Phosphate adsorption on different filter materials

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A study of some Norwegian constructed wetlands in arable catchments showed that the average phosphorus (P) retention varied from 21-44% (Braskerud 2001). In catchments with vulnerable water bodies it is of interest to improve P retention in the constructed wetlands by including P adsorbing filters in the end of the wetland. Construction of filters at the outlet of tile drains is also a possible mitigation option. P retention in filters is expected to be a combined effect of retention of soil particles that are too small for sedimentation in the wetland and adsorption of dissolved P. Here, results from a laboratory study of adsorption of phosphate to four different materials of interest for use as filters in constructed wetlands are presented.

The filter materials tested were Maxit Filtralite P, Kemira CFH-12, crushed lime stone and coral sand. In Kemira CFH-12, Fe is the active component (ferric hydroxide granules), whereas in the other three Ca is the active component. The laboratory experiment was performed with four different phosphate concentrations in the range from 50 to 500 µg P/L, three different contact times (30 min, 2h and 6h) and with 1 g filter material to 30 ml solution.

The ferric hydroxide granules were superior to the other filter materials. At 30 min contact time and 500 µg P/L, 88% of P was adsorbed, whereas at 6 h contact time 99% of P was adsorbed. Crushed lime stone adsorbed less than 20% of P in the 500 µg P/L solution. Filtralite P and coral sand showed quite similar ability to adsorb P. At 30 min contact time and 500 µg P/L 35-50% of P was adsorbed, whereas at 6 h contact time 78-90% of P was adsorbed.

Reference

Braskerud, B.C. 2002. Factors affecting phosphorus retention in small constructed wetlands treating agricultural non-point source pollution. Ecological Engineering 19, 41-61.