LAND USE *for* NET ZERO >>> HUB

On-Farm Soil Health Measuring & Assessing Initiatives

Friday 13th June 2025

UK Research and Innovation

Department for Environment Food & Rural Affairs

Department for Energy Security & Net Zero

Llywodraeth Cymru Welsh Government

Scottish Government Riaghaltas na h-Alba

DAERA Department of Agriculture, Environment and Rural Affairs
An Roinn Talmhaíochta, Comhshaoil agus Gnóthaí Tuaithe
Depairtment o' Fairmin, Environment an' Kintra Matthers
www.daera-ni.gov.uk

Soil assessment is an increasingly crowded space

A large and growing number of organizations are looking to influence or prescribe how farmers measure and assess their soil.

This has the potential to lead to:

- Confusion among farmers – unsure of what approach to use, and for what purpose.
- Inconsistent data collection - for stakeholders looking to understand change and impact over time.
- Different interpretations of what a healthy soil is.

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Agenda

11:00 Welcome & Introductions

Ellen Fay (Sustainable Soils Alliance)
Pete Smith (University of Aberdeen)

11:10 Research Overview

Anicée Defrance (Sustainable Soils Alliance)

11:25 Learning from Existing Initiatives

Amanda Bennett (AHDB)
Joseph Gridley (Soil Association Exchange)
Chris Feeney (UK Centre for Ecology and Hydrology)

11:45 Q&A

11:55 Stakeholder Insights

Sophie Harrison (WRAP)

12:10 Next Steps

Matthew Orman (Sustainable Soils Alliance)

12:20 Summary & Conclusions

Ellen Fay (Sustainable Soils Alliance)

Different ownership and influence

We identified 34 schemes/initiatives in widespread use.

They either have official ‘authority’ e.g. from government and/or a high-profile, respected organization, or are representative of novel trends in on-farm sustainability/GHG measurement.

These schemes are ‘owned’ by a variety of organizations with different objectives and different levels of influence over the end-user. This is reflected in the tools they adopt to influence soil measurement.

Regulatory Compliance

Incentivization Schemes

Certification

Toolkits

Novel Technology

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Different priorities

Soil Health

AHDB

vidacycle

UK CEH

Soil Carbon

Downforce TECHNOLOGIES

nrm part of Cawood

Agricarbon

Farm Carbon Toolkit

Farm Sustainability

SAI PLATFORM

Soil Association

FAO FIAT PANIS

demeter

RED TRACTOR CERTIFIED STANDARDS

LINKING ENVIRONMENT AND FARMING LEAF

OF&G ORGANIC

regenagri

PASTURE FOR LIFE CERTIFIED

CERTIFIED REGENERATIVE BY AGW

DEFRA Sustainable Farming Incentive (SFI)

Welsh Government Sustainable Farming Scheme

Scottish Government Preparing for Sustainable Farming

DAERA Northern Ireland Soil Nutrient Health Scheme

Clean Water

NATURAL ENGLAND

DEFRA (2018) Farming Rules for Water

Welsh Government (2021) The Water Resources (Control of Agricultural Pollution) (Wales) Regulation

Scottish Government (2021) The Water Environment Regulation (Scotland)

DAERA (2019) The Water Framework Directive

GHG Emissions

CFA COOL FARM ALLIANCE

Farm Carbon Toolkit

agrecalc

trinity AGTECH

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… and different scopes

12/34 initiatives

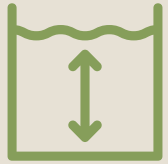
1. Don't specify soil metrics

Simply highlight the need for soil measurement to take place.

22/34 initiatives

2. Specify soil metrics

Specify the soil metrics farmers should measure.



13/34 initiatives

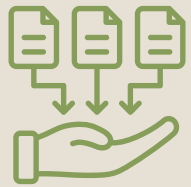
3. Define methodologies for soil samples

Define protocols on how soil measurements should be made.

11/34 initiatives

4. Include interpretation for soil test results

Analyze and interpret the results of the measurement that have taken place.



10/34 initiatives

5. Collect soils data

Collect and store soils data – either for a farmer's own benefit or as part of a wider program.

