The International Society for Plant Pathology promotes the world-wide development of plant pathology and the dissemination of knowledge about plant diseases and plant health management

PROMOTING WORLD-WIDE PLANT HEALTH AND FOOD SECURITY

INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

ISPP NEWSLETTER

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SEASONS GREETINGS

DANIEL HUBERLI

The ISPP Executive Committee and Secretariat send our warm and sunny greetings for the holiday season to all ISPP members and their families and colleagues. Jan Leach, the ISPP President, will be sending her special annual message and greetings to everyone in the January issue of the ISPP Newsletter. Best wishes for a happy and safe 2021 from DownUnder!

***Grevillea* sp. with leaflies – Mono print with sepia ink, chine colle and watercolour (D. Huberli, 2016)**

THE SOUTH AFRICAN JOURNAL OF SCIENCE CELEBRATES THE INTERNATIONAL YEAR OF PLANT HEALTH

NADIA GROBLER, SOUTH AFRICAN JOURNAL OF SCIENCE

The South African Journal of Science recently published a special issue commemorating the International Year of Plant Health 2020. It serves as an excellent source of the latest research, reviews and commentaries from leading plant pathologists and entomologists in South Africa. It will inform not only plant pathologists and food growers, but also policymakers and the public of the importance of plant health. As Mirko Montuori (UN Food and Agriculture Organization) states in his Commentary, '…our own health depends on plants while the health of plants depends on us'.

The Commentary by Mirko Montuori provides a clear synthesis of contemporary plant health research. He discusses the concept of how protecting plants directly protects human health. This topic is explored further by Ida Wilson who specifically emphasises the importance of plant health for sustainable crop production in South Africa. She suggests that a holist approach should be implemented when considering a management strategy against pests and pathogens.

Microbe and insect collections may be considered national biodiversity resources. These collections, which detail the historical records of disease and pest outbreaks, are important for decision-makers as they contain critical information for phytosanitary regulations. In her insightful Commentary, Adriaana Jacobs outlines the importance of these natural science collections, one of which in particular has a long and sustained history in South Africa.

The Southern African Society of Plant Pathology and Microbiology was formed in 1962. Initially the presentations at the annual congresses focused on plant pathogens, but this changed in the 1970s with microbiological topics dominating proceedings. In 1980, the disciplines split into the South African Society of Microbiology and the Southern African Society of Plant Pathology. Mike Wingfield and Teresa Coutinho describe the history of the Southern African Society of Plant Pathology, which has developed into a highly successful professional society.

One of the primary objectives of plant pathologists is to manage diseases to prevent significant economic losses. In 1926, Paul van der Bijl, head of the Department of Plant Pathology and Mycology at Stellenbosch University, wrote a seminal paper in the South African Journal of Science on 'Landmarks in the development of the science of plant pathology and of disease control'. In his Commentary on this article, Bernard Slippers compares key factors that influence plant disease development and management today compared with what was known almost 100 years ago. One of the most renowned epidemiologists in the world during the 20th century was James E. Vanderplank, and Mike Wingfield and colleagues present the achievements of this remarkable scientist. In the contribution by Trudy Paap and colleagues, the epidemiology in South Africa of an invasive exotic pest, the shot hole borer, is discussed. Although initially only a problem in the urban environment, it is now a tremendous threat to agriculture and forestry.

Victoria Pastor from Jaume I University in Spain reviewed two volumes of the book Plant Health Under Biotic Stress', edited by Dr Rizwan Ali Ansari and Dr Irshad Mahmood. Volume 1 focuses on organic strategies while Volume 2 examines microbial interactions. She entitled her review 'Green actions for a better plant health', thus highlighting the trend towards using biological alternatives rather than chemical pesticides to manage plant pests and diseases.

This year (2020) the National Science and Technology Forum (NSTF) included a special category to celebrate the IYPH 2020. Several distinguished plant pathologists and entomologists were nominated for this award and Mike Wingfield, a highly accomplished researcher in the field of forest protection, was the recipient. Salmina Mokgehle provides a profile of Mike's accomplishments over the course of his 40-year career.

This issue also includes six review articles focusing on viruses and other pathogens that have caused, and remain the cause of, significant losses to the agricultural and forestry sectors in South Africa. The first, written by Chrissie Rey, is similar to a detective story as it records the early history of the discovery of plant viruses in the country. The two reviews by Jacquie van der Waals and Kerstin Krüger cover the diseases and the vectors of the most important pathogens affecting potato production areas in South Africa. Mike Wingfield and co-authors reflect on the history of forest protection in South Africa, while Zakkie Pretorius discusses the accomplishments of his group in wheat rust research over the past 40 years. Kwasi Yobo and co-authors highlight the importance of Fusarium head blight on wheat and emphasise the significance of multiple strategies to manage the disease.

