INTERNATIONAL NEWSLETTER ON PLANT PATHOLOGY

ISPP Newsletter 46 (3) March 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)

Subscribe to the ISPP Newsletter by joining the ISPP mail list

In this issue:

12th International Congress of Plant Pathology, 2023 - Call for Bids

Towards the end of March 2016, Associated Societies of ISPP will be invited to present bids to host the 12th International Congress of Plant Pathology to be convened by the International Society of Plant Pathology in 2023.

A Notice announcing the call for bids will appear on the ISPP website by the end of March 2016 and announced in the April 2016 Newsletter. Associated societies will then need to submit bids by 31 August 2016.

New strategies for responding to and recovering from biosecurity threats to agriculture

New strategies for responding to and recovering from both intentional and unintentional biosecurity threats to European Union (EU) agriculture, developed by the "Plant and Food Biosecurity, Network of Excellence" (PLANTFOODSEC) project, were presented in Brussels, Belgium, on 19 January 2016. The workshop "Tools for Plant and Food Biosecurity" focused on the results of the 5-year project that was launched in February 2011 with 5 year EU funding of EUR 6 million. The project was established specifically with the aim of creating a virtual centre of competence at international level in the field of biosecurity.

The considerable amount of research promoted by the European Union - which has also involved non-EU countries such as the United States, Israel and Turkey - has made possible the development of a comprehensive set of tools to enable end users to respond rapidly in the event that pathogens are accidentally or deliberately introduced into crops and the agro-food supply chain.
The PLANTFOODSEC toolbox includes the following features:

- Assistance in the identification of target crops and target pathogens.
- A tool for the prioritisation of target human pathogens on plants
- Analytical methods for the identification of microbial or toxin contamination.
- A decision tool to determine whether a foodborne illness was introduced intentionally.
- A forensically valid microbial strain discrimination technology, based on multilocus variable tandem repeat assessment (MLVA).
- A risk assessment tool to enable rapid assessments of agro-terrorism scenarios.
- The PLANTFOODSEC web-based virtual diagnostic network.
- Management programmes against various outbreak scenarios.

Besides the toolbox, project achievements include the identification and regulatory analysis of biosecurity challenges; experimental and modelling approaches applied in plant disease epidemiology; advanced molecular

diagnostics; and, more generally, training, dissemination and networking activities to increase awareness of plant biosecurity and food safety among agronomists and food producers and within the scientific, policy and inspection sectors.

For more information visit the PLANTFOODSEC project website.

(PLANTFOODSEC News, Issue 10, January 2016)

Two new review papers in Australasian Plant Pathology

Two review papers, "Biological control of Crown Gall" by A. Kerr and "Biology and biocontrol of *Sclerotinia sclerotiorum* (Lib.) de Bary in oilseed Brassicas" by M. Kamal et al., were published in February 2016 by Australasian Plant Pathology. Articles can be accessed through the Australasian Plant Pathology journal website.

Finding a way to track and stop human and agricultural viruses

A Virginia Tech scientist and his collaborators have found a way to track and potentially stop viruses from replicating. The discovery has broad ranging applications in stopping viral outbreaks such as Hepatitis C in humans and a number of important viruses in plants and animals because it applies to many viruses in the largest category of viral classes; positive-strand RNA viruses. The findings were recently published in the Proceedings of the National Academy of Sciences. Read paper.

(EurekAlert, 18 February 2016)

Kiwifruit bacterial canker bacterium survives on wild plant species

Pseudomonas syringae pv. *actinidiae* (PSA), can cause serious economic losses on *Actinidia* spp. (*deliciosa* and *chinensis*) has been, unfortunately, known internationally for several years now. Until now, many studies have been conducted to clarify the relationship between this bacterium and plant pathogen species of kiwifruit cvs. with productive, commercial and economic importance, but little is known about the ability of this bacterium to colonise other plant species.

During recent years, an international collaboration between the research Team of Prof. Balestra, at the Dip. DAFNE University of Tuscia and of Prof. Zhu, at the Key Lab of Pomology, School of Horticulture, Anhui Agricultural University, Hefei, Anhui provinces, China, have isolated PSA from wild plants. The results will be published shortly in the European Journal of Plant Pathology ("*Pseudomonas syringae* pv. *actinidiae* isolated from non-kiwifruit plant species in China", Authors: Pu Liu, Xue Shizhou, Rong He, Jiayong Hu, Wang Xiaojie, Bing Jia Lorenzo Gallipoli, Angelo Mazzaglia, Giorgio M. Balestra, Zhu Liwu).

