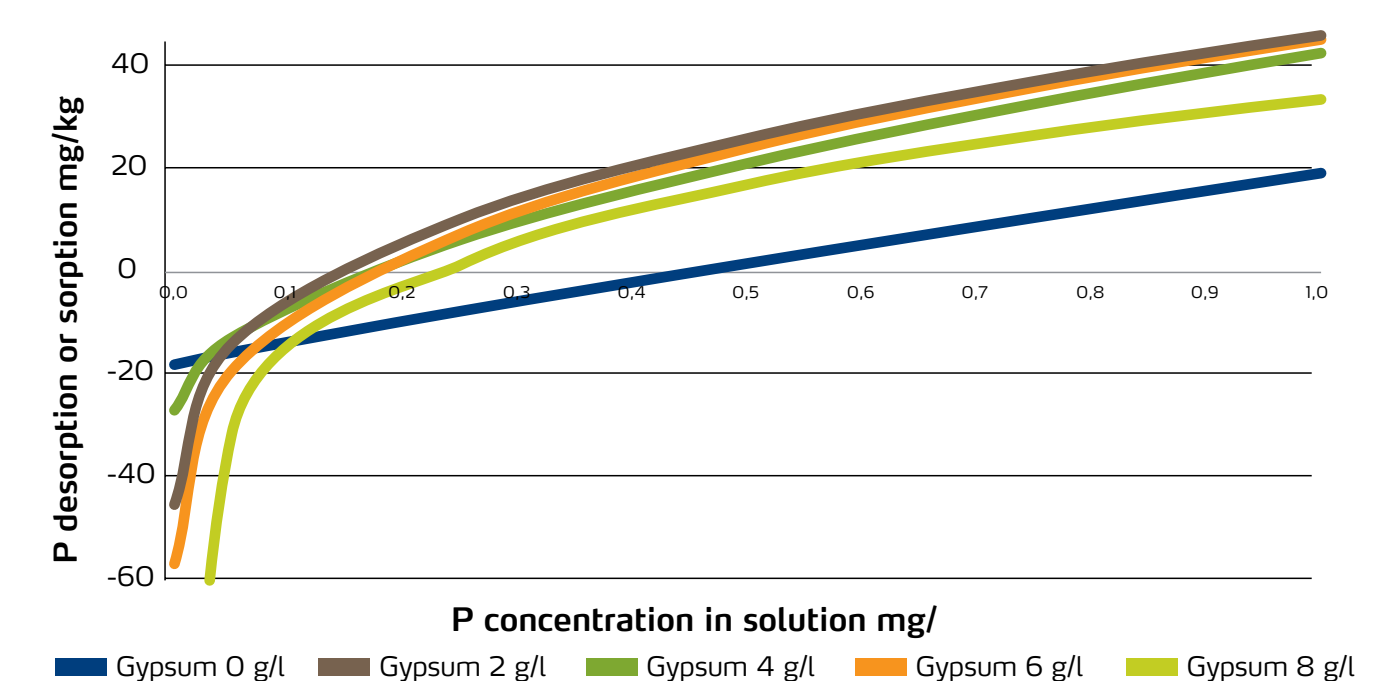
1 The Equilibrium Phosphorus Concentration (EPC) (mg/l)

Treatment (g/l)	The Equilibrium Phosphorus Concentration (EPC) (mg/l)
Gypsum 0	0,451
Gypsum 2	0,131
Gypsum 4	0,167
Gypsum 6	0,172
Gypsum 8	0,233

2 The effect of gypsum to phosphorus desorption from soil samples



3 The effect of gypsum on phosphorus sorption-desorption isotherms



¹⁾ [www.yara.com/sustainability/sustainable_agriculture/Baltic Sea - how to reduce phosphorus](http://www.yara.com/sustainability/sustainable_agriculture/Baltic_Sea_-_how_to_reduce_phosphorus)