

GCRI travel grant report

A summary of the International Society of Molecular Plant Microbe Interactions XVIII Congress

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I am an early career researcher working at NIAB EMR in Kent. NIAB EMR focuses on pioneering research to aid the UK horticultural industry. My research focuses on bacterial plant pathogens, principally understanding the genetics mechanisms underlying pathogenicity on certain hosts. My PhD, and subsequent postdoc position focus on bacterial canker disease of cherry and other stone fruits which is a major limiting factor to production globally. Bacterial pathogens, including established diseases such as canker as well as newly emerging diseases such as *Xylella fastidiosa*, remain a threat to horticulture due to lack of effective chemical controls. Research is required due to uncertainties about pathogen host range and the rapid evolution of bacterial populations to overcome chemical controls and the resistance of plant cultivars. It is important that fundamental research looking at the basics of bacterial pathogenicity feeds into more applied work, which we strive to acheive at NIAB EMR.

In July, supported by a GCRI Trust bursary, I attended the IS-MPMI Congress in Glasgow. The Congress brought together over 1000 researchers from over 52 countries around the world. The research area was broad, spanning both applied and basic research of all types of plant-microbe interactions. It covered a wide range of topics and included many more-focused satellite meetings, where researchers could meet others with similar projects to discuss ideas and form collaborations.

At the start of the conference, I attended a satellite meeting focused on insect-vectored diseases. It was highly useful to attend as the pathogen *Xylella fastidiosa* which could be devastating to UK horticulture if it were to arrive, is vectored by insects. Maria Saponari gave an overview of Xylella research ongoing in Europe, discussing the widespread surveying that has led to spittlebugs being identified as the major vectors of this disease. Another talk, given by Sofia Seabra discussed insect vestor demography, including genetic studies on the insect populations across Europe and North Africa. These studies are important as it could allow us to predict how this disease could be spread to and within the UK. Caroline Roper also gave a talk on *Xylella* pathogenicity on grapevine. Her group found variation in outer molecules of the bacterium led to evasion of plant resistance mechanisms, leading to disease symptom development.

The congress was divided into many concurrent sessions. This was useful as we were able to move between sessions to listen to talks most interesting to our research. I attended a session on environmental factors influence diseases. One talk by Xiufang Xin highlighted the role of humidity plays in promoting plant disease and characterised the changes occurring at the molecular level, impacting plant immunity. Horticultural plants are often grown in specialised growing systems to provide high-density such as table-top systems under cover of glass or tunnel. It is important to consider how environmental factors change in these systems and could influence disease outcomes.

Of particular relevance to my current work on *Pseudomonas* cherry canker, were talks such as one by Ryan Melnyk who used genomics to uncover the evolution of pathogenicity in clades of the usually non-pathogenic *Pseudomonas fluorescens* species. They found that gain of a region of DNA encoding toxins converted these bacteria to pathogens. The techniques were highly relevant to my current work. Such findings also could be translated to be used in molecular diagnostics of pathogens, with methods focused specifically on these pathogenicity-related DNA regions. In addition, a talk by Darrell Desveaux on *Pseudomonas* proteins called effectors that trigger resistance was very useful. His team developed a novel high-throughput research tool to study how effectors interact with the plant, whereby many proteins are expressed individually in a pathogen and then screened on its host plant. Any change in disease symptoms is due to the addition of that effector, allowing them to elucidate how it interacts with that plant species. These techniques could be a useful way to identify resistance in any plant species to *Pseudomonas*. Finally, a talk by Derek Lundberg described the work currently being performed in Europe to characterise *Pseudomonas* bacteria living on natural plant populations. Studying how pathogens evolve in natural ecosystems is important as most plant pathology research focuses on crop systems, giving us narrow, likely simplistic view on the diversity of pathogen populations and where emerging diseases may arise from.

I had the chance to present our current work on *Pseudomonas* cherry canker at the conference. This allow me to discuss techniques and ideas with others. I was also able to meet other researchers presenting posters on *Pseudomonas* diseases, including work on kiwifruit canker in New Zealand, which is caused by a related strain of *Pseudomonas syringae* and likely utilises similar pathogenicity mechanisms to cause canker disease.

**Final note**

I am extremely grateful to the GCRI Trust for their funding to allow my travel to this conference. The support of GCRI to early career researchers like myself studying protected horticultural crops is highly appreciated. It was a useful experience to learn about the most cutting-edge research in this wide field. The conference brought together world experts on plant diseases and it was inspiring to hear them talk about their research.