In this study, part of a large epidemiological survey in progress in China, 11 bacterial isolates were isolated from three wild plant species, *Setaria viridis, Alternanthera philoxeroides* and *Paulownia tomentos*, found close to *Actinidia* spp. plants affected by kiwifruit bacterial canker. These results have important impact on the evaluation of the presence of the pathogen in a specific area and the approach to the kiwifruit bacterial canker control strategies and, consequently, of all the kiwifruit production to reduce PSA inoculum. The destruction of weeds, like *S. viridis*,, an alternative host of PSA, very common in kiwifruit orchards and widely distributed in most major countries of kiwi fruit production, such as China, Italy and New Zealand will be an important consideration in PSA management.

(Fresh Plaza, 19 February 2016)

Every plant-parasitic nematode has an ascaroside lining

While the human response to dealing with parasite infection has been thoroughly researched; it has only recently been discovered that plant-parasitic nematodes not only activate defensive responses in plants, but also provide nematode-mediated immunity to subsequent attack by pathogens and viruses. Following the current tightening of legislation, withdrawal from use of inorganic pesticides and a lack of resistant plant varieties, there is an urgent need to understand more about plant natural defenses to promote resistance to nematodes and other pathogens and pests.

A recent study published in Nature Communications investigated whether ascarosides can be detected by plants, and whether detection of the molecules induced the plant-defence response. Detection of ascr#18 by plants increased resistance to viral, bacterial, oomycete, fungal and nematode infections in *Arabidopsis*, as well as tomato, potato and barley. Additionally, three other ascarosides applied to different plants showed defense responses were induced by structurally diverse ascarosides, but that this varied in a structure- and species-dependent manner.

The ability to activate plant immune responses as and when required by using signalling molecules, such as ascarosides, is an exciting discovery that could contribute to improving the economic and environmental

sustainability of agriculture. One potential application could be spraying of ascr#18 on crop leaves; as although plants primarily encounter ascarosides via their roots, leaf exposure to low ascr#18 concentrations was also effective at inducing the defense responses to confer fortification against attack. Read blog article.

(BugsBitten blog, 1 January 2016)

Join forces against crop pests among Southern African Development Community countries

Plant-disease scientists who gathered in Harare, Zimbabwe, for a 2-week Africa Solidarity Trust Fund regional plant health sanitary and phytosanitary (SPS) management workshop said the region harboured hundreds of unreported crop pests and diseases which posed a significant threat to agricultural productivity. Dr Joyce Mulila-Mitti, a Food and Agriculture Organisation plant disease expert, said closer collaboration is critical for the region because efforts to control a plethora of new diseases and insect pests that hamper crop production and productivity are fragmented and actions limited to only some countries, allowing the epidemics to persist.

A total of 30 plant disease experts drawn from Angola, Botswana, Madagascar, Mozambique, Namibia, South Africa, Zambia and Zimbabwe attended the training workshop under ASTF Southern African Region project on "Strengthening Controls of Food Safety, Plant and Animal Pests and Diseases for Agricultural Productivity and Trade in Southern Africa." This training of trainers' course aims to equip plant disease experts with skills in SPS management both at the national and regional level. Ministry of Agriculture, Mechanisation and Irrigation Development Permanent Secretary, Ringson Chitsiko, said capacity building activities are important and will enable participating countries to address a number of shortcomings in the field of SPS measures and control in crops and plants in general.

(Sifelani Tsiko, The Southern Times, 15 December 2015)

Reducing reliance on conventional agricultural pesticides

A review paper by J. Lamichhaneet et al. titled "Toward a reduced reliance on conventional pesticides in European agriculture" was published in January 2016 by Plant Disease (vol. 100 pp. 10-24). The full paper is available on open access. The abstract is as follows:-

Whether modern agriculture without conventional pesticides will be possible or not is a matter of debate. The debate is meaningful within the context of rising health and environmental awareness on one hand, and the global challenge of feeding a steadily growing human population on the other. Conventional pesticide use has come under pressure in many countries, and some European Union (EU) Member States have adopted policies for risk reduction following Directive 2009/128/EC, the sustainable use of pesticides. Highly diverse crop production systems across Europe, having varied geographic and climatic conditions, increase the complexity of European crop protection. The economic competitiveness of European agriculture is challenged by the current legislation, which banned the use of many previously authorized pesticides that are still available and applied in other parts of the world. This challenge could place EU agricultural production at a disadvantage, so EU farmers are seeking help from the research community to foster and support integrated pest management (IPM). Ensuring stable crop yields and quality while reducing the reliance on pesticides is a challenge facing the farming community is today. Considering this, we focus on several diverse situations in European agriculture in general and in European crop protection in particular. We emphasize that the marked biophysical and socio-economic differences across Europe have led to a situation where a meaningful reduction in pesticide use can hardly be achieved. Nevertheless, improvements and/or adoption of the knowledge and technologies of IPM can still achieve large gains in pesticide reduction. In this overview, the current pest problems and their integrated management are discussed in the context of specific geographic regions of Europe, with a particular emphasis on reduced pesticide use. We conclude that there are opportunities for reduction in many parts of Europe without significant losses in crop yields.

