## **WELCOME!** Horizon Europe Mission: A Soil Deal for Europe -Community Building Event

#### Housekeeping

- To avoid background noise all participants will be muted and cameras will be off.
- We will allow delegates to unmute themselves and share their cameras during the breakout rooms.
- Please <u>use the chat to introduce yourself.</u> Please note due to GDPR we cannot share the chat so capture what you need.
- Please also use the Q&A function to submit your questions.
- If you have any technical problems, please use the chat to seek advice from the host (Michael Foster)



PLEASE NOTE – THE WEBINAR IS BEING RECORDED



me (UK)	Session	Speakers		
9.30	Introduction to the session and community e-platforms	Belen Rebollo, Innovate UK KTN		<b>V</b>
09:40	European and UK Soils Research and Innovation Capabilities	<ul> <li>European Commission; DG Agri: Annette Schneegans</li> <li>BBSRC: Luke williams</li> <li>Rothamsted Research: Martin Broadley</li> <li>Cranfield Soil, AgriFood and Biosciences: Jane Rickson</li> <li>Agri-Food and Biosciences Institute (AFBI): Elaine Groom</li> <li>FUNDECYT (NATI00NS Project): Concha Civantos</li> </ul>		ROTHAMSTED RESEARCH
10:45	Panel discussion	Chair of panel: Helen Sweeney; Innovate UK		
11:05	BREAK		Biotechr Biologica Research	nology and al Sciences
11:15	Soil Mission overview and upcoming opportunities	Helen Sweeney; Innovate UK	Research	n Council
11:30	Q&A	Viola Hay, Innovate UK KTN		
11:40	Breakout rooms: - Room 1: Spatial planning and subsoil	Main reception: Viola Hay and Michael Foster Room 1 Chair: Helen Sweeney, Innovate UK	AGRI-FOOD & BIOSCIENCES	NATIOONS
	<ul> <li>Room 2: Horticulture and Peat alternatives</li> <li>Room 3: Digitalisation &amp; soil pollution</li> <li>Room 4: Living labs</li> <li>Room 5: Communities</li> </ul>	Room 2 Chair: Cathryn Lambourne, Innovate UK KTN Room 3 Chair: Catherine Holt, Innovate UK Room 4 Chair: Elaine Groom, AFBI Room 5: Anni Laihanen, UKRI	INSTITUTE CO	Innovate UK KTN
12:15	Closing remarks	Belen Rebollo/Helen Sweeney; Innovate UK		
12:30				



### Innovate UK KTN – European Programmes Activity and support



#### Belen Rebollo-Garcia Knowledge Transfer Manager

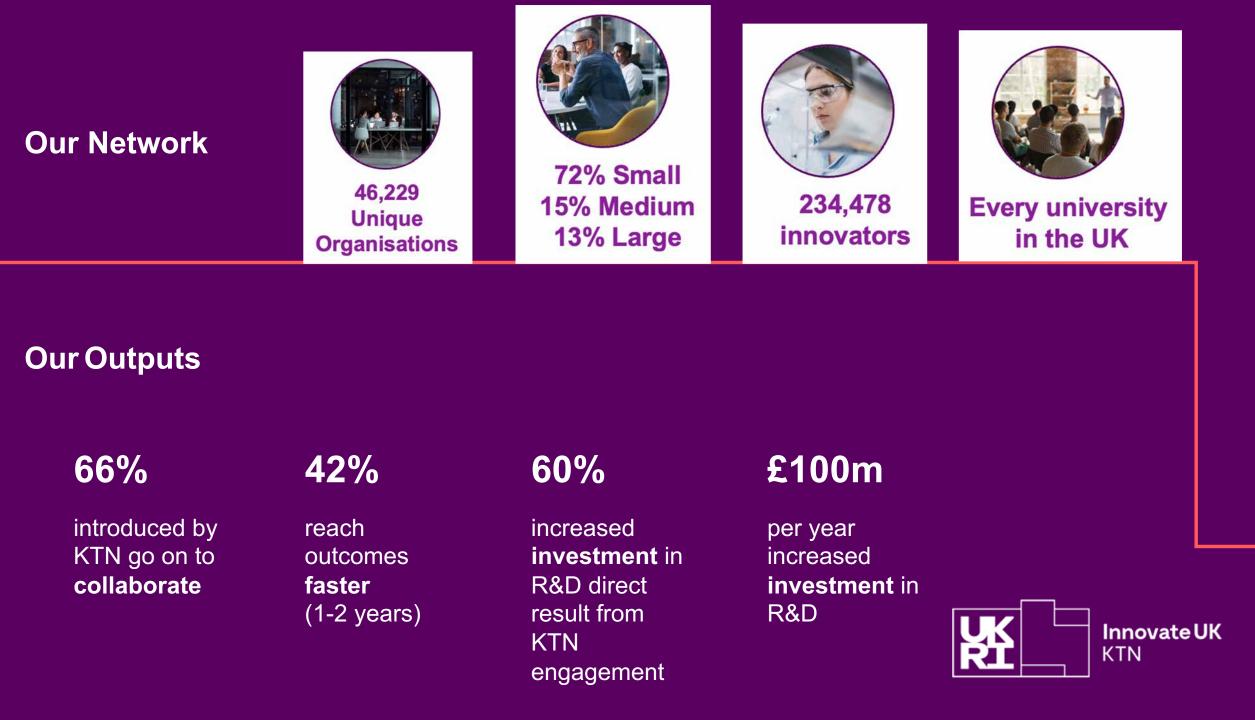




**Innovate UK KTN** exists to connect innovators with new partners and new opportunities beyond their existing thinking – accelerating ambitious ideas into real-world solutions.

#### **Cross-Sector Expertise**

Agrifood Biotechnology Chemistry Creative Industries Design Digital Electronics Energy Geospatial Health Industrial Maths Infrastructure Manufacturing Materials Photonics Quantum Robotics & Al Security & Defence Sensors Space Transport Water



#### **Primary Delivery Partners**



#### XX.

Department for Science, Innovation & Technology



Department for Business & Trade

Department for Energy Security & Net Zero

Department for Culture Media & Sport

Foreign & Commonwealth Office UK Science & Innovation Network



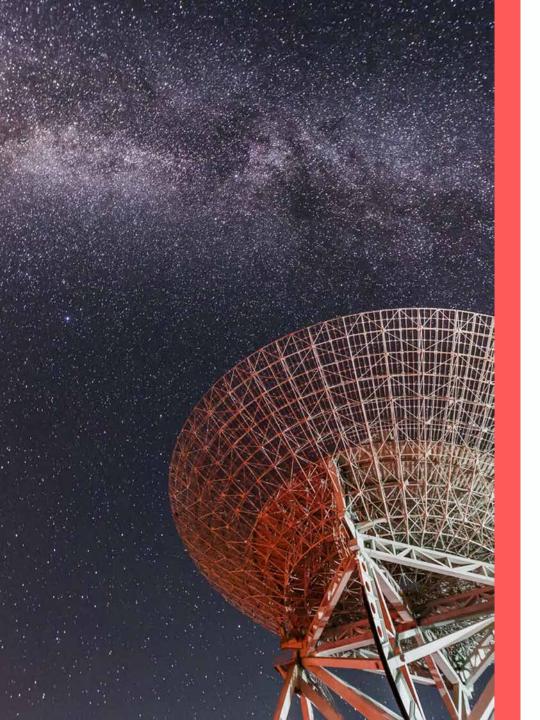
Innovate UK KTN



Plan for action for UK business innovation







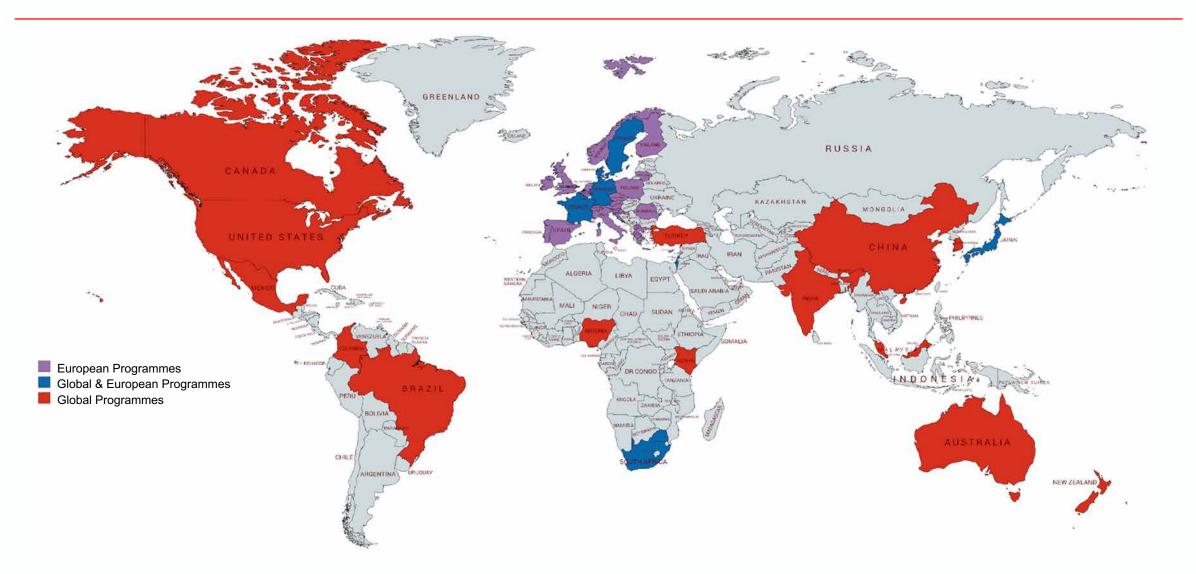
## We connect **regional**, **national** and **global** innovation

Our **Global Alliance** programme drives international collaborations with governments, societies, enterprises, institutions and people from every corner of the globe.





