SCIENCE PROTECTING PLANT HEALTH CONFERENCE (SPPH2017); 26–28 SEPTEMBER, BRISBANE AUSTRALIA

Jon West, Rothamsted Research, reports on a recent crop protection conference

Jon West

The SPPH2017 conference brought over 500 delegates from around 40 countries to converge on the Brisbane Convention Centre in unusually warm spring weather. Fortunately, the convention centre was an excellent venue, and while the temperature outside reached 37°C, the delegates could listen to talks and discuss points in relative comfort with the breadth and quality of the programme of talks making the entire event a great success. Major sponsors of the conference were the Australasian Plant Pathology Society and Plant Biosecurity Cooperative Research Centre, and since biosecurity is a major concern in Australasia, topics of monitoring and surveillance featured prominently, along with sessions on diagnostics, responses to pest and pathogen incursions and biosecurity policy. There were also sessions on molecular plant-pathogen interactions, breeding for resistance, epidemiology, modelling and pest risk analysis, pest and pathogen evolution and diversity, IPM, biological and chemical control, soil and forest health, as well as sessions covering economics and education. Overall, this provided an emphasis on practical and applied crop protection, but with some excellent highlights of fundamental aspects too.

The format for the event was generally well-arranged with a plenary presentation in the morning and afternoon, covering key aspects of all the main topic areas and this was complemented with late-morning and late-afternoon concurrent sessions (five topics presented simultaneously) and poster viewing. As is often the case, there were tough decisions as to which concurrent session to attend as frequently two or more interesting talks were scheduled at the same time, such was the quality of presentations made. Fortunately, it is possible to view most of the presentations (some in a modified form), at the SPPH2017 website http://sciplant2017.com.au/#. Sessions did not have time for many questions or further discussion of the topics, but there were generous breaks between sessions when delegates could continue discussions with speakers and others.

The first plenary lecture was the Daniel McAlpine Memorial lecture, given by Prof Barbara Howlett (University of Melbourne), who gave her insights on *Leptosphaeria* species causing canker, or blackleg, of oilseed rape. This gave an excellent overview of multidisciplinary research involving both lab and field work, and demonstrated scientific progress in our understanding of this system, facilitated by the development of new techniques over the years, such as gel-electrophoresis, qPCR, pyrosequencing, whole genome sequencing and bioinformatics. The lecture was a great success story after the oilseed rape (canola) industry collapsed in the late 1970s in Australia due to blackleg and was re-established in the 1990s after successful resistance breeding, which has continued to battle with adaptation and selection within the pathogen population aided with the pathogen's propensity for Repeat Induced Point (RIP) mutations, leading to newly virulent isolates. Possible solutions investigated, included combining major (single-gene) resistance with more durable minor-gene resistance, rotation of groups of resistance genes used in planted crops, and monitoring the pathogen population to alert the industry of emerging virulence before it takes hold. The latter work, in collaboration with Angela Van de Wouw, Steve Marcroft and others, is an excellent example of applying science to crop protection – by alerting growers of an emerging virulent population in the Eyre peninsular of South Australia in 2012 so that they switched the varieties they planted. It is estimated the growers saved over £10Million in lost yield.

On the subject of surveillance and monitoring, many presentations featured rapid or in-field diagnostics, using LAMP or RPA, aptamers, other biosensors or MinIONs. A novel

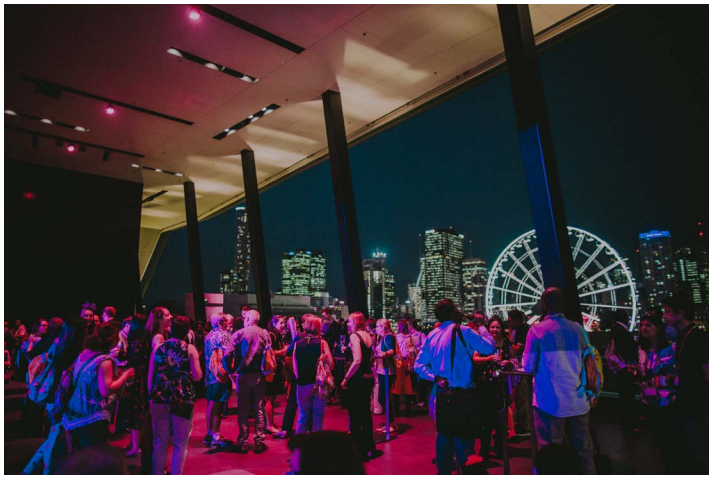

Figure 1. Welcome reception at the SPPH conference with the city centre of Brisbane in the backdrop. (Photo: Faith Thiang Photography)

