

Molecular Biology of Plant Pathogens (MBPP) conference 29th – 30th March 2017,
Durham, UK

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- An investigation of gene expression of *Sclerotinia sclerotiorum* infected lettuce plants has provided identification of key immunity regulators, which can inform future breeding efforts.
- Powdery mildew biocontrol agents of *Ampelomyces* species have been modified to express Green Fluorescent Protein (GFP) which will aid future studies.
- The model plant *Arabidopsis thaliana* with modified receptors for the plant hormone ABA showed increased resistance to *Pseudomonas syringae* pv. DC3000, paving the way for future work in crop species.
- The gene editing technology CRISPR/Cas9 has been optimised in the model plant *Arabidopsis thaliana*, making it easier to use this powerful technique in protected crop species.
- A high number (90%) of tested imported ornamental plants test positive for the presence of oomycete plant pathogens

Background:

The Molecular Biology of Plant Pathogens (MBPP) conference is organised biennially by the British Society for Plant Pathology (BSPP) and is aimed at early career researchers. Although most work is focused in model species, such as thale cress (*Arabidopsis thaliana*) or tobacco (*Nicotiana tabacum*), work was presented in several crop species such as: grapevine, tomato, lettuce, strawberries and a piece of work on a wide range of ornamental species. Both oral presentations and a poster session were held. This event was very valuable to see the current state of the field and to aid in the creation of a researcher network.

Travel Findings:

MBPP is a recently restarted biennial conference series organised by the BSPP and aimed at allowing early career researchers to present their work in a less intimidating environment than other conferences, as established scientists are discouraged from attending. The vast majority of the work presented was in model species, however there is a growing amount of molecular work being performed in crop and ornamental species. For instance, Elspeth Ransom, a PhD student at York University, has carried out an RNASeq experiment on an infection time course experiment on lettuce plants infected by the fungal pathogen *Sclerotinia sclerotiorum* to analyse the changes in gene expression during the infection cycle. They have identified key 'node' genes within the lettuce genome that appear to regulate the defence response. Satish Kulasekaran, of Warwick University, presented some very interesting work investigating modifications to the ABA pathway in *Arabidopsis thaliana* resulting in an increased resistance to *Pseudomonas syringae* DC3000. They designed synthetic constructs to modulate ABA signalling and the breakdown of ABA during interactions with pathogens. These modified plants showed reduced symptom development, however no examination of yield effects has yet been performed.

There was also a poster session on the first evening, with forty-seven posters being presented. I presented my own titled 'Characterising *Phytophthora fragariae*, the causative agent of strawberry red core disease to understand the resistance response' and had several useful discussions with other PhD students and some of the group leaders who organised the conference. Also interesting was a poster presented by Alexandra Pertolas of the University of Aberdeen. This work was investigating the movement of oomycete pathogens in the international ornamental plant trade. They found that approximately 90% of tested plants contained at least phytopathogen and 86% of asymptomatic plants contained oomycetes in the growth substrate. This raises important questions for UK biosecurity, especially with the recent increase in the international plant trade.

Márk Németh of the centre for Agricultural Research at the Hungarian Academy of Sciences (MTA ATK) presented work on pycnidial fungi of the genus *Ampelomyces* having been modified to express GFP and imaged when infecting various powdery mildew fungi species which parasitise: cucumber, barley, tobacco and pepper. The transformants were imaged under a fluorescent microscope and allowed the imaging of the intracellular colonisation of various cell structures of powdery mildew fungi. There were no observed changes in the ability of the biocontrol agents to parasitise powdery mildew fungi. GFP transformants will allow further investigation to increase the understanding of the mechanism of action of these biocontrol agents, potentially allowing better deployment of these agents in the field. The development of a method of genetic transformation will also aid in the investigation of the ways these biocontrol agents control powdery mildew and potentially allow for the development of more effective agents.

Baptiste Castel of The Sainsbury Laboratory, Norwich presented work on the use of CRISPR-Cas9 in the model plant *Arabidopsis thaliana*. CRISPR-Cas9 is a relatively new gene editing method which has previously been shown to be non-trivial to perform in plant species and especially difficult in the model plant *Arabidopsis*. Baptiste has optimised this system for *Arabidopsis*, which will aid in advancing studies of plant immunity and help to guide studies in crop species. For example, Baptiste has used this system to investigate a key resistance gene involved in white rust resistance.

There were several breaks during which it was possible to have more in depth discussion with several attendees. During one of these breaks I had a very useful conversation with the attendees from Warwick University to discuss the analysis of the RNASeq data from a time course of *P. fragariae* infection on strawberry plants. There was also a conference dinner in the evening, which provide a good opportunity to meet other young scientists working in the field of molecular plant pathology.

In summary, the conference was extremely interesting, providing opportunities to discuss exciting new developments in the molecular plant pathology field with other early career scientists. Although these are not immediately applicable to a commercial growing situation, they do advance the field and provide new tools for use in applied research in protected crops.

Personal Statement:

This conference gave me an opportunity to discuss the current status of my investigation into the variation of virulence in the strawberry red core pathogen *Phytophthora fragariae* with early career researchers. This resulted in useful discussions about analysis strategies moving forward. Specifically of interest to GCRI members would be the information presented on key genes at hubs in the disease resistance network of lettuce infected with *Sclerotinia sclerotiorum*, which will inform future breeding.

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