#### **Our Reach**







### Global Alliance: European Programmes

#### **European Programmes Experts**



Jane Watkins Regional Lead



**Viola Hay** Knowledge Transfer Manager



Belen Rebollo Knowledge Transfer

Manager

## Find out more



@KTN\_Global

Horizon Europe Hub

https://ktn-uk.org/programme/european



## Can the UK participate in Horizon Europe? YES!!!

### The UK is a Candidate Associated Country

- Applicants should carry on working in their consortiums on the 2023 Work Programme Call topics.
- UK applicants should continue applying as beneficiaries and request EU budget at the proposal stage
- UK Horizon Europe Guarantee in place to support successful applicants if Association not in place at time of Grant Agreement







K



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## European and UK Soils Research and Innovation Capabilities



Helen Sweeney Panel Chair - UK NCP





### European and UK Soils Research and Innovation Capabilities

Annette Schneegans European Commission DG Agriculture & Rural Development







# EU MISSIONS

## SOIL DEAL FOR EUROPE

100 living labs and lighthouses to lead the transition towards healthy soils by 2030

#### **Annette Schneegans**

Soil Mission Secretariat DG Agriculture and Rural Development - European Commission

Community Building event Soil Mission, 01 March 2023

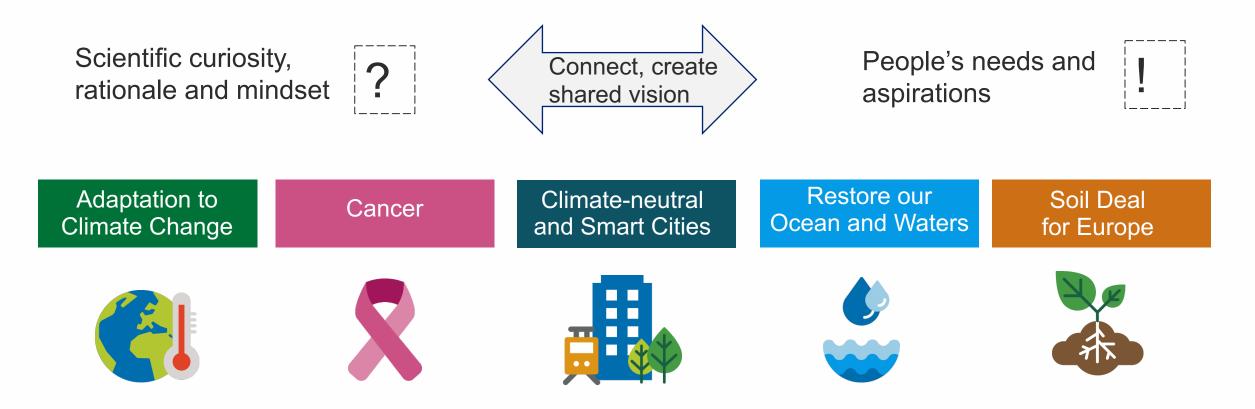
#### **#EUmissions #HorizonEU #MissionSoil**





### Missions: a new instrument under the R&I programme Horizon Europe (2021 – 2027) to address major societal challenges

A mission is a portfolio of actions across disciplines intended to achieve a **bold and inspirational and measurable goal** within a set timeframe, with **impact** for society and policy making.







### **Co-creating the Soil Deal Mission**

#### Mission Board "Soil health and food" **R&I days 2020** Chair Vice-Chair the Mission Board hands 0 over its report "Caring for Caring for soil is caring for life European Missions Consi VEERMAN (NL soil is caring for life" Teresa PINTO-CORREIA (PT Ithy by 2030 European Missions A Soil Deal for Europ 100 living labs and ighthouses to lead th ransition towards here 612453 achezar Hrist FILCHEV (BG) Emil CIENCIALA (CZ) Sridget Anne EMMET (UK) GRAND (AT) ZITA KRIAUČIŪNIENĖ (LI VELA OLMO (ES) WITTKOWSKI (DE until June 2021 29 Sept 2021 September 2019 September 2020 until September 2020 **Commission services R&I days 2019** the Mission board prepares its prepare the mission Official launch of the creation of the Mission Board and recommendation for a mission with implementation plan (IP) missions through a involvement of Member States, the the Mission Assembly Soil health with the advise of the Commission Mission Assembly as well and food as Mission Board Communication stakeholders and citizens: more than 60 events to promote and co-create

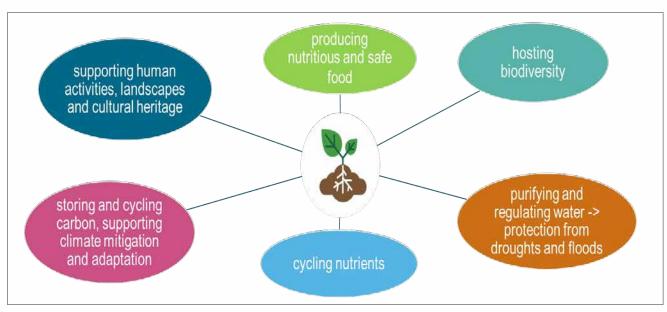
the mission all around Europe

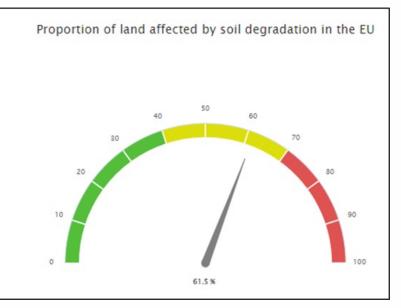




### The soil mission's starting point (1)

- Healthy soils are the basis for nutritious and safe food and other vital, interconnected ecosystem services.
- According to Mission Board, 60-70% of soils in Europe can be considered as being unhealthy due to current management practices, pollution, urbanisation and effects of climate change.





From JRC EUSO Dashboard, 2023 https://esdac.jrc.ec.europa.eu/esdacviewer/euso-dashboard



## Examples of soil health issues in Europe

**2.8 million** potential **contaminated sites** (only 24% inventoried) posing major health risks

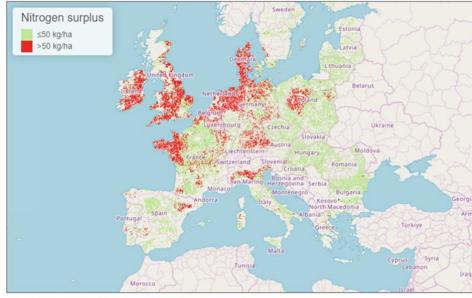
65-75% of agricultural soils with nutrient inputs at levels risking eutrophication of soils and water and affecting biodiversity

Cropland soils losing carbon at a rate of 0.5% per year; 50% of peatlands drained and losing carbon – this is contributing to the climate crisis

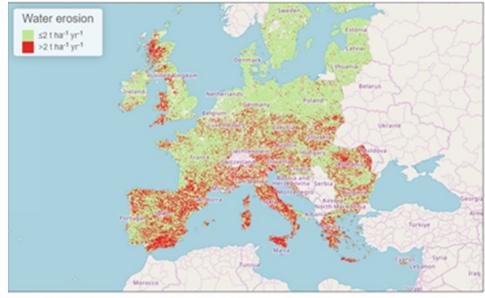
24% of land with unsustainable water erosion rates

25% of land at High or Very High risk to desertification in Southern, Central and Eastern Europe in 2017





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Webtools • © EC-GISCO • Leafet | © OpenStreetMap contributors | Disclaime





### The soil mission's starting point (2)

- Knowledge regarding sustainable soil management is not sufficiently applied in practices; solutions for soil management need to be adapted to the local context – need
- Need to focus on place based innovations and pathways to address the knowledge – practice divide.
- Soil related knowledge, monitoring and policies focus to a large extent on agricultural soils. More knowledge and data needed to address soil health in other land uses.
- In the EU, soil monitoring is not harmonised or undertaken in a systematic way. Currently, only 6 or 7 Member States have active soil monitoring programmes.
- The scale of soil contamination is largely unknown.
- Political and "business" attention increasingly turning to soils need to operationalise the concept of "healthy soils"







### The Soil Deal mission supports the Green Deal and other commitments

#### Mission part of:

- Farm to Fork Strategy
- EU Biodiversity Strategy for 2030
- Climate Adaptation Strategy
- Forest Strategy
- Zero Pollution Action Plan for air, water and soil
- Organic Action Plan
- Long term vision for rural areas
- EU Soil Strategy for 2030 and upcoming Soil health Law
- Communication on sustainable carbon cycles
- Communication "Safeguarding food security and reinforcing the resilience of food systems"
- Communicaton "Ensuring availability and affordability of fertilisers"

#### By 2030

- 25% of land under organic farming
- Reduce the overall use and risk of chemical pesticides by 50% and the use of more hazardous pesticides by 50%
- Reduce fertilizer use by at least 20%
- Reduce nutrient losses by at least 50%
- Reduce by 30% microplastics released into the environment
- Reduce net greenhouse gas (GHG) emissions by at least 55% compared to 1990 levels.

