

Mining soil phosphorus by zero P application: an effective method to reduce P loading to surface water?

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High soil P contents in agricultural soils in the Netherlands cause excessive leaching of P to surface waters. The reductions in P application rates in the present manure policy are not sufficient to reach standards resulting from the European WFD in 2015. Accordingly, additional measures have to be considered to further reduce P loading to surface water.

Greenhouse experiments showed that a rapid reduction in soluble P and readily available soil P can be obtained by zero P application (Koopmans et al., 2004). Field data confirming these findings were scarce thus far.

In 2002, a P-mining experiment started on four grasslands sites on sand (2 sites), peat and clay soils. The mining plots received no P, and 300 kg ha⁻¹ yr⁻¹ mineral N. The grass is removed by mowing five to seven times a year. At the same sites the effects of different P surpluses (0-40 kg P₂O₅ ha⁻¹ yr⁻¹) are studied from 1997 onwards, giving the opportunity of comparing the effect of mining with regular manure policy.

Mining soil phosphorus by zero P-application, over a period of four years, led to a strong (30-90%) reduction in both MRP and MUP concentration in the uppermost soil layer (0-5 cm). The reduction in concentrations declined with depth and changes were generally not significant in the deeper (up to 30 cm) soil layers. Mining also led to a decline in P pools in the soil solid phase. The largest decline was found in water extractable P, whereas reductions in more strongly bound P forms like oxalate extractable P and total-P were not yet significant (van der Salm et al., in prep).

References

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