



Department
for Environment
Food & Rural Affairs

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Crops and Horticulture Policy Delivery Evidence Plan

**Policy portfolio: Rural Development, Sustainable
Communities and Crops**

Timeframe covered by Evidence Plan: 2013/14-2017/18

Date of Evidence Plan: March 2013

This evidence plan was correct at the time of publication (March 2013). However, Defra is currently undertaking a review of its policy priorities and in some areas the policy, and therefore evidence needs, will continue to develop and may change quite rapidly. If you have any queries about the evidence priorities covered in this plan, please contact StrategicEvidence@defra.gsi.gov.uk.

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1. Policy context

What are the key policy outcomes for the policy programme/area?

Background

Arable and horticultural crops are a key part of UK agriculture, with total crop output of £8.9 billion in 2011¹, 41% of total farming output. Crop production underpins a healthy and sustainable food supply and supports a competitive rural economy.

Cereal production is the largest UK cropping sector with £3billion's worth² of cereals produced across 3 million hectares in 2011, of which wheat remains the most prominent with £2billion's worth of wheat produced over 2.2 million hectares. Oilseed rape, the main break crop within arable rotations, was grown on 750 thousand hectares in 2011, with a total value of £1.1billion.

The UK horticulture sector produced fruits and vegetables worth £1.8billion and ornamentals worth £1billion in 2011 across 168 thousand hectares. The UK Horticulture industry includes more than 300 crops: fruit (soft and tree), field vegetables, protected crops, mushrooms, bulbs and outdoor flowers, hard nursery stock and potatoes. Horticulture and Potatoes employ 30,000 permanent and 56,000 seasonal workers. Potatoes are worth £743m at farm gate and £3.5 billion at consumer level.

The UK garden industry employs 284,000 staff in 30,000 businesses, most of them SMEs. Around 1% of people are employed in retail work in garden centres. About 33% of all garden retail sales are plants. The UK garden industry contributes about £9 billion per annum to the UK economy, of which the garden retail sector industry is worth £4.1 billion.

Fruits and vegetables represent the largest sector (by value) for imports at £4.5billion in 2011³ with UK producers losing market share to overseas producers. The Fruit and Vegetable Task Force Report (2010) sets out the UK's commitment to addressing this issue and reversing the decline in indigenous vegetable self-sufficiency to return it to 73%; and continuing the growth of self-sufficiency in indigenous fruit, to achieve 50%. In 2011, indigenous vegetables rose to 63% and fruit to 43%.

Policy on crops and horticulture directly contributes to Defra's business plan priority to "*Support and develop British farming and encourage sustainable food production*", and in partnership with other teams in Defra to "*Enhance the environment and biodiversity to improve quality of life*" and "*Support a strong and sustainable green economy, including thriving rural communities, resilient to climate change*".

¹ [National Statistics produced by Defra on Total Income from Farming for the United Kingdom for 2011](#)

² At farm gate prices

³ <http://www.defra.gov.uk/statistics/files/defra-stats-foodfarm-crosscutting-auk-auk2011-120709.pdf>

Policy outcomes

- i. Reform of CAP schemes for crops and horticulture.
The Common Agricultural Policy (CAP) schemes relating to crops and horticulture are cumbersome to operate for businesses and government. They create market distortions, and are expensive for consumers and taxpayers. We are working with others to simplify the schemes and remove trade barriers.
- ii. Improved productivity and competitiveness in the Crops and Horticulture sectors, helped by innovation, and achieved in an environmentally-conscious manner (In line with the Foresight report on Food and Farming, the Green Food Project and the Fruit and Vegetable Task Force).

This encompasses:

- working with other government actors in the EU and the UK, levy bodies and trade bodies to remove barriers to innovation and promote sustainable growth in the sectors;
- helping farming systems deliver improved and consistent crop yield and quality, with reduced demand for inputs;
- assisting growers in building resilience to a variable and changing climate. Unpredictable weather patterns in 2012 caused a significant drop in yields for most commodities with impacts extending into the following season, affecting planting and disease risk, which growers need to manage.

