



HAPI • HORTICULTURE AND POTATO INITIATIVE

HORTICULTURE AND POTATO INITIATIVE (HAPI) SECOND CALL FOR GRANT APPLICATIONS

INTRODUCTION

A rising global population combined with climate change and pressure on vital resources threaten global food security and an urgent response is needed. Delivering global food security means providing a sustainable, secure supply of good quality food from less land and with more efficient use of inputs. Food security is a key strategic priority for the Biotechnology and Biological Sciences Research Council (BBSRC) and we are contributors to Global Food Security, a partnership bringing together the food related research interests of the relevant Research Councils, Government Departments, Devolved Governments and Executive Agencies.

The edible horticulture and potato sector is an important component of the food security equation in the UK, is consumer-led and has a strong record of adopting innovation. It provides 60% of all vegetables consumed in this country and 95% of all potatoes (excluding processed frozen products), but only 10% of the fruit it consumes. The horticulture and potato supply chains face the need to enhance their competitiveness and resilience which link to considerable challenges in terms of increasing production, reducing waste and improving sustainability. Through consultation with industry and related stakeholders from the sector, BBSRC has identified opportunities where targeted research support could help to address these challenges.

In line with its Business Interaction Strategy, BBSRC launched the Horticulture and Potato Initiative to support collaborative research projects in this area. The aim of the initiative is to support excellent quality, industrially-relevant research and to help foster productive networks and knowledge exchange between the research base and industry.

INITIATIVE AIMS

The aims of HAPI are to:

1. Support high quality, innovative, strategic research within UK universities and institutes to underpin the development of improved potato and edible horticulture crop production systems that sustainably deliver increased productivity and consistent, high quality food products;
2. Strengthen the academic research community and encourage collaborations which will move research closer to application in the areas of crop breeding, production and processing for food crops through interdisciplinary research and the provision of training.
3. Ensure the exchange of knowledge between the science base and industry through the support of effective networking between academic groups and companies.

FIRST CALL FOR PROPOSALS

HAPI previously awarded £3M to support 4 research projects spread across its remit through the first call for proposals. In addition, 5 four-year PhD studentships aligned with the funded projects will be supported by BBSRC.

SECOND CALL FOR PROPOSALS

Submissions are invited to the second call of the Horticulture and Potato Initiative. Approximately £4M is available for grant awards through this call. The funding is from the BBSRC. Further details on specific guidelines for the call are in **ANNEX 1**.

There is a two stage application procedure. For the initial outline stage, proposals must be submitted on the outline proposal form, which is available on the Research Councils' Joint Electronic Submission system (Je-S; <https://je-s.rcuk.ac.uk>). The closing date for outline proposals is **5 March 2014 at 4pm**. Subsequently, full proposals will be invited from applicants successful at the outline stage.

To be eligible for this call, projects must have at least one industry partner. The industry partner(s) must provide a minimum of 10% of the full economic cost (fEC) of the project; a minimum of 5% must be a cash contribution but the remaining 5% may be in-kind resources. For the BBSRC-funded component, costs will be paid at 80%¹. Industry collaborators are expected to have production, manufacturing or research sites in the UK. The contribution of different levels of cash or in-kind resources from different industry partners is at the discretion of the individual consortia.

BBSRC has worked with industry to identify a number of important research challenges that are described below. Projects supported through this Initiative will address these challenges through pre-competitive, innovative and excellent science, which falls within BBSRC's scientific remit. Proposals may address any aspect of the HAPI research challenges. The Steering Group has also identified a number of research areas in which it would particularly welcome applications. These highlight areas are described on page 6.

It is crucial that research funded through this Initiative is strategically relevant to the horticulture and potato industry sectors. Applicants will need to demonstrate that their proposed research has strategic relevance, identifying the likely impacts and how these will be achieved.

¹ To calculate the cash contribution required, firstly determine the full economic cost of the project as a whole. Use 10% of this value as the minimum contribution required from the industrial partner, noting that 5% must be a cash contribution. Once the industrial contribution has been agreed, this amount should be subtracted from the original full project cost. The outstanding balance should then be requested from BBSRC.

For example, if a project is fully costed at £360k, the industry partner should contribute a minimum of £36k, of which at least £18k must be cash. If the total industrial contribution is £36k, then the amount requested in the application to BBSRC would be £324k. BBSRC will fund 80% of the value requested in the application form.

