

Rating soil assessment methods



Figure 1. AHDB GREATsoils resources are available to help growers to assess and manage the health of soils

Field demonstration trials were run as part of a three-year AHDB Horticulture GREATsoils project CP 107b (April 2015 – March 2018). Growers from various horticultural production systems selected, trialed and compared a range of soil assessment methods in their own fields. Some of the methods that they selected for trialling were deemed new to the participating growers, as they had hardly or had never used them before the project. The trialed methods were ranked according to their practicality and ease of use, on costs and on how useful the test results were in informing practical soil management strategies, to improve soil health.

One aim of comparing soil assessment methods in the project was to reconnect growers with their soils, increase grower confidence in assessing soils' health (Figure 1), and enable them to evaluate and select indicators of soil health for ongoing monitoring. A secondary aim of the trials was to determine whether different horticultural systems required specific soil assessment methods, combinations of methods or their own interpretation of results.

This factsheet specifies soil assessment methods that were chosen as best for the various horticultural production systems. It reports on the practical experience and thoughts of the growers who hosted the demonstration trials, testing a range of soil assessment methods on their farm. It also

takes into account the experiences and thoughts of growers and consultants who engaged with the demonstration trials' via group discussion meetings and during the demonstration trials' open days.

Selected soil assessment tests for horticulture

On physical tests, water infiltration rates and simple compaction tests were judged to be the best by all growers who participated in project CP 107b. However, growers acknowledge that physical, chemical and biological testing are all needed to get a holistic measure of the health of a soil.

Soil infiltration rates

The soil infiltration test measures how much time a given volume of water takes to make its way into the soil through a short piece of drainpipe (Figure 2). This test was considered to be very useful for soil structure and compaction assessment. Growers found the method easy and they could interpret results straightaway and translate them into soil management strategies. For example, growers could determine if soils were compacted and the compaction layers' depth, which in turn informed the necessary depth of cultivation needed to alleviate it. However, depending on the soil type, structure or moisture content, the test can take too long. It is not ideal for heavy soils with poor soil structure and high moisture content. For more information see the **Soil structure and infiltration** factsheet.



Figure 2. Soil infiltration method

Simple compaction test

For this test, a blunt knife, soil probe or corer is pressed straight into the soil to get an impression of how much force or pressure is needed to insert the implement into soil (Figure 3). The test gained positive feedback from growers as a tool to assess soil structure and compaction, although growers were aware that the method is subjective because the level of resistance felt when pushing a blunt knife or soil corer into the ground is subject to personal interpretation. It cannot be numerically quantified without a penetrometer. Nevertheless, growers were of the view that they can 'calibrate themselves' by repeatedly practising the method and testing it in different fields and soils. Growers who had previously used the method stated that, with experience, even the depth of the compacted layer could be estimated (Figure 3).



Figure 3. Compaction can be assessed using simple implements

Additional methods for different systems

Earthworm counts for field vegetables

Earthworms are some of the more common and easily assessable soil organisms that are widely accepted as an indicator for soil fertility, health and organic matter. Growers should note that it is crucial to perform earthworm counts in spring and/or autumn, when the worms are most active in the top layers of the soil. In addition, when heavy tillage machinery and tools are used, earthworm populations decrease very quickly.

Many field vegetable growers were interested in earthworm counts (Figure 4), but none had any previous experience.

An agreed method for earthworm counting has been published in the **How to count earthworms** factsheet. Growers stated that the method can be useful if a good base population of worms is already present in a field, and where a certain assessment 'routine' can be adopted for long-term monitoring; but they also highlighted that expertise needs to be built up over time and that the method can be time-consuming.



Figure 4. Guidance for earthworm counting is given in the the AHDB GREATsoils factsheet *How to count earthworms*

Laboratory soil health testing for protected leafy salads

These are relatively new laboratory tests, which often provide an overall soil health index or score based on chemical soil health indicators (P, K, Mg, pH, total soil organic matter), physical indicators (texture) and biological indicators (respiration). Growers have to send soil samples to laboratories offering the test. The laboratory reports include soil management recommendations, which are derived from the results.

These laboratory tests were seen by growers as potentially very useful in the future, particularly as more information becomes available on soil biological indicators and if useful soil health and respiration testing procedures and protocols (Figure 5) become part of routine soil testing and monitoring programmes.



Figure 5. The Solvita® soil health test measures the carbon dioxide evolved from respiration of soil organisms

Earthworm counts and tailored visual soil assessment for tree fruit

Both earthworm counts and visual soil assessment were deemed useful by tree fruit growers.

Given there is no specific VSA tool for horticulture available, tree fruit growers selected the *Healthy grassland soils* factsheet developed by AHDB.

The growers agreed that the tool was highly useful for extensive horticultural systems (Figure 6). They stated that if the test is used regularly and on several locations in the field, it gives insight into the soil health of an orchard.

Growers highlighted that the tool assesses not only soil structure, but also root development (pattern and vigor), as well as soil smell and colour; and that it provides ample opportunity to count earthworms. They felt it was a practical way of gaining a quick assessment of the health of soil.



Figure 6. The *Healthy grassland soils* factsheet was deemed very useful by tree fruit growers

Table 1. Usefulness of each test in a particular growing system as rated by growers during the project

Method	Field vegetables	Tree fruit systems	Protected crops
Visual soil assessment (VSA)	OK	Good	Poor
Earthworm counts	Good	OK	Poor
Soil health laboratory test	OK	OK	Good
Simple infiltration rates	Good	Good	Good
Simple compaction test	Good	Good	Good

*The results represent qualitative feedback from around 20 growers per system including the host growers from the Field Trials.

■ Poor
 ■ OK
 ■ Good

Conclusion

The outcome indicates that simple and practical soil assessment tools can be highly useful to growers who aim to evaluate the health of soils and monitor changes in soil over time. Soil assessment is also useful to assess the short- and long-term impacts of specific soil management practices. The work confirmed that different horticultural production systems need appropriate soil assessment methods (Table 1) and demonstrated the benefit in growers trying out different and/or new approaches of soil assessment.

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Further information

Visit ahdb.org.uk/greatsoils to see the publications below and to find out more.

- *Soil structure and infiltration factsheet*
- *How to count earthworms factsheet*
- *Healthy grassland soils factsheet*

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