#### By 2035

 The EU should aim to reach climate neutrality in the land use, forestry & agriculture sectors – by 2050 fully climate neutral

#### By 2050

- All EU soil ecosystems are in healthy condition
- No net land take
- Soil pollution should be reduced to levels not longer harmful





## A supportive framework for soil protection in the EU

Policy framework: "All soils are healthy by 2050"







### Mission goal 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

Specific objectives



2. Conserve soil organic carbon stocks

3. Stop soil sealing and increase re-use of urban soils

4. Reduce soil pollution and enhance restoration





6. Improve soil structure to enhance soil biodiversity

7. Reduce the EU global footprint on soils

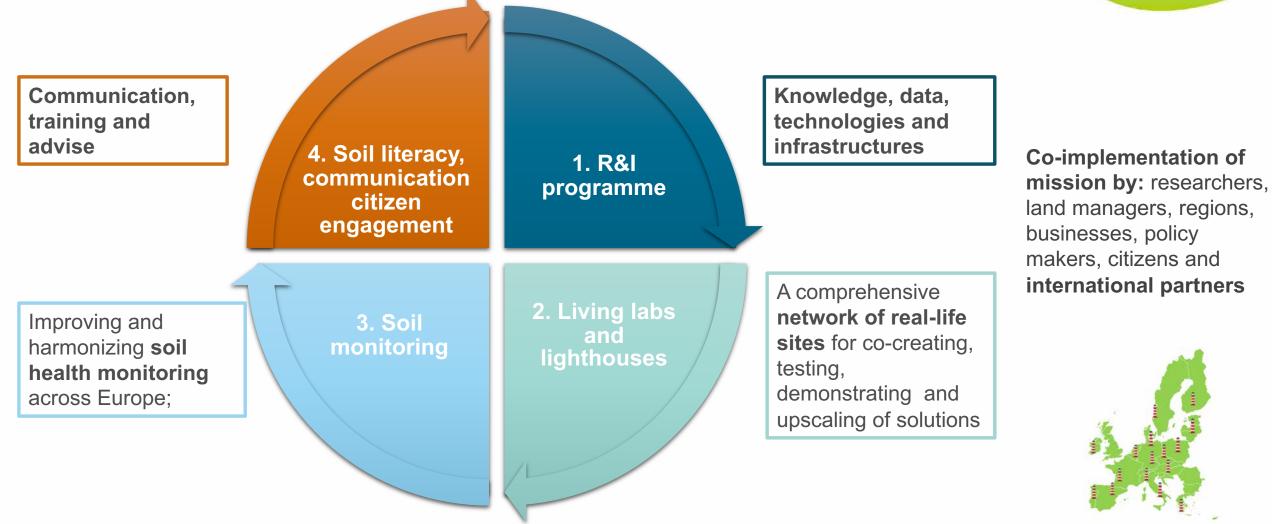
8. Improve soil literacy in society

Each specific objective is backed by **one or more quantified targets** and **measurable indicators**. Objectives apply to **all types of land use**.





### How will the mission be implemented?



Activities under the **four building blocks** to address **soil health** and the **drivers of soil** health





## **Update: The emerging landscape of Mission projects**

<u>WP 2021</u> Topics on e.g.

soil monitoring and soil health indicators, businesses models for soil health, link between soil health and food quality and safety, engagement of municipalities and regions

Budget: 67 M€

<u>WP 2022</u>

Topics on e.g.

remediation strategies for contaminated sites, soil biodiversity, use of biowaste for soil improvement, carbon farming, soil literacy

Budget: 95 M€

#### WP 2023

Topics on e.g.

Living Labs, spatial planning, soil and cultural and creative industries

Opening of call: 17 January '23

Deadline for applications:

20 September 2023

Budget: 139 M€

UK participation, e.g. in project Al4SoilHealth on soil monitoring:

- Pete Smith, University of Aberdeen
- David Robinson, UK Centre for Ecology and Hydrology
- Soil Association





## What's new? What next?

- Mission Implementation Platform up-and-running to
- build a **one-stop Mission shop** for external stakeholders develop effective **Mission project portfolio and a project hub** 
  - track Mission progress and establish a Mission dashboard
- ÷ Š
- promote and **support of soil Mission communities across territories and sectors** contribute to outreach e.g. through the **Mission's website** and **Mission Fair**
- New **Mission Board** is in place
- Cluster event of projects funded under the EU Mission 'A Soil Deal for Europe', 22-23 March 2023
- Mission manifesto
  - **Objective:** non-legally binding document for stakeholders to express support for the Mission and gain visibility as soil ambassadors
  - Target: regional and local public authorities, private sector organisations, individuals
  - When: Launch event 18 April with European Regions Research and Innovation Network





## **Examples of communication and outreach activities**



250+ co-creation and engagement events since September 2019



Social media campaigns (#MissionSoil on-going)

Several articles, press releases, newsletters, 4 videos, 2 factsheets



2 Podcast episodes



Publications: soil health Results Pack / Report on communication and citizen engagement initiatives in line with Mission Soil



Interactive games for kids and adults, including composting training



Survey sent to **7000+** contacts across Europe and 2500+ contributions received

- Factsheet Mission A Soil Deal for Europe
- Factsheet Mission A Soil Deal for Europe Living Labs
- Projects results Pack Soil Health
- Video EU Mission "A Soil Deal for Europe"
- Video EU Mission 'A Soil Deal for Europe', the CAP and carbon farming
- <u>Podcast episode Food for Europe Ep. 15 Soils in danger: Europe fights back</u>
- Social media campaign #MissionSoil: best practices to keep our soils healthy

More resources in **Official webpage Mission A Soil Deal for Europe**: <u>http://ec.europa.eu/mission-soil</u>

Funding and tenders portal: <u>https://ec.europa.eu/info/funding-</u> tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-12missions\_horizon-2023-2024\_en.pdf



#### **EUROPEAN UNION**



...



Mission Soil is Mission Critical- wonderful to see this momentous shift in our approach to planetary wellbeing. #SaveSoil. Let's make it happen. -Sg @ca4sh\_global @EUAgri @EU\_ENV @cpsavesoil #COP27Egypt

EU Agriculture Y 🔗 @EUAgri · Nov 10 Mission Soil will be presented at #COP27 😨 as part of EU efforts to increase climate resilience 🔲 #EUatCOP27

11 November, from 12:00 CET

Puring the session on the need for a Soil Health resolution, organized by @ca4sh\_global

Livestreaming here foodsystemspavilion.com/thematic-day/1...

For further information and questions please contact the mission secretariat: AGRI-SOIL-MISSION-BOARD@ec.europa.eu

#### #MissionSoil #EUmissions #HorizonEU



### European and UK Soils Research and Innovation Capabilities

Luke Williams Senior Portfolio Manager BBSRC



Biotechnology and Biological Sciences Research Council



Innovate UK KTN



## UK Soils Research Landscape

Dr Luke Williams Senior Portfolio Manager, Soils and Agrisystems <u>luke.williams@bbsrc.ukri.org</u>

## Agenda

## **1** Brief outline of UK Research and Innovation

**2** Research for different purposes

**3 UK Soil Research and the Soil Mission** 

**4** Upcoming Funding





## **UK Research and Innovation**

We work with the government to invest over £7 billion a year in research and innovation by partnering with academia and industry to make the impossible, possible. Through the UK's nine leading academic and industrial funding councils, we create **knowledge with impact**.





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## **Research for different purposes**





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## **Previously funded work**

## Together, we are UKRI AgriFood4NetZero Network+

Bringing together key research leaders and stakeholders, their organisations and networks, our mission is to shape the next decade of research to support and drive the agrifood system's progress towards net zero. As a Network+, we're taking a co-development approach to engage scientists and stakeholders to progress and prioritise UKRI and other research. We've assembled – and continue to strengthen – a formidable team that combines systems-level expertise with comprehensive coverage of all key specialisms.

Our reach, like our expertise and coverage, is broad and deep. Stakeholders extend across government departments, devolved administrations and their agencies, NGOs, innovation bodies, the agrifood industry, and farming and fishery groups across the UK.

We want you to join us. To play your vital part, by adding your voice, your specialist expertise.

Join our Network+



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https://www.agrifood4netzero.net/

# Soil can be found in many different places <u>Centre in climate change and health</u>

Apply for funding to establish a centre in climate change and health.

This centre will be a world-leading centre of excellence that carries out interdisciplinary, cutting-edge and impactful research to address major challenges at the interface of climate and health research.

You must be based at a UK research organisation eligible for UK Research and Innovation (UKRI) funding.

We will fund all justified costs associated with international co-investigators and coinvestigators from UK business, civil society or government bodies at 100% FEC. However, these combined costs must not exceed 30% of the full 100% FEC cost of the grant.



**Biotechnology and Biological Sciences** Research Council

## https://www.ukri.org/opportunity/

## **UK Soil Research and the Soil Mission**

Soil Mission	UKRI Funding	
Discovering the subsoil	Signals in the Soil	
Soil pollution processes	Molecules to Landscapes	
Onsite digital technologies	Signals in the Soil	
Innovations to prevent and combat desertification	Landscape Decisions SPF	
Soil friendly practices in horticulture	Landscape Decisions SPF	
Soils in spatial planning	Landscape Decisions SPF	
Back to earth – bringing communities and citizens closer to soil	Green Transition Ecosystems (AHRC)	
Co-creating solutions for soil health in Living Labs	AgZero+	
Carbon farming in living labs	AgZero+	



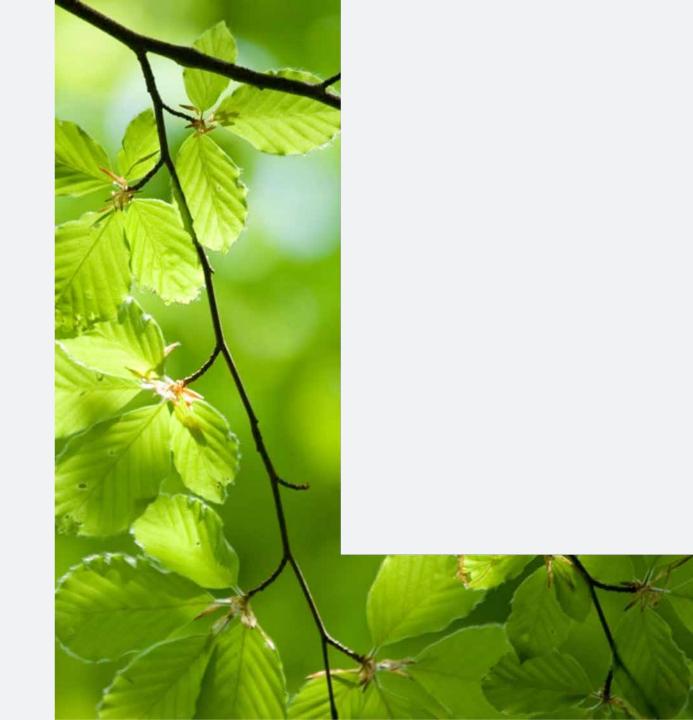
### **Building a Green Future**

Accelerating the UK's transition to a secure and prosperous green economy by 2050. Partnering with UK Government departments, business and internationally, we will build on our existing £800m p.a. portfolio, to fast-track development of solutions necessary for meeting UK NetZero targets, through strategic cross-UKRI investments, keeping the UK at the forefront of the green industrial revolution.





