AGRIRESEARCH
FACTSHEET

FERTILISERS

Why do research and innovation on fertilisers and sustainable nutrient management matter?

Fertilisers play a significant role in food security. Fertilisers can be mineral or organic. The primary nutrients required for crop production are nitrogen, phosphorus and potassium. Farmers apply fertilisers made from atmospheric nitrogen, mineral and organic sources to meet the nutrient requirements of their crops and to support yields. The EU is largely dependent on imports of mineral fertilisers. Furthermore, during the peak in gas prices in the summer of 2022, gas had come to account for up to 90% of the variable production cost of nitrogen fertilisers. This resulted in a 149% increase in the price paid for these products by EU farmers in September 2022 compared with September 2021, impacted farmers income and food prices. The objective of the EU farm-to-fork strategy is to reduce nutrient losses by 50% by 2030 while preserving soil fertility. This is expected to lead to a reduction in fertiliser use of at least 20%.

Research and innovation on the sustainable management of nutrients aims to find the balance between maintaining and enhancing yields while reducing fertiliser-related losses and emissions, environmental impacts and costs. In addition, developing methods to extend efficient nutrient recycling from organic waste streams contributes to reducing the dependence of European agriculture on mineral fertilisers from outside the EU. The mission 'A soil deal for Europe' pioneers the transition to healthy soils and sustainable nutrient cycling management, supporting crop productivity and reducing contamination.

Fertilisers under Horizon 2020 and Horizon Europe

CORDIS search keywords

fertiliser, nutrient management, nutrient use efficiency, organic fertilisers, nutrient osses biobased fertilisers

Nb of projects

90 Horizon 2020

26 Horizon Europe

EU contribution

€ 623 million

€ 129 million

Figures comprise Horizon Europe Cluster 6 projects, including Work Programme 2023-2024 expected projects / Selection of a few projects logos

Success stories dedicated to fertilisers and nutrients

Bio-based alternatives as substitutes for fossil fuel-based and mineral fertilisers

Horizon 2020 projects, such as **Rustica**, **Fertimanure**, **Nutri2Cycle**, **Lex4Bio** or **Sea2Land**, are optimising the processes for producing and recovering bio-based fertilisers from nutrient-rich waste and side streams, thereby ensuring their safety and building evidence-based trust in their use and agronomic efficiency. The thematic network Nutriman compiles knowledge 'ready for practice' for such recovered product applications, practices and technologies, connecting applied science and industrial practice, for the interest and benefits of agricultural practitioners and other users. Under Horizon Europe, EU-funded research and innovation (R&I) will continue to valorise alternative sources of new, innovative fertiliser products, for example through **Fer-Play** (Multi-assessment of alternative fertilisers for promoting local sustainable value chains and clean ecosystems) or **Novafert** (Novel procedures and sustainable guidelines to enhance the use of alternative fertilisers).

#bio-based fertilisers

Sustainable nutrient management

Farming tools for external nutrient inputs and water management (**Fatima**) has developed innovative new farm capacities that help the intensive farming sector optimise its management and use of external inputs (nutrients, water). Applied on a large scale (demonstration cases in seven countries with all main crops grown in the EU), Fatima has yielded a range of outputs: tools, from web geographical information system (GIS) platforms to calculators (for nutrients, yield, irrigation, etc.); models; a high-resolution variable rate technological scanner–spreader; several adapted fertiliser spreaders; wireless sensor networks; and thematic frameworks. Another successful project is **Circular Agronomics**, a comprehensive synthesis of practical solutions to improve current carbon, nitrogen and phosphorus cycling in European agro-ecosystems.

#nutrient management #farming

Transfer of innovative techniques for sustainable water use in fertigated crops

(Fertinnowa) is a thematic network on innovative technologies and practices for fertigation of horticultural crops. The project has built a knowledge exchange platform to evaluate existing and novel technologies (innovation potential, synergies, gaps, barriers) for fertigated crops. Tools, databases and other resources to help optimise the efficiency of water and nutrient use are available. Other successful projects are **SolACE**, which has developed solutions for improving agro-ecosystem and crop efficiency through the design of novel crop genotypes and agro-ecosystem management innovations to improve water and nutrient use efficiency, and **WaterProtect**, which has carried out case studies (**'action labs'**) involving multiple actors in implementing good practices (land management, farming, product stewardship, preventing point source pollution) to ensure safe drinking water supplies.

#water management #fertigation #nutrient management #farming

Horizon 2020 and Horizon Europe collaborative projects on fertilisers

Follow the CORDIS link for more information on the start-end date, EU contribution, coordinator and results.
List sorted by ascending project acronym.

