

Catch crops for phosphorus

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Catch crops have successfully been used to mitigate losses of nitrogen (N) from agricultural land, but their impacts on phosphorus (P) losses are uncertain. Cultivating catch crops of appropriate species and varieties may effectively reduce P losses through surface runoff and erosion by increasing water infiltration and improving soil structure. In addition, catch crops may act as a sink of plant-available P after the main crop has been harvested. Opposite, they may act as a source, since P may leach from the very plant cells e.g. when destroyed by frost. This is of great concern for Nordic countries with cold winter climate and many freezing-thawing cycles of the soil. As a part of the understanding of the role of plant, including those on buffer strips, for P retention, the leaching from some selected plants are studied after freezing and thawing the whole plants including the soil.

In laboratory P leaching from various potential catch crops after a problematic winter climate is simulated through seven repeated freezing-thawing cycles. Lysimeters with five plants representing two different clay soils from two climatic regions in Sweden are used. The plants presently tested are: ryegrass (*Lolium perenne* L.), cocksfoot (*Dactylis glomerata* L.), oil radish (*Raphanus sativus* L.), honey mustard (*Phacelia tanacetifolia* L.) and chicory (*Cichorium intybis* L.). In each cycle, the plants and soils are frozen 12 hours at -18°C and thawed another 12 hours at $+18^{\circ}\text{C}$. The soil columns (20 cm in diameter \times 25 cm in height) are repeatedly irrigated with a total of 70 mm water, with the intensity of $10\text{ mm}\cdot\text{h}^{-1}$, before and after freezing-thawing cycles. Basic soil physical and chemical properties, P content in plant, and dissolved reactive P (DRP), particulate bound P (PP) and total P (TP) in the water leachate are analyzed as well.