

Nitrous Oxide (N_2O) Measurements in Field Trials

Franziska Eller

4th NFTN Conference 2026

Bedriftsudledningsprogrammet

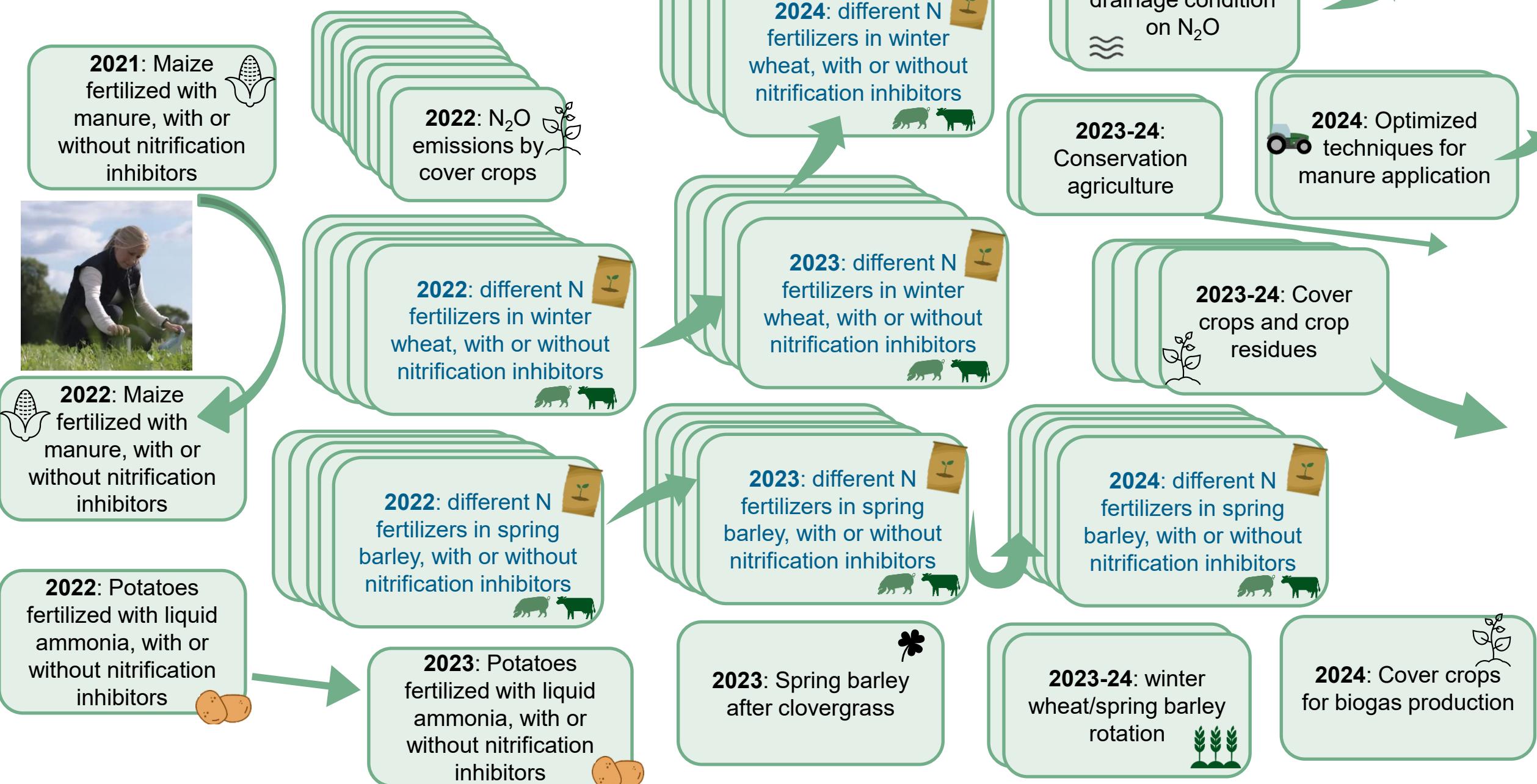
innovationsfonden

Promilleafgiftsfonden for landbrug

