

Removal of phosphorus from drainage water using an enveloped tile drain

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In Dutch surface waters, phosphorus (P) concentrations are often too high and eutrophication is a major problem. Leaching of P from agricultural land contributes largely to the total P load of surface waters. However, with source-oriented measures such as equilibrium fertilization, in certain parts of the rural areas the primary objective of the Water Framework Directive will not be met. Additional measures are, therefore, needed that can contribute to improving the chemical surface water quality.

We tested the effectiveness for reducing P leaching of enveloping a drainage pipe with iron-coated sand, a side product of drinking water production from anaerobic groundwater. We previously tested iron coated sand in the laboratory and found that it can bind P very well (Chardon et al., 2011). The field test was conducted on a dune sandy soil in the flower bulb-growing area in the western part of The Netherlands, where high concentrations of P can be found in surface and drainage waters. Concentrations of P in the effluent of the enveloped drainage pipe was compared with the quality of the effluent from two control drainage pipes. Preliminary results show that the average treatment efficiency is around 94%. The iron-coated sand did not lead to increased leaching of iron; on the contrary, less iron was found in the effluent from the enveloped drainage pipe when compared with the results of the control drainage pipes.

We conclude that surrounding drainage pipes with iron-coated sand seems to be a promising measure to reduce P leaching.

Chardon, W.J., J.E. Groenenberg, E.J.M. Temminghoff, and G.F. Koopmans. 2011. Use of reactive materials to bind phosphorus. *J. Environ. Qual.* in press.