

New Project

CP 107

A gap analysis of soil management research and knowledge transfer in horticulture to inform future research programmes.

Project Number:	CP 107
Project Title:	A gap analysis of soil management research and knowledge transfer in horticulture to inform future research programmes.
Project Leader:	Professor Jane Rickson
Contractor:	Cranfield University
Industry Representative:	Mr Robin Buck, Jack Buck Farms Ltd
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Project Cost (total project cost):	£38,730

Project Summary:

The sustainability of UK horticulture relies on healthy soils that can deliver high productivity (yield quantity, quality and reliability), business profitability and environmental protection. To achieve this, clear, consistent and reliable guidance on sustainable soil management is needed. This advice has to be based on knowledge gained from scientific research and practical in-field demonstrations.

Currently, the development of best practice guidelines for sustainable soil management in horticulture is hindered by uncertainty surrounding the evidence base. Knowledge relating to soil management does exist, but it is dispersed throughout the sector. The proposed project will collate and review research from the past 20 years (both fundamental science and field-based experience) related to soil management for horticultural crops (including when grown in rotation). The study will also consider the effectiveness of knowledge exchange mechanisms in applying science into practice. The views of representatives of the horticultural industry will be gathered to identify and prioritise their current soil management issues.

The aim is to identify key gaps in research and knowledge transfer mechanisms related to horticultural soil management. Future research and development activities will need to address these gaps to strengthen the scientific and practical robustness of best management guidelines for sustainable horticultural soils.

Aims & Objectives:

Aims:

To identify key gaps in research and knowledge transfer which currently hinder the development and implementation of best practice guidelines for sustainable soil management in temperate horticulture and horticulture/arable/non arable rotations.

Objectives:

1. Collate and review UK and international evidence, reports, data and knowledge transfer mechanisms related to soil management for temperate horticultural crops (including when grown in rotation)
2. Consult with representatives from the horticultural industry to identify and prioritise their current soil management challenges.
3. From the outputs of Objectives 1 and 2, identify the key gaps in research and knowledge transfer related to soil management in horticulture and horticulture/arable rotations.
4. Indicate how exchange of knowledge both between the different horticultural sectors and from other agricultural sectors (e.g. potatoes, cereals and other combinable crops) might fill any gaps identified in Objective 3.
5. Evaluate the importance of each of the research and knowledge transfer gaps identified in Objective 3, given the R&D priorities of the HDC panels.

The review will be unbiased and impartial. It will be presented as a written report, including a full bibliography of source material. All soils used for horticultural crops (i.e. field soils, soils under temporary or permanent protection) will be included. Organic or inorganic substrates such as peat, rockwool and coir are beyond the scope of the review.

Benefits to industry

The aim of the project is to identify key gaps in research and knowledge transfer / exchange which currently hinder the development and implementation of best practice guidelines for sustainable soil management in horticulture and across horticulture/other crop rotations. Identifying these gaps will help guide the strategic direction of future R&D in horticultural production systems in working towards 'sustainable intensification' (Pretty, 1997). This will bring the following benefits:

- a) Benefits to levy payers

The proposed review of soils R&D will be an efficient and effective use of levy payers' funds. The report will be an accessible, user-friendly 'one-stop shop' collation and analysis of major research outputs/findings and of their application in practice. The review document will integrate R&D activities, adding value to the original research investment. The report will be an efficient way of transferring this information to the horticultural and allied industries. As a result, individual levy payers can access and benefit from the collective knowledge contained in the report.

The gaps highlighted in the review will pinpoint where future soils research and knowledge transfer activities are needed for the industry to progress towards sustainable intensification. This gap analysis will enable more effective and efficient targeting of future research and development funding. The return on this investment will be robust, practical and economically viable soil management guidance aimed at reducing production costs (e.g. energy, fuel, seeds, water, labour, nutrients, pesticides, herbicides, soil resources, waste) and increasing outputs (e.g. yield quality, quantity and consistency, and environmental protection). These are tangible benefits to levy payers.

Simply put, well-managed, healthy soils lead to greater business profitability. Soils in good condition are associated with increased income (higher prices paid for higher yields and better crop quality) and reduced costs associated with production and environmental protection (e.g. dredging of eroded sediments, water treatment costs, alleviation of compaction, withdrawal of single farm payments).

b) Benefits to consumers

The review document itself is likely to be of marginal direct benefit to consumers. However, as a step on the path towards sustainable intensification, it is an essential stage in the process. It will focus future research and knowledge transfer activities which will have more immediate and beneficial impacts on the consumer and society as a whole. The aim of sustainable soil management is an increase in product quantity and quality at an affordable price to consumers, without incurring increased costs to society as a whole due to environmental degradation. We estimate that in the long term, benefits of effective soil management will accrue to society, as healthy soil delivers diverse ecosystem goods and services needed for sustainable living (including the provision of food and protection of the environment; Kibblewhite et al., 2008), and continued socio-economic growth and stability (GOS, 2010). Also, delivering safer, more affordable, more reliable produce is a cornerstone of the improving public health agenda (Defra, 2010).

c) Benefits to the environment

The review document will give better access to current information on how soil management practices are linked to environmental protection, especially the sustainable use of soil and water resources. Poor soil management is associated with environmental degradation processes. These include soil compaction, soil erosion by water and wind, loss of organic matter and biodiversity, GHG emissions, poor energy use and efficiency, diffuse pollution (e.g. nitrate leaching, pesticides in runoff) and ammonia volatilisation. These processes jeopardise the

sustainability of agricultural production.

The gap analysis will identify the research and knowledge transfer activities that can support clear and reliable guidance on soil management practices which avoid environmental degradation. The ultimate aim is to maintain or restore healthy soils that are capable of producing horticultural crops economically, whilst reducing ecological footprints (e.g. carbon, water) and building resilience against future environmental degradation. The guidance must ensure that the way we manage our soils today will not compromise their capacity to deliver ecosystems goods and services in the future (Powlson et al., 2011).

d) Financial benefits of the research

It is not possible to quantify the immediate financial benefits expected to accrue from the review itself, nor at this stage, those resulting from the best practice guidelines that are the ultimate purpose of the review. However, the financial impacts of such guidelines will include:

- Improved soil health leading to greater business profitability, as a result of increased income (higher prices paid for higher yields and better crop quality)
- Cost savings due to the reduced inputs associated with better soil management (e.g. savings in fuel, machinery maintenance, water use, nutrient and pesticide applications, and wastage at harvest)
- Better protection of soil and water resources, so requiring less investment in remedial works (e.g. dredging of eroded sediments, water treatment costs, alleviation of compaction) and fewer financial penalties (e.g. withdrawal of single farm payments)
- A safer, more affordable, more reliable food supply, resonating with the government's agenda of improving public health

The benefits of sustainable soil management can also be valued in terms of the reduced costs of soil degradation, which is often associated with poor soil management. Although not attributable to any one agricultural sector, these have been estimated at the national scale in a recent report for Defra (Graves et al., 2011).

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