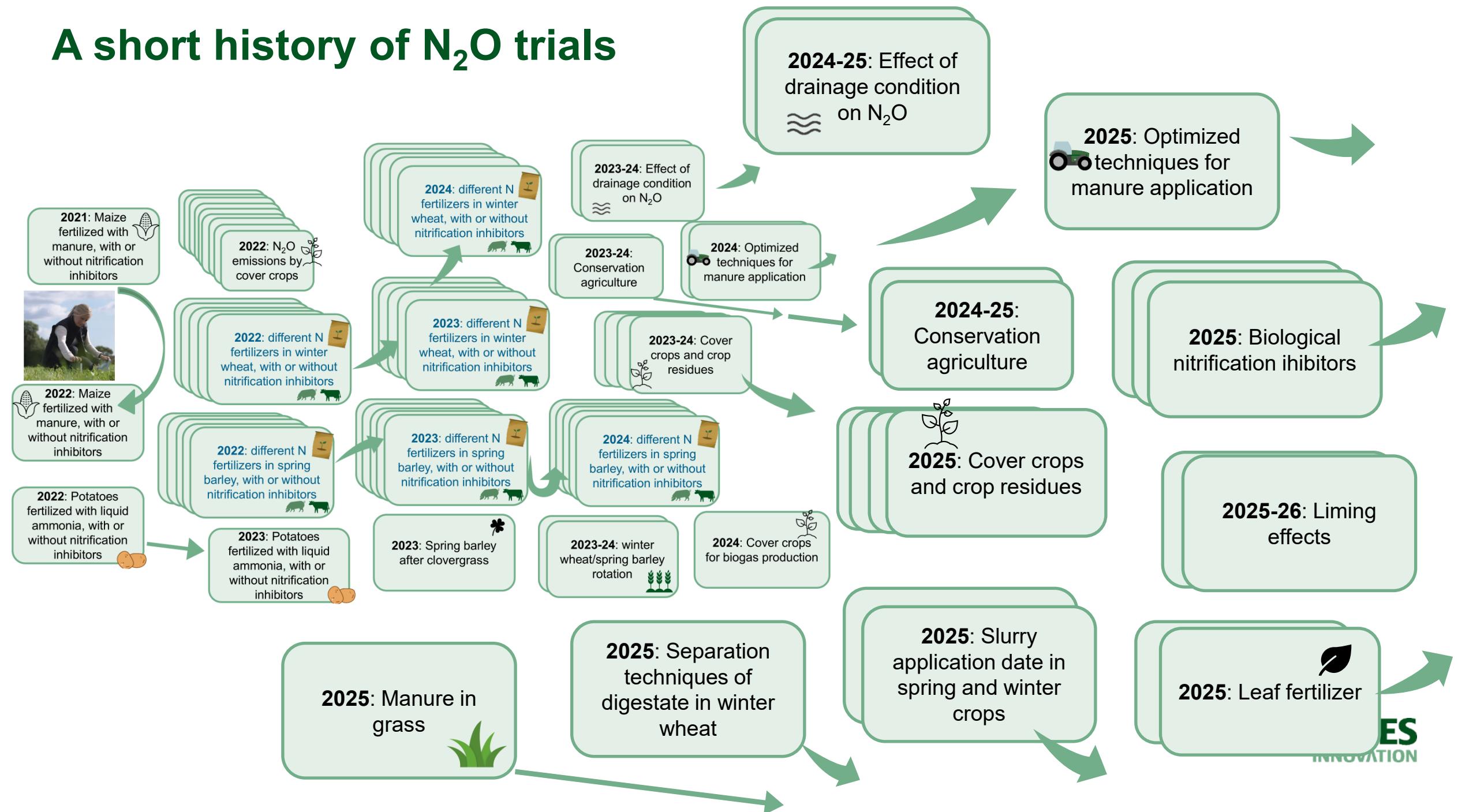
STØTTET AF

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A short history of N₂O trials



A short history of N₂O trials



A short history of N₂O trials

From 1 trial in 2021...