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# Thank you luke.williams@bbsrc.ukri.org





### European and UK Soils Research and Innovation Capabilities



Martin Broadley Science Director Rothamsted Research









European Commission



### Horizon Europe Mission: A Soil Deal for Europe - Community Building Event [1<sup>st</sup> March 2023]

Professor Martin R. Broadley Director, Sustainable Soils & Crops Rothamsted Research

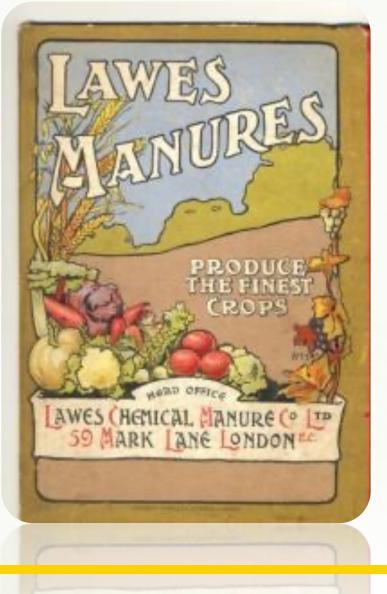




Biotechnology and Biological Sciences Research Council

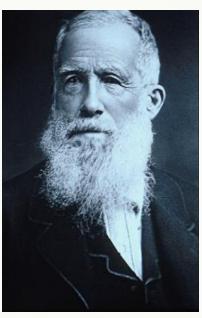
## **Rothamsted Research (RRes)**



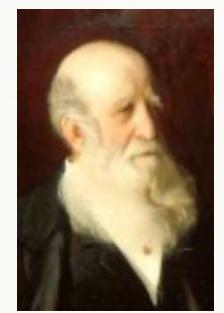


### Rothamsted Experimental Station est. 1843

- Developed our understanding of plant nutrition
- Produced the world's first commercial chemical fertilisers



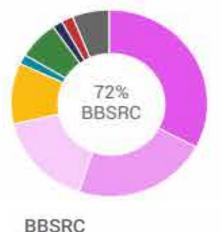
Sir John Bennet Lawes 1814–1900

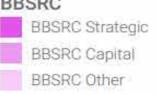


Sir Joseph Henry Gilbert 1817–1901

## **Rothamsted today:**

One of 8 BBSRC core-funded institutes, providing National Capability and expertise in a strategically key area





#### Non BBSRC



>400 people >35 nationalities

+ collaborations in over 50 countries

- >300 publications per year in peer-reviewed scientific journals
- **2 campuses + 2 field trial site** 830 ha of field environment
- **~£32m turnover** 
  - 10-15% of this from industry
- Rothamsted Enterprises Ltd (REL) >30 tenant companies

Rothamsted Enterprises







## Soil Sciences: Key Research Leads





**Soil Microbiology** Ian Clark Tim Mauchline Vanessa Nessner Kavamura



**Soil Physics** Hannah Cooper Xiaoxian Zhang







**Soil Systems** Laura Cardenas Alice Milne Andy Neal Martin Blackwell



Soil C/Biogeochemistry Marcelo Galdos Steve McGrath



**Soil Fertility / Crop Nutrition** Martin Broadley

Stephan Haefele Edward Joy Grace Kangara

Agronomy/Long-Term Experiments Andy Gregory Jon Storkey



Protecting Crops & the Environment

## **Institute Strategic Programmes (ISPs)**

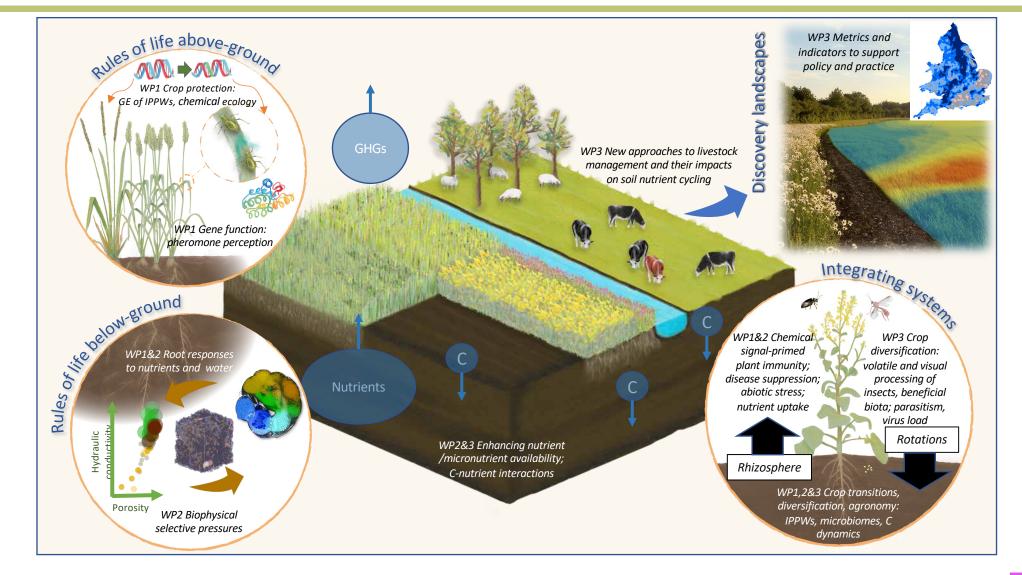






## **Growing Health ISP: 1-health ambitions**

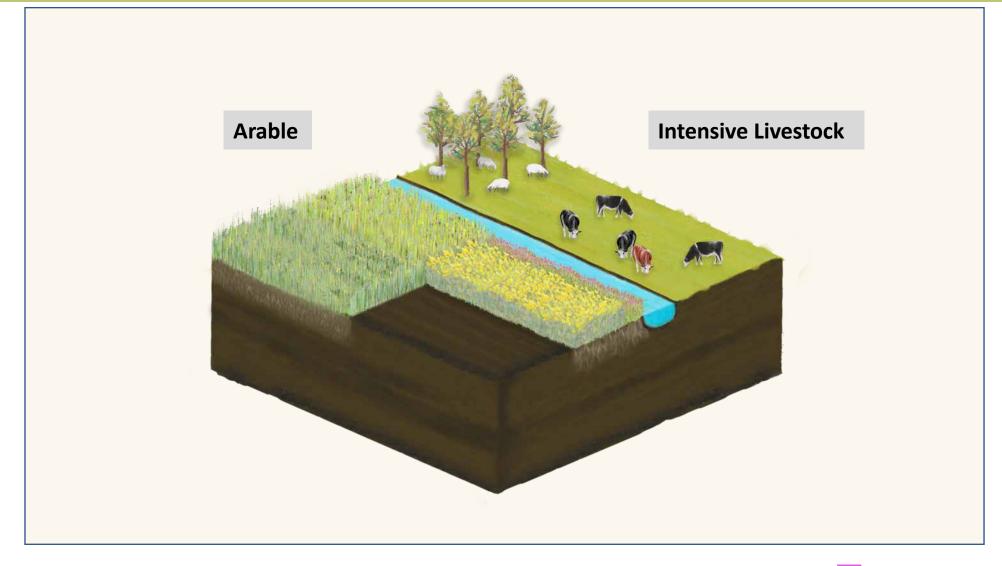






## **Growing Health ISP: field platforms**







## **Growing Health ISP: arable platforms**





## **Growing Health ISP: grazing platforms**







### Transformation for sustainable nutrient supply and management

HORIZON-CL6-2022-ZEROPOLLUTION-01-03: EU—China international cooperation on nature—based solutions for nutrient management in agriculture



#### **Overall objective:**

To develop and test innovative **Nature Based Solution (NBS)** practices and pathways that contribute to a socio-ecological transformation of existing intensive agricultural systems towards an increasingly sustainable nutrient management system.

#### Partners:

University of Hoheneim, Germany Wageningen University, Netherlands Aarhus University, Denmark Szechenyi Istvan University, Hungary Plan4all, Czech Republic Rothamsted Research, UK Research Institute of Organic Agriculture, Switzerland Chinese Academy of Agricultural Sciences, China



Start date: December 2022 End date: November 2026 (4 years) Overall value: €6 million

Dr Martin Blackwell

Nature based solutions include: Novel crop rotations Manure management Nutrient management Decision Support Systems (DSS) Novel/recycled fertilisers

## Soil Sciences: Scales & Sensors

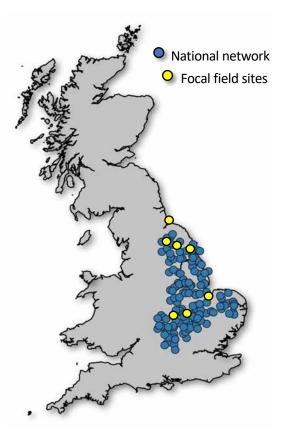




## Soil Sciences: Co-Development



Sustainable weed management...



**Black Grass Resistance Initiative** Network of  $\sim$ 70 farmers has enabled us to capture a valuable time series on the impacts of environment and management on resistance evolution. Engagement with farmers has also influenced treatments explored in our experiments. Impacts of diversification and regenerative agriculture on soil health and pests and beneficials...