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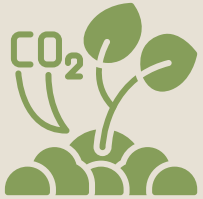
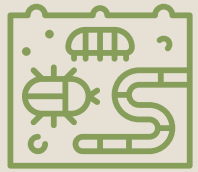
Changes in measurement reflects changes in priorities (corporate, political, scientific) for soil health

Historically soil measurement focused on **chemistry** to advise farmers on the appropriate application of chemical fertilizers – driven largely by clean water legislation.



Interest in farming's role in climate change mitigation has increased the focus on **soil carbon** – both as an indicator of a farm's net zero performance and a proxy for overall soil health.



Interest in **biological activity** and the regenerative farming movement has highlighted the importance of overall soil health – and life.

Recent extreme weather has emphasized the importance of measuring **soil structure** to understand soil's water-holding capacity and climate resilience.

As more organizations need to report on the impact on climate and nature – including soils, **precise data collection** and storage has become a priority.

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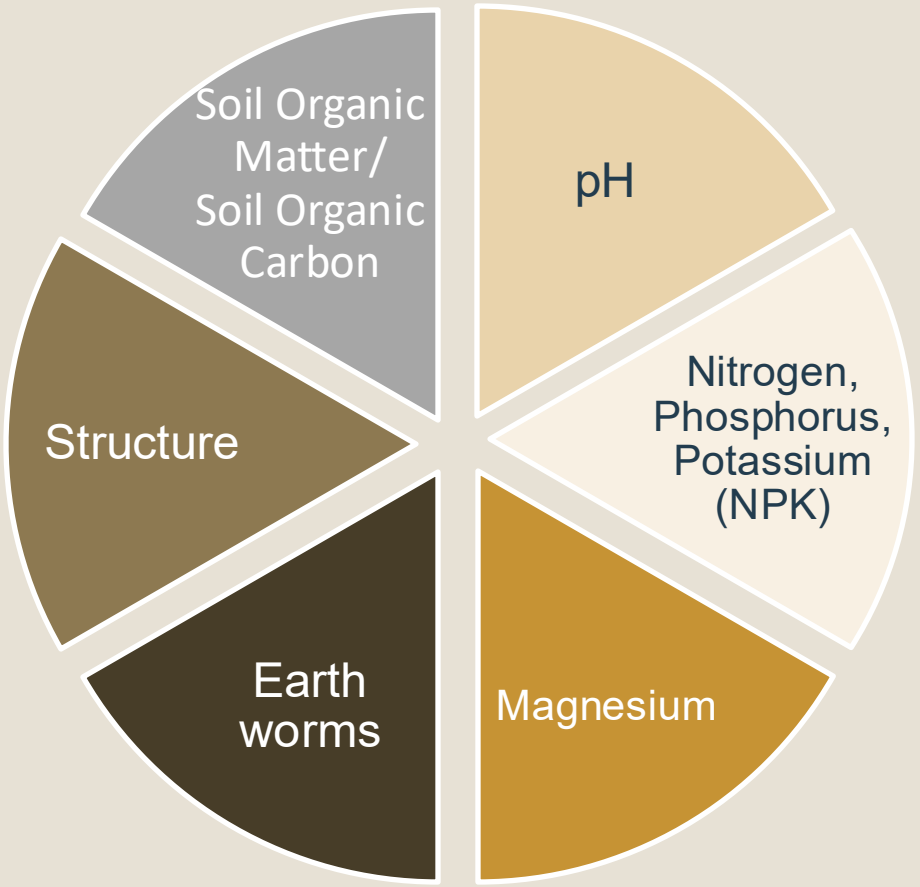
8 metrics recur most frequently and might therefore be considered ‘core metrics’

3 chemical, physical and biological properties

- Voluntary
- Variations in sampling protocols



5 chemical properties

- Legally required (England - (Farming Rules for Water, Wales – NVZ)
- Sampling protocol (RB209)

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Variations in sampling protocols

Types of fields: Ranging from representative fields to those with problem areas.

Number of samples: Ranging from 3 to 15 samples.

Sampling design: Some do not specify design, some call for a ‘W’ transect, others a 5m radius area.

