

Why do research and innovation on Soils matter?

Life on Earth depends on healthy soils. Soils are a finite resource, crucial for food and nutrition security as well as for climate change mitigation and adaptation, preserving nature and biodiversity, regulating water and nutrient cycles and sustaining our cultural and landscape heritage. In short, soils are the basis of our well-being and prosperity. Yet, soils have been degrading continuously in many parts of Europe and the world. In the EU at least 60% of soils are considered to be unhealthy, i.e. experience manifold degradation processes as a result of inappropriate management practices and the effects of climate change.

Developing knowledge, research and innovation will be essential to improve our understanding of the drivers of soil degradation, to analyse and monitor the impacts of current management practices on the various aspects of soil health, and to advance sustainable soil management in agriculture, forestry and other sectors. Given the diversity of soils across Europe, R&I is needed also to tailor the analysis and advice specifically to the conditions in any given place. Taking into account the need for place-based R&I on soils, the Commission is implementing novel approaches through the EU Mission “A Soil Deal for Europe”, where education, training, investments, monitoring and demonstration of good practices in “living labs” and “lighthouses” are part of comprehensive portfolio of activities.

Results of funded projects contribute to the European Green Deal targets on sustainable farming, climate, biodiversity and zero-pollution. The Mission Soil is a flagship initiative of the EU’s Long-term vision for rural areas and main vehicle to implement the ambitions of the EU Soil Strategy and upcoming Soil Health Law.

Soils under Horizon 2020 and Horizon Europe



CORDIS search keywords

soil, soil health, soil organic carbon, soil pollution, erosion, soil biodiversity, soil degradation, desertification



Nb of projects

59 Horizon 2020
48 Horizon Europe



EU contribution

€ 371 million
€ 304 million

Horizon 2020 Societal Challenges 2, Horizon Europe Cluster 6 and Mission Soil projects, Work Programme 2023-2024 expected projects included / Selection of a few projects logos





Success stories dedicated to soils

The impact of soil biodiversity on soil health, the environment, crop productivity and agri-food systems

Soils host a quarter of our planet's biodiversity and safeguards ecosystems and their services. EU-funded research is increasing the knowledge on soil biodiversity and its manifold ecosystem services to unleash its potential for more sustainable soil management practices. The project **EXCALIBUR** studies the important role of soil microbial communities in agricultural soil systems. It will test and deliver new multifunctional soil microbial products for achieving lower input farming systems. **SoildiverAgro** promotes the adoption of crop management practices and systems that enhance soil functional biodiversity to reduce the use of external inputs while increasing crop production and quality. **SOILGUARD** is developing an analytical framework for the assessment of soil biodiversity and its functions in order to support stakeholders in their transition to sustainable management. **SOIL-O-LIVE** addresses the link between soil biodiversity and the quality of olive production in the Mediterranean Region. **BIOservicES** and **SOB4ES** will explore the role soil biodiversity in the delivery of ecosystem services in different land uses.

Decontamination of agricultural soils

Pollutants from plastics, pesticides, heavy metals and other substances are a wide-spread problem in agriculture. The project **PAPILLONS** elucidates the ecological and socioeconomic sustainability of agricultural plastics (APs) in relation to releases and the impacts of micro- and nanoplastics (MNPs) in European soils. **MINAGRIS** assesses the use of different plastic polymers in agricultural systems and identifies the resulting types and concentrations of MNPs. It also provides validated analytical tools that allow the quantification and identification of these substances. The projects **ARAGORN**, **EDAPHOS** and **ISLANDR** will develop remediation strategies for the decontamination and reuse of soils.

Developing robust indicators and monitoring systems for soil health

Soil monitoring is key for assessing the status of soil health and the impact of different soil management practices and policies on land management. **BENCHMARKS** will develop an Integrated Soil Health Monitoring Framework including a Soil Health Dashboard, based on a validated set of soil health indicators. The framework will be tested using case studies taking into account various scales, land uses and pedoclimatic conditions. **AI4SoilHealth** will create an open access, European-wide digital infrastructure for assessing and monitoring soil health metrics by land use and/or management based on advanced AI methods. This will include the development of a Soil Digital Twin. The projects **MARVIC** and **MRV4SOV** will assess the effects of farming practices on soil carbon dynamics and develop a robust system for monitoring, reporting and verification (MRV) of carbon removals. This is essential for the widespread uptake of carbon farming practices.

Promoting business models and advisory services for soil health

Projects **InBestSoil**, **NOVASOIL** and **SoilValues** will contribute to develop a set of comprehensive methods, market instruments and recommendations to policy to support land managers in rural and urban areas with incentives for sustainable land and soil management and generating new opportunities for income. In addition, work will support industries in their efforts to develop soil friendly and climate neutral value chains. The project **NBSoil** provides ample opportunities for the training of specialised soil advisors, based on the development of novel learning material, digital tools and open spaces for information.

Horizon 2020 and Horizon Europe collaborative projects on soils

Follow the **CORDIS** link for more information on the start-end date, EU contribution, coordinator and results.

List sorted by ascending start date.

