INTERNATIONAL NEWSLETTER ON PLANT PATHOLOGY

ISPP Newsletter 46 (2) February 2016

News and announcements from all on any aspect of Plant Pathology are invited for the Newsletter. Contributions from the ISPP Executive, Council and Subject Matter Committees, Associated Societies and Supporting Organisations are requested.

Editor: Daniel Hüberli (E-mail)

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In this issue:

Nature Plants celebrates its first anniversary

To acknowledge their first anniversary, Nature Plants are making the top 2015 papers free for one month. Explore the journals' growth in their interactive landing page - from dung beetle trickery to tree mortality and dexterous dandelions.

How plants interact with beneficial microbes in the soil

Scientists have wondered for years how legumes whose roots host nitrogen-fixing bacteria are able to recognise these bacteria as both friendly and distinct from their own cells, and how the host plant's specialised proteins find the bacteria and use the nutritional windfall. Now a team of molecular biologists led by Dong Wang at the University of Massachusetts Amherst, working with the alfalfa-clover Medicago truncatula, has found how a gene in the host plant encodes a protein that recognises the cell membrane surrounding the symbiotic bacteria, then directs other proteins to harvest the nutrients. Details appear online in the January edition of Nature Plants.

(News and Media Relations, University of Massachusetts Amherst, 12 January 2016)

Nervous systems differ between species of nematodes

Nematodes have long been used as model organisms for studying the function of neurons. For years, it was assumed that neuron anatomy was remarkably similar across this large and diverse group. In a comparative study looking at a range of nematodes, including some parasites, substantial differences in the number of neurons in the ventral cord were observed by nematologist Nathan Schroeder. On a practical level, the results of this study may lead to the development of new nematicides that target plant-parasitic nematodes.

"We know from some of the old nematicides that the nervous system is a very effective target. Unfortunately, some of those nematicides were very broad spectrum and would target anything with a nervous system, including us," Schroeder noted. The study showed that soybean cyst nematodes may have unique neurons that could be targeted by new nematicides to avoid harming beneficial soil organisms. More research will be required to determine whether such a product could be developed.

(Science Codex, 14 January 2016)

Dishwashers provide a selective extreme environment for fungi

A review paper by R. Gümral et al. titled "Dishwashers provide a selective extreme environment for human-opportunistic yeast-like fungi" was published in January 2016 by Fungal Diversity (vol. 76 pp. 1-9). The abstract is as follows:-

Urban life has led to the creation of human-made environments that, from a microbiological perspective, provide extreme life conditions. Certain non-ubiquitous microorganisms such as thermophilic members of the black yeast genus *Exophiala* are enriched within these habitats for which no counterpart is known in nature. Dishwashers consistently accumulate a number of specific black, white and red yeasts on the rubber seals of doors and in stagnant water at the interior. Several of these yeasts are primarily known as agents of human opportunistic infections. In this review, the literature data are supported by a screening study involving 937 households in 15 cities in Turkey. Fungi were detected in 230 samples (24.5 %). Using rDNA sequencing, the prevalent species were identified as *Exophiala dermatitidis* (n=116), *Candida parapsilosis* (n=44), *E. phaeomuriformis* (n=45), *Magnusiomyces capitatus* (n=22), *Rhodotorula mucilaginosa* (n=15), and *C. lusitaniae* (n=14). The possible role of dishwashers in transmitting disease is discussed.

See: http://link.springer.com/article/10.1007/s13225-015-0327-8?wt_mc=alerts.TOCjournals

GM Potato shows extreme resistance to late blight in Uganda

The first field trial of genetically modified (GM) potatoes resistant to potato blight conducted in Uganda from October 2015 to January 2016 has been completed at the Kachwekano Zonal Agricultural Research and Development Institute (KaZARDI) of the National Agricultural Research Organization (NARO) near Kabale.

Twelve highly resistant GM potatoes of 'Desiree' and one of 'Victoria' varieties from the International Potato Center (CIP) showed extreme levels of resistance compared to the non-GM plants of the same varieties. Using genetic transformation, three resistance (R) genes from wild relatives (*Solanum bulbocastanum* and *S. venturii*) were transferred into farmers' preferred varieties and the results are encouraging. A number of partially resistant varieties exist, but these are not preferred by farmers and consumers. This first observation of zero-fungicide potatoes marks an important milestone in the development and future deployment of biotech potato varieties to farmers in Africa that will significantly reduce losses and cost of production.