RESEARCH CHALLENGES

In-depth discussion with the horticulture and potato industries has identified a number of research areas that are important to companies across this sector. Targeted BBSRC funding could have a significant impact in addressing these challenges.

Central to the research challenges identified by industry are two broad and inter-related issues. Firstly, a sustainable increase in the productivity of crop production systems is required in order to meet the rising demand for food from a growing global population. Climate change predictions suggest the UK and other Northern European countries are likely to have an opportunity to become more important global food producers whilst other traditional food producing regions may become too hot or dry for large-scale field production. Research is vital for the industry to adapt to these changing pressures and demands.

Secondly, crop production practices need to adapt to changes in our climate. This means adapting to changing growing seasons, reduced water availability, increased weather extremes, changing pest and disease pressures and increasing fuel costs whilst also reducing the industry's emissions of greenhouse gases by improving the efficiency of resource use.

Alongside the research challenges identified below, a number of current and emerging technologies exist that could make important contributions to addressing industry's challenges. Proposals are welcomed that use, improve or develop these technologies, whilst addressing the research challenges.

Where appropriate, projects supported by the Initiative should make use of systems approaches to research challenges incorporating mathematical and computational modelling to understand the behaviour of whole systems.

Horticulture is characterised by its complex production-systems which achieve quality through great attention to detail. Research supported through this Initiative should be related to real crop production systems in order to maximise the delivery of useful outcomes for industry.

The research challenges identified in consultation with industry are as follows:

Changing Seasons

Many varieties of crops grown in the UK are tailored to the specific climate conditions of this part of the world. Changes in temperature that are predicted with climate change will have a particularly important effect on the seasonal performance of crops and varieties will be needed that are suited to different seasonal patterns. Changes in rainfall patterns and the occurrence of extreme weather events will also have a major impact on un-protected crop production systems. Breeders will need to adapt current UK crops but there will also be opportunities for cultivating crops country-wide that are currently grown only in more southerly regions and for the introduction of novel crop species and their appropriate growing systems. Retailers are increasingly looking to procure from within the UK and this means a demand for varieties and systems of production that extend traditional growing seasons.

Crop Maturity and Spoilage

The horticulture and potato markets are largely driven by the demands of the consumer and the production of crops that meet consumer quality criteria is vital. One aspect of delivering quality produce is ensuring that items do not deteriorate after they have been harvested,

thus extending duration of availability to consumers. Research is needed to better understand the genetic, biochemical and physiological aspects of maturity and spoilage in horticultural and potato produce and how this can be managed. Research is also needed to understand how maturity can be managed better within the field so that produce which is timely and uniform can be achieved to optimise usage and minimise wastage.

Soil

Soil is an essential resource for the majority of crop production systems. It is vital that we improve our understanding of how to manage and use soils sustainably. Research is needed to increase our knowledge of the way in which plants interact with soils and other growth media to obtain nutrients and water; this will involve better understanding of root systems and their complex interactions with biotic and abiotic factors. This includes beneficial interactions such as mycorrhizal associations and detrimental interactions such as those with soil-borne pests and pathogens. Research in this area will help us to better understand the effects of different management practices on soil health and will help to tailor crop genetics to optimise plant-soil interactions.

Pests and Pathogens

All horticulture and potato crops suffer from attack by pests and pathogens that reduce yield and quality and contribute to considerable waste within crop production systems and in storage post-harvest. Research is required to understand all aspects of the interaction between crop plants and pests and pathogens including improved understanding of pest and pathogen lifecycles and virulence, crop resistance mechanisms at the genetic, biochemical and physiological scales and chemical, cultural and biological means of crop protection. In particular, biological control methods have become increasingly important in protected crop production in recent years. Research that helps to extend the benefits of this approach to other parts of the industry is required. This will include research on companion planting, bio-pesticides, semio-chemicals, natural predators and disease and pest forecasting.

It is particularly relevant for research in this area to take a crop management systems approach as the most effective and sustainable solutions are often those that integrate a variety of different approaches and which recognise the complexity of the interaction between pests and pathogens and their hosts. This research area is particularly timely given the current changes to the availability of different crop protection products as a result of changes to the EU pesticide approvals process.

