

Phosphorus leaching from two Swedish organic soils mitigated with Fe coated biochar- A lysimeter study

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Agriculture in Northern Europe is one of the major contributors of non-point source phosphorus (P) which has resulted in eutrophication of the Baltic Sea. The introduction of the HELCOM Baltic Sea Action Plan in Sweden and its goal to have nutrient concentrations and algal bloom occurrences as close to natural as possible has heightened the need to identify all possible nutrient polluting sources.

One of these important sources is leaching of P through mineral soils. This has been well documented in many studies throughout the world and also in Sweden. Leaching from organic soils or peat soils have been far less documented in recent times.

In an attempt to quantify potential concentrations and loads of P from organic arable soils, two soils from central Sweden were utilised in a lysimeter study using 90cm long by 30cm diameter undisturbed soil columns. As previous international studies have shown high loads of P from similar soils, a 3cm layer of Fe coated biochar was added as a filter treatment placed 30 cm under the soil surface aimed at reducing P leaching. Mean total P loads over a one year period from soil 1 were: control 0.42kg ha⁻¹ (S.D. 0.11), Fe biochar 0.36kg ha⁻¹ (S.D. 0.11) (n=3). Soil 2: control 0.6kg ha⁻¹ (S.D. 0.23), Fe biochar 0.32kg ha⁻¹ (S.D. 0.02) (n=3). Measured loads in both control and Fe biochar treatments were at a level that could promote eutrophication in surface waters. Although the biochar results suggest a potential for this method as a mitigation measure, placement of a 3cm layer 30cm below the soil surface in the field is impractical. Improvements on this idea could include back-filling existing or new drainage trenches with a layer of Fe treated biochar. More comprehensive larger scale testing is required before a thorough conclusion can be made.