Depth: Topsoils and/or sub soils. Measurements for top and sub soils range between 0-25cm, and 10cm-1m.

Tests: SOM/SOC (Loss of Ignition (LOI) test, DUMAS test or Elemental Analysis). Soil structure (SRUC scores or ThinkSoils guidance.

Tools: Spades or auger.

Frequency of measurement: Raging between 1 to 5 years.

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Differences in results interpretation and presentation

The **interpretation** of results:

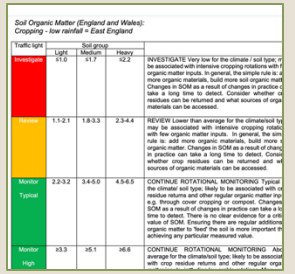
Different static parameters:

- Approaches to soil type/classification.
- Approaches to land use type/classification.
- Approaches to climate (rainfall) and geography (England, Scotland, Wales) remain the same if included.

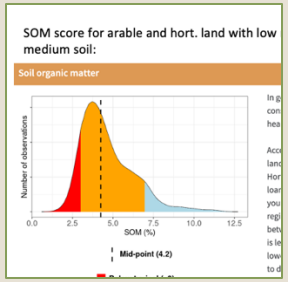
Different underlying datasets (for SOM/SOC):

- Defra projects SP0306 and SP0310 (2001-2004). England and Wales.
- James Hutton Institute (JHI) Soil Information System database. Scotland.
- UK CEH Countryside Survey (1978-2007). England, Wales and Scotland.

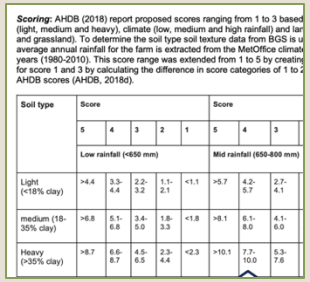
How these results/benchmarks are **visually presented**:



Traffic light (AHDB)



Graph (UK CEH)



Grid (SA Ex)

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Example of different interpretations

The use of different scoring systems, datasets and terms used to describe thresholds means the same soil health results may be understood differently across different initiatives.

AHDB soil health score card (SHSC)

Soil Organic Matter (England and Wales):
Cropping - low rainfall = East England

Traffic light	Soil group			
	Light	Medium	Heavy	
Investigate	≤1.0	≤1.7	≤2.2	INVESTIGATE Very low for the climate / soil type; may be associated with intensive cropping rotations with few organic matter inputs. In general, the simple rule is: add more organic materials, build more soil organic matter. Changes in SOM as a result of changes in practice can take a long time to detect. Consider whether crop residues can be returned and what sources of organic materials can be accessed.
Review	1.1-2.1	1.8-3.3	2.3-4.4	REVIEW Lower than average for the climate/soil type; may be associated with intensive cropping rotations with few organic matter inputs. In general, the simple rule is: add more organic materials, build more soil organic matter. Changes in SOM as a result of changes in practice can take a long time to detect. Consider whether crop residues can be returned and what sources of organic materials can be accessed.
Monitor Typical	2.2-3.2	3.4-5.0	4.5-6.5	CONTINUE ROTATIONAL MONITORING Typical for the climate/ soil type; likely to be associated with crop residue returns and other regular organic matter inputs e.g. through cover cropping or compost. Changes in SOM as a result of changes in practice can take a long time to detect. There is no clear evidence for a critical value of SOM. Ensuring there are regular additions of organic matter to 'feed' the soil is more important than achieving any particular measured value.
Monitor High	≥3.3	≥5.1	≥6.6	CONTINUE ROTATIONAL MONITORING Above average for the climate/soil type; likely to be associated with crop residue returns and other regular organic matter inputs, including ley-arable rotations. Many well-established conservation agriculture or organic farming systems would appear in this group. Ensuring there are regular additions of organic matter to 'feed' the soil is more important than achieving any particular measured value.