These activities are enablers of **growth**, domestically and on the export market. Our main role is to help identify and address market failures in the regulatory system, and in the provision of R&D and information on tools and techniques that combine greater yields with desirable environmental traits. The latter involves translation of basic research to use on farm, and support for initiatives aimed at improving coordination across agri-food research pipeline.

The role and scope of our evidence activities

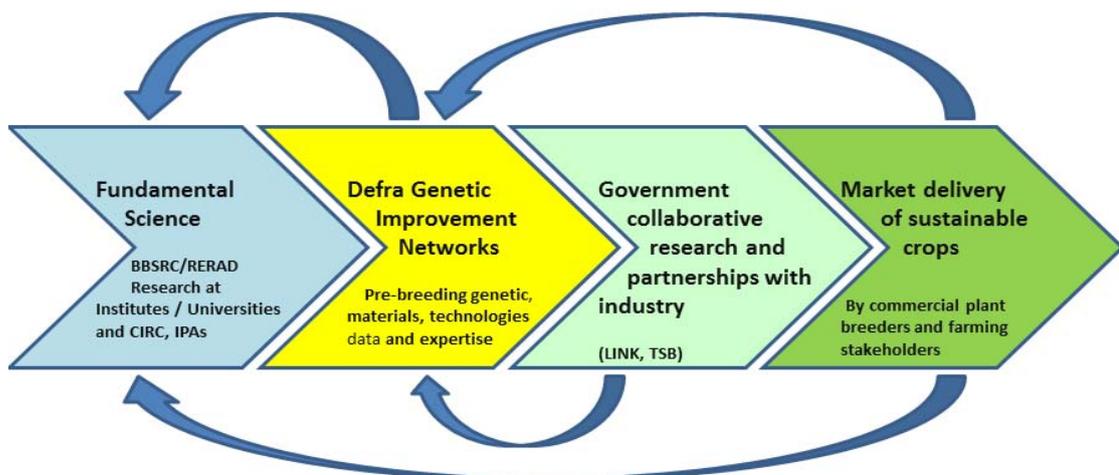
Our evidence work fulfils three distinct but complementary needs:

- **gathering and analysis of data** on the economic, social and environmental issues affecting crop production to inform policy;
- procurement and management of **projects on agronomic and technological innovation** to underpin competitive and sustainable crop production;
- **translation** of research and innovation **into practice**, in partnership with other funders and stakeholders (UK, EU and international - public sector, academia and industry).

It fills two gaps:

- 1) On pre-competitive research, the commercial pressures (competition + shareholder pressures to keep R&D expenditure low) mean there are no incentives for companies to collaborate without government brokering;
- 2) Research and knowledge transfer on sustainability and environmental protection which the farming industry may not have the capacity to commission, and is currently not paying for itself (gap in the provision of public good).

Figure 1: Defra's positioning in the research landscape



Projects are prioritised according to:

- urgency of need, e.g. short-term need to support a particular sector adapt to changes in legislation or where a new or evolving pest population threatens production
- the nature and likely persistence of a market failure
- the value we can add in and the total funding leveraged by joint projects. Other funders within the research landscape the sectors in the Agriculture and Horticulture Development board (AHDB), Scottish government, the Biotechnology and Biological Science Research Council (BBSRC), the Chemicals Regulatory Directorate (CRD) and industry. Defra works in partnership with other funders, to avoid duplication and deliver value for money.
- contribution to a healthy sustainable diet and/ or sustainable production as part of the cropping rotation

In the future, we aim to add estimated potential benefits to the list of prioritisation criteria (whilst recognising the difficulty and uncertainty of estimating these benefits in many cases). At the moment, these benefits are articulated but seldom quantified.

While a balanced coverage of crop type and research topics may be desirable, prioritising according to the size and value sector or crop type may result in counter-productive choice. This is because large or very profitable sectors may be more able to finance a greater proportion of their R&D needs.

2. Current and near-term evidence objectives

What are the current and near-term objectives for evidence and how do they align to policy outcomes?

a) Economic and statistical analysis underpins our work in Europe (delivering objective i.)

