

THE NETHERLANDS: INTEGRATING NATURE-BASED SOLUTIONS FOR SUSTAINABLE NUTRIENT MANAGEMENT

Summary

The Dutch NBS site investigates plant-based fertilisation at the Planty Organic experimental field as a circular alternative to animal manure. By using legume biomass grown within the crop rotation, the system aims to reduce dependence on external nutrient inputs while maintaining a balanced nutrient cycle at the farm level.

The results indicate that this adapted organic cropping system offers promising opportunities, but also faces important challenges. One of the main challenges is synchronising nutrient availability with crop nutrient demand throughout the growing season. In addition, further research is needed to assess the economic feasibility and scalability of the system for financially sustainable commercial farms, particularly in view of the potential impacts on crop yield and land use.

This case demonstrates that plant-based fertilisation can reduce dependence on external nutrient inputs and contribute to a more circular nutrient management system. At the same time, further research is required to better understand and quantify its long-term agronomic performance and economic impact.

The need

The Dutch case responds to the challenge of improving nutrient circularity and reducing reliance on external inputs in specialised arable systems. Organic arable farms without livestock often depend on externally sourced certified organic manure, which can be scarce and expensive.

The case also addresses the need to develop sustainable nutrient strategies for a region specialised in seed potato production and located near vulnerable Natura 2000 areas such as the Wadden Sea and Lauwersmeer. There is a need to maintain productivity while reducing dependence on synthetic fertilisers, animal manure and externally sourced nutrients.



The benefits

- Reduced dependence on organic manure by expanding the use of plant-based fertilisation sources, such as grass-clover, lucerne pellets, and harvested legume biomass.
- Greater nutrient circularity by growing part of the required nitrogen within the crop rotation and returning plant biomass to agricultural soils.
- Practical insight into timing and availability of nitrogen through the NDICEA model.
- Innovation opportunities for specialised arable systems, including possible future consumer interest in crops fertilised without animal inputs.
- Strong science-practice connection through SPNA field trials, farmer meetings, videos, newsletters, webinars and involvement of crop advisors.



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trans4num solution

The Dutch NBS site provides practical insights into the opportunities and challenges of using plant-based fertilisers. At the long-term Planty Organic trial, legume biomass is grown within the crop rotation, harvested, stored and returned to the field based on crop nutrient needs and decision-support modelling.

Additional trials evaluate plant-based fertiliser pellets in winter wheat, grass-clover fertilisation in organic wheat, and NBS measures in seed potato production, including straw and grass-based mulches to improve crop health and reduce aphid-related virus risks.

The Dutch AKIS brings together SPNA, Wageningen University, farmers and crop advisors to test, evaluate and promote NBS in practice. SPNA runs the field trials, while Wageningen University provides scientific monitoring and analysis.

Knowledge exchange takes place through field meetings, lectures, newsletters, social media videos and webinars. Meetings at Ebelsheerd and Kollumerwaard were organised to present the results of the various field trials to stakeholders. In addition, several hybrid meetings were held to broaden participation and increase the reach of the project.

A distinctive feature of the Dutch AKIS is the involvement of an experienced but traditional crop consultant during the growing season. At each important cultivation decision, common best practice is compared with NBS alternatives. This creates a practical bridge between innovation and daily arable decision-making, increasing the chance that NBS findings can be translated into advisory practice and wider uptake.

What were the challenges / limitations in the implementation process?



- Plant-based fertilisers require careful timing to meet crop nutrient demand.
- Supplementary spring nitrogen may improve performance.
- Long-term monitoring is needed to account for climate variability.
- Monitoring challenges required additional data collection.
- Successful adoption depends on farmer and advisor adaptation.

What kind of resources do you need to implement the proposed solution?



- Legume biomass production and storage facilities.
- Plant-based fertilisers (e.g. grass-clover or alfalfa pellets).
- Decision-support tools for nutrient planning.
- Soil and crop monitoring and analysis.
- Advisory support for NBS implementation.
- Farmer communication and knowledge-sharing activities.

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More information

- Find more about the [Dutch NBS site](#)
- Read more [Practice Abstracts](#)
- [A day in the field at SPNA](#)



Learn more about the project at <https://trans4num.eu/en/>

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