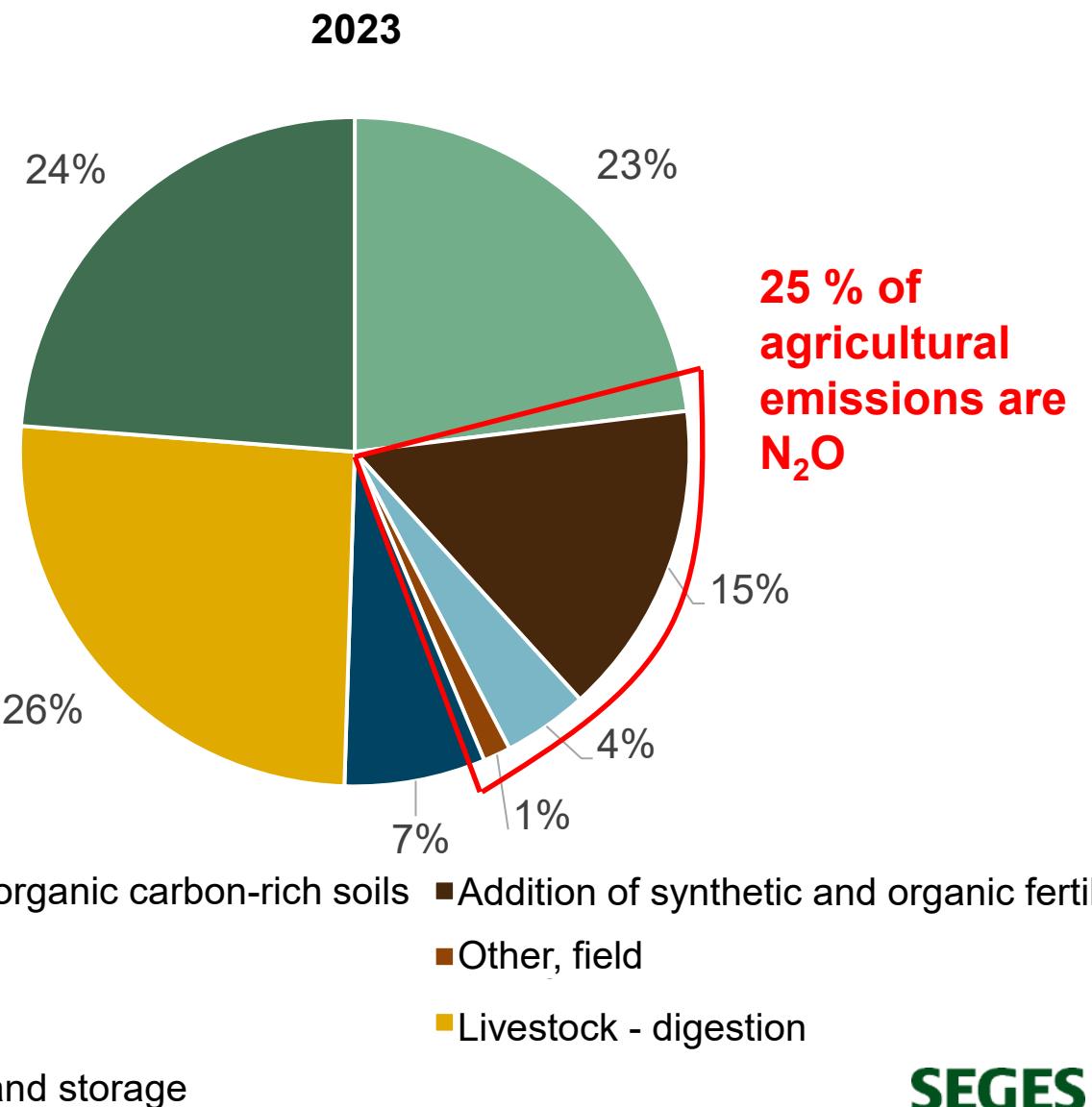
...to 21 trials in 2022 → 22 trials in 2023
→ 16 trials in 2024

→ 17 trials in 2025 and counting

77 trials from 2021-25

The purpose behind the initiative

- Contribute data to support the development of disaggregated national emission factors for N_2O
- Develop climate friendly fertilization and management strategies
- Give farmers options for action



The methodology applied



A milestone

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Contradicting default nitrous oxide emission factors: Average nitrous oxide emissions from mixed organic fertilizer application are higher than those from synthetic nitrogen fertilizers on Danish agricultural soils

