

# trans4num: Nature-Based Solutions in Action



## About

trans4num accelerates the transition toward more sustainable agricultural systems in Europe and China by improving nutrient management through Nature-based Solutions (NBS).

trans4num tests and evaluates Nature-based Solutions across seven EU and Chinese agricultural sites, applying a multi-actor, system-level approach to assess impacts from field to regional scale and strengthen innovation uptake within AKIS.

For **farm advisors**, trans4num provides tested insights and practical evidence to support the shift toward more sustainable and resilient food systems.



### The United Kingdom: Novel Fertilisers and System-Level Rotation Strategies

**What is tested?** Alternative fertilisers and diversified rotation systems to assess productivity, profitability, and environmental performance under different management intensities.

The UK trials show that:

- The novel bio-fertiliser “Thallo” delivers yields comparable to conventional mineral fertilisers, demonstrating that alternative phosphorus sources can maintain yield potential.
- Grain quality and crop nutrient content remain stable under alternative fertilisation.
- Diversified crop rotations (3-, 5-, and 7-year systems) create measurable differences in yield stability and system resilience.
- Reduced tillage and organic amendments influence soil organic carbon dynamics.
- “Smart” crop protection strategies (variety blends and companion cropping) contribute to disease management while reducing chemical inputs.
- Financial monitoring (gross margins) allows direct comparison of agronomic and economic performance across systems.

#### Takeaways

- ✓ Alternative fertilisers derived from recycled biomass can replace conventional mineral inputs without compromising yield.
- ✓ Rotation length and diversity are strategic levers for improving resilience and reducing input dependency.
- ✓ Reduced tillage and organic amendments should be evaluated in combination, not isolation.
- ✓ Integrated crop protection (variety blends, companion crops) can support gradual reduction of fungicide and herbicide reliance.
- ✓ Financial performance must be assessed alongside agronomic results to guide farm-level decision-making.



### Denmark: Regional Nutrient Cycling and Regulatory Innovation

**What is tested?** Whether integrated Nature-Based Solutions can meet ambitious nutrient reduction targets in intensive farming regions – without reducing overall production.

The Danish case shows that:

- Perennial grass and grass-clover rotations significantly reduce nitrate leaching, while improving soil structure and soil organic matter.
- Green biorefining enables protein extraction for feed, while residues are reused as bio-based fertiliser and biogas feedstock.
- Bio-based fertilisers from refinery residues reduce dependency on synthetic fertilisers and strengthen nutrient autonomy.
- Dynamic nutrient modelling confirms the potential to reduce nitrogen losses at regional scale
- A Multi-Ministry “Regulatory Sandbox” enables experimentation with adapted regulation to support circular fertilisation systems.
- Strong stakeholder engagement across the value chain increases legitimacy and readiness for scaling.

#### Takeaways

- ✓ System transformation, not simple input reduction, is required to meet nutrient targets in intensive regions.
- ✓ Perennial biomass rotations can serve multiple functions: leaching reduction, soil improvement, and feedstock production.
- ✓ Regional nutrient cycling (farming-biorefinery-fertiliser reuse) creates new advisory roles linking production and processing sectors.
- ✓ Regulatory flexibility can accelerate innovation uptake when ministries, agencies, and practitioners collaborate.
- ✓ Cross-sector coordination and value chain alignment are essential for scaling Nature-Based Solutions beyond pilot farms.



### The Netherlands: Closing Nutrient Cycles with Plant-Based Fertilisation

**What is tested?** Plant-based fertilisation strategies (“Cut-and-Carry”), long-term organic rotations, and nature-based pest control to assess how closed nutrient cycles perform in both organic and conventional systems.

The Dutch experiments show that:

- “Planty organic” systems contain lower total nitrogen and phosphorus stocks across the soil profile compared to conventional systems.
- Organic management increases soil microbial diversity, strengthening biological soil functioning.
- Pure plant-based fertilisation can result in lower wheat yields, particularly under higher weed pressure.
- Organic materials such as straw mulch in seed potatoes reduce reliance on chemical crop protection, supporting natural aphid control and virus prevention.

