



Grower Summary

CP 107b

“Growing Resilient Efficient And
Thriving” GREAT Soils

Annual 2017

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Further information

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

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Project title: "Growing Resilient Efficient And Thriving" GREAT Soils

Project number: CP 107b

Project leader: Ben Raskin, Soil Association

Report: Annual report, March 2017

Previous report: Annual report, March 2016

Key staff:

- Liz Bowles - Project Director
- Ben Raskin - Project Leader WP 4 and involvement in WP 1,2,3
- Anja Vieweger – Project Leader WP1,2
- Bruce Pearce – Scientific Supervisor
- Audrey Litterick – Project Leader WP3
- Martin Wood – Technical involvement WP1,2,3,4

Location of project: UK wide – with project leaders based in Bristol

Industry Representative: James Brown
Pollybell
Holmes Farm, Wroot Road, Epworth, Doncaster

Date project commenced: 01 April 2015

Date project completed (or expected completion date): 31 March 2018

GROWER SUMMARY

Headline

The project has brought together growers from a broad range of sectors to trial and share soil health assessment methods. Observations from field trials, wide mainstream and social media coverage, and peer to peer learning indicate that soils assessment and management information dissemination is being taken on board by growers, which may lead to improved soils and financial gain in the long term.

Background

The importance of improving the health of soils is increasingly recognised by governments and policy makers as fundamental to the agronomic and financial sustainability of horticultural enterprises. It is widely acknowledged by scientists and an increasing number of farmers and growers that there is a problem with the state of UK soils. Most suffer from degradation (e.g. compaction, declining soil organic matter content, nutrient leaching, erosion), partly as a result of current farming practices. Many growers understand the importance of soil health but do not keep up to date with the research and latest best practice.

Project CP107b seeks to work with growers to improve the health of soils by assessing and field testing current methods of soil testing. The project aims to inspire and empower growers to improve their soil through training events, building connections, and by translating these methods, tools and approaches into clear practical information.

Summary

The first year of field trials is now complete; full details of work done can be found in the 1st annual project report. The project has also continued to deliver a full programme of knowledge exchange events during its second year.

In the field trials, which look at the efficacy of different soil health assessment methods and tools on six regionally and system diverse horticultural sites, early findings demonstrate that the set of soil assessment tools need to be refined for the specific needs of each growing system.

For example:

- The Visual Soil Assessment (VSA) tool is proving less relevant for the intensive field horticultural systems, though this might be addressed by changing the timing of the testing.
- For earthworm counts it is crucial to perform the counts in spring and/or autumn, when the worms are most active in the top layers of the soil. It is most useful when repeated regularly,

maybe twice a year over a couple of years, to get used to the method and get a feel for the 'normal' number of worms and natural fluctuations of populations in the specific field/soil. Soil management also needs to be taken into account in the interpretation of results, as heavy tillage machinery can decrease populations very quickly.

The Year 2 programme of knowledge exchange has delivered 19 free grower events made up of workshops, online webinars, field trial demonstration days, and field lab meetings, attracting in total over 275 attendees. Details are provided in the appendix section of the full report. In some cases people have attended more than one event so overall attendance numbers are around 350. Recordings of the online webinars have been viewed nearly 1000 times. These activities are demonstrating that there is real interest from growers in understanding and measuring soil health. The events have particularly shown the value of peer-to-peer learning, as growers demonstrate and discuss their growing systems and the challenges that they face.

Sample attendee feedback includes:

"We need to consider how we are managing our soils if we want to be able to farm for the next few hundreds of years in the line"

"Think about soils in terms of biological activity rather than chemical and physical properties"

"Very interesting and easy understanding of how important your soil is."

"I found it very informative and useful" "Good balance of theory and practical."

Work Package 1 - Review

A literature review was completed in Year 1. It is available on the AHDB Horticulture website.

Work Package 2 - Developing an integrated approach to soil health assessment and improvement.

The project team is working with six host farms on two-year field trials to compare the usefulness of a number of different soil assessment methods and tools.

The focus of the tests chosen for the field trials is to monitor soil organic matter. Grower consultation events held in 2015 showed that this is what the vast majority of growers were most interested in exploring. The focus for each site is as follows:

- Balbirnie Estates (Scotland) (growing for Kettle Produce) - Studying the impact of conventional carrot production in beds on soil health parameters including routine soil nutrient testing (pH, P, K, Mg), SOM, VESS and soil respiration.