Quantitative and qualitative modelling is critical to our EU negotiations, across all the Crops and Horticulture regimes. Such modelling allows us to estimate the impacts of proposals to growers, consumers and taxpayers, and to put forward alternatives.

b) Up-to-date market intelligence, monitoring and surveillance, and technical advice informs policy development (delivering objective i.)

- We need current, detailed information to give accurate and meaningful advice to Ministers and parliamentarians, businesses and the general public – for example on weather impacts and emergencies, plantings and yields.
- We also need to meet various EU Regulatory requirements to report crop and horticulture production and market information (e.g. commodity prices) to help inform policy decisions taken at a European level.
- We need a benchmarking exercise on take up of Integrated Farm Management practices, so that we can review our evidence base and interventions.

c) Genetic improvement (delivering objective ii.)

Pre-competitive genetic improvement is needed to reduce requirements for water and nutrients, build resilience to extreme weather events such as drought and flooding, and for genetic resistance and tolerance to pests and diseases - *alongside* increased yield. Defra's Genetic Improvement Networks (GINs) are pre-breeding platforms providing shared resources and expertise for subsequent commercial exploitation. Genetic improvement networks are ongoing for wheat, oilseed rape, pulse crops, major field vegetables, and oats (as a LINK project). A similar collaboration exists on soft fruit. These platforms would not exist without Government intervention owing to cost and competition dis-incentives. The GINS are a key mechanism for demonstrating and driving the development of public good and sustainability traits into UK-adapted germplasm, influencing both upstream to research councils and downstream to plant breeders and industry. Without this research the plant breeder will not have access to sustainability traits and market pull will continue to direct private research towards short term gains in increased yield.

d) Integrated pest management (IPM) (delivering objective ii.)

We need to improve our understanding of emerging and economically important pests and weeds, so that integrated control strategies with reduced reliance on chemical pesticides can be developed. Moving away from chemical pesticides represents a step change and requires a different and more integrated approach to crop management. At present the use of alternative approaches including the use of crop monitoring, decision support tools and

cultural and biological control methods are viewed as more labour-intensive and hence expensive than traditional chemical crop options and therefore lacks market pull.

Defra's strategic research in this area is an important component of the UK's commitment to the UK National Action Plan for the Sustainable Use of Pesticides⁴, as part of the requirements under the EU Sustainable Use Directive. Work in this area feeds upstream by identifying fundamental knowledge gaps to be addressed by BBSRC and downstream to the development of alternative control methods and practical on farm advice as funded by CRD and AHDB respectively. Priority is placed on pests which are currently controlled using a small number of products, or products at risk of removal under the EU legislation (Sustainable Use Directive or the Water Framework Directive.) and a lack of new products coming to the market. Without this area of research development of new control methods and products is unlikely to consider public good outcomes and facilitate the step-change needed to move away from reliance on chemical pesticides. Defra research on IPM is most important for the horticultural sector. Due to the large diversity of crops, many with a relatively small market size, market failure exists as the potential returns are unlikely to cover the investment needed by Agro-chemical companies to bring a new product to market.

e) Innovation and resource use efficiency (delivering objective ii.)

- Water is set to become a scarcer resource, especially in South and Eastern England, where a large percentage of cropped land is located. Evidence is needed to understand the physiological impacts of reduced water availability on crop yield, quality and nutrient requirement to feed into the development of water-efficient cropping systems. Previous Defra research has shown targeted reduction of water in field-grown strawberry can actually increase yield and flavour. Further research will investigate similar models for other key crops and establish how nutrients and pests can be managed effectively within low-water systems (e.g. through precision farming). Care will be taken to ensure that this evidence plan complements that for the Water Programme to exploit synergies and avoid duplication between the two.
- Defra supports innovation and technology development aiming to make more efficient use of energy, water and inputs and minimise waste and greenhouse gas emissions in crop production and storage. It does so in collaboration with industry, through the Sustainable Agri-Food Innovation Platform led by the Technology Strategy Board. Applied research within the platform will help industry deliver its own technology for the detection and control of pests and diseases, development of new crop varieties and on-farm decision making.
- Increased uptake of information technology and robotics in agriculture is being supported collaboratively with other member states through the Information and Communication Technology and Robotics (ICT AGRI) ERAnet project. Research includes projects to develop and demonstrate automated assessment of crop quality, ripeness and nutrient requirement; robotic picking and decision support