#### Takeaways

- ✓ Plan nutrients precisely when using plant-based fertilisation: lower N and P stocks require careful balancing to avoid long-term depletion.
- ✓ Monitor biological indicators, not just nutrient levels. Increased microbial diversity can signal improved soil functioning even with lower nutrient stocks.
- ✓ Manage weed pressure proactively in fully plant-based systems to avoid yield penalties.
- ✓ Integrate organic materials strategically (e.g., straw mulch) to reduce pesticide reliance in high-value crops such as seed potatoes.
- ✓ Use nutrient budgeting tools to calculate application rates and improve decision-making in closed-loop systems.



### Hungary: Comparing Nature-Based and Conventional Farming Systems

**What is tested?** Field-scale trials (25 ha) compare a full Nature-based system with a conventional intensive system under a three-year crop rotation (durum wheat, sorghum, soybean).

The Hungarian comparative trials demonstrate that transitioning to an integrated Nature-Based System can deliver measurable environmental and agronomic benefits.

- Soil health indicators show improving trends, confirming the long-term regeneration potential of system-based approaches.
- Plant nutrient status remains stable even with reduced external inputs, indicating improved nutrient efficiency.
- Yields are comparable or higher, depending on crop type and seasonal conditions.
- CO<sub>2</sub> emissions are significantly lower, strengthening the climate performance of NBS systems.
- Drone-based monitoring highlights strong site-specific variability, underlining the importance of precision-informed advisory support.

#### Takeaways

- ✓ NBS can maintain productivity while reducing environmental pressure.
- ✓ Reduced-input systems can sustain crop nutrition when well-designed.
- ✓ Climate mitigation benefits can be quantified and communicated to farmers and policymakers.
- ✓ Site-specific variability must guide nutrient and system recommendations.
- ✓ Long-term monitoring is essential to validate system transitions.



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Website



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EU CAP Network



Oppla



Zenodo



# Growing, harvesting and sharing knowledge for rural futures

EU-FarmBook is a free, open-access platform designed for rural communities across Europe. It connects you to practical tools, guides, videos, and research-based insights from EU-funded projects that work to support farming, forestry, and broader rural development. **The EU-FarmBook makes valuable knowledge, innovations and projects easy to find and use.**

## FEATURES THAT MAKE A DIFFERENCE



### MULTILINGUAL PLATFORM

Language is often a barrier to sharing knowledge across borders. EU-FarmBook removes this hurdle with automatic translations in **24 EU languages** and **AI-assisted smart search functions**.



### FARM-ASSISTANT

The **AI chatbot** 'Farm-Assistant' provides responses only from materials on the platform. Every answer includes a link to the original source for deeper insights, ensuring accurate and **quick access to information**.



