

Final Project Summary

Project title	Arable Crop Disease Alert System		
Project number	21120002-2140021	Final Project Report	PR594
Start date	April 2015	End date	March 2018
AHDB Cereals & Oilseeds funding	£75,000	Total cost	£120,000

What was the challenge/demand for the work?

In the UK, arable crops essential for food security, suffer 15% yield loss to diseases caused by airborne spores. Farmers protect key leaves with fungicides but sporadic diseases (e.g. *Sclerotinia*, and *Fusarium*) infect at other growth stages. This leaves crops susceptible to disease or can lead to fungicides being applied unnecessarily. A third disease, zymoseptoria leaf blotch, caused by *Zymoseptoria tritici*, also has a sporadic late phase of infection caused by airborne ascospores which can infect the flag leaf of wheat when an earlier fungicide spray has degraded. The challenge was to deliver a device that could be used to provide a reliable forecast to alert farmers of imminent risk of these diseases in time for action.

How did the project address this?

The project addressed this by delivering a new device that could be used in a network to provide regional web-based risk alert system providing an early warning to growers. The system uses a highly efficient automated air sampler made by Burkard, integrated with automated processing steps to perform a DNA-specific LAMP assay to quantify pathogens, with the result issued by mobile phone text for presentation on a web site. Existing weather-based infection models can also be integrated with the information on presence of spores.

What outputs has the project delivered?

The project has delivered new hardware: an automated spore trap (The DNA auto spore trap) and new LAMP assays for the following pathogens: *Pyrenopeziza brassicae*, *Sclerotinia sclerotiorum*, *Zymoseptoria tritici*, *Rhynchosporium* sp, *Oculimacula yallundae* & *O. acuformis* (joint assay), *Alternaria solani*, and for fungicide insensitivity in *Zymoseptoria tritici* (assays for reduced DMI sensitivity and separately an assay for multidrug resistance including reduced DMI and SDHI sensitivity). These new assays can be used both in the device or also by trained staff in diagnostic labs or using portable LAMP machines. Other published assays were assessed for sensitivity and specificity to UK pathogens (*Phytophthora infestans*, *Puccinia striiformis* and *Fusarium graminearum*) for use in the device. Two simplified infection models were briefly compared with existing published models for *Sclerotinia* and Yellow rust.

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Who will benefit from this project and why?

The AHDB could benefit from this research by investing in a network of devices that will provide information for surveillance and monitoring of key crop diseases to inform levy payers. In addition, individual farmers or extension companies would also be free to purchase and operate the devices to get more local or pathogen-specific information if they wished. The scientific community also benefitted from new LAMP assays that can be used in other research.

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

The challenge was met.

Lead partner	Rothamsted Research
Scientific partners	
Industry partners	Burkard Manufacturing Company
Government sponsor	

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