Min-/zero-till Notts-Leics min-till farmer group, BASE farmer network



Alley cropping, silvo-arable, Wakelyns Farm, Suffolk



Cereal/cover crop rotations, under sowing Honeydale Farm, Cotswolds, BASF farmer network



Grazed herbal rotation leys, Erth Barton Farm, Cornwall



**Partners:** 

UK:

Ireland: UCD

Malawi: LUANAR

Zambia: U Zambia

Poland: Poznan, Fargo

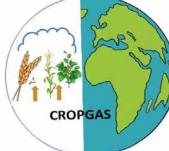
South Africa: U Free State

**U** Nottingham

Zimbabwe: U Zimbabwe

**Rothamsted Research** 

**British Geological Survey** 



### **CropGas: The effect of conservation agriculture** interventions on greenhouse gas emissions



#### **Dr Laura Cardenas**

The University of

Nottingham

British

Survey

Geological

BGS

ROTHAMSTED

#### Activities include:

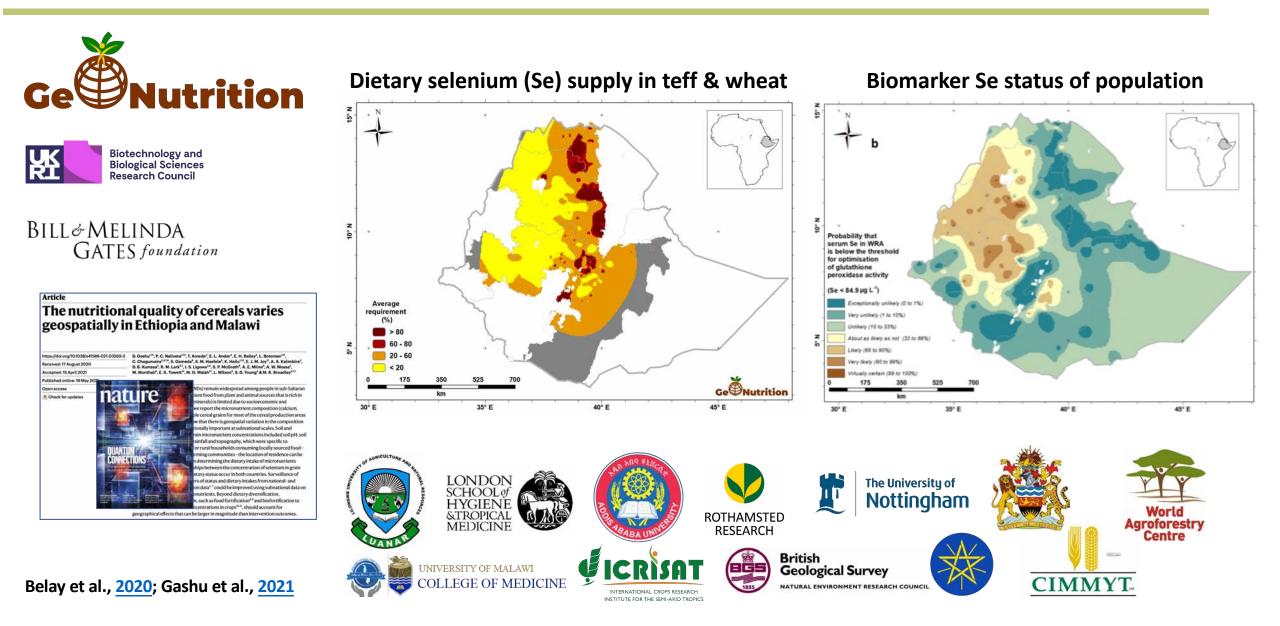
- Use existing experiments in the UK, Ireland, and Poland that include locally relevant zero/min till and crop rotation interventions with conventional cultivation comparisons
- Use existing experiments in South Africa, Zambia, Zimbabwe and Malawi which compare conventional management of a maize crop with zero/min till and residue retention combined with other CA interventions (e.g. intercropping)
- Install field instrumentation to measure soil GHG emissions and soil parameters for plots across all sites with good temporal resolution
- INCREASE CAPACITY in developing countries that can be extended to other countries
- Develop CS emission factors for crop rotations and assess mitigation strategies





Hypothesis workshop, June 2022 **EJP** SOIL Agricultura

## **Soil Sciences: Links to Human Nutrition**



ROTHAMSTED RESEARCH

#### IN RESPONSE TO:

EXPRO+ ESA AO/1-11144/22/I-EF FOR AGRICULTURE SCIENCE PRECURSORS





Earth Observation for estimating and predicting crop nutrients (EO4Nutri)



Dr Stephan Haefele



**Dr Alice Milne** 

Innovative scientific solutions that bring together the capabilities of various Earth Observation (EO) data through novel methods and approaches to estimate and predict the nutrient content of soil, crop canopy, and harvested crops for global staple grains: maize, rice, sorghum, teff and wheat

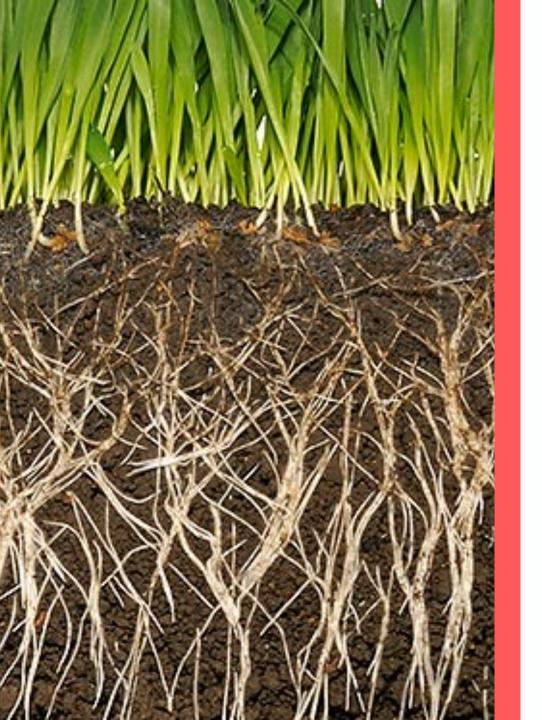
ID	WP Name	WP Manager Organization		
WP0	Project Management	M. Belgiu ITC		
WP1	Scientific requirement consolidation	M. Belgiu ITC		
WP2	Dataset collection	G. Candiani	CNR-IREA	
WP3	Development and validation	M. Marshall	ITC	
WP4	Agriculture Science Precursors	M. Marshall	ITC	
	Experimental Dataset Generation			
WP5	Advancing Earth System Science	M. Rossini	UniMIB	
WP6	Transferring science into solutions for	S. Haefele	RRes	
	society	5. Hacicic		
WP7	Science agenda and five years	M. Belgiu	ITC	
	scientific roadmap	Wi. Deigiu	110	
WP8	Promotion and Coordination	M. Belgiu	ITC	

## **RRes: Open for Collaborations!**





- 1. HORIZON-MISS-2023-SOIL-01-01: Discovering the subsoil
- 2. HORIZON-MISS-2023-SOIL-01-02: Soil pollution processes modelling/inclusion in digital decision-support tools
- 3. HORIZON-MISS-2023-SOIL-01-03: Onsite digital technologies to monitor nutrients and chemical or biological stressors in soil and plants with relevance for food safety and nutrition
- 4. HORIZON-MISS-2023-SOIL-01-04: Innovations to prevent and combat desertification
- 5. HORIZON-MISS-2023-SOIL-01-05: Soil-friendly practices in horticulture, including alternative growing media
- 6. HORIZON-MISS-2023-SOIL-01-06: Soils in spatial planning
- 7. HORIZON-MISS-2023-SOIL-01-07: Back to earth: bringing communities and citizens closer to soil
- 8. HORIZON-MISS-2023-SOIL-01-08: Co-creating solutions for soil health in Living Labs
- 9. HORIZON-MISS-2023-SOIL-01-09: Carbon farming in living labs



### European and UK Soils Research and Innovation Capabilities



Jane Rickson Prof. of Soil Erosion & Conservation Cranfield University





Horizon Europe Mission: A Soil Deal for Europe

Soils Research and Innovation Capabilities at Cranfield University

Jane Rickson, FIAgrE, CEnv Professor of Soil Erosion and Conservation

> Centre for Soil, Agrifood and Biosciences School of Water, Energy and Environment Cranfield University United Kingdom

> > www.cranfield.ac.uk

**Cranfield** Environment and Agrifood





### **Cranfield soils expertise and capability**



Prof Tim Hess, Water Management

#### **River Restoration Centre**

Dr Maria del Carmen Alamar Gavidia, Research Fellow, Postharvest Bioscience

Dr Angel Medina Vaya, Senior Lecturer, Food Mycology

+ New academic appointments in Soils, Agricultural Engineering, Bioinformatics and Mycology



### The National Soil Map and Inventory

### Soils properties vary

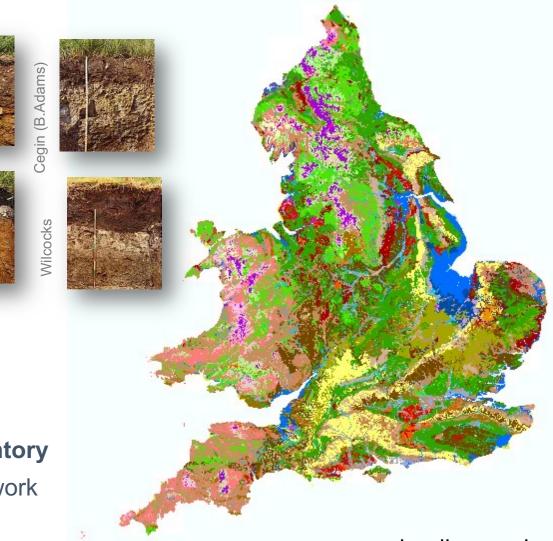
- Texture
- Stoniness
- Organic content
- Depth to rock
- Mineralogy
- Permeability
- Natural drainage
- Consolidation
- Acidity

### National Soil Map and Soil Inventory

- Product of > 200 years of field work
- 747 Soil Series (soil types)
- 306 Soil Associations (soil types occurring together)

Denbigh (B.Adams)