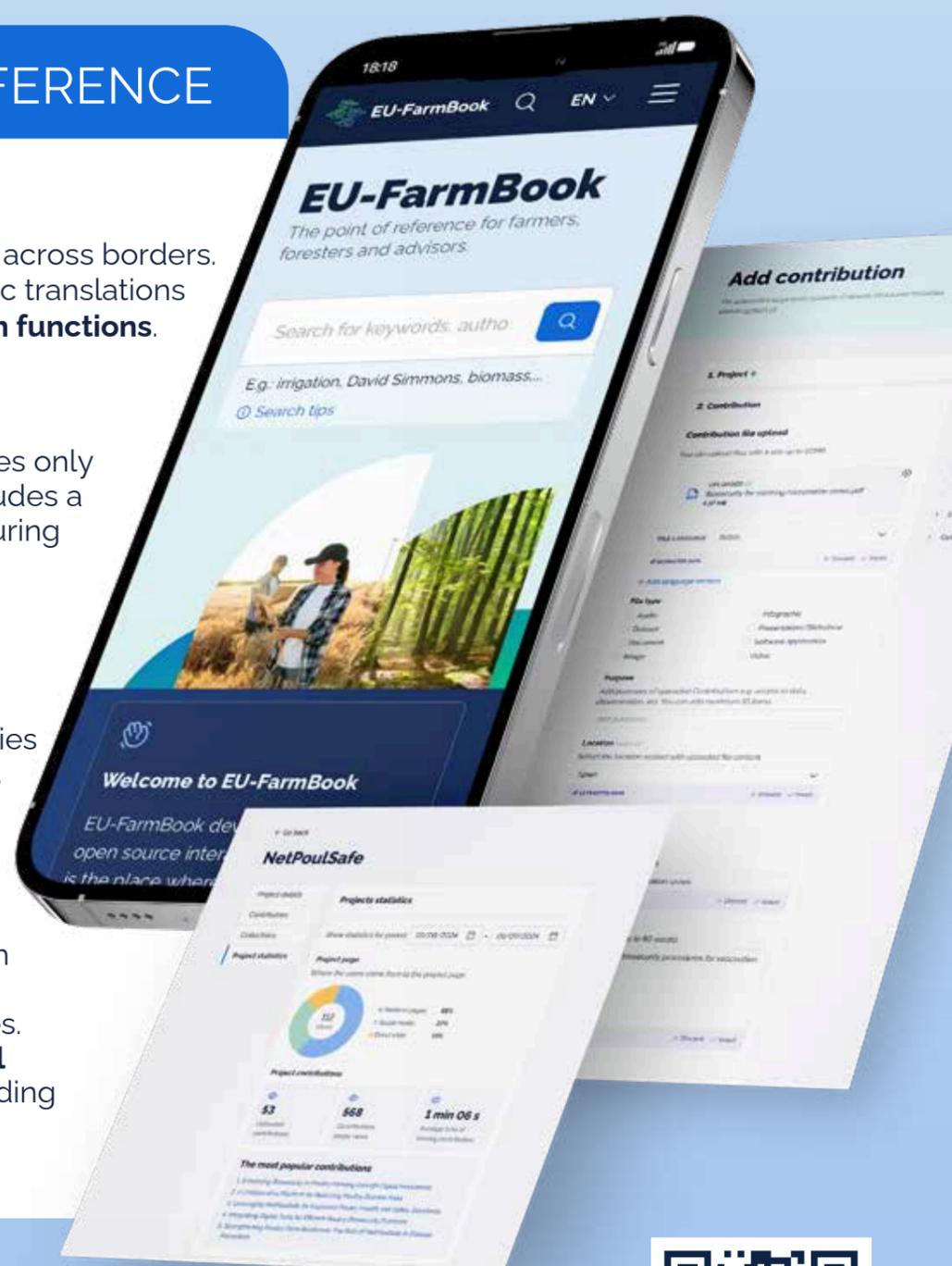
### FREE AND LONG-TERM ACCESS

Ensures that valuable practice-oriented materials supporting farmers, foresters, and rural communities remains accessible long-term, **without additional costs, all in one platform**.



### EU-BACKED KNOWLEDGE

Access practical results from EU-funded Research & Innovation projects that address the immediate needs of farmers, foresters, and rural communities. It provides access to fact-based, **non-commercial knowledge**, ensuring credibility when recommending or accessing solutions.



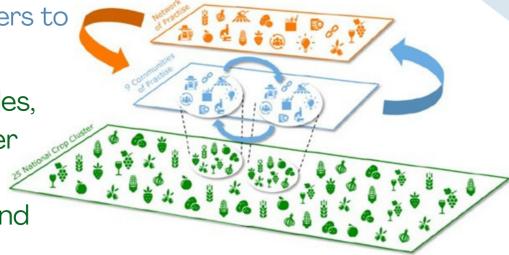


## ZLTO's Role

Network of Practice as the overarching Platform with all relevant decision making players at EU level.