In Uganda, losses due to potato late blight can reach up to 60%, forcing farmers to spray fungicides up to 15 times to protect their crops. About 300,000 smallholder households grow potatoes for their subsistence living and income generation. Losses due to late blight represents between 10-25% of their revenue from potato.

(Crop Biotech Update, 27 January 2016)

Plant virus discoveries in Laos help plant protection in the region

A recent plant virus survey in Laos has resulted in many new plant virus records, helping to improve local plant protection practices while alerting Australia to potential virus threats. The aim of the survey was to assist with identifying plant viruses while building capacity in Laos.

The survey was undertaken by locally based plant pathologists and University of Queensland virologists Dr Andrew Geering and Dr John Thomas. Ms Khonesavanh Chittarath, a plant pathologist from the Laos Plant Protection Centre, undertook the diagnoses at the Ecosciences Precinct laboratories in Brisbane. Many new plant virus records have been obtained, including begomoviruses, tospoviruses and potyviruses. Banana mild mosaic was very common, while banana bunchy top and cucumber mosaic virus were seen at several locations. Some cucurbit and solanaceous crops were uniformly infected with begomoviruses, such as tomato leaf New Delhi virus, tomato leaf Thailand virus and pepper leaf curl Malaysia virus. The symptoms of these viruses were so striking that they often disguised mixed infections with other viruses such as chilli ringspot.

The survey showed that virus diseases are widespread among crop and weed hosts in Laos. In many instances they are having a major impact on production, but until now the extent of the problem and the identification of local viruses had been undocumented. The survey was part of a Plant Biosecurity Cooperative Research Centre (PBCRC) and Australian Centre for International Agricultural Research funded project led by Dr Gary Kong of PBCRC and Dr Ben Stodart from Charles Sturt University. Additional financial support for Ms Khonesavanh Chittarath to travel to Australia was kindly provided by the Crawford Fund.

Inspecting cassava cuttings for virus symptoms and mealybugs in Laos (Credit: Andrew Geering).

(The Leaflet, PBCRC, January 2016)

A Symposium on Emerging Plant Disease and Global Food Security, 23-24 March 2016

The Emerging Plant Disease and Global Food Security Chancellors Faculty Excellence Program cluster at North Carolina State will host an international symposium on 23-24 March, 2016, in Raleigh, USA, to bring together experts that study emerging plant diseases and their arthropod vectors. Managing the threats of emerging diseases that affect agricultural crop plants requires experts in genetics, biology, epidemiology, evolutionary biology, climate change, metadata analysis, geospatial analytics and global development policy.

We will synthesise new developments on emerging plant disease biology and discuss an expanding array of new technologies to gather, analyse, synthesise, and share knowledge about the evolution of emerging infectious diseases of plants that affect global food security. Four sessions with keynote speakers, a closing panel and posters are planned.

For further details see the meeting website.

(Jean Ristaino)

Growing spuds in Mars-like conditions

In the 2015 sci-fi movie "The Martian," Matt Damon's character grew potatoes on Mars, and now NASA wants to do the same. According to an article from CNBC, NASA and the Peru-based International Potato Centre are experimenting with producing potatoes in Mars-like conditions on Earth. They hope to eventually build a controlled dome on Mars, capable of farming spuds. Read article.

(AgWeek, 28 January 2016)

Botrytis - new book

Botrytis - the Fungus, the Pathogen and its Management in Agricultural Systems. 2016. Sabine Fillinger and Yigal Elad (Eds.). Springer, 486 p.

Botrytis, a genus of fungal plant pathogens, is the focus of intensive scientific research worldwide. The complex interactions between these pathogens and the plants they infect (referred to collectively as the pathosystem) and the economic importance of the diseases caused by Botrytis on more than 1400 species of cultivated plants, many of which are important agricultural crops, render this pathogen of particular interest to farmers,

agriculture experts, advisers, extension staff, students and researchers worldwide.