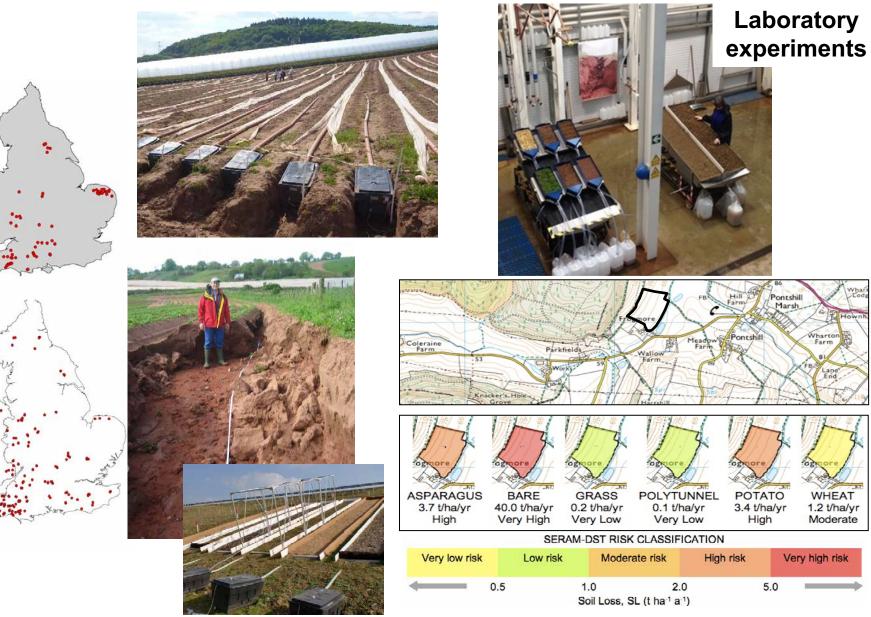
Hiraethog (B.Adams)



www.landis.org.uk



### Soil degradation threats: soil erosion research



#### **Field erosion surveys**

#### Modelling: soil erosion risk classes

## Total costs of soil degradation in England and Wales (<u>£ million per year</u>) (From Graves et al. (2011)) Prices adjusted for inflation, 2022

	Ecosystem service							
Provisioning		Regulating services					Total	
£ million per year	Agricultural production	Flooding	Water quality	GHG emissions	Other	Cultural	Central estimate	%
Soil erosion	54	88	81	12	?	? 🤇	235	14%
Compaction	270	216	95	68	?	?	648	39%
Loss of organic matter	3	?	?	743	?	?	745	45%
Contamination	?	?	?	?	34*	?	34*	2%
Loss of soil biota	?	?	?	?	?	?	?	0%
Soil sealing	?	?	?	?	?	?	?	0%
TOTAL	327	304	176	822	34	? (	1,662 m	100%
%	20%	18%	11%	49%	2%		100%	

\* cost of regulation to protect soils from contamination

**?** = Estimates not available at national scale

From Graves, A.R., Morris, J., Deeks, L.K., Rickson, R.J., Kibblewhite, M.G., Harris, J.A., Farewell, T.S. and Truckell, I. (2015) 'The total costs of soil degradation in England and Wales', Ecological Economics, 119, pp. 399–413. **N.B. Total costs of soil erosion in Scotland = £50 million per annum (2019 costs)** 



### Innovative soil management research





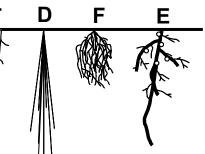






#### **Applied soils research at Cranfield**

- Cultivations and tillage practices
- Cover cropping
- Soil (organic) amendments
- Field engineering
- Erosion control products

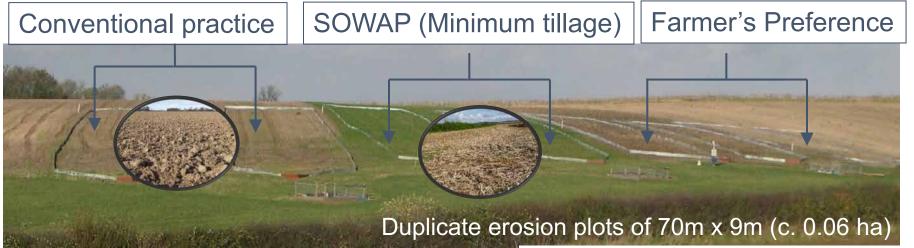


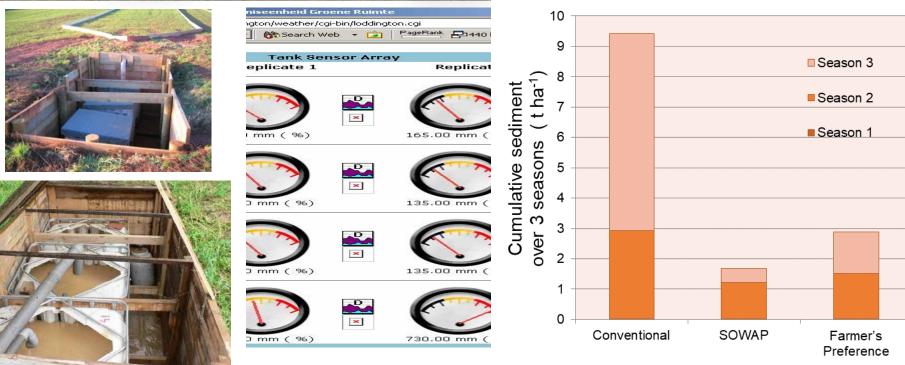




### Soil management research: Soil and Water Protection in Northern Europe (SOWAP)











### **Innovative soils research**

Initial and final measurements of soil health







#### Soil parameter

#### Soil texture

Penetration resistance (in-situ - continuous depth)

Infiltration rate (in-situ using ring infiltrometer)

Surface (micro)topography

Bulk density

Aggregate size distribution (including stone content)

Total N

KCl extractable N

Total C

Soil organic matter (loss on ignition)

рΗ

Total P

Available P

Total K

Available K

Available Magnesium

Sulphur

GHG emissions using AgriEPI kit + chambers

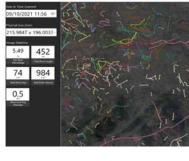
CO<sub>2</sub> respiration

**Microbial biomass** 

Earthworms (in-situ)









Horizon Europe Mission: A Soil Deal for Europe

European and UK Soils Research and Innovation Capabilities

### Thank you for your attention

Jane Rickson, FIAgrE, C.Env. Professor of Soil Erosion and Conservation Cranfield University United Kingdom

www.cranfield.ac.uk

**Cranfield** Environment and Agrifood





### European and UK Soils Research and Innovation Capabilities



Elaine Groom Northern Ireland NCP Cluster 6 Agri-Food & Biosciences Institute





#### Leading | Protecting | Enhancing





Dr Elaine Groom NI Contact Point Cluster 6 March 2023

afbini.gov.uk

AGRI-FOOD



## About Agri-Food and BioSciences Institute

#### A Public Research Institute funded by NI Department of Agriculture Environment and Rural Affairs (DAERA)

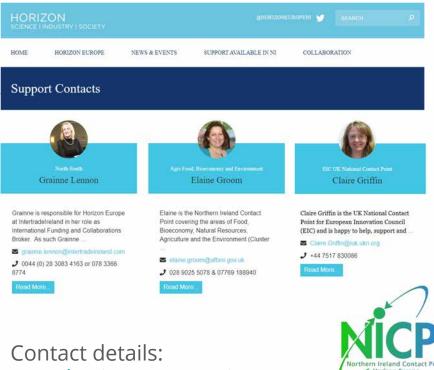
- Staff complement: ~650 FTE permanent staff
- Operates across a wide breadth of scientific expertise, protecting animal, plant and human health and enhancing the natural and marine environment.
- Provides research, demonstration, analytical and diagnostic services, and scientific advice to the agri-food industry
- Supports policy development and statutory testing, surveillance, emergency response.



- 1. Newforge Lane, Belfast (HQ, Research Laboratories)
- 2. Stormont, Veterinary Sciences
- 3. Crossnacreevy, Plant Testing Station
- 4. Hillsborough Research Farm
- 5. Loughgall Research Farm
- 6. Omagh, Veterinary Laboratory
- 7. Bushmills, River Bush Salmon Station
- 8. Research Vessel Corystes

Role:

- A regional contact point for Horizon Europe (CL6)
- Based in AFBI

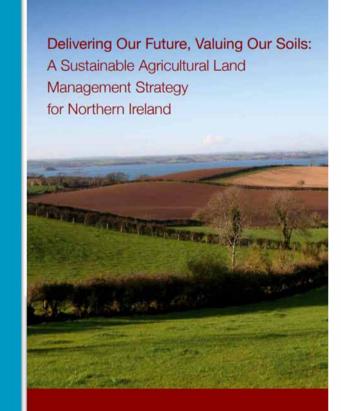


www.horizoneuropeni.com

## Northern Ireland's journey towards soil health

- Agriculture vital part of the NI economy
  - Uses more than 75% of total NI land area
  - NI is 6% of UK land area but produces 10-15% of UK agricultural products from livestock
- Land Management DAERA Policy Development
  - Independent Expert Working Group on Sustainable Land Management
  - Report (2016) "Delivering Our Future, Valuing Our Soils: A Sustainable Agricultural Land Management Strategy for Northern Ireland"
  - Annex (2018): "Making Ammonia Visible"
  - H2020 EJP Soil Project (2020-2025)
  - Northern Ireland Soil Nutrient Health Scheme (2022-2026)





Expert Working Group on Sustainable Land Management

# EJP SOIL: Towards climate-smart sustainable management of agricultural soils

A European Joint Programme COFUND on Agricultural Soil Management

- €80M COFUND, commenced February 2020;
- duration 60 months



• The EJP will boost soil research

• in particular on agricultural soil management and its contribution to climate change mitigation and adaptation.

