FACTSHEET

GREATSOILS

Soil Biology and Soil Health Partnership Research Case Study

Testing the soil health scorecard (On-farm soil monitoring 2018–2019)

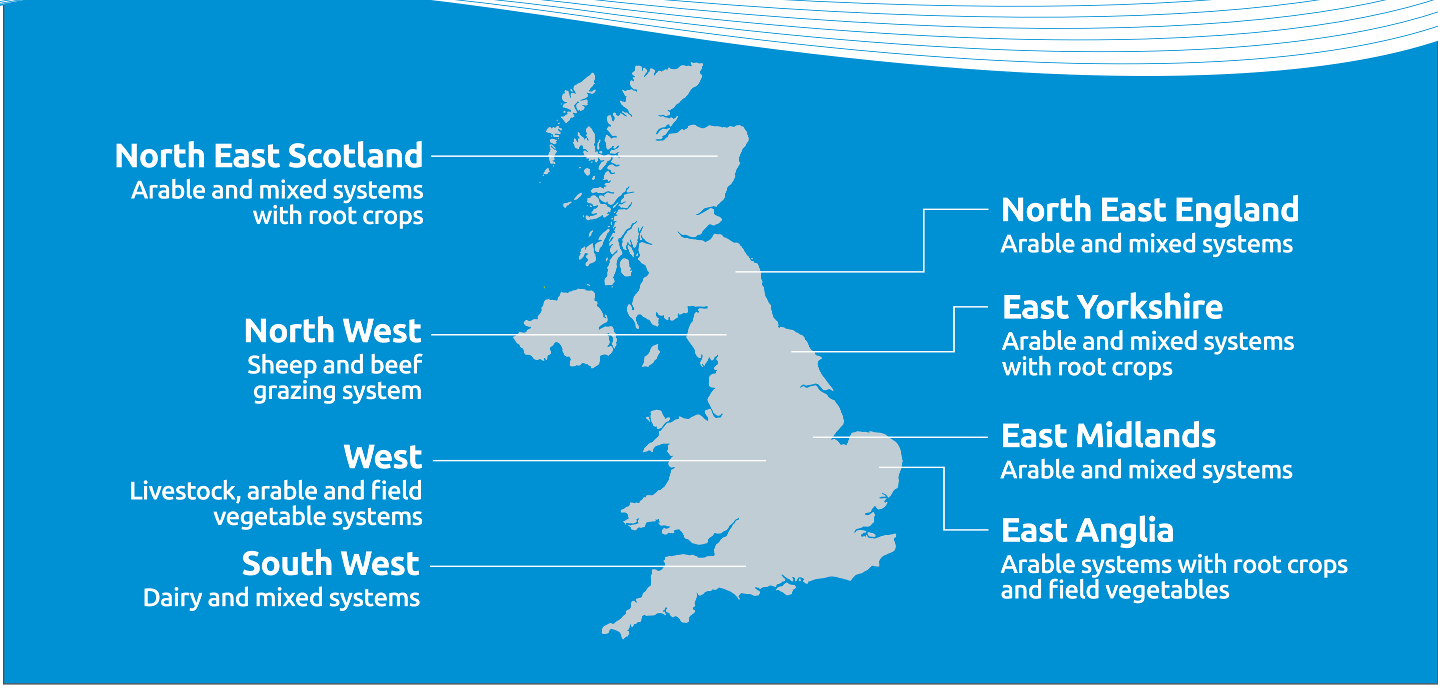

Figure 1. Locations of the farmer-research-innovation groups working with the Soil Biology and Soil Health Partnership

Background

Growing food and fibre crops requires soils to be maintained in a suitable state that provides optimal soil structure, water retention and nutrient availability. The physical, chemical and biological properties of soil interact to deliver these functions. Measuring soil health therefore requires an integrated approach that combines the assessment of the chemical, physical and biological properties of soil. There is a good understanding of the soil chemical and physical constraints to crop and grassland productivity, however, the role of soil biology is less clear.