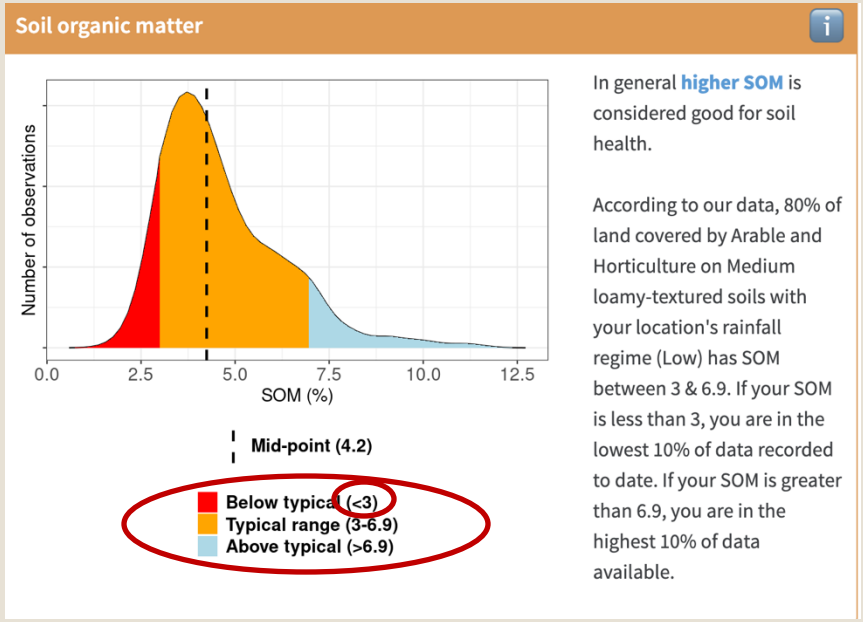
Soil Association Exchange (SA Ex)

Scoring: AHDB (2018) report proposed scores ranging from 1 to 3 based on soil type (light, medium and heavy), climate (low, medium and high rainfall) and land use (arable and grassland). To determine the soil type soil texture data from BGS is used. Mean average annual rainfall for the farm is extracted from the MetOffice climate data for 30 years (1980-2010). This score range was extended from 1 to 5 by creating subcategories for score 1 and 3 by calculating the difference in score categories of 1 to 2 and 2 to 3 of AHDB scores (AHDB, 2018d).

Soil type	Score					Score				
	5	4	3	2	1	5	4	3	2	1
	Low rainfall (<650 mm)					Mid rainfall (650-800 mm)				
Light (<18% clay)	>4.4	3.3-4.4	2.2-3.2	1.1-2.1	<1.1	>5.7	4.2-5.7	2.7-4.1	1.1-2.6	<1.1
medium (18-35% clay)	>6.8	5.1-6.8	3.4-5.0	1.8-3.3	<1.8	8.1	6.1-8.0	4.1-6.0	2.0-4.0	<2
Heavy (>35% clay)	>8.7	6.6-8.7	4.5-6.5	2.3-4.4	<2.3	>10.1	7.7-10.0	5.3-7.6	2.8-5.2	<2.8
	High rainfall (800-1100 mm)					Permanent pasture (all climates)				
Light (<18% clay)	>8.6	6.2-8.6	3.8-6.1	1.4-3.7	<1.4	>10.8	7.9-10.8	5.0-7.8	2.2-4.9	<2.2
Medium (18-35% clay)	>10.1	7.6-10.0	5.1-7.5	2.6-5.0	<2.6	>12.2	9.3-12.2	6.4-9.2	3.5-6.3	<3.5
Heavy	>11.5	8.9-	6.3-	3.7-	<3.7	>13.4	10.5-	7.6-	4.7-	<4.7

UK CEH SOil funDamentals (SOD)

SOM score for arable and hort. land with low rainfall and medium soil:



Differences in data collection, storage and use

There are different approaches to data collection, storage and use across the different initiatives. Different purposes include the following:

- **Farmer use only:** Farmers upload and can access their test results to record their soil health and track changes.
- **Compliance purposes:** A Soil Management Plan, including test results, is used to demonstrate that testing has taken place.
- **Comparison:** Data is anonymized but aggregated to enable local comparison and benchmarking.
- **National benchmarking:** Data is anonymized and used to improve models and nationwide benchmarking.

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Thank you

For more information: anicee@sustainablesoils.org

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