 Develop a sustainable framework for an integrated community of research groups working on related aspects of agricultural soil management.
 Website: https://ejpsoil.eu/

funding from the European Union's Horizon 2020 research and innovation programme: Grant agreement No 862695





### **EJP Soil - Overarching challenges : Ambitions**

Scientific Level	<ul> <li>5 year roadmap</li> <li>New knowledge on management options that are climate-smart sustainable soil</li> <li>New knowledge on SOC sequestration</li> <li>Scientific underpinning on policy</li> </ul>
Operational Level	<ul> <li>Strengthen the scientific community alignment, implementation of research, training and capacity building</li> <li>Harmonized soil information system</li> <li>Improved reporting on soil (carbon, soil degradation, biodiversity)</li> </ul>
Policy Level	<ul> <li>Evidence based recommendations for policy makers</li> <li>Science policy practitioners dialog</li> </ul>
Societal Level	Raise awareness on soils their challenges, their management

• Improve science – stakeholders dialog, participation and co-construction



### **AFBI – EJP Soil Activity**

- Task 2.4.5: Stock take study and recommendations for harmonizing methodologies for fertilization guidelines across regions (Task Leader)
- Example Internal Research Projects:
- CarboSeq How much soil organic carbon (SOC) can be sequestered in European soils?
- SensRes Sensor data for downscaling digital soil maps to higher resolution
- MIXROOT-C Are mixed species systems fostering below ground C inputs and C sequestration?

- EJP Soil Newsletter <u>sign-up</u>
- Annual Science Days & General Meeting 2023 <u>Click to register</u>!
- Call for papers EJP SOIL Special Issue
- Webinar 30 March on spring calls: <u>Visiting</u> <u>scientists & Access to infrastructure</u>
- New EJP SOIL projects <u>strengthening</u> <u>international cooperation</u>

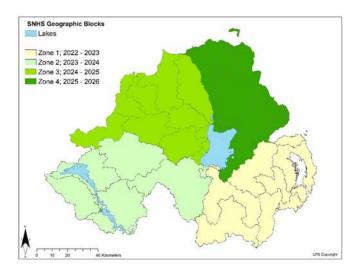


- <u>About National Stakeholders and Hubs</u>
- Become a stakeholder <u>sign-up</u>
- UK National Hub Webpage



## NI Soil Nutrient Health Scheme

- Cost to DAERA £37million; Duration: 2022-2026
- AFBI, with partners Ulster University & University of Leeds
- Sampling approximately 650,000 fields in four geographic zones
- Will allow farmers to optimize the application of nutrients, increasing profitability and reducing nutrient losses for environmental benefit



#### AFBI\_Soils @AfbiSoils · Feb 17

The Soil Nutrient Health Scheme reached its 100k milestone of fields sampled to date in you can watch the short clip from John Mercer's farm in Dromara, Co Down. #SNHS\_NI #soiltesting #soilhealth #soilscience #carboncaptureSNHS\_NI @daera\_ni @DAERAPermSec @DiscoverCAFRE @AFBI\_NI

#### 🛲 BBC Newsline 🤣 @bbcnewsline · Feb 16

There are seven hundred thousand fields in Northern Ireland - and in four years time all of them will have been tested for their soil quality. It's part of an important scheme that will help farmers to receive payments in the future.





### NI Soil Baseline

#### **FARMERS receive:**

### Soil Status Assessment

- Soil sampling
- Soil analysis
- Mapping
- Recommendations

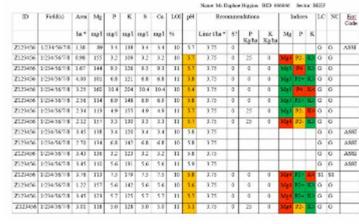
### **Carbon Stock Estimates**

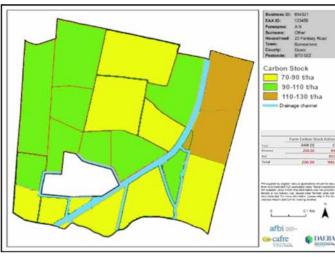
- Soil C
- Above Ground Biomass

### **Mitigating Impact on Water**

- Runoff risk mapping
- HSA/CSA

### NMP training (CAFRE)

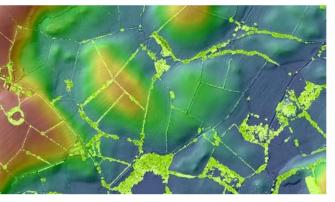




#### Analysis for: P, K, pH, Mg, Ca, S, LOI (7.5cm grassland/15cm arable)

Results & Recommendations based on last/next crop entry

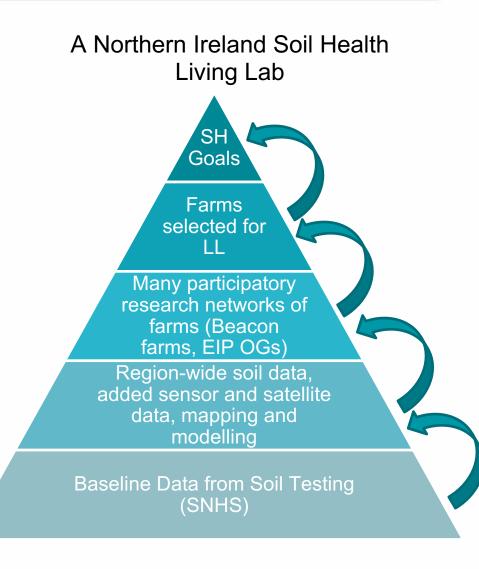




### NI Soil Nutrient Health Scheme – Research Component

- Soil carbon in actively farmed soils Quantification of baseline stocks soil biogeochemistry
- Carbon in above ground biomass
  - LULUCF budgets 100,000km+ hedgerows, small woodlands and single trees not currently contributing to the C inventory
- Basaltic soils Improved measurement of available P preventing over-fertilisation
- Water Catchments (AFBI, UU) Run-off maps
- Behavioural change (Leeds, AFBI) Assessing farmers' awareness of soil testing benefits, and impacts based on real-time data







### European and UK Soils Research and Innovation Capabilities

Concha Civantos Project Advisor – NATI00NS Project FUNDECYT Foundation









Supporting the soil deal for Europe across national communities

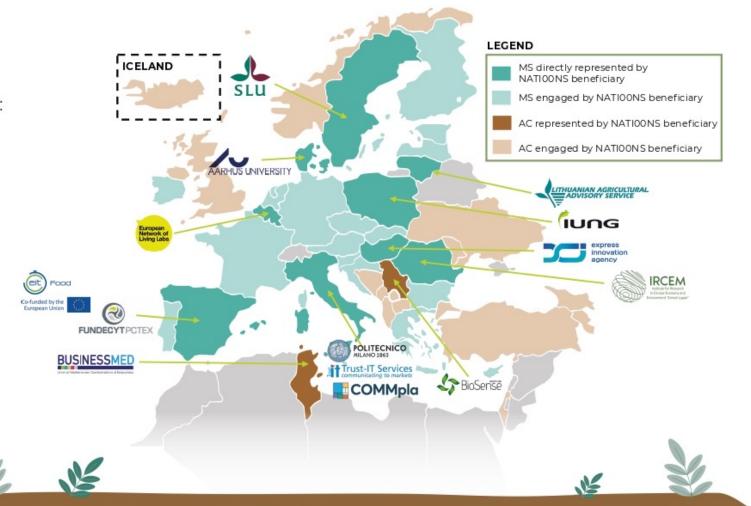
Concha Civantos NATIOONS project FUNDECYT-PCTEX





### NATIOONS Partners

NATIOONS partners and Advisory Board members include different stakeholders: from multidisciplinary academic partners to EU umbrella organisations representing specific groups, like farmers, public authorities, Living Labs, industry and business, multi-actor organisations and NGOs.





	Engagement events
0 0 1	Matchmaking – national
	Factsheets & E-learning
	Helpdesk & FAQ
<b>7</b>	Webinars LL methodology
	Coaching

**Inform, engage & promote.** 43 countries (EU MS + AC), national language

Facilitate creation of local LL. Online and along engagement events

Inform & train. LL, open call, types of LL peculiarity

Support. Online, addressing all questions on LL creation

Train.

How to set up, develop and enlarge a LL.

Support.

Available in local language, appointed mentors.

**Inform, train & engage.** Different themes for specific land uses.

Facilitate creation of partnerships of LLs. Online and along thematic events



### Individual Coaching Sessions

 For confidential, individual coaching sessions, please contact: Elaine Groom (<u>elaine.groom@afbini.gov.uk</u>) from the Agri-Food and Biosciences Institute



### Matchmaking Sessions (will be open soon)

 B2Match Platform for continuous networking <u>https://nati00ns.eu/matchmaking-opportunities</u>



### Newsletter:

Subscribe here: <u>https://nati00ns.eu/#newsletter</u>, and stay tuned!

### nati00ns.eu

### nati00ns.eu



### Join the Community



nati00ns.eu



@nati00ns

1.1



Contact Details

**NATIOONS Project Concha Civantos** concha.civantos@fundecyt-pctex.es

NATIOONS Mentor for UK **Elaine Groom** elaine.groom@afbini.gov.uk

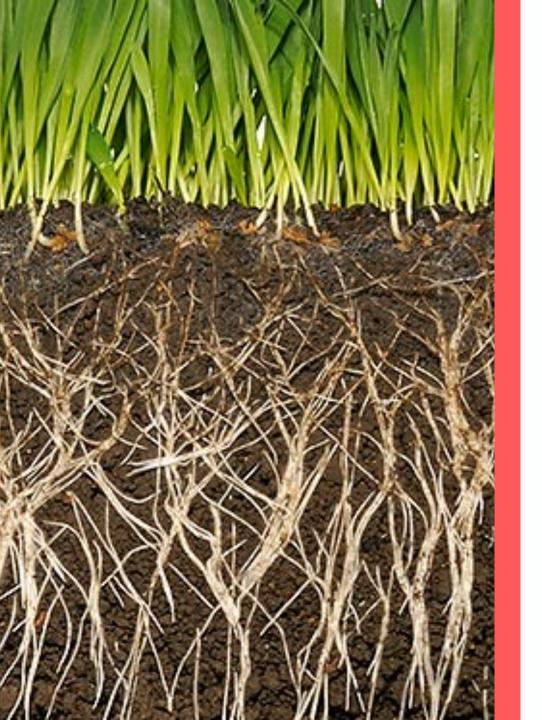
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# Any Questions?