Community of Practice for strawberries, collaborating with policymakers, academia, & suppliers to develop policy & strategy recommendations to overcome barriers to IPM.

National crop cluster leader for apples, strawberries, and potatoes. Together with farmers and advisors, we've assessed IPM tools and strategies and looked ahead to the future of crop protection.



Pave the way for adoption of IPM tools and technologies, the SUPPORT project will develop relevant and actionable knowledge to be used in co-creation design with actors of public policies and private sector strategies.



2023 - 2026



20 partners  
10 EU countries



25 National  
Crop Clusters



## SUPPORT IPM Monitoring Tool

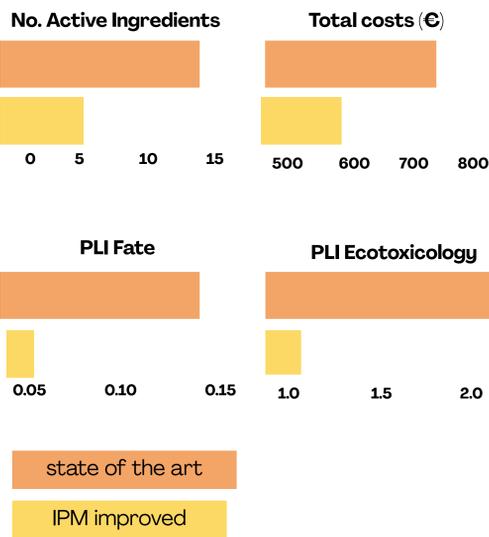
Development of a monitoring system using high-level indicators to assess the environmental, economic, social, and agronomic impacts of IPM strategies.

### Data input



Procedure / Measure  
Technique  
Date  
Area [%] [%](von 1 ha)  
Area in [ha]  
Drift reduction  
Distance surface water [m]

### Output (Wheat, Germany)



## IPM Toolbox



Inventory of current IPM practices across EU. Organized:

- Per crop
  - Strawberry, onion, potato, apple, wheat, maize, grapes, olives
- Type of measure (preventative, intervention, monitoring)



### BOTRYTIS

Botrytis caused by the fungus *Botrytis cinerea*, is common fungal diseases that causes gray mold which leads to decay and rot of flowers, fruits and foliage.

### Preventative measures:

- Avoid planting plant material too deep in the pot.
- Ensure airy conditions during cultivation.

### Monitoring:

- Decision Support System

### Intervention

- Prestop 4b: spread through bumblebees 5-10gr per bumblebee with 20 hives per ha max 25x per crop.



## Policy Recommendations

1

### Improving Knowledge Transfer for IPM Uptake

- IPM knowledge is fragmented, unevenly accessible, and poorly translated into practice
- Weak links between research, policy, advisory services and farmers slow uptake.

2

### A New Monitoring System for Farmers

- Current pesticide monitoring relies on sales data, not real farm practices or risks.
- Farmers lack tools to compare IPM strategies transparently.

3

### Promoting the Role of Agricultural Economic Actors

- IPM policies often overlook cooperatives, processors and retailers.
- Market incentives and private schemes are poorly aligned with public policy.

4

### Leveraging Advisory Services to Boost IPM Adoption

- IPM is knowledge-intensive and context-specific.
- Advisory systems are fragmented and sometimes commercially biased.

5

### IPM Pathways and Policy Options

- Farmers face economic risks, regulatory uncertainty and limited alternatives.
- Perceived trade-offs between sustainability and profitability persist.



