STØTTET AF
Promilleafgiftsfonden for landbrug

Phosphorus filters as a mitigation tool to achieve the Danish climate goals for agriculture

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Poster or Oral (tick box)- oral

Introduction

Denmark aims to reduce agricultural greenhouse gas (GHG) emissions with 1,9 mil tons of CO_2e by 2030 (Ministry of Finance, 2021). Emissions from cultivated peatlands are recognized as one of the major GHG contributors in the Danish agricultural sector, though carbon-rich peatlands represent less than 7% of all cultivated areas in Denmark (Klimarådet, 2020). It is estimated that the annual GHG emission from Danish peatlands is roughly 5,7 mil tons CO_2e, corresponding to approximately 40% of all GHG emissions from the Danish agricultural sector (DCA, 2023). Thus, one of the Danish strategies to meet the climate goals is to rewet 50.500 ha of peatland soil (Ministry of Finance, 2021). However, rewetting can remobilize phosphorus (P) which can cause loss of aquatic biodiversity due to eutrophication. Therefore, all rewetting projects must undergo a nationally P-risk evaluation. So far, this evaluation has resulted in the rejection of 33% of all submitted rewetting projects due to the risk of substantial P-losses (Filsø S.S, 2019). Consequently, Denmark needs new P-mitigation strategies to reach the current climate goals for the agricultural sector. The GUDP FosLav project (2022-2025) aims at developing highly efficient P filters by utilizing and combining existing filter components. Hereby developing new P-mitigation tools, which can increase the acceptance rate of rewetting projects and thus accelerate the green transition of the Danish agricultural sector.

Methodology

The project entails three study sites across Denmark. Two of the areas are peatlands and one area consists of drained mineral soil. According to an initial analysis of soil and water chemistry different combinations of sediment filters from WaterCare Aps, electro-flocculation devices from Bio-Aqua A/S, and reactive filters from DiaPure AB will be tested and evaluated in relation to the retention of both particulate and dissolved P. Water samples will be collected at the inlet and after each filter component to determine the effectiveness of the individual filter components and of the whole filter system.

Results and discussion

The FosLav project has yet to produce results of the filter's effectiveness. However previous results from small-scale experiments have shown a monthly removal rate for TP varying between -33 to 88%, with an average removal of 61%, indicating an acceptable average efficiency. However, in the previous study only 10% of the drainage water from a 25-ha catchment was directed through the reactive filter component (Pugliese and Heckrath, 2022). Consequently, full-scale field experiments are necessary to evaluate the true potential of the filter systems, and this is the purpose of the GUDP FosLav project, which is currently collecting data from the first two active P-filter systems.

Acknowledgments

The FosLav project is funded by the Green Development and Demonstration Program and Promilleafgiftsfonden for Landbrug.

References

DCA, 2023
Mange udfordringer ved udtagning af lavbundsjord (au.dk)

Filsø, S.S, 2019. Erfaringer fra lavbundsordningen -Udtaning af kulstofrige jorde som klimavirkemiddel. SEGES Innovation P/S.
Rapport samlet_Barrierer og muligheder for realisering af lavbundsprojekter.pdf (altinget.dk)

Klimarådet, 2020. Carbon rich peat soils- Proposal for a new model for effective regulation and rewetting. Klimarådet.
ENGKulstofrige-lavbundsjorder_FINAL3-16dec20-final4.pdf (eeac.eu)

Ministry of Finance, 2021. Aftale om grøn omstilling af dansk landbrug.
Aftale om grøn omstilling af dansk landbrug (fm.dk)

Pugliese, L., Heckrath, G.J. 2022. Test of compact drainage filter system for phosphorus. Department of Agro Ecology, Aarhus University.
Status report 2022 P filter system Fensholt_updated.pdf