
Testing phosphorus sorbing materials - results and questions about criteria

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In The Netherlands, it was long attempted to reduce the loss of phosphorus (P) to surface water only via general measures: lowering the amount of P in animal feed, reducing the amount of manure that can be applied, a ban on manure application in winter, etc. This has led to a gradual decrease in P content in surface water (Chardon and Schoumans, 2007), but on too many locations this remained too high. Therefore, innovative remediation practices are being developed that should address agricultural P loss to waters in the short term. Trapping P on its way to surface water via barriers or filters could be such a practice.

For binding P, we tested iron hydroxide (ferrihydrite) produced by oxidizing Fe²⁺ in anaerobic groundwater, pumped up for the production of drinking water. The ferrihydrite was either available as a sludge (with 33% Fe) or as a coating on filter sand (with 20% Fe).

In a batch experiment the sludge showed a very high affinity for P. However, the coating of the sand was not stable during shaking, so the coated sand could not be tested in a batch experiment.

In a column experiment we tested the coated sand and a mixture of 1, 5 and 10% sludge with resp. 99, 95 and 90% of pure sand; this gave an Fe-content of the mixtures of resp. 0.33, 1.65 and 3.3%. This was percolated with a solution of 4 mg ortho-P L⁻¹ at ca. 19 pore volumes a day. As expected, breakthrough was strongly, and negatively, correlated with the amount of Fe present in the column. In the near future, also granulated ferrihydrite will be tested.

Results will be presented, and the applicability of sludge, coated sand and granulated products will be discussed. Especially the hydraulic conductivity of pure products and mixtures will be addressed. Also, the methods for testing materials in the laboratory will be discussed, e.g. influence of initial concentrations used and kinetic aspects.

Reference

Chardon, W.J., Schoumans, O.F. 2007. Soil texture effects on the transport of phosphorus from agricultural land in river deltas of Northern Belgium, The Netherlands and North-West Germany. *Soil Use Manage.* 23 (Suppl. 1), 16-24