

AGRIFUTURE: INNOVATING CROP ROTATIONS & SOIL HEALTH ON CLAY SOILS



Summary

The goal of AgriFuture is to develop a future-proof crop rotation system that meets the needs of tomorrow's farming practices. In this 'farm of the future', solutions are explored at the systems level for some of agriculture's most pressing challenges, including:

- Herbicide-resistant weeds
- Limited availability of chemical inputs
- Rising production costs
- Declining water quality
- Extreme weather and climate change

By addressing these issues in an integrated way, AgriFuture is working toward a farming system that is not only ecologically and economically sustainable, but also resilient and innovative.

The need

The Oldambt region features a distinctive arable farming structure, largely shaped by its heavy clay soils. While these soils are highly fertile, they limit crop diversity. As a result, the area is dominated by cereal crops, particularly grains, and relatively few root crops like potatoes or carrots are grown.

The landscape is defined by wide expanses of grain fields (especially winter cereals) interspersed with sugar beet, rapeseed, and an increasing share of seed onions. This crop rotation system is known as the Oldambt crop plan, a unique approach within the Netherlands. In other regions, root crops often play a more prominent role.

Although cereals are generally considered break crops, the tight grain-to-grain rotation typical of the Oldambt demands closer attention. Disease pressure, soil health, and maintaining crop yields remain key challenges for the long-term sustainability of arable farming in the region.



The benefits

The Oldambt crop rotation system is on the brink of a necessary renewal. To become more future-proof and sustainable, it needs a "version 2.0": a cropping system that not only offers economic viability for farmers but also contributes actively to addressing broader societal challenges.

Key focus areas include:

- Reduced use of fertilizers and crop protection products
- Enhancing biodiversity
- Improving soil health
- Protecting water quality (EU Water Framework Directive)
- Climate adaptation

Several promising ideas for sustainable transition are already in motion – both at the Ebelsheerd experimental farm and among individual farmers in the region. Examples of promising initiatives:

- Expanding crop rotations with legumes or mixed cropping systems
- Mechanical weed control and the use of robotics as alternatives to chemical inputs
- Collaborations between dairy and arable farms
- Use of organic by-products, such as compost or bokashi

By sharing knowledge and exchanging experiences, we are collectively shaping a renewed crop rotation system that is both profitable and environmentally responsible.



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trans4num solution

Goals for future-oriented arable farming:

- Develop a sustainable and future-proof Oldambt crop rotation system by 2030
- Achieve weed control and crop health without the use of substances listed under the CfS (Candidates for Substitution) list
- Significantly reduce the Environmental Impact Point System (MBP) at both farm and crop level
- Replace linear (synthetic) fertilizers with circular alternatives
- Implement climate-resilient water management tailored to the revised crop rotation
- Monitor soil health and biodiversity using Key Performance Indicators (KPIs)
- Map the CO₂ reduction potential of the cropping system
- Maintain or improve the financial profitability of the farm

What were the challenges / limitations in the implementation process?

- Working toward long-term goals using the tools and knowledge available today
- Balancing innovation with practical applicability on real farms
- Ensuring that forward-looking solutions remain feasible in day-to-day operations
- Aligning different perspectives from farmers, researchers, and advisors
- Maintaining ongoing dialogue to support shared direction and decision-making

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

- Access to appropriate crop rotations, limiting cereals to a maximum of 50% and incorporating spring crops
- Machinery and/or robotics for effective weed control as an alternative to chemical herbicides
- Agronomic support and knowledge sharing to reduce reliance on chemical inputs, including the use of resilient crop varieties and optimal sowing strategies
- Understanding of circular agriculture opportunities in the region, including cooperation between arable and livestock farms
- Monitoring tools to track soil and crop health and guide adaptive management

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More information

- [SPNA webpage on AgriFuture](#)
- [trans4num Dutch NBS site](#)