Read paper

Soil Health, Soil Biology, Soilborne Diseases and Sustainable Agriculture - new book

Soil Health, Soil Biology, Soilborne Diseases and Sustainable Agriculture. 2016. Graham Stirling, Helen Hayden, Tony Pattison, Marcelle Stirling. CSIRO Publishing, 280 p.

This new book by CSIRO Publishing provides readily understandable information about the bacteria, fungi, nematodes and other soil organisms that not only harm food crops but also help them take up water and nutrients and protect them from root diseases. Complete with illustrations and practical case studies, it provides growers and their consultants with holistic solutions for building an active and diverse soil biological community capable of improving soil structure, enhancing plant nutrient uptake and suppressing root pests and pathogens.

The book is written by scientists with many years' experience developing sustainable crop production practices

in the grains, vegetable, sugarcane, grazing and horticultural industries.

This book:

- Provides examples from Australian agriculture,
- Shows growers how to make the transition to an ecologically based form of agriculture to manage soilborne diseases and reduce losses through practice change,
- A comprehensive and readable coverage of the causes and effects of soilborne diseases,
- Discusses the fundamentals of soil biota and the key pathogens in Australian agriculture, and
- Gives a step-by-step guide to biological processes to minimising losses to diseases.

A detailed description of this book can be found on CSIRO Publishing.

Trichoderma: Identification and Agricultural Applications - new book

Trichoderma: Identification and Agricultural Applications. 2015. Gary J. Samuels and Prakash K. Hebbar. APS Press, 204 p.

Trichoderma, a genus of beneficial microorganism that promotes nutrient and mineral uptake as well as the remediation of plant diseases, is an increasingly popular agent used in organic food production systems. The new publication from APS PRESS, is the 'how to' book for harnessing the benefits of *Trichoderma*. This book provides details on how to isolate Trichoderma, select and maintaining efficacious cultures, formulate them for application, and apply them in the field or greenhouse.

Authors Gary J. Samuels and Prakash K. Hebbar, are both recognised experts in this growing field, draw on and translate the experimental literature to clearly describe the process of identifying *Trichoderma* cultures to species using molecular and classical techniques.

A special section of the book titled, "Interactions Among *Trichoderma* Species, Plants, and Their Pathogens: A Primer," offers layman's point of view for agriculturalists who want to understand how this beneficial microorganism interacts with the plant and its pathogens.

A detailed description of this book can be found on APS Press website.

Trees have social networks

"In the deep stillness of a forest in winter, the sound of footsteps on a carpet of leaves died away. Peter Wohlleben had found what he was looking for: a pair of towering beeches. 'These trees are friends,' he said, craning his neck to look at the leafless crowns, black against a grey sky. 'You see how the thick branches point away from each other? That's so they don't block their buddy's light.' ... Trees can count, learn and remember; nurse sick neighbours; warn each other of danger by sending electrical signals across a fungal network known as the 'Wood Wide Web'; and, for reasons unknown, keep the ancient stumps of long-felled companions alive for centuries by feeding them a sugar solution through their roots." Read full article.

(The New York Times, 29 January 2016)

Hybridistion a major force in the generation of new fungal plant pathogens

A review paper by E. Stukenbrock titled "The role of hybridization in the evolution and emergence of new fungal plant pathogens" was published in February 2016 by Phytopathology (vol. 106 pp. 104-112). The abstract is as follows:-

Hybridisation in fungi has recently been recognized as a major force in the generation of new fungal plant pathogens. These include the grass pathogen *Zymoseptoria pseudotritici* and the powdery mildew pathogen *Blumeria graminis* triticale of triticale. Hybridisation also plays an important role in the transfer of genetic material between species. This process is termed introgressive hybridisation and involves extensive backcrossing between hybrid and the parental species. Introgressive hybridisation has contributed substantially to the successful spread of plant pathogens such as *Ophiostoma ulmi* and *O. novo-ulmi*, the causal agents of Dutch elm disease, and other tree pathogens such as the rust pathogen *Melampsora*. Hybridisation occurs more readily between species that have previously not coexisted, so-called allopatric species. Reproductive barriers between allopatric species are likely to be more permissive allowing interspecific mating to occur. The bringing together of allopatric species of plant pathogens by global agricultural trade consequently increases the potential for hybridisation between pathogen species. In light of global environmental changes, agricultural development, and the facilitated long-distance spread of fungal plant pathogens, hybridisation should be considered an important mechanism whereby new pathogens may emerge. Recent studies have gained insight into the genetics and biology of fungal hybrids. Here I summarize current knowledge about hybrid speciation and introgressive hybridisation. I propose that future studies will benefit greatly from the availability of large genome data sets and that genome data provide a powerful resource in combination with experimental

approaches for analyses of hybrid species.

Read paper

Acknowledgements
Thanks to Grahame Jackson, Greg Johnson, and Peter Williamson for contributions.