This book is the product of intensive work by 41 authors, all of whom are leading scientists from various scientific disciplines studying *Botrytis* as a fungus and as a pathogen. The authors of this book have amassed state-of-the art knowledge on diverse topics, including *Botrytis* epidemiology, disease management, biological and chemical control and aspects of the plant-pathogen interactome, including virulence factors and defense processes, signaling cascades, the oxidative burst and general biological aspects, such as vegetative incompatibility, mycoviruses, and the revised *Botrytis* species concept. This book also provides reviews of the genetic and post-genomic analyses, such as transcriptomics and proteomics, used to study Botrytis biology and pathogenicity.

This 20-chapter book is a comprehensive treatise covering the rapidly developing science of Botrytis and reflecting the major developments in studies of this fungus. It will serve as a source of general information for specialists in agriculture and horticulture, but also for students and scientists interested in the biology of this fascinating, multifaceted phytopathogenic fungal species.

With contributions from:

- Yigal Elad, Melané Vivier, and Sabine Fillinger: *Botrytis*, the good, the bad and the ugly
- Anne-Sophie Walker: Diversity within and between species of Botrytis
- Sabine Fillinger and Anne-Sophie Walker: Chemical control and resistance management of *Botrytis* diseases
- Isidro G. Collado and Muriel Viaud: Secondary metabolism in *Botrytis cinerea*: Combining genomic and metabolomic approaches

(INRA News, No. 78, January 2016)

Virulence Mechanisms of Plant-Pathogenic Bacteria - new book

Virulence Mechanisms of Plant-Pathogenic Bacteria. 2015. Nian Wang, Jeffrey B. Jones, George W. Sundin, Frank White, Saskia Hogenhout, Caroline Roper, Leonardo De La Fuente, and Jong Hyun Ham (Eds). APS Press, 492 p.

Bacterial plant pathogens are among the largest yield robbers in agriculture. One of the best sources of innovation for managing these pathogens is an understanding of their virulence mechanisms. Virulence Mechanisms of Plant-Pathogenic Bacteria, a new book published by APS Press, builds a foundation for the creative, effective, and ongoing management of bacterial diseases in plants by highlighting the latest research advances on virulence mechanisms in the context of the most important bacterial diseases in agriculture.

The first section of this book covers the many basic concepts related to virulence mechanisms of bacteria, such as quorum sensing, biofilms, pathogen-associated molecular patterns (PAMPs), cell surface polysaccharides (SPSs), fimbrial surface attachment structures, cyclic diguanosine monophosphate (c-di-GMP) regulation, bacterial secretion systems and effectors, cell-wall-degrading enzymes, regulation, metals as regulators of virulence, and high-throughput sequencing technology.

The second section offers case studies of virulence mechanisms in significant bacterial pathogens, including '*Candidatus Liberibacter*' spp., *Xylella fastidiosa*, phytoplasmas, spiroplasmas, *Erwinia amylovora*, *Ralstonia* spp., *Xanthomonas* spp., *Pectobacterium* and *Dickeya* spp., and *Streptomyces* spp.

The book was developed by a team of top researchers in this field, making it the most current and authoritative resource available. A detailed description of this book can be found on APS Press website.

1st International Soilborne Oomycete Conference, December 2015

The 1st International Soilborne Oomycete Conference was held during 8 to 10 December, 2015, in Duck Key, Florida, USA . The conference was organised by Alex Csinos and Pingsheng Ji (University of Georgia) and Pam Roberts (University of Florida). Scientific researchers, students, and industry representatives from seven countries and 22 states in USA attended the conference. Mike Matheron (University of Arizona) gave a keynote presentation entitled "Phytophthora, the plant destroyer: Past, present, and future." Scientists working on oomycete pathogens of a variety of crops presented and discussed recent advancements in various aspects of oomycetes, including biology, epidemiology, taxonomy, genetics, diversity, host resistance, chemical control, and integrated disease management. Representatives from international companies, including Syngenta, DuPont, and Bayer, presented updates on new product development and registration. The meeting provided a great platform for the global scientific community to network and discuss collaborations to combat plant diseases caused by oomycete pathogens. More information about speakers and presentations at the conference can be found at the meeting website www.oomyceteconference.org.

(Phytopathology News, February 2016)

The path to plant pathology

These short videos outline how staff and students at University of Minnesota became interested in plant pathology.

(Phytopathology News, February 2016)

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