# MAPPING INNOVATION SUPPORT SERVICES (ISS)



**ATTRACTISS**  
Empowering Innovation Support Services

## ISS INVENTORY

### Why ISS matter for AKIS and Advisory Services?

- Connect farmers, advisors, researchers & policymakers
- Enable co-innovation and knowledge transfer
- Support CAP Strategic Plans and EIP-Operational Groups
- Strengthen European advisory and innovation ecosystems

### Objective:

- To identify and map the diverse actors providing innovation support services across the Member States
- To understand their roles, organizational models, their AKIS environment and governance systems in which they operate



## OUR TRAININGS

Building skills for Innovation Support Services



## WoW WEBINARS

Connecting actors through collaborative spaces

## THE TOOLBOX

Practical tools and resources for innovation



World Café

## AKISConnect PLATFORM

A digital hub linking AKIS actors and innovations



## METHODOLOGY

Database compiled using AKISConnect ISS providers and additional providers identified and contacted by ATTRACTISS partners.

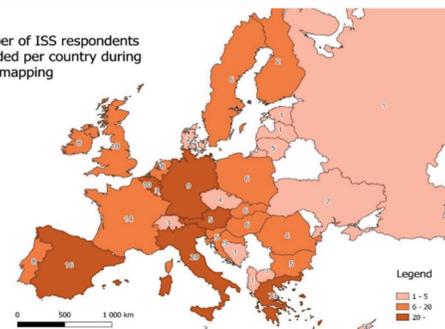
**Take part in our survey to help map organisations that provide Innovation Support Services in agriculture and rural development.**

Your insights are essential!



## COVERAGE MAP

Number of ISS respondents recorded per country during 2025 mapping



## RESULTS

### ISS FUNCTIONS

#### What do ISS providers do?

**Key insight:** Advisory, knowledge exchange and networking form the core of ISS provision in Europe

ISS Function	Frequency	Organizations
(1) ISS1 - Awareness and knowledge	82	88.2%
(2) ISS2 - Advisory	76	81.7%
ISS3 - Demand articulation	38	40.9%
(3) ISS4 - Network facilitation	79	84.9%
(4) ISS5 - Capacity building	61	65.6%
(5) ISS6 - Access to resources	56	60.2%
ISS7 - Institutional support	38	40.9%

#### Main type of organizations:

- Advisory organizations (52%)
- Government Institutions
- Policy consultancies.
- Research Institutes & Universities
- Farmer organizations

#### Who provides ISS?

**Key insight:** ISS provision is a hybrid ecosystem combining advisory, research, policy and civil society actors

Ownership	Frequency
Public	35%
Private	28%
Non-profit/ NGOs	25%
Mixed (public-private)	10%
Cooperative	3%
<b>Grand Total</b>	<b>100%</b>

### THEMATIC FOCUS OF ISS - MOST FREQUENT THEMES:

**Key insight:** ISS strongly support sustainability transition and advisory modernization.



### POLICY & ADVISORY RELEVANCE :

**Key insight:** ISS are key operational actors in implementing EU agricultural innovation policy.

- Strong connection with CAP & EIP
- ~50% of ISS involved in CAP Strategic Plans
- 54.8% involved in EIP Operational Groups
- Many deliver daily advisory & innovation services

#### Next steps:

- Increase response across Europe
- Improve representation of advisory organizations
- Integrate ISS database into AKISConnect
- Support policy learning & advisory collaboration

# TOGETHER FOR STRONGER AKIS IN EUROPE

Discover key results and tools that strengthen AKIS actors' ability to transform and co-create more effective, innovative Agricultural Knowledge and Innovation Systems.

## E-LEARNING TRAINING

Training modules on AKIS offer a comprehensive understanding of the complexities inherent in agricultural systems.

- Available in all official EU languages
- Clear, accessible terminology
- Mobile-friendly
- 30-minute modules
- User-centred learning experience
- Certificate of completion

## AKIS-IN-PRACTICE

- Explore **real AKIS practices from EU Member States**, highlighting successful interventions and best-practice examples in agriculture.
- The content covers sustainable farming, rural development, and innovation within the CAP framework.



