Rationale

The availability of nutrients and water determines soil quality parameters and the production potential for crops. We compare different wetland management practices regarding their effects on carbon sequestration, nitrogen retention, soil organic C stabilization, and nutrient balances. Moreover, soil-atmosphere gas fluxes are measured and used as sustainability indicators for soil organic matter stability, the closeness or openness of the nitrogen cycle, and the redox status of the soil. The effects of several agricultural treatments are being studied at the super test sites in the central experiment at three hydrological situations (0-2 [Fringe], 2-4 [Middle], 4-6 months [Center] of water saturation) on the dynamics of C and N between pedosphere and atmosphere.

Focus

Atmosphere

Input
- Atmospheric CO₂
- Nutrients (natural and anthropogenic fertilizers)
- Water

Output
- Greenhouse Gas Emissions (CO₂, CH₄, N₂O)
- Rates of C & N Loss

Results: Center Position

Highlights

Gleysoils in valleys are more “fertile” than Fluvisols in floodplains.

GHG fluxes (CO₂, CH₄, N₂O) are highly variable between treatments

Fe content is higher in the topsoil of fringe than in center positions

No clear pattern (treatment or position effects) were apparent for C and N stocks

Methods

The intensive monitoring program of three different hydrological wetland situations includes:
- Biweekly observation of GHG emissions by static chamber method
- Biweekly analysis of nitrogen and ammonia content
- Continuous measurement of redox-potential and temperature
- Density fractionation of SOM in profiles
- Pre- and post-crop observation of soil attributes

The aim is to measure seasonal and spatial changes in soil nutrient availability and greenhouse gas emissions.

Soil profiles

Left: C-Stock and Fringe-Profile; Middle: N-Stock and Middle-Profile; Right: Organic-Matter Stock and Center-Profile

Contact: Sabine FIEDLER
Nicolas BRÜGGEMANN

Authors: B. GLASNER and K. WAGNER