EXECUTIVE SUMMARY
Horticulture and Potato Initiative (HAPI)

To address the challenge of global food security, the Biotechnology and Biological Sciences Research Council (BBSRC) began the Horticulture and Potato Initiative (HAPI) in 2012, to bridge gaps in research and innovation, and to generate new opportunities to add value, in the under-exploited UK horticulture and potato sectors.

With support from the Natural and Environmental Research Council (NERC) and the Scottish Government, the BBSRC has brought together researchers and 33 leading UK businesses, to drive precompetitive research towards real industrial impact. Over £9M has been awarded to HAPI projects at the UK’s world-leading research institutes, universities and independent research organisations.

To date, HAPI has fostered ten collaborative projects (Annex 1), five studentships, and three Knowledge Exchange fellowships. All the projects are in partnership with leading businesses from the fresh produce sector (Annex 2), providing £800K of support (£500K cash and £300K in-kind). Industry contributions range from experimental materials, equipment, knowledge, and access to innovative industrial researchers, all enabling HAPI to deliver research that generates new solutions for this sector.

Introduction

Food security is a key strategic priority for the BBSRC. Delivering global food security means providing a sustainable, secure supply of good quality food from less land and with more efficient use of inputs. Faced with climate change, environmental destruction, and a growing population, research in this area has global importance.

The edible horticulture and potato sector is an important component of the food security equation in the UK, providing 60% of all vegetables and 95% of all potatoes consumed in this country (excluding processed frozen products). Production, downstream processing and retail of horticultural products as a whole contribute up to £15.5Bn to the UK economy each year, in addition to the employment opportunities these industries create.

The sectors are consumer-led with strong innovation records, but must continually enhance their competitiveness and resilience. Increasing production, reducing waste and improving sustainability, as well as maintaining profitability in a competitive market, are considerable challenges. HAPI funds collaborative programmes of research in this sector to aid in addressing these challenges by engaging researchers with industry, to facilitate knowledge exchange, and to identify the gaps and opportunities in horticulture and potato research.

The Horticulture Innovation Partnership (HIP) provides coordination support for HAPI and has made significant progress in facilitating BBSRC’s engagement with businesses and key stakeholders in the horticulture sector. This has been a significant contribution to our strategy, and has made it possible for us to facilitate collaborations between industry and academia addressing challenges across the industry.
HAPI Research Challenges

In-depth discussion with the horticulture and potato industries has identified six research challenges that are important to organisations across this sector. These challenges fit into two overarching themes: Meeting the rising demand for food from a growing global population, and adapting to changes in our climate.

- Changing seasons
- Crop maturity and post-harvest quality
- Soil health
- Crop protection
- Seed quality and vigour
- Resource use efficiency

Benefits of interacting with BBSRC and the research community

BBSRC has a strong record in managing collaborative research programmes, including the Research Innovation Club mechanism. Companies report a range of significant benefits from their involvement with BBSRC:

- Capacity to influence research in important strategic areas
- Up to date knowledge on the progress of research projects and early access to results
- Opportunity to work with leading researchers and to build strong relationships with them
- Opportunity to identify the best potential industry recruits
- Guidance on other Research Council activities and funding opportunities
- Promotion of company through relevant activities, objectives and outputs

Delivering industrial impact

HAPI projects have made real progress since the initiative began in 2013, and are generating useful outputs, which are spurring continued interest from their industrial partners.

Impacts in crop protection:

- Understanding of pathogenicity genes, new onion germplasm, and molecular markers to develop durable resistance to Fusarium basal rot (Dr. John Clarkson)\(^1\)
- Integrated deployment of host resistance and fungicides to sustain effective crop protection (Dr. Frank van den Bosch)
- A scientific foundation for optimum field practice of biofumigation to control soil-borne pests and pathogens (Prof. Peter Urwin)\(^1\)

Impacts in post-harvest quality:

- Candidate genes and associated hormonal networks which may be exploited to extend and monitor dormancy in potato and onion to improve crop storage (Dr. Glenn Bryan)\(^2\)
- Improved methods to deliver multiple traits in genetically modified crops for grower, processor and consumer benefit (Prof. Johnathan Jones)\(^3\)
- Improved understanding of the genetic and biochemical basis of pinking and browning in cut lettuce to help reduce post-harvest waste (Dr. Jim Monaghan)\(^4\)

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Annex 1

HAPI Research Portfolio

Ten projects have been funded from two funding calls. The first in 2013 resulted in four funded projects, and the second in 2015 resulted in six funded projects.

Detailed project information can be found online by using the BBSRC reference numbers to search:
- RCUK Gateway to Research: [http://gtr.rcuk.ac.uk/](http://gtr.rcuk.ac.uk/)
- BBSRC Portfolio Analyser: [www.bbsrc.ac.uk/research/grants-search/quicksearch/](http://www.bbsrc.ac.uk/research/grants-search/quicksearch/)

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<tr>
<th>Code</th>
<th>Title</th>
<th>PI</th>
<th>Research Organisation</th>
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<tr>
<td>BB/K020706/1</td>
<td>Establishing biofumigation as a sustainable replacement to pesticides for control of soil-borne pests and pathogens in potato and horticultural crops</td>
<td>Prof Peter Urwin</td>
<td>University of Leeds</td>
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<td>BB/K020870/1</td>
<td>Exploiting next generation sequencing technologies to understand pathogenicity and resistance in Fusarium oxysporum</td>
<td>Dr John Clarkson</td>
<td>University of Warwick</td>
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<tr>
<td>BB/K020889/1</td>
<td>Controlling dormancy and sprouting in potato and onion</td>
<td>Dr Glenn Bryan</td>
<td>Scottish Crop Research Institute</td>
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<td>BB/K020900/1</td>
<td>Strategies for integrated deployment of host resistance and fungicides to sustain effective crop protection</td>
<td>Dr Frank Van den Bosch</td>
<td>Rothamsted Research</td>
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<td>BB/M017745/1</td>
<td>A genetic approach to improving post-harvest quality</td>
<td>Prof Jim Monaghan</td>
<td>Harper Adams University</td>
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<td>BB/M01777X/1</td>
<td>Apple Replant Disease (ARD) Evolution and Rootstock Interaction (ARDERI)</td>
<td>Prof Xiangming Xu</td>
<td>NIAB East Malling Research</td>
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<td>BB/M017834/1</td>
<td>New UK potato varieties with late blight and potato cyst nematode resistance, reduced bruising and improved processing quality</td>
<td>Prof Jonathan Jones</td>
<td>University of East Anglia</td>
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<td>BB/M017869/1</td>
<td>Exploiting seed coat properties to improve uniformity and resilience in Brassica seed vigour</td>
<td>Dr Steven Penfield</td>
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<td>BB/M017877/1</td>
<td>A Systems Approach to Disease Resistance Against Necrotrophic Fungal Pathogens</td>
<td>Dr Katherine Denby</td>
<td>University of Warwick</td>
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<td>BB/M017923/1</td>
<td>Developing integrated approaches for pest and disease control in horticultural field crops (IAPAD)</td>
<td>Dr John Walsh</td>
<td>University of Warwick</td>
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Annex 2

Industrial Partners in HAPI Projects

Biotechnical Solutions Ltd  G&D Matthews Ltd  Hay Farming Ltd  RJ and AE Godfrey