A key aim of the Soil Biology and Soil Health Partnership is to improve our understanding of soil biology and to explore ways in which farmers can measure and manage soil health. The Partnership has developed a soil health scorecard, which aims to provide information on key indicators of the chemical, physical and biological condition of soil, to help guide soil and crop management decisions.

Measuring soil health on farm

The Partnership is working with eight farmer-research-innovation groups around the UK to review the soil health scorecard approach, and test it on farm. Further groups with a focus on protected cropping and perennial (tree) crops will test the scorecard approach for those systems in the future.

Farmers across the groups are involved in a range of practices that support soil health, including: regular soil testing; linking yield maps and soil nutrient patterns; extended rotations; innovative grazing management systems; application of a range of organic matter sources (FYM, digestate, composts); use of cover crops and companion cropping; livestock introduced to arable systems; adoption of no till and controlled traffic systems.

Testing the soil health scorecard

The farmer groups have tested the proposed new sampling approach for soil health: observations of soil structure and earthworm numbers are made at georeferenced sites within a field, and samples for laboratory analysis are collected at the same time.
To allow us to benchmark data between the groups, the data must be collected in the same way and under similar soil moisture/temperature conditions. Currently, within the Partnership, we are making the soil health assessments:

- After harvest, and
- After the topsoil has wetted up in the autumn, and
- At least one month after any cultivations/moderate soil disturbance

In the dry autumn of 2018, 67 samples were collected by 26 farmers between late October and early December.

The soil health scorecard brings together information about the chemical, physical and biological properties of soil. ‘Traffic light’ coding is used to identify properties where further follow-up investigation is needed to identify management options that could minimise any potential risks to crop productivity. On farm in 2018, we tested the scorecard for those soil properties where the evaluation framework is established (e.g. soil nutrients, visual soil assessment score – VESS) or under test (e.g. soil organic matter, SOM). The scorecard is also being tested and validated on research sites and we expect to add indicators for a wider range of soil properties, including biological indicators, in future years.

In autumn 2019, we will continue to test the sampling and recording approach and add some of the most promising biological indicators to the on-farm scorecard.

Table 1. Example scorecards sampled in November 2018 for fields on light soils of the same soil series in the mid-rainfall region (North East England, Midlands, Southern England)

Attribute*	Field A; Farm 1	Field B; Farm 2	Field C; Farm 3
SOM (%)	3.4	2	2.2
pH	6.7	6.9	7.0
Ext. P (mg/l)	40.6	59.6	37.2
Ext. K (mg/l)	158	106	148
Ext. Mg (mg/l)	82	89	144
VESS score	2	2	2
Earthworms (Number/pit)	13	8	1

Investigate Monitor No action needed

*SOM: Soil Organic Matter – comparison to ‘typical’ levels for the soil type & climate; Partnership project 2 **ahdb.org.uk/greatsoils**

Ext. P, K & Mg: Extractable Phosphorus, Potassium and Magnesium; See ‘The Nutrient Management Guide-RB209’ for specific crop advice, **ahdb.org.uk/nutrient-management-guide-rb209**

VESS: Visual Evaluation of Soil Structure – limiting layer score; **sruc.ac.uk/info/120625/visual_evaluation_of_soil_structure**

Earthworms: total number of adults and juveniles; >8/pit = ‘active’ population for arable or ley/arable soils; Partnership project 2 **ahdb.org.uk/greatsoils**

These scorecard data provoked interesting discussions in the farmer group about different management systems and their impact. Field A had higher SOM because of previous long-term inputs of farmyard manure and composts; the current field vegetable system now includes cover crops to try to maintain the SOM levels – the value of this added organic matter can still be seen in SOM and earthworm numbers. In Field B, potassium (K) has reduced under the mixed cutting/grazing management in the 3-year grass ley in this mixed system because of the high offtakes of K in silage. Field C had grown potatoes in 2017; the low earthworm numbers are probably because of the intensive cultivations associated with that crop.

Figure 2. Example of earthworm populations from sites on medium soils with regular organic matter inputs (manures, crop residues) but contrasting tillage systems – conventional (left) and zero till (right) showing the beneficial effects of reduced tillage on the large deep-burrowing earthworm species

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