

## Final Project Summary

<b>Project title</b>	<b>Optimised Detection and Control of Potato Blight: Sensing Pathogens to Inform Smart Spray Decisions</b>		
<b>Project number</b>	11120007	<b>Final Project Report</b>	<b>11120007</b>
<b>Start date</b>	01/04/15	<b>End date</b>	30/09/18
<b>AHDB Potatoes funding</b>	£31,000	<b>Total cost</b>	£1,036,533

### What was the challenge/demand for the work?

In connection with work packages 5 & 6 of a related InnovateUK-funded project “Blight Alert - Optimised detection and control of potato blight - Sensing pathogens to inform smart spray decisions” (innovateUK project 102099), which ran from 1 April 2015-30 September 2018; AHDB funded the commercial growers in the InnovateUK project (Spearhead, Velcourt, Frontier and G's) to acquire additional data that will be disseminated for the benefit of the wider business community. WP 5 concerned Data Requirements, Model Extension & Development of an inoculum-based forecast integrated with a weather-based infection model. WP6 concerned End User Engagement and presentation of data.

### How did the project address this?

Disease observations and weather data were sent to the academic partners in the InnovateUK project (James Hutton Institute and Rothamsted Research) by the commercial partners. The commercial partners also undertook training on the use of the inoculum-based forecast system and gave useful feedback on its operation, information requirements and ease of use. The developed system was presented at a number of trade events to inform the wider community and growers within the commercial companies (details below).

### What outputs has the project delivered?

Exploitable outputs include:

- a) Intelligence on risk to crop, potential value and efficacy of fungicide applications and concomitant savings for growers and their advisors (Spearhead, Velcourt, G's Fresh, Frontier Agriculture Ltd)
- b) A commercial data service that growers would pay for to inform Smart spray recommendations in the future (Burkard, Frontier Agriculture Ltd).
- c) Real-time inoculum maps that inform regional trends alongside existing blight risk information (e.g. AHDB Potato Fight Against Blight and Blightwatch data) of use to levy payers.
- d) Automated spore samplers manufactured by Burkard (approx. cost £12k per unit) which can be readily adapted for use with a wide range of crop and vegetable diseases.

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e) Consumables costs of £400/month per device and annual maintenance costs. Route to market is through large farm and extension company partners with extensive market reach operating networks of devices to allow interpolation of spatial information. There is an initial target market of 2300 UK potato growers with a European market of ~100,000 growers. Devices can also stand alone, providing precise information to individual farms.

f) Developed LAMP assays will have value for research purposes and can be applied in lab or field conditions to diseased samples (leaf, tuber and soil) taken manually for identification purposes through existing diagnostics provision at JHI.

The disease forecast web-portal was adapted to include an events tab that growers could use to enter crop history of different fields adjacent to the sampler location. An ability for the system to email notifications to users on the status of the device (i.e. running out of sampling pots, vials, reagents, etc) was added. A method for over the air updates to be made to the program used by the automated sampler was also developed. A method to integrate weather-based infection models, using the new Hutton blight criteria was added.

Unfortunately, the final year of the project, 2018 was a very hot and dry summer with very little blight recorded. The system developed in the InnovateUK project could automatically detect *P. infestans* sporangia in air, when tested in controlled conditions with new reagents but identified problems still to overcome to improve the shelf life of the reagents and methods to reduce insensitivity caused by large amounts of dust. Due to insufficient reliability in the data currently produced by the system, a follow-up project would be needed to address these issues before the developed system could be used other than for research purposes.

### Who will benefit from this project and why?

Potato growers and agronomists will benefit if improved blight control can be achieved. Information on the spatial variability of airborne inoculum of *P. infestans*, dispersal gradients, improved weather-based infection models, a LAMP assay for *P. infestans*, improved methods for DNA extraction from air samples and a method for automated disruption of spores for testing with a LAMP assay have been produced. However, the fully automated system would be required for growers/agronomists to achieve the maximum benefit and the technical issues mentioned below need to be resolved.

### If the challenge has not been specifically met, state why and how this could be overcome.

#### Describe any further research required before commercialisation can be achieved

New information was collected, the automated spore trap system was explained at numerous industry events and feedback was received. This information exchange has helped the design of future disease inoculum-based forecasting services. Unfortunately, until two technical issues are solved

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(reagent shelf life and insensitivity induced by large amounts of other dust), the outcomes so far cannot be fully exploited by AHDB in the form of a working automated system.

<b>Lead partner</b>	Burkard Manufacturing Co Ltd (InnovateUK-funded)
<b>Scientific partners</b>	Rothamsted Research and the James Hutton Institute (InnovateUK funded)
<b>Industry partners</b>	G's, Frontier, Spearhead, Velcourt (jointly InnovateUK and AHDB-funded)
<b>Government sponsor</b>	InnovateUK (project 102099)

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