### European and UK Soils Research and Innovation Capabilities

### **Panel Discussion**



Helen Sweeney Panel Chair UK National Contact Point





# BREAK



Option of watching UKRI video on experiences from Horizon 2020 and Horizon Europe UK grantees

https://www.youtube.com/watch?v=gdxHQ\_7VRFg&list=PLkjB0VcEl5P\_zFLV2 oKywwXzZ4Vz2l8Zu





# Soil Mission Overview and upcoming opportunities



Helen Sweeney Panel Chair UK National Contact Point





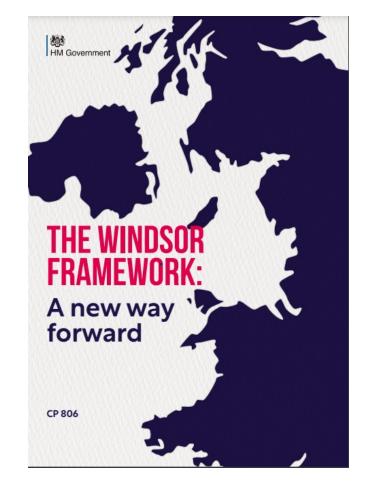
# **Overview of Call Topics**





## **The Windsor Framework**







Innovate UK

# The UK is a Candidate Associated Country

- Applicants should carry on working with their consortiums on the 2023 Work Programme Call Topics.
- UK applicants should continue applying as beneficiaries and request EU budget at the proposal stage
- If Association not in place at time of Grant Agreement the <u>UK Horizon Europe Guarantee</u> in place to support successful UK applicants
- FAQ on UK's eligibility for collaborative projects in Horizon Europe



## Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment







# Goal of the Mission: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030



Each specific objective is backed by **one or more quantified targets** and **measurable indicators**. Objectives apply to **all types of land use**.

### Soil Call Topics in 2023 Missions Work Programme

Call Topic Reference	Title	Action	Budget € / No of Projects
<u>MISS-2023-SOIL-01-01</u>	Discovering the subsoil.	RIA	12 / 2
	Soil pollution processes – modelling and inclusion in advanced digital decision-support tools.	RIA	14 / 2
	Onsite digital technologies to monitor nutrients and chemical or biological stressors in soil and plants with relevance for food safety and nutrition.	IA	6 / 2
<u>MISS-2023-SOIL-01-04</u>	Innovations to prevent and combat desertification.	IA	14 / 2
	Soil-friendly practices in horticulture, including alternative growing media.	IA	13 / 2

### **Soil Call Topics in 2023** Calls are open until 20<sup>th</sup> September 2023

Call Topic Reference	Title	Action	Budget € / No of Projects
MISS-2023-SOIL-01-06	Soils in spatial planning.	RIA	7 / 1
<u>MISS-2023-SOIL-01-07</u>	Back to earth: bringing communities and citizens closer to soil.	CSA	6 / 1
<u>MISS-2023-SOIL-01-08</u>	Co-creating solutions for soil health in Living Labs.	RIA	36 / 3
MISS-2023-SOIL-01-09	Carbon farming in Living Labs.	RIA	12 / 1
MISS-2023-CLIMA- OCEAN-SOIL-01-01	Joint demonstration of an integrated approach to increasing landscape water retention capacity at regional scale.	IA	15 / 1
<u>MISS-2023-OCEAN-</u> <u>SOIL-01-01</u>	Joint demonstration of approaches and solutions to address nutrient pollution in the landscape-river-sea system in the Mediterranean sea basin.	IA	16 / 2

# **Breakout Rooms**

**Room 1: Spatial Planning and Subsoil** 

**Room 2: Horticulture and Peat Alternatives** 

**Room 3: Digitalisation and Soil Pollution** 

**Room 4: Living Labs** 

**Room 5: Communities** 





# Any Questions?





# **Breakout Rooms**





### **Breakout Rooms**

- Room 1: Spatial planning and subsoil Helen Sweeney UK National Contact Point



- Room 2: Horticulture and Peat alternatives



Cathryn Lambourne Innovate UK KTN

### - Room 3: Digitalisation & soil pollution

Catherine Holt UK National Contact Point



### - Room 4: Living labs

Elaine Groom AFBI



### - Room 5: Communities

Anni Laihanen UK National Contact Point



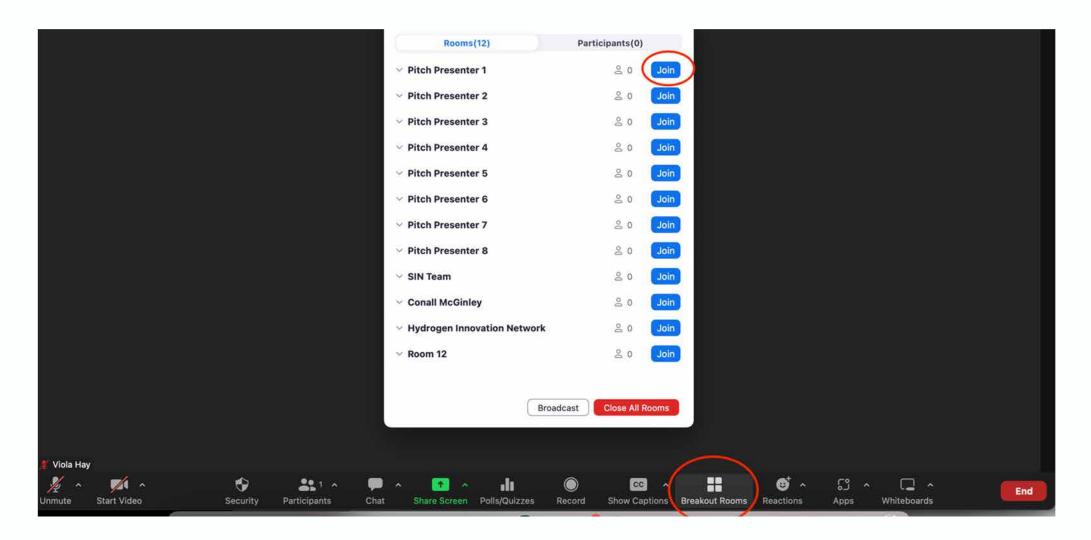


- About 30 minutes for Breakout room discussions.
- You select which breakout room you'd like to join.
- You can move around and go to more than one breakout room.
- Facilitated discussion on selected topics relevant to the Soil Mission call themes.
- Opportunity for networking and engaging in new collaborations.
- If you drop out, you can join the webinar again in the main room and we can help you join breakout rooms of interest to you.

### PLEASE NOTE: BREAKOUT ROOMS ARE NOT BEING RECORDED.

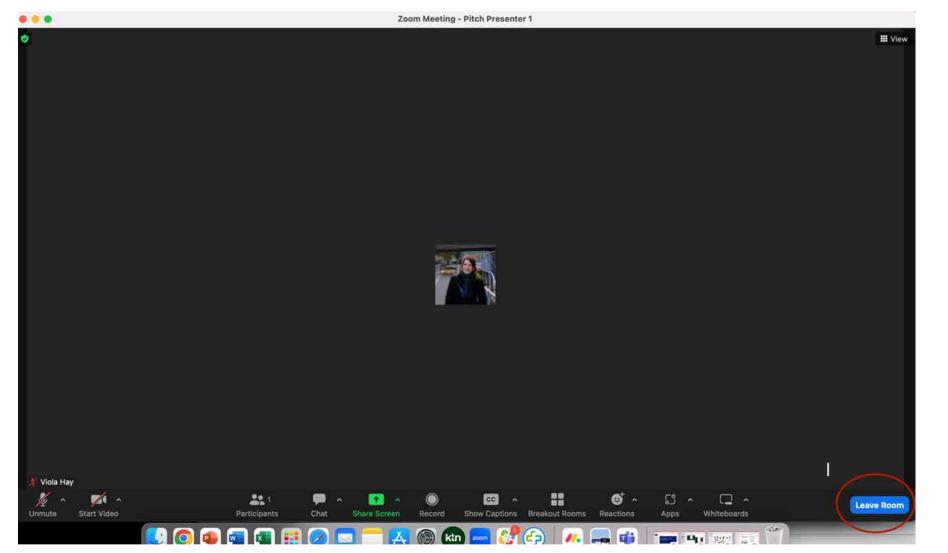


### How to JOIN a breakout room





### How to LEAVE a breakout room







# **Key Messages**



### **Breakout rooms Summary**

- Strengths and capabilities in the area
- Ideas for better engaging with our EU partners
- Their interest in the Soil Deal for Europe Mission Call Topics
- Examples of current projects they are involved in
- Examples of current collaborations with researchers/organisations in other countries





#### **Horizon Europe**

Horizon Europe is an opportunity for all types of UK organisations (including businesses and academia) to get funding for research and innovation. For UK businesses this is an opportunity to collaborate with partners with the right expertise to expand markets and accelerate innovation across Europe and internationally.

> Horizon Europe Horizon Europe is an opportunity for all types of UK organisations (including businesses and academia) to get funding

for research and innova Learn.more →





### UK Horizon Europe Hub <a href="https://ktn-uk.org/programme/european/">https://ktn-uk.org/programme/european/</a>

Horizon Europe Webinar Series:

• 6 December 2022 – Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment

https://eufunding.ukri.org/subscribe



Global Alliance Newsletter -December 2022 edition

#### Innovate UK KTN Global Alliance Newsletter

https://ktn-uk.org/news/global-alliance-newsletter-december-2022-edition/

Innovate UK KTN