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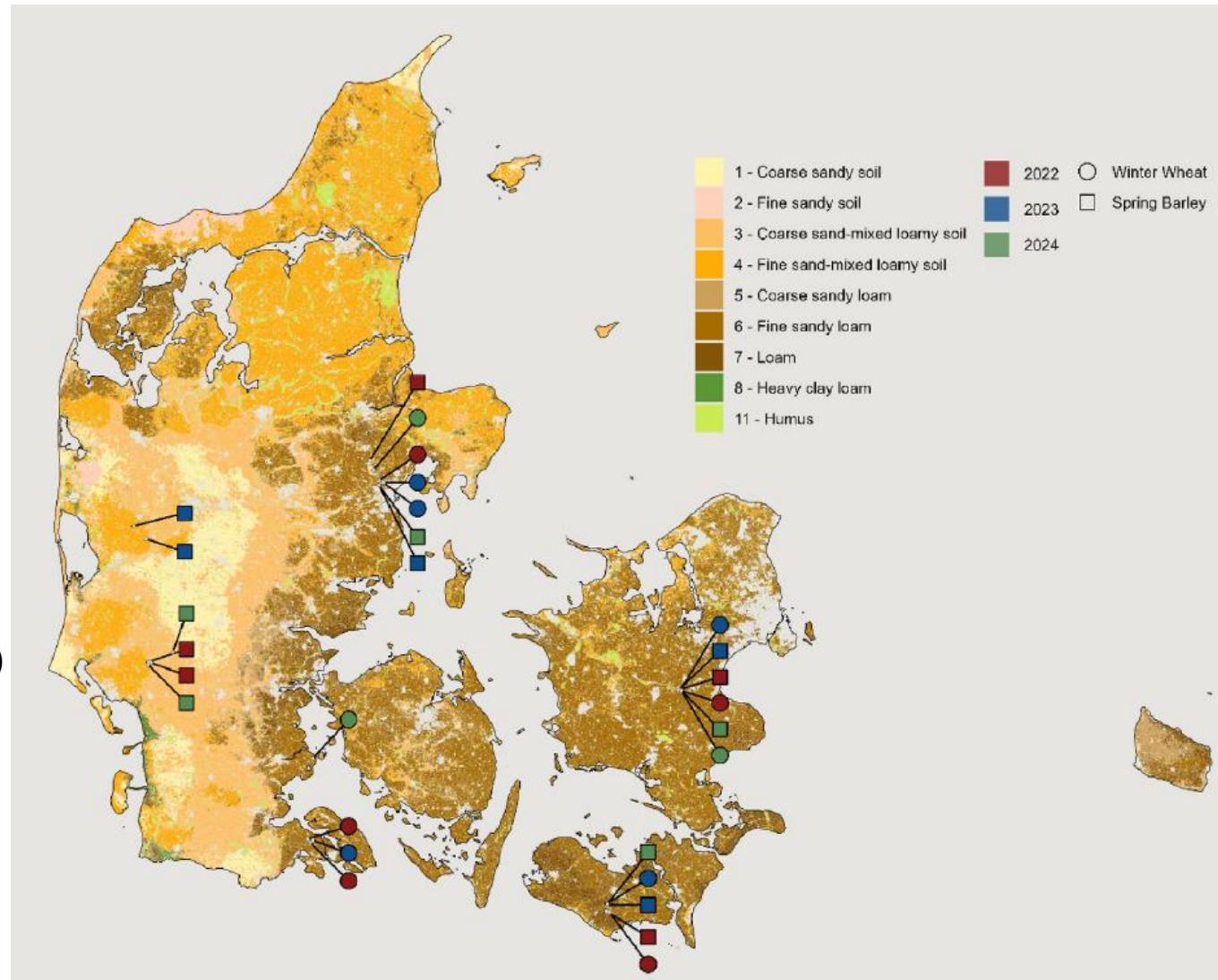


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N₂O measurements during the growing season

- **28 field trials:** 2022, 2023, 2024
- **Crops:** winter wheat or spring barley
- **Field management:** typical Danish field practices
- **Fertilization:**
 - Synthetic fertilizer
 - Pig manure
 - Cattle manure
 - Digestate
- **Control:** unfertilized reference

} + synthetic starter fertilizer
(≈ 1/3 of total N-dose)