- Valefresco (West-Midlands) Monitoring the effect of cover crops on soil health, fertility and structure in a large scale conventional protected and field veg production system. Comparing respiration rates (NRM soil health test), earthworm counts and VSA.
- Jepco (Lincs) Using short-term green manures to assess and monitor soil health in a large scale conventional field veg production system. Comparing respiration rates (NRM soil health test), earthworm counts, VSA and their result interpretation.
- Taylorgrown (Lincs) Assessing the effect of green manure strips through a carrot field on beds on soil health and crop health. Comparing respiration rates (NRM soil health test), earthworm counts, VSA and their result interpretation.
- Loddington Farm (Kent) Using two different flowering green manures to increase soil health in an apple orchard, and attracting beneficial insects as pollinators and predators. Comparing respiration rates (NRM soil health test), earthworm counts and VSA.
- Tolhurst Organic C.I.C. (Oxon) Organic matter assessment and monitoring (for a long-term increase), in a stock-free, small scale organic veg system without animal inputs: Comparing respiration rates (NRM soil health test), earthworm counts and VSA.

A demonstration field day was held in each of the six locations during the year. The events were public and open to all growers, advisors and other interested parties and intended to provide broader access to the learnings of the project. The events were well attended with participants ranging between 12 and 20 (Figure 1).



Figure 1. Field trial open days

The methods used to assess soils in the first year of the field trials were:

- **Earthworm counts** the OPAL earthworm survey's guide to earthworm assessment. Monitoring numbers and species of earthworms over time and throughout growing seasons

can deliver good information about soil organic matter. The OPAL guide is publically available and free to download here: <https://www.opalexplornature.org/soilsurvey>

- **Visual Soil Assessment (VSA)** using the Healthy Grassland Assessment Tool developed by EBLEX-DairyCo (now AHDB Beef & Lamb and AHDB Dairy). This tool consists of a 2-page glossy soil scoring sheet, with colour pictures to compare the own sampled soil with, as well as a small pocketbook for some further detail and information. It provides practical instruction to sample a soil block with a spade and how to assess and compare it with the provided pictures and their scores.
- **NRM Soil Health Test** This is a laboratory test which provides an overall soil health index/score based on chemical soil health indicators (P, K, Mg, pH, total soil organic matter), a physical indicator (texture) and a biological indicator (respiration rate), with certain soil management recommendations derived from the results.

Earthworms were counted on each of the six trial sites during spring and autumn 2016. At Tolhurst's for example, 9 worms were counted in total in May, all juvenile and rather small. However, at the sampling date in autumn, 191 worms were found; again taken from 3 locations in each bed of the green manure trial. The full results are shown in the full report. On this site, we were able to perform a species identification of the adult worms that were found in the field. The species identified are common and expected to be present in such systems. It is notable however, that the total number of worms found in early sown green manure was larger in each bed compared to the later sown green manure beds. Overall, when summing up the numbers per treatment, the difference between the two treatments was still very clear.

Also the VSA/VESS test was performed in each of the six trial sites. Here however, it was clear that this tool, specifically developed for soil assessment in grasslands, has it's challenges when applying it in intensive horticultural systems. In many field veg production systems beds are formed and the soil is managed regularly and often with a significant impact on soil structure, e.g. at Taylorgrown or JEPCO. For such systems, this tool is only (if at all in the current stage) useful if applied in early spring for example, when the soil has had a certain amount of time to settle down and structure assessment is possible. In more extensive horticultural systems, such as the top fruit orchards at Loddington however, our trials have shown that this easy and quick soil assessment tool can deliver highly relevant information on changes in soil structure and the direct impact of different management strategies.

Since this is only the first year of the trials, there is not yet enough data to draw meaningful conclusions (the data from year one is provided in the full report). The team has however determined from the data collected, that the chosen set of tools needs to be refined for the specific needs of each growing system.

The team is also discussing the possibility of adding some tests which could better serve the needs of a system – for example an infiltration rate test or soil compaction assessment.

For year 2 of the trials, each site will make slight adaptations to their set of methods, such as adding simple infiltration rate measurements using a drain pipe and stop watch, or changing timing of particular soil assessments, as the VSA method (developed for grasslands) is not useful in most seasons for intensively worked soil, such as horticultural crops on beds etc.

Work Package 3 - Development of KE strategy and materials.

The KE strategy developed in Year 1 is being delivered. A synopsis on the delivery of events and media coverage appears below under Work Package 4 and in more detail in the Knowledge Transfer and Technology section below and Appendices 1-4.

