

UNITED KINGDOM: INTEGRATING NATURE-BASED SOLUTIONS FOR SUSTAINABLE NUTRIENT MANAGEMENT

Summary

The UK NBS site combines recycled fertilisers with long-term farming system experiments. At North Wyke, the recycled phosphorus fertiliser Thallo achieved yields comparable to conventional fertilisers, while the Large-Scale Rotation Experiment evaluates compost, organic amendments, crop rotations, reduced tillage and smart crop protection. The results show that NBS can reduce reliance on mineral fertilisers and improve soil health, but successful adoption depends on local conditions and careful management.

The need

The UK NBS site addresses the need to reduce reliance on conventional mineral fertilisers while maintaining crop productivity under increasingly variable climate conditions. The case is particularly concerned with phosphorus security, because conventional phosphorus fertiliser production depends heavily on rock phosphate resources concentrated in a limited number of geopolitically sensitive regions.

The UK NBS site also addresses the need for practical evidence on integrated NBS systems, including compost, organic amendments, crop rotations, reduced tillage and smart crop protection. Farmers require robust long-term evidence before adopting practices that may affect yield, pest pressure, disease risk, labour needs and profitability.



The benefits

- Bio-based phosphorus substitution: the Thallo fertiliser trial showed that grass and winter wheat fertilised with Thallo achieved yields significantly higher than the nil control and statistically equivalent to conventional fertiliser treatments under the tested conditions.
- Nutrient circularity: Thallo uses abattoir by-products, helping valorise livestock-sector waste and reduce dependence on rock phosphate.
- Potential micronutrient benefits: Thallo contains elements such as zinc, manganese and copper, which are not typically present in standard NPKS fertilisers.
- Soil carbon and resilience potential: compost and organic amendments can improve soil health and build soil carbon, although benefits depend on soil type and time horizon.
- Long-term evidence: the LSRE helps identify which combinations of rotations, tillage, organic amendments and crop protection are agronomically viable under real conditions.
- Risk screening: the UK work also identifies NBS approaches that may be too risky under certain weather, soil or disease conditions, improving the credibility of recommendations.



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trans4num solution

The UK NBS site work combines two complementary NBS platforms. The first is a replicated plot-scale fertiliser trial at North Wyke testing Thallo, a bio-based fertiliser made from agricultural and abattoir by-products, against conventional mineral fertilisers and a nil-input control. The trial includes grass ley and winter wheat, with nutrient rates aligned with UK fertiliser recommendations.

The second platform is the Rothamsted Large-Scale Rotation Experiment (LSRE), which tests combinations of crop rotation diversity, cultivation intensity, nutrition strategy and crop protection at two contrasting sites: Brooms Barn in Suffolk and Harpenden in Hertfordshire. The LSRE explores how compost, cover crops, organic amendments, reduced tillage and smart crop protection interact with soil type and climate variability.

The UK AKIS is centred on Rothamsted Research as a long-term experimental and knowledge-brokerage actor, connected to farmers, advisors, industry experts, agronomists, NGOs and policy stakeholders. The system combines scientific trials with stakeholder events that test how results can be made meaningful for practice.

Engagement activities included Research Insight days, soil-carbon workshops, LSRE field visits and events on pests, weeds, diseases and organic amendments. Participants included farmers, advisors, industry representatives, researchers, journalists, the Environment Agency, the NFU and organisations such as Farm Carbon Toolkit and Westcountry Rivers Trust.

The UK NBS site trial results cannot simply be handed to farmers as universal prescriptions. They need to be interpreted through farm priorities, soil conditions, climate risk and trusted advisory channels.

What were the challenges / limitations in the implementation process?

- Weather extremes affected crop establishment and performance.
- Some NBS practices increased yield or establishment risks under certain conditions.
- Disease pressure remains a challenge for some crop systems.
- Organic amendments require investment and long-term commitment.
- NBS performance depends on local soils, climate and management.
- Wider adoption of recycled fertilisers depends on market and regulatory acceptance.

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

- Access to recycled fertilisers and clear quality standards.
- Monitoring and advisory support for nutrient and crop performance.
- Infrastructure for producing and applying organic amendments.
- Long-term trials and data to assess system impacts.
- Advisory services to support local implementation.
- Collaboration among farmers, advisors, researchers and policymakers.

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More information

- Find more about the [British NBS site](#)
- Read more [Practice Abstracts](#)
- [Farmers and researchers explore the power of organic amendments at Rothamsted](#)
- [Closing nutrient loops in the UK](#) | [Nature-based solutions for farming animation](#)