Website	Project	CORDIS
Circular Agronomics	Efficient Carbon, Nitrogen and Phosphorus cycling in the European Agri-food System and related up- and down-stream processes to mitigate emissions	773649
FATIMA	FArming Tools for external nutrient Inputs and water MAnagement	633945
FERTIMANURE	Innovative nutrient recovery from secondary sources – Production of high-added value FERTIlisers from animal MANURE	862849
FERTINNOWA	Transfer of INNOvative techniques for sustainable WAter use in FERtigated crops	689687
Fer-Play	Multi-assessment of alternative fertilisers for promoting local sustainable value chains and clean ecosystems	101060426
LEX4BIO	Optimizing Bio-based Fertilisers in Agriculture – Knowledgebase for New Policies	818309
NoAW	Innovative approaches to turn agricultural waste into ecological and economic assets	688338
NOMAD	Novel Organic recovery using Mobile ADvanced technology	863000
NOVAFERT	Novel procedures and sustainable guidelines to enhance the use of alternative fertilisers	101060835
Nutri2Cycle	Transition towards a more carbon and nutrient efficient agriculture in Europe	773682
NutriBudget	Optimisation of nutrient budget in agriculture	101060455
NUTRIMAN	Nutrient Management and Nutrient Recovery Thematic Network	818470
OPTAIN	OPtimal strategies to retAIN and re-use water and nutrients in small agricultural catchments across different soil-climatic regions in Europe	862756
RUN4LIFE	Recovery and utilization of nutrients 4 low impact fertilizer	730285
RUSTICA	Demonstration of circular biofertilisers and implementation of optimized fertiliser strategies and value chains in rural communities	101000527
SEA2LAND	Producing advanced bio-based fertilizers from fisheries wastes	101000402
SoIACE	Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use	727247
SYSTEMIC	Systemic large scale eco-innovation to advance circular economy and mineral recovery from organic waste in Europe	730400
WaINUT	Closing waste water cycles for nutrient recovery	101000752
Water2REturn	REcovery and REcycling of nutrients TURNing wasteWATER into added-value products for a circular economy in agriculture	730398
WATERAGRI	Water retention and nutrient recycling in soils and streams for improved agricultural production	858375

Relevant sources of information supporting fertilisers

Other instruments like the 'European Innovation Partnership for Agricultural productivity and sustainability' (EIP-AGRI), Partnerships (like PRIMA, Partnership for R&I in the Mediterranean Area or the European Joint Programme EJP Soil), the Circular Bio-based Europe Joint Undertaking and EU missions, in particular the Mission 'A Soil Deal for Europe', also help enabling sustainable and circular management and use of natural resources.

Fertilisers under EIP-AGRI activities – Focus Groups and Operational Groups

- Fertiliser efficiency
- Nutrient recycling
- Digital tools for sustainable nutrient management
- Investigation of varieties of natural by-product manure types
- Bio-fertilisation handling protocols in Basque horticulture
- Sub-plot differentiated and optimised nutrient management in arable farming

Fertilisers under the EU Missions

Relevant topics under the R&I mission 'A Soil Deal for Europe"

- HORIZON-MISS-2023-OCEAN-SOIL-01-01: Joint demonstration of approaches and solutions to address nutrient pollution in the landscape–river–sea system in the Mediterranean sea basin

Relevant topics under the Circular Bio-based Europe Joint Undertaking

- HORIZON-JU-CBE-20203-IA-02: Production of safe, sustainable, and efficient bio-based fertilisers to improve soil health and quality

In the pipeline and future funding opportunities

Updated list of relevant topics from cluster 6 work programme 2023–2024

- HORIZON-CL6-2023-CLIMATE-01-6: Analysing fossil-energy dependence in agriculture to increase resilience against input price fluctuations
- HORIZON-CL6-2023-ZEROPOLLUTION-02: Optimisation of manure use along the management chain to mitigate GHG emissions and minimize nutrients/contaminants dispersion in the environment
- HORIZON-CL6-2024-ZEROPOLLUTION-01: Demonstrating how regions can operate within safe ecological and regional nitrogen and phosphorus boundaries
- HORIZON-CL6-2024-ZEROPOLLUTION-01: Best available techniques to recover or recycle fertilising products from secondary raw materials
- HORIZON-CL6-2023-GOVERNANCE-01-22: Developing EU advisory networks on fertilizers
- HORIZON-CL6-2024-FARM2FORK-02-1-two-stage: Increasing the availability and use of harmless inputs in organic farming

ISBN 978-92-68-01928-3