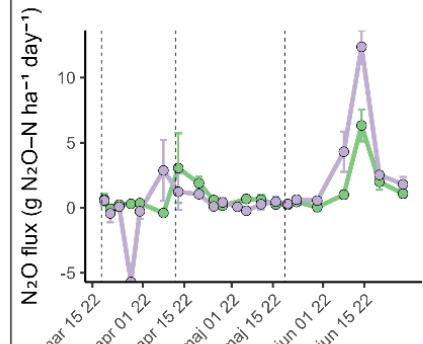


2022

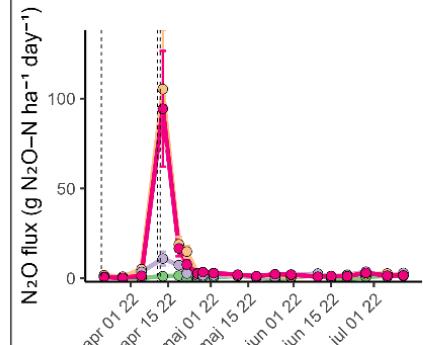
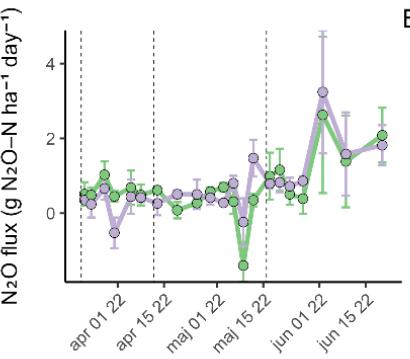
2023

2024

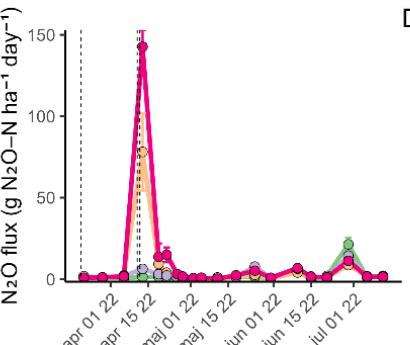
2022



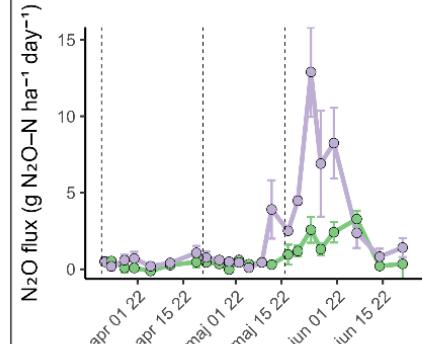
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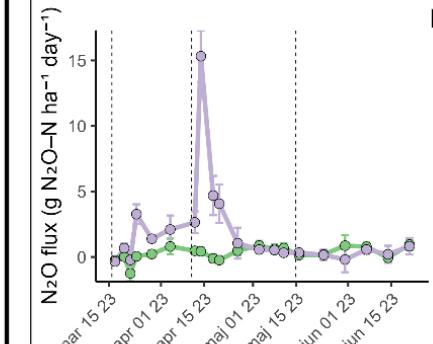
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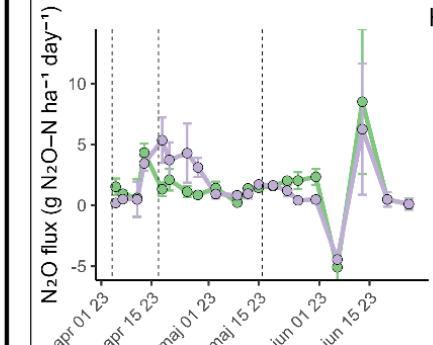
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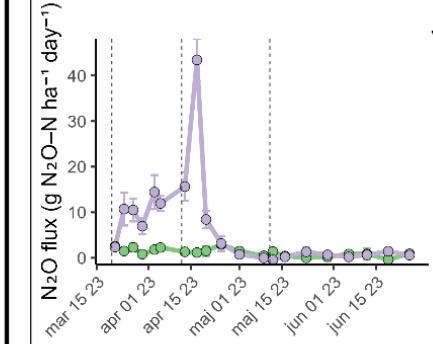
2023