Seed Quality and Vigour

The reliability of seeds to germinate uniformly and of seedlings to establish well is essential to the success of producers in delivering a quality crop. Poor germination and establishment leads to an in-efficient use of resources, including land and inputs, within the crop production system. Research is needed to better understand the mechanisms behind germination and establishment from the genetic level through to the physiological level. An improved understanding of seed specific diseases and the interaction between pathogens and seeds would help to breed stronger resistance and to improve treatments that would reduce losses. Knowledge of the effects of climatic conditions on germination and establishment is also particularly important in the light of predicted seasonal changes as a result of climate change. Better understanding of seedling vigour will contribute to the development of varieties that are better able to out-compete weeds and reduce the need for pesticide applications.

Resource Use Efficiency

All of the resources utilised in crop production systems have some degree of environmental and economic cost. Resource use efficiency is key to improving the economic and environmental sustainability of horticultural and potato crop production.

Research is needed to help address a number of resource issues of importance to the sector, in particular:

Water

As highlighted above, it is predicted that summers will become drier in coming decades as the effects of climate change are felt more acutely and rainfall is subject to large regional variation within the UK. This will have the combined effect of increasing horticulture and potato producers' requirements for water and water retention whilst also increasing the competition with other users for limited resources. Research is needed to provide varieties with traits for more efficient use of water and crop production systems that better utilise limited water resources as well as understanding how careful water management can optimise crop quality.

Nitrogen

Conventional horticulture and potato production relies heavily on the use of nitrogenous fertilisers to deliver high crop yields. However, the production of nitrogen fertilisers is dependent on finite fossil fuel reserves and is an important source of greenhouse gas emissions. In addition, their use can lead to the pollution of watercourses and contributes further to greenhouse gas emissions through the release of gaseous nitrous oxides. Reducing the economic and environmental cost of nitrogen fertiliser use depends on improving the efficiency with which nitrogen is used in the crop production system. Research is needed to understand nitrogen use efficiency traits in crop species, both from the perspective of the efficiency of uptake from the soil and the processes by which resources are then utilised in the plant. Research is also needed to understand how nitrogen delivery can be optimised, this requires research into the way in which nitrogen acts in different soil environments and how supply can be matched to the demands of the crop. Greater understanding is required from the biochemical scale to the level of crop and landscape management.

Phosphorus

Readily available reserves of phosphorus are being depleted worldwide. Phosphorus is an important macro-nutrient component of fertilisers and its availability is vital for healthy plant growth. Research is required to improve the phosphorus uptake efficiency of plants, particularly the ability for crop plants to make better use of lower soil phosphorus levels. It is also important to identify how phosphorus can be delivered to the crop in the most appropriate form and at the optimum time for it to be used effectively and this means understanding how the nutrient acts under different environmental conditions and soil types.

Energy

The production of horticultural and potato crops can have a high energy demand. In the case of crops grown under protection or stored, CO₂, light and heat may need to be regulated. In field grown crops, fuel requirements for cultivation, pesticide application, harvesting and storage can be significant. Improving the efficiency of energy use will also help to reduce the emissions of greenhouse gases throughout the agri-food supply chain. Developments in varieties and cultivation practices are required that help to reduce the energy costs of crop production.

Cross-cutting Themes

In addition to the specific research challenges identified above, there are two cross-cutting themes that will strengthen research proposals and should be considered in by all applicants:

- **Consideration of the system context**
Research that contributes useful impacts for industry needs to consider the context of the whole crop production system, rather than studying any particular aspect in isolation. Therefore, research projects are encouraged that take into account the context of the wider crop production system.
- **Aiming to deliver broad relevance**
Proposals that are relevant to more than one crop species or to different elements of the agri-food supply chain are particularly encouraged. Often research in one crop species will have relevance to many other crops species and BBSRC would seek to encourage this wider impact from the research where the opportunities exist.

HIGHLIGHTED AREAS FOR SECOND CALL

The research themes identified above define the broad scope of the second call and proposals are invited across all of these areas. The Steering Group aims to support a portfolio of projects across HAPI's remit. In order to achieve this, the HAPI Steering Group would particularly welcome proposals in the following highlighted areas:

- Soil health is important for the sustainable production of crops within the remit of HAPI. Applications addressing the challenge of soil, particularly quality, fertility, and management practices, would be welcome.
- Applications addressing challenges in resource use efficiency, seed quality and vigour, and crop maturity and spoilage.
- Applications tackling problems which span a range of horticultural crops.