The first Case Studies (CS) and Guidance Notes (GN) for the project have been delivered and are awaiting publication. They cover a variety of topics including:

- CS1 Compost for soil health
- CS2 Soil testing for carrot production
- CS3 Engineering the landscape to secure asparagus production
- GN1 Avoiding the pitfalls of Soil pH testing to maximize your soil health

Work Package 4 - UK wide KE programme

Attendees to Year 2 events break down as follows:

167 attendees at 10 Soil Health and Farm Viability workshops around the country

110 attendees at 4 online webinars, these have been viewed 995 times since then

64 attendees at 4 field trial demonstrations

26 attendees at 3 field lab meetings

Interactive one day workshops: Throughout this year the project delivered ten of a programme of 24 interactive workshops for growers. (Figure 2) The subject of the workshops has been Soil Health and Farm Viability. Workshops have included a variety of topics including introduction to soil health, the use of compost to increase fertility and soil structure, managing runoff and erosion in row crops, maintaining soil fertility and structure in a high rainfall area, using green manures for soil health, and avoiding soil compaction. They have been delivered at farm hosts across the country taking in different sectors including field veg, soft fruit, ornamentals, and protected growing.



Figure 2. GREATsoils workshop in Cornwall

Online webinars: The team delivered a series of four online webinars on soil health.

- Soil Health and the Bottom Line
- Soil health and what to measure
- Managing soil health using organic manures
- Short term green manure strategies for intensive growers

Attendance was higher than hoped for with most participants staying for the duration of the event. The benefit of the webinars is that growers can access the information and ask questions without giving up a day of their time. In addition the recordings of these sessions are now available as a resource on the AHDB Horticulture website and are being accessed regularly.

Field Labs: The first GREATsoils field labs commenced towards the end of the year and will run through Year 3 of the project. The field labs are year-long grower led practical farm trials. The results of these trials will add to the knowledge base of the project as they demonstrate real world examples of growers trialling methods to improve soil health.

These are five new field labs specifically for the GREATsoils programme being run in collaboration with the Innovative Farmers programme <https://www.innovativefarmers.org/>. The methodology and achievements from each are being documented on the Innovative Farmers portal as the project develops. This data can be accessed for free.

The first three field labs are:

- 1. Improving Soil Health And Organic Matter Using Cover Crops In A Shared Rotation**
- 2. Amendments For Soil Health In Top Fruit**
- 3. The Impact Of Whole Digestate On Soil Health In Field-Grown Vegetable Crops On The Moray Coast**

Video: The first video from the project has been designed to replicate the successful peer-to-peer learning of the workshops by featuring a particular grower sharing his story. The video

promotes the benefits of cover crops which have been an important area of interest for the field trials and the workshops. It has so far been viewed 174 times. It can be viewed here: <https://www.youtube.com/watch?v=cMdP2lqv5mU>.

Media campaign and other outreach: Interest in the project from trade media has been strong, indicating that awareness of the importance of soil health in horticulture is growing. In this year of the project GREATsoils CP107b has been featured in 14 major articles across a range of industry publications. The team has also published 5 original blog posts by growers involved in the trials.

The project team have met growers and advisors at 15 conferences and sector events as part of the Soils Roadshow during Year 2. Team members have taken part in events as speakers, run stalls, and given demonstrations. At the Elsom's Seed day and the British Herbs field events the project team teamed up with GREATsoils projects CP107c and CP 107d projects to provide a cross programme focus.

The project has been building up a network of growers via sign-ups at events, website, newsletters, and twitter. By the end of Year 2 the network had 460 members and 933 followers on Twitter. To keep the network informed the team has published an email GREATsoils bulletin. This has included information on this project and also events from the other AHDB soils projects.

Financial Benefits

Evidence of financial savings from improved soils is still anecdotal. Growers have reported financial benefits from using green manures in relation to cultivation costs and nitrogen use. The results of the field trials may add some practical evidence to support this; however more testing and benchmarking would need to be carried out in order to build a more robust case for this.

Action Points

More detailed recommendations will form part of the final year report for the project however interim results from the field trials as well as feedback from the peer to peer learning have shown that:

- If not already doing so growers should start testing their soil for health. Those that are already doing some testing can always improve or expand their testing. The summary from year 1 will help growers make a decision about which methods to use. Additional findings have emerged for instance ensuring optimal timing of earthworm counts and VSA within specific production systems – full details are given in the full report.

- Building organic matter - This is well-recognised as one of the best indicators of soil health, but changes take place slowly and implementing is tricky within intensive vegetable/salad production systems.
- Grow a green manure as part of the horticultural rotation. Trials work indicates that even a very short term green manure can make a difference to soil structure and health. Choice of cover crop and timing of sowing may also have a significant impact.
- Join or set up a group of local, like-minded growers to work together. This will help benchmark findings as growers develop their soil health testing methods, but also provides a framework and discipline for testing and sharing findings with fellow growers.