⁴ <http://www.defra.gov.uk/consult/files/consult-nap-pesticides-document-20120730.pdf>

systems to improve the efficiency of farm operations. Our role is two-fold: our small financial contribution leverages €5.5m of applied research, and our input ensures that the practical needs of the horticultural sector are fed in. In time, such technological developments may provide a solution to some of the UK's issues with labour availability.

f) Economic analysis of the impact of R&D projects funded during the 2010 Spending Review period

This is needed to assess actual uptake of projects, monitor value for money (e.g. through assessing impact on GDP), and re-calibrate future evidence needs.

Social science is generally included within scientific research projects in line with policy need or where there is a perceived need for behaviour change necessary for uptake of new management options or to assess the translation of research on farm.

3. Future evidence needs

What are the longer-term evidence needs for the policy area/ programme?

Note – the relative priority of projects under each heading will need to be assessed in the light of budget allocations in the next Spending Review period, and the prioritisation criteria outlined in Section 1. The plan will also be informed by the forthcoming Agri-Tech Strategy.

Our need for economic analysis, statistical data, market intelligence and technical advice is likely to continue beyond the current period. As we move from CAP reform into implementation, and face new policy challenges and opportunities, the nature of our evidence needs may change, but the resources required are unlikely to do so.

Integrated Farming Systems

Evidence is needed to inform arable and horticultural farming systems that are profitable and competitive, and support other ecosystem services, such as water quality and biodiversity alongside increasing production. Research will improve understanding the role of rotation, cultural and biological approaches in sustainable management of nutrients, water, soils and pests and diseases. This work will be carried out in collaboration with the Sustainable Land and Soils and Sustainable and Competitive Farming Systems Policy teams. Much of our current research underpins innovation in crop management practices. As it is incorporated or adapted at the level of farming systems, this research will feed into joint work over the next five years.

Adapting cropping to climate change

We will collaborate closely with the Defra Climate Change team who lead on this work. Recent seasons are indicative of the impact of extreme and changing weather patterns

have on the arable and horticultural sectors. Climate change presents both risks and opportunities for UK growers and evidence will be needed to ensure that the policy framework, knowledge and technology allow UK growers to take advantage of new opportunities and protect their businesses from the negative impacts. This evidence will support delivery of the forthcoming National Adaptation Plan.

Defra will need to work with industry to ensure that crops and farming systems continue to adapt to UK conditions. Full environmental and economic risk assessment will need to be carried out to ensure new practices do not put additional pressure on tight resources such as water and are consistent with protecting biodiversity and reducing greenhouse gas emissions.

Sustainable intensification

To deliver policy objectives (e.g. growth of the industry and potential for increasing exports whilst improving environmental performance) in line with the outcomes of the Green Food Project, we need to capitalise on existing expertise within the agricultural community, working in partnership with bodies such as AHDB. Developments such as the alternative uses of grains (for example for bio-fuels) are already having an impact on the internal UK grains market place, with the likelihood of turning us from a net exporter to a net importer and consequential impacts on prices, supply chains and profits of UK producers. In the horticultural sector too, higher yields of quality products can displace imports and provide export opportunities. Increasing yields and quality could help mitigate the likely loss of land from climate change and flooding, and free up land to provide greater biodiversity benefits.

We will need to identify where there are market failures or gaps in achieving those increases in yield and quality sustainably in practice. We may also need to invest in social research to help drive those changes. Wider application of best practice is expected to have multiple benefits - better yields and quality, protect the environment *and* our ability to continue to produce in the future, and will allow us to capitalise on the genetic potential available in crop varieties.

4. Meeting evidence needs

What approach(es) will be taken to meeting evidence needs?

Evidence Capability

Market data is supplied from statistical surveys of farmers/producers, some is received from trade bodies and other organisations for free, and some is obtained from contractors. Monitoring and surveillance data are supplied mainly by the Food and Environment Research Agency (FERA) or the Horticultural Marketing Inspectorate (HMI)

For **analytical capability**, we currently rely on in-house provisions from other programmes (particularly Competitive Farming and CAP Reform).