DOI: 10.1564/v28_dec_00

Figure 2. Prof Barbara Howlett from the University of Melbourne, presenting the opening Daniel McAlpine memorial lecture 'A genome to paddock approach to control plant disease'. (Photo: Faith Thiang Photography)

variation on the established insect pheromone trap was presented as the 'RapidAim' insect traps, which use a pheromone to lure fruit flies into them but then electrical contacts made by the feet of the flies, detect their presence and algorithms identify the typical pattern of movement of attracted flies to make an identification, while measuring the number of flies trapped. This means that instead of 100s of traps, including the empty ones, being checked manually each week by field-staff, the traps send their results wirelessly by LoRaWAN. Some excellent work being done at the South Australia Research and Development Institute, involves the use of smart insect traps and mobile spore traps, mounted on the roof-rack of a car and automated to collect samples into different tubes by GPS-controlled referencing so that different samples collected along the route are geo-located – with sample tubes being reused as the sampling vehicle returns to a previously-visited location.

In addition to the conference, two field trips were also available to the Northern Grain and Gardens area around Toowoomba and to the Tweed Valley Horticultural Region. Many additional conference workshops covered subjects such as; Experimental Design for Agricultural Trials, an Introduction to Linear Mixed Models, Identification and biology of powdery mildews, Identifying plant pathogenic *Fusarium* species, Botryosphaeriaceae Taxonomy and Management, Management of plant-parasitic nematodes, the Brown Marmorated Stink bug (*Halyomorpha halys*), whitefly (*Bemisia tabaci*) biology and control, a Student Professional Development workshop, Pestpoint digital tool for surveillance and monitoring, seed-borne pathogens, and the tomato-potato psyllid (*Bactericera cockerelli*).

The atmosphere of the conference lended itself to excellent networking, fruitful discussions and formation of new connections. This was perhaps facilitated by the location itself – Brisbane is a well-designed and vibrant city comprising a mix of old and very modern buildings, fantastic public transport and many tourist sights. Those near the city centre (central business district or CBD) include the botanic gardens (also featuring excellent birds, lizards and – in the evening – fruit bats), the city museum and art gallery. The latter shows an excellent and unique range of Aboriginal, oriental and European art, both old and new.

Technical terms

Aptamers – are peptides or oligonucleotides that bind to a target molecule such as protein or DNA or RNA, in a similar way to an antibody but they can be designed and produced synthetically.

GPS – Global Positioning System is a system allowing geographic location of an object and time to be determined precisely, based on connectivity of the object to four or more GPS satellites, operated by the US Air Force.

LAMP – Loop mediated isothermal amplification – is a method to amplify specific DNA (or RNA following a reverse transcription step) at a single temperature (around 65° C). The method can use a relatively crude sample and produces results more quickly than PCR, usually in 20–50 minutes.

LoRaWAN – a type of Low-Power Wide-Area Network, providing wireless telecommunication in various radio frequencies of many small bits of data over moderate distances within a network, typically a network of sensors sending data to a 'gateway', where the data are decoded and further communicated.

MinION – from Oxford Nanopore Technologies is a matchbox-sized portable DNA- or RNA-sequencing device, which plugs into a computer to allow results to be analysed. https://nanoporetech.com/products/minion

Pyrosequencing – is a way to sequence a piece of DNA by detecting which nucleotide is incorporated into a strand of nucleic acid by a DNA polymerase as each nucleotide is added to the strand.

RPA – Recombinase Polymerase Amplification is a method like LAMP to amplify specific DNA (or RNA following a reverse transcription step) but using different enzymes to LAMP, at a single temperature (at 37 to 42° C) and producing results in only 10 to 20 minutes.

Similar articles that appeared in *Outlooks on Pest Management* include –