**Explore more:**  
[modernakis.eu](https://modernakis.eu) | [akisconnect.eu](https://akisconnect.eu)

## ISS TOOLS & METHODS

- Tools and methods co-created with Innovation Support Services (ISS) to strengthen support for farmers, agribusinesses, and AKIS actors.
- They help boost technology adoption, market access, and sustainable practices while improving collaboration across the AKIS network.

## AKIS-IN-PLAY

- Interactive games that simulates the dynamics of knowledge transfer within AKIS.

## AKISCONNECT.EU

AKISConnect is an interactive platform linking AKIS actors across Europe to share knowledge, build capacity, and collaborate on innovation. It enables:

- Cross-border collaboration
- Networking across AKIS communities
- Access to best practices
- Stronger regional AKIS networks through active exchange



## Professional and hands-on training for advisors in organic farming

The project aims to provide regular technical and methodological trainings for advisors in organic farming to ensure high-quality advisory services. These cross-disciplinary trainings foster knowledge transfer, practical exchange, and networking—especially supporting freelance advisors, newcomers, and experienced professionals.

“My reasons for participating were to gain further information and to exchange with fellow advisors from across Germany”  
- Participant, 2024

“What was especially helpful for me was meeting, talking to, and listening to colleagues — and experiencing the sense of community.”  
- Participant, 2024

### Program Highlights

**1. Technical two-day trainings**  
Have been taking place annually for over 20 years, covering topics such as beekeeping; sheep, goat, poultry, dairy, and pig farming; fruit, crop and vegetable production; viticulture; marketing; nature conservation; business management; farm succession; and CSA.



Technical two-day trainings

**2. Methodological seminars**  
These recognized CECRA seminars are flexibly adapted to expectations of participants, and are offered both online and in-person. Topics include moderation, reflection on one’s own advisory practice, change management, and communication in advisory work.



Methodological seminars

### Participant Benefits



**Nationwide and cross-association networking**  
Target group are advisors and other stakeholders working in organic agriculture or those, working closely with it. Past participants include advisors from associations, researchers, project managers and veterinarians.



**Target-group oriented**  
The programs are based on advisors’ needs and designed bottom up. Advisors in the preparation team ensure the program reflects current needs, making it up-to-date and tailored to the target audience.



**Knowledge transfer of current scientific and project finding**  
Keynote presentations share new findings and translate them into practical recommendations. There are few but high-quality presentations from external speakers or group members.



**Interactive sessions**  
Seminars encourage experience sharing and mutual learning on regulatory and implementation differences through moderated discussions and group work. Some seminars include excursions to explore best-practices.



# THIS SUMMER POSSIBILITY FOR ADVISORS

# EXPRESS YOUR INTEREST ELIGIBLE FOR APPLICATION

**2**  
cross visits per country

**900**  
EUR per cross visit  
to cover travel and subsistence costs

**CHOOSE**  
the thematic and country experience  
You are most interested in

**APPLY**  
by writing to [ilze.lavrenova@llkc.lv](mailto:ilze.lavrenova@llkc.lv)

**STRATUS aims at connecting advisors across Europe to support farmers bringing the knowledge on integrated fertilization management into practice, to achieve the ambition of the Farm to Fork and Biodiversity Strategies, thus reducing nutrient losses to the environment while maintaining soil fertility.**

organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>FINLAND</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>ESTONIA</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>LITHUANIA</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>IRELAND</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>DENMARK</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>GERMANY</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>HUNGARY</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>LUXEMBOURG</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>ROMANIA</b>
organization _____ e-mail _____ possible CVs _____ number of advisors _____		<b>PORTUGAL</b>