The majority of **scientific input** is obtained through contracts with national institutes, academic institutions and private research suppliers. Individual projects include several research contractors in order to engage natural scientists, engineers, social scientists, statisticians, 3rd sector organisations and industry.

Working in partnership

Evidence needs are **prioritised** in the context of the current evidence base, budget forecasts and Ministerial priorities before the start of the financial year by a programme management board made up of Defra policy and evidence specialists, the Devolved Administrations and key stakeholders including Linking Environment and Farming (LEAF) and the Agriculture and Horticulture Development Board. Alignment with other Defra research programmes and the link to Defra objectives are evaluated at the subsequent cross-cutting steering group. High priority projects will be scoped through further discussions with policy colleagues and commissioned in line with Defra guidance. The programme will respond to emerging evidence needs as required in-year.

Cross-cutting evidence needs will be tackled in collaboration with other policy areas (particularly Sustainable and Competitive Farming, Sustainable Land and Soils and Biodiversity) and evidence specialists. We will continue to take part in joint activities such as the Sustainable Intensification Platform, European research and programme management groups, and follow-up to cross-cutting initiatives such as the Green Food Project.

The Sustainable Intensification Platform is the key mechanism for responding to recommendations on research and development from the Green Food Project report⁵. The platform is being led by the Sustainable and Competitive Farming Strategy and Sustainable Land and Soils teams. The Crops and Horticulture evidence team are engaged in the development and scoping of the platform and will continue to influence its delivery through representation on the steering group. The platform aims to engage a wide range of stakeholders and will provide new linkages between crops evidence and Natural England, the Environment agency, DfID, and NERC among others.

The Technology Strategy Board led Sustainable Agri-Food Innovation Platform remains the Defra key initiative to fund research collaboratively with Industry. The Crops and Horticulture evidence team will continue to support and influence the scope and direction of the platform along with the Sustainable Competitive Farming Strategy, Sustainable Land and Soils and the Food and Sustainable Economy evidence teams.

Representatives from Crops and Horticulture evidence team will continue to be members of the Standing Committee for Agriculture Research Collaborative Working Group for IPM and the ERAnet for ICT and Robotics in Agriculture, which provide opportunities to shape the European research agenda and leverage funding. In addition, regular contact with

⁵ <http://www.defra.gov.uk/publications/files/pb13794-greenfoodproject-report.pdf>

AHDB and CRD is maintained through attendance at research committee meetings and joint initiatives including the Genetic Improvement Networks and Crop Improvement Club.

5. Evaluating value for money and impact

What approach(es) will be taken to maximise and evaluate value for money and impact from evidence?

Representatives from relevant policy teams within Defra and external funding bodies sit on the programme management group in order to reduce the risk of duplication and identify opportunities for collaboration and data sharing.

Project proposals are let through open competition where possible to ensure contractors offer the best value for money to the department. Successful bids will be chosen by a multidisciplinary evaluation panel including external expertise where necessary.

Proposals and outputs from projects are quality assured through adherence to Defra procurement guidance. Peer review of proposals and final reports will be carried out in line with guidance in the Defra Evidence Handbook.

The timing and scope of evaluation of evidence will depend on the nature of that evidence. Non-R&D activities are normally evaluated shortly after they are completed. Success is measured according to whether or not the analysis had an impact on shaping policy discussions. For R&D projects, evaluation can take place:

- at the end of a phase for long-term projects; through triennial reviews for TSB;
- through specific Defra contribution to TSB's standard project evaluation procedures after completion;
- or through discrete evaluation as described in section 2f.

Defra evidence programmes will be formally reviewed periodically in line with Defra evidence policy. Collaborative research will be reviewed via the review process of the external partner (i.e. the Technology Strategy Board).

For the collaborative work with industry generally, success is measured by industry reaction and take-up by farmers of e.g. varieties with improved quality or agronomic traits;

Contractors are encouraged to publish project outputs in peer-reviewed journals and to disseminate the findings to the wider scientific community.