Website	Project	CORDIS
LANDMARK	LAND Management: Assessment, Research, Knowledge base	635201
ISQAPER	Interactive Soil Quality Assessment in Europe and China for Agricultural Productivity and Environmental Resilience	635750
SOILCARE	Soil Care for profitable and sustainable crop production in Europe	677407
RELACS	Replacement of Contentious Inputs in organic farming Systems	773431
SHui	Soil Hydrology research platform underpinning innovation to manage water scarcity in European and Chinese cropping systems	773903
BEST4SOIL	Boosting 4 BEST practices for SOIL health in Europe	817696
SoildiverAgro	Soil biodiversity enhancement in European agroecosystems to promote their stability and resilience by external inputs reduction and crop performance increase	817819
EXCALIBUR	Exploiting the multifunctional potential of belowground biodiversity in horticultural farming	817946
SIEUSOIL	Soil Observatory for intelligent Land Use Management	818346
UPSCALE	Upscaling the benefits of push-pull technology for sustainable agricultural intensification in East Africa	861998
Soils4Africa	Soil Information System for Africa	862900
PAPILLONS	Plastic in Agricultural Production: Impacts, Lifecycles and LONG-term Sustainability	101000210
TUdi	Transforming Unsustainable management of soils in key agricultural systems in EU and China..	101000224
SMS	Soil Mission Support: Towards a European research and innovation roadmap on soils and land management	101000258
HoliSoils	Holistic management practices, modelling and monitoring for European forest soils	101000289
SOILGUARD	Sustainable soil management to unleash soil biodiversity potential and increase environmental, economic and social wellbeing.	101000371
MINAGRIS	Micro- and NAno-Plastics in AGRlricultural Soils: sources, environmental fate and impacts on ecosystem services and overall sustainability	101000407
ORCASA	Operationalising the International Research Cooperation on Soil Carbon	101059863
PREPSOIL	Preparing the ground for healthy soils: building capacities for engagement, outreach and knowledge	101070045
AI4SoilHealth	AI4SoilHealth: Accelerating collection and use of soil health information using AI technology to support the Soil Deal for Europe and EU Soil Observatory	101086179
NATIOONS	National engagement activities to support the launch of the Mission 'A Soil Deal for Europe' 100 Living Labs and Lighthouses	101090738
BENCHMARKS	Building a European Network for the Characterisation and Harmonisation of Monitoring Approaches for Research and Knowledge on Soils	101091010
HuMUS	Healthy MUnicipalities Soils	101091050
InBestSoil	Monetary valuation of soil ecosystem services and creation of initiatives to invest in soil health: setting a framework for the inclusion of soil health in business and in the policy making process	101091099
SOLO	Soils for Europe	101091115
SOIL O-LIVE	The soil biodiversity and functionality of mediterranean olive groves: a holistic analysis of the influence of land management on olive oil quality and safety	101091255
NBSoil	Nature Based Solutions for Soil Management	101091246
NOVASOIL	Innovative business models for soil health	101091268
SoilValues	Enhancing Soil health through Values-based business models	101091308

Relevant sources of information supporting soils

Research on soils is supported by other programmes, such as **EJP SOIL** - European Joint Programme on agricultural soil management, Horizon Europe partnerships such as the Partnership for Research and Innovation in the Mediterranean Area-**PRIMA**, the partnership on Agroecology, the Marie Skłodowska-Curie Actions programme (for example the **AGG-REST-WEB** project and **IDESoWa** project) as well as the European Research Council (ERC) (for example the project **DormantMicrobes**), and also the, the EU's funding Programme for the environment and climate action **LIFE**.

Soils are also widely addressed under the **EIP-AGRI** 'European Innovation Partnership for Agricultural productivity and sustainability' (now part of the **EU CAP Network**). Since its launch in 2013, the EIP-AGRI has set up 46 Focus Groups which have gathered and summarise practice-oriented solutions to specific soil challenges in agriculture.

Soils under EU CAP Network activities – examples, for more info see [EIP-AGRI site on soil related activities](#)

Focus Groups examples

- Soil salinisation
- Soil contamination
- Recovery of abandoned agricultural lands
- Soil organic matter in the Mediterranean region

Operational groups

- Innovative organic matrices from compost and biochar for sustainable viticulture – Enochar
- VASC – Re-enactment and improvement of soils: Return to earth of stream sediments
- Digestate, cover crops and tillages to increase soil organic matter – DICO SOS

In the pipeline and future funding opportunities

As a result of WP 2022 calls, 17 projects under the **EU Mission 'A Soil Deal for Europe'** will start soon to work on soil decontamination, soil biodiversity, use of biowaste for soil improvement, carbon farming, soil education and citizen science. In addition, a support structure for Living Labs will be operational as of early 2024.

The **Mission Work Programme 2023** offers 139 M€ of funding which have been allocated to nine topics on: the subsoil; soil pollution and digital tools; innovations to prevent and combat desertification; soil-friendly practices in horticulture; link between soils and food safety; spatial planning; cultural and creative initiatives for bringing communities closer to soil, and to establish the first wave of Living Labs for co-creating solutions for soil health. There are also 2 joint calls with the Mission Restore our Ocean and Waters by 2030 and the Mission Adaptation to Climate Change. In addition, a new call has been launched by the Joint Undertaking CBE - Circular Bio-based Europe Joint Undertaking: HORIZON-JU-CBE-2023-R-01 **Phyto-management; curing soil with industrial crops, utilising contaminated and saline land for industrial crop production**

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