No	Country	Location	Thematic Area	Organizing STRATUS partner	Title	Start date	End date	Link
1	Italy	Pisa, Tuscany	Bio-based Fertilizers	RT in collaboration with the Crop Production Research Group of the Scuola Superiore Sant'Anna, the Le Prata farm, and the Fattoria Tommasi Luca farm.	<b>FERTIBIO: Development of the production process of bio-fertilizers</b>	12.06.2026.	14.06.2026.	<a href="https://www.advisoryagrihub.eu/details/34?language=en">https://www.advisoryagrihub.eu/details/34?language=en</a>
2	Poland	Radoma	Precision Farming	CDR / Instituut voor Landbouw-, Visserij- en Voedingsonderzoek (ILVO)	<b>Fertiliser spread pattern measurement and spreader adjustment using collection trays</b>	23.06.2026.	23.06.2026.	<a href="https://www.advisoryagrihub.eu/details/36?language=en">https://www.advisoryagrihub.eu/details/36?language=en</a>
3	Sweden	Lund	Precision Farming	Hushållningsällskapens Service Aktieföretag	<b>Zero spots method to optimize wheat nitrogen fertilization</b>	23.04.2026.	25.04.2026.	<a href="https://www.advisoryagrihub.eu/details/55?language=en">https://www.advisoryagrihub.eu/details/55?language=en</a>
4	France	Angers – Pays de la Loire	Precision Farming	AC3A - Association of the Chambers of Agriculture of the Atlantic Area	<b>Site-specific estimation of winter cereals and rapeseed nitrogen needs via satellite imagery; Optimising fertilisation by using non-microbial biostimulants</b>	04.06.2026.	05.06.2026.	<a href="https://www.advisoryagrihub.eu/details/6?language=en">https://www.advisoryagrihub.eu/details/6?language=en</a>
5	Greece	Athens	Precision Farming	Agricultural University of Athens (AUA)	<b>Using soil moisture sensors to optimize irrigation and soil moisture content for better mineral uptake and crop growth</b>	28.05.2026.	29.05.2026.	<a href="https://www.advisoryagrihub.eu/details/18?language=en">https://www.advisoryagrihub.eu/details/18?language=en</a>
6	The Netherlands	Eindhoven area	Soil Quality	Zuidelijke Land-en Tuinbouworganisatie (ZLTO)	<b>Farm soil and water plan &amp; Growth simulation</b>	19.05.2026.	20.05.2026.	<a href="https://www.advisoryagrihub.eu/details/15?language=en">https://www.advisoryagrihub.eu/details/15?language=en</a>
7	Slovenia	Central Region	Bio-based Fertilizers	Association of the Chambers of Agriculture of the Atlantic Area (AC3A)	<b>Optimising fertilisation by using non-microbial biostimulants</b>	12.05.2026.	13.05.2026.	<a href="https://www.advisoryagrihub.eu/details/27?language=en">https://www.advisoryagrihub.eu/details/27?language=en</a>
8	Spain	Navarra	Bio-based Fertilizers	Instituto Navarro de Tecnologías e Infraestructuras Agroalimentarias (INTIA)	<b>Managing nutrient availability rate from municipal sludge</b>	22.04.2026.	23.04.2026.	<a href="https://www.advisoryagrihub.eu/details/29?language=en">https://www.advisoryagrihub.eu/details/29?language=en</a>
9	Belgium	Leuven	Soil Quality	Association des Chambres d'Agriculture de l'Arc Atlantique (AC3A)	<b>Reducing soil tillage / Simplified cultivation techniques</b>	21.04.2026.	21.04.2026.	<a href="https://www.advisoryagrihub.eu/details/39?language=en">https://www.advisoryagrihub.eu/details/39?language=en</a>
10	Croatia	East Slavonia, Zagreb	Soil Quality	South Eastern Europe Advisory Services (SEASN)	<b>Application of biomass ash to improve agricultural production and soil fertility</b>	07.04.2026.	09.04.2026.	<a href="https://www.advisoryagrihub.eu/details/54?language=en">https://www.advisoryagrihub.eu/details/54?language=en</a>