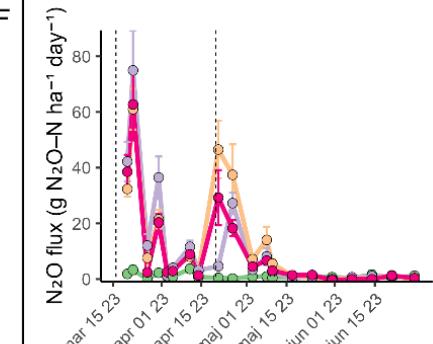
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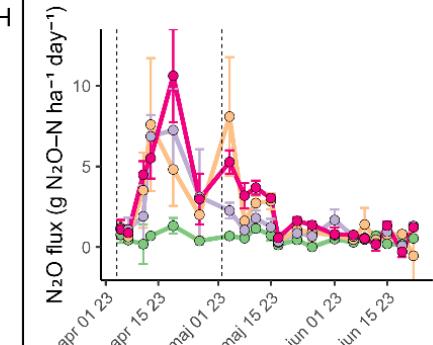
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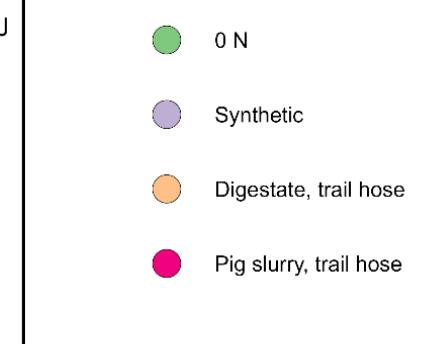
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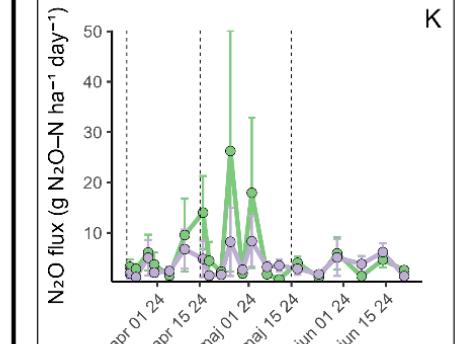
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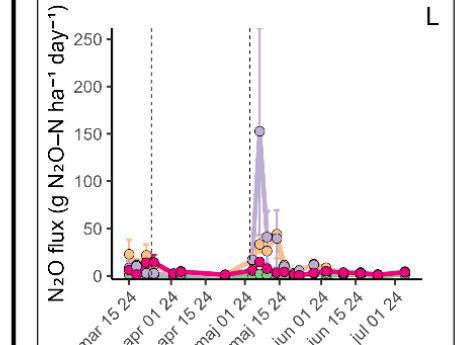
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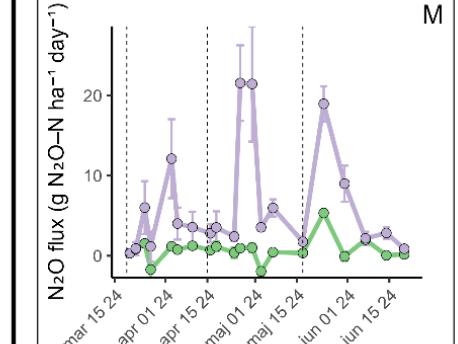
2024



K



L



M

Emission factors ($[\text{Emission}_{\text{fertilized}} - \text{Emission}_{\text{control}}] / \text{applied N}$)

Eller et al. 2026	Winter wheat (avg \pm SE)	Spring barley (avg \pm SE)	IPCC 2006	1	%	
	0,16 \pm 0,06	0,11 \pm 0,03				
Synthetic fertilizer	0,16 \pm 0,06	0,11 \pm 0,03				
Digestate	0,37 \pm 0,10*	—				
Pig manure	0,38 \pm 0,09*	—				
Cattle manure	—	0,38 \pm 0,05*				

*Including starter fertilizer

Future trials

- Automated chambers for higher temporal resolution
- Nitrification inhibitor test
- Nitrogen balance (ammonia, ammonium, nitrate, nitrous oxide, plant N)



A photograph of a person in a field, likely a scientist or researcher, standing near some equipment. The field is green and open, with a line of trees in the distance under a blue sky with some clouds. The person is wearing a dark jacket and is positioned in the center-left of the frame. In the foreground, there are several pieces of equipment, including a white rectangular box with a black cable, a clear cylindrical container, and some smaller white boxes. The overall scene suggests a field experiment or data collection.

**A huge thank you to all NFT employees, DTI, our
collaborators and funding bodies**

Thank you for listening