Project *brief*

Thünen Institute of Climate-Smart Agriculture 2024/29a

The positive impact of paludicultures on the greenhouse gas balance of a former grassland on fen peat

Philipp Köwitsch[1], Bärbel Tiemeyer[1], Sonia Antonazzo[1], Ullrich Dettmann[1]

- **We measured the greenhouse gas exchange of reed (*Phragmites australis*) as well as of narrowleaf and broadleaf cattail (*Typha latifolia und T. angustifolia*) grown as paludicultures at an experimental site in Lower Saxony.**
- **We found a considerable mitigation potential (around 48 t CO_2-equivalents per hectare and year) compared to a neighbouring grassland under low-intensity use.**
- **Water levels below ground during the establishment phase fostered the dominance of undesirable species, especially common rush (*Juncus effusus*).**

Background and Aims

To use peatlands for agriculture, they are usually drained which causes high emissions of greenhouse gases (GHG), especially carbon dioxide (CO_2) and nitrous oxide (N_2O). Paludiculture, i.e., the productive use of rewetted peatlands offers the possibility to maintain productive land use while mitigating these emissions. Besides wet grasslands, the cultivation of reed and cattail is currently being tested. However, data on the GHG exchange is so far rare. As these fen species possess aerenchymous tissues, the exchange of methane (CH_4) is of particular importance. To reduce CH_4 emissions, topsoil removal is discussed, but this might have negative impacts on yields due to the nutrient removal.

Methods

Within the joint research project "Product chains from fen paludiculture" we measured for two years the GHG exchange of three fen paludiculture species: reed (*Phragmites australis*), narrowleaf cattail (*Typha angustifolia*) and broadleaf cattail (*Typha latifolia*). Further, we investigated the effect of topsoil removal. To do so, the three species were planted at a former grassland (0.3 hectares) on fen peat, which was then rewetted and subdivided into several basins. Further, we determined the GHG balance of the dam surrounding the experimental field and of a neighbouring grassland under low-intensity use. In the first year, there were unfortunately problems with the water management system which caused dry spells and a dominance of common rush (*Juncus effusus*) in all treatments.

Key findings

- A well-functioning water management system is essential for a successful establishment of reed and cattail.
- Despite suboptimal water levels during the first year and considering the harvest in the second year, nearly all paludiculture treatments could be shown to be both a CO_2 and a GHG sink.
- During the investigated initial phase of two years, topsoil removal did neither decrease methane emissions nor yields.
- To optimize the GHG balance of the whole system, the share of dams should be minimized.
- It remains to be seen whether reed and cattail will be able to outcompete common rush.
- Further, the long-term nutrient supply especially of the treatments with topsoil removal needs to be clarified.

Further Information

Contact

[1] Thünen Institute for Climate-Smart Agriculture

Philippfernando.koewitsch@thuenen.de
www.thuenen.de/ak

Run time

09.2019-06.2023

Project-ID

2306

DOI:10.3220/PB1732866520000

Partners

- 3N Competence Centre Renewable Resources e.V. (Coordination)
- Jade University of Applied Sciences
- OWL University of Applied Sciences and Arts
- University Trier
- Leibniz University Hannover
- Julius Kühn-Institute
- Floragard Vertriebs GmbH

Funding

The project is funded by the European Regional Development Fund (ERDF) and the state of Lower Saxony as well as the Lower Saxony Ministry for the Environment, Energy, Building and Climate Protection and contributes to the implementation of the programme "Lower Saxony peat landscapes".

Kofinanziert von der Europäischen Union

EUROPA FÜR NIEDERSACHSEN