CONTACT

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GUIDELINES FOR CALL

- The objectives of the research proposed must fit within the Horticulture and Potato Initiative's research challenges and must fall within the remit of BBSRC.
- Outline proposals must be submitted in the first instance.
- Projects are typically 3-4 years in duration but funding is available for projects up to 5 years in duration.
- Research proposals must have at least one industry partner.
- 10% of the total (100% fEC) project costs should be provided by the industry partners, 5% should be cash which will be paid directly to the research institutions in the project. BBSRC will fund the remaining costs for successful awards at 80%.
- It is likely that the aims of this Initiative can best be achieved by an interdisciplinary approach. Therefore, collaborative applications which bring together groups with relevant expertise or experience to move research closer to application are particularly encouraged.
- Total funding of around £4M is available from BBSRC for this call to support a portfolio of projects at 80% fEC.

ELIGIBILITY

Standard BBSRC eligibility rules, as described in the section 3 of the Grants Guide (<http://www.bbsrc.ac.uk/funding/apply/grants-guide.aspx>), apply to this call. Main research Providers (MRPs) to the Scottish Government are not eligible to apply for funding from this call. This includes the Moredun Research Institute, The James Hutton Institute and Biomathematics and Statistics Scotland (BioSS).

All projects must have at least one industry collaborator. Industry collaborators are expected to have production, manufacturing or research sites in the UK. Industry partners are not eligible to receive funding and must cover their own costs for participation in the projects.

10% of the total project costs (100% fEC) should be provided by the industry partners, 5% should be cash which will be paid directly to the research institutions in the project. BBSRC will fund the remaining costs for successful awards at 80%.

APPLICATIONS PROCEDURE

There is a 2-stage application process. The information below describes the procedure for the **outline stage** only.

- Outline proposals must be submitted in an electronic form using the Je-S system. Applicants should select the following from the Je-S menus:
 1. Council: **BBSRC**
 2. Document Type: **Outline Proposal**
 3. Scheme: **Standard Outlines**
 4. Call/Type/Mode: **Horticulture and Potato Initiative**
- A CV (maximum 2 pages; standard font and margin sizes) should be submitted for the Principal Investigator and each Co-Investigator and a completed Case for Support document (maximum 5 pages; see below) should be uploaded to Je-S.

Please also refer to the Je-S guidance for Outline proposals in the help section of the Je-S site (<https://je-s.rcuk.ac.uk>).

- Applicants should read the Financial Guidelines document (see downloads section of HAPI: apply for funding) and complete the summary of requested resources table. A completed version of this document should be uploaded to Je-S along with the documents outlined above. Justification of this request is not required at the outline stage. It is expected that the resources requested in a full application, if invited, reflect those in the outline application.
- **Applicants should note that under no circumstances should their application exceed the page limits described. Any outline submissions which exceed the stipulated page limits will be withdrawn.**
- The closing date for outline proposals is **5 March 2014, 4pm**.
- A Consortia-Building Workshop will be held in **early 2013**. Further details will be provided on the website: www.bbsrc.ac.uk/hapi
- Successful applicants will be invited to write a full proposal for submission in **July 2014** (dates are for guidance only and may be subject to change). Further guidance will be made available to those applicants invited to submit a full proposal; however, applicants should note that:
 - Pathways to impact will be required at the full proposal stage and these should be formulated to meet the needs of the horticulture and potato industry sectors.
 - In addition, at the full proposal stage a letter from the lead applicant's Technology Transfer Office (TTO), or equivalent, will be a mandatory requirement summarising the proposed terms of the collaboration with industry partners. Should the application be funded, a signed collaboration agreement will be required before work starts on the grant.

CASE FOR SUPPORT – OUTLINE STAGE

Applicants must supply a case for support document with their applications. The case for support should be submitted as a single document and contain the following sections. Standard font and margin sizes apply. **The whole case for support document should not exceed 5 pages and the “Summary of proposed research” section should not exceed 3 pages.** Submissions that exceed these pages will be withdrawn.

Research area

- Please refer to the Research Challenges section of this document, which begins on page 3 and identify which challenge(s) your proposal is relevant to.

Strategic relevance (approximately 1000 characters including spaces)

- Please explain how your research proposal is strategically relevant to the horticulture and/or potato industries and the aims of the Initiative.

Summary of proposed research (approximately 12000 characters including spaces)

- Identify the aims and objectives of the proposed research.
- Summarise the proposed methodology.

- Explain why the proposed research is of sufficient timeliness and novelty to warrant consideration for funding.
- Comment on the extent to which the proposed project will provide research training and development opportunities of benefit both to the individual(s) employed, and to the wider science base beyond the completion of the specific project.

Project Partners

- Please name all project partners and identify a lead contact for each. Please also indicate the expected contribution from each project partner towards the project costs (see the guidance provided on page 2).

ASSESSMENT

Outline proposals will be assessed by the Initiative Steering Group and will not be externally reviewed. Full proposals will be externally peer reviewed prior to final assessment by the Steering Group. The decision to fund proposals will be announced in December 2014 (dates are for guidance only and may be subject to change). Further details on assessment are as follows:

- In order to be considered fundable proposals must demonstrate both scientific excellence and strategic relevance to the horticulture and potato industry sectors.
- The Steering Group consists of a chair, 7 academic members and 7 industrial representatives.
- For assessments conducted by the Steering Group, each proposal is assigned to at least two Introducers. One Introducer is from academia and the other is from industry.
- Where there is a conflict of interest (e.g. where a Steering Group member has pre-existing links to an applicant) individuals will leave the room while the proposal is being discussed.
- After the assessment is undertaken, feedback on proposals will be provided by BBSRC only.

CRITERIA FOR ASSESSMENT

The primary criteria for assessment are the quality of science proposed and the strategic relevance to the Horticulture and Potato Initiative. It is expected that any proposal that goes on to be funded through the Initiative will be competitive against comparable international work and will demonstrate alignment with the Initiative's aims. Proposals will be assessed against the following criteria:

- **Scientific Excellence**
The extent to which the proposal meets the highest international standards of current research in its field. High performance against this factor will indicate a project of the highest standard, competitive with the best activity anywhere in the world, demonstrating originality and innovative potential.
- **Strategic Relevance to the Horticulture and Potato Initiative**
Demonstrated alignment with the Initiative's aims and research challenges. Consideration of the cross-cutting themes of broad relevance and systems context. Relevance to the food-producing horticulture and potato industry sectors. Plans to

enhance the impact of the research. Balance of the overall research portfolio of the Initiative.

- **Timeliness and Promise**
The extent to which the proposal is particularly appropriate at the present time, or offers longer-term benefits over and above the direct value of the research.
- **Economic and Social Impact**
The extent to which the output of the research will contribute knowledge that shows direct potential for economic return or societal benefits to the UK.
- **Value for Money**
The extent to which the resources requested, relative to the anticipated scientific gains, represent an attractive investment of BBSRC funds.
- **Staff Training Potential of the Project**
Where resources are requested for postdoctoral or other research staff the extent to which the proposed project will provide research training and development opportunities of benefit both to the individual(s) employed, and to the wider science base beyond the completion of the specific project.

SPECIAL CONDITIONS

This initiative aims to support pre-competitive research that benefits the entire industry sector. In order to facilitate the dissemination of research project outcomes, grant holders will be required to:

- Produce annual progress reports. A form will be available on the website for grant holders to complete and the grant holder will be notified in advance when the final report is due.
- Attend and present the results and progress of funded research projects at 9-monthly dissemination events. Grant holders will be notified of the dates and the format required for their presentation.

INTELLECTUAL PROPERTY

The primary aim of this initiative is to gain underpinning knowledge which can then be applied to agri-food production, rather than the development of new products/technology itself. Therefore, in line with standard Research Council Terms and Conditions, the institution awarded the grant will own any intellectual property rights arising from the research grant in the first instance. **As all projects must have at least one industry collaborator, the lead applicant's technology transfer office (or equivalent) should discuss the terms of the collaboration with all members of the consortium (academic and industrial) prior to application. A letter summarising the proposed terms of the collaboration will be a requirement at the full application stage. Should the application be funded, a signed collaboration agreement will be required before work starts on the grant.**

Industrial partners on grants who wish to contribute background IP or offer in-kind services, must do so on the understanding that the terms and conditions of grant, including the dissemination of results, will remain the same unless agreed otherwise by the funders.