Some of the most devastating plant diseases in South Africa are the core of the six research articles. These articles include research undertaken by Maryke Craven and co-authors on northern corn leaf blight as a predisposing factor of ear rot incidence and severity; the development and improvement of an epidemiological model for citrus black spot by Providence Moyo and colleagues; and the first report of tropical race 4 (TR4) of the pathogen responsible for Fusarium wilt of banana in Mozambique by Altus Viljoen and his collaborators. The occurrence of TR4 in Mozambique is considered to be a major threat to banana production in the rest of Africa. Mapotso Kena and her colleagues describe the use of plant extracts (from Monsonia burkeana and Moringa oleifera) and Trichoderma harzianum as a biocontrol option to manage damping-off of tomato seedlings caused by Rhizoctonia solani. Research by Kwasi Yobo and co-authors on the entomopathogenic fungus and endophyte, Beauvaria bassiana, as a control measure against the rice stem borer is also included. Finally, Dave Berger and his team determined that northern corn leaf blight is the most serious disease of maize in smallholder farms in South Africa and that it can be successfully managed by the deployment of resistant cultivars.

For more information please visit https://www.sajs.co.za/issue/view/820.

POSTPONED CONFERENCE DUE TO COVID-19

In order to protect the health, safety and well-being of our international community from COVID-19 some conferences and workshops have been postponed or changed to virtual meetings. Affected meetings with cancellations or new dates, where confirmed, are listed here. These changes have also been updated in the Coming Events list. Please let me know of any date changes that I may have missed.

- 7th International Conference of Pakistan Phytopathological Society, has been postponed with a date yet to be announced.

GENETICS BEHIND DEADLY OAT BLIGHT IDENTIFIED

KRISHNA RAMANUJAN, CORNELL CHRONICLE, 23 NOVEMBER 2020

A multi-institution team has identified the genetic mechanisms that enable the production of a deadly toxin called Victorin – the causal agent for Victoria blight of oats, a disease that wiped out oat crops in the U.S. in the 1940s. The study, "Victorin, the host-selective cyclic Peptide toxin from the oat pathogen *Cochliobolus victoriae*, is ribosomally encoded," was published recently in the journal *Proceedings of the National Academy of Sciences*.

Victoria blight is caused by the fungus *Cochliobolus victoriae*, which produces the Victorin toxin, but until now no one has uncovered the genes and mechanisms involved.

"The oat varieties favored by farmers in the 1940s were resistant to Crown Rust disease, but scientists later discovered this was the very trait that made those oat varieties susceptible to Victoria blight because the Victorin toxin was targeting that specific plant protein," said co-senior author Gillian Turgeon, professor and chair of the Plant Pathology and Plant-Microbe Biology Section of the School of Integrative Plant Science, in the College of Agriculture and Life Sciences (CALS). "Unearthing the molecules involved in this fungus-plant interaction is fundamental to our understanding of how plants respond to attack by diverse microbes."

Most fungal toxins are synthesised by large, multi-functional enzymes, and the small peptides created by these enzymes include both toxins and medicines, such as the antibiotic penicillin. But Turgeon and co-author Heng Chooi, a researcher at the University of Western Australia, discovered the Victorin toxin is actually synthesised directly in the ribosome, which is an organelle in cells that makes most proteins. These small molecules produced in ribosomes are known as ribosomally synthesized and post-translationally modified peptides, or RiPPs.

This alternate mechanism for producing small peptides like Victorin – coupled with the fact that fungal genomes likely contain many RiPP-associated genes – could lead to the discovery of additional small molecules, including both new toxins and beneficial compounds.

Further, first author Simon Kessler, a doctoral student at the University of Western Australia, confirmed the enzymatic function of several Victorin genes, including a novel enzyme that converts the Victorin peptide to its active form. Surprisingly, the research team found that the Victorin genes encoding these enzymes are scattered across repetitive regions in the pathogen genome – a stark contrast to genes for most known small molecules which are typically found in compact clusters on the fungal chromosomes.

The finding could help researchers better understand the evolutionary origins of molecules like the Victorin peptides, what determines the virulence of emerging crop diseases and how to better prevent them in the future.

Funding for this work was provided by the Australian Research Council, the China Scholarship Council, the Australian National University Grains Research and Development Corporation, the New South Wales Department of Primary Industries, and the Joint Genome Institute.

HISTORICAL VIRUS ISOLATE COLLECTIONS

A paper by Roger A. C. Jones *et al.* titled "Historical virus isolate collections: An invaluable resource connecting plant virology's pre-sequencing and post-sequencing eras" was published on 10 November 2020 by *Plant Pathology* (online early view). The abstract is as follows:-

Many laboratories maintain historical collections of preserved plant virus isolates that store a wealth of untapped data, including original type isolates, studied in the pre-sequencing era. Currently, many recently recognized virus species exist with no supporting reference sequences. Also, many virus sequences appear new when compared to available sequences, but, on sequencing pre-sequencing era isolates, they may coincide. Such linkages allow access to data from previously determined biological and other parameters from pre-sequencing era studies. These linkages are increasingly being found using high-throughput sequencing, helping clarify virus taxonomy and improving understanding of virus ecology and evolution. Thus, mistakes can be avoided in naming viruses and in combining or separating them, as well as enabling identification of unknown viruses preserved long ago. With well-established viruses, success in dating and other evolutionary studies, and discovery of changes in regional virus populations, both depend upon comparisons between recent and old isolate sequences covering the greatest possible time periods. Such studies help reveal the extent that human activities have influenced virus evolution and changed virus populations on a global scale. Sequencing virus genomes from herbarium specimens, archaeological specimens, or living plant collections can provide complementary data. By bringing context to newly detected viruses and supporting plant pest risk analyses, linking new virus discoveries to previously generated disease symptom, host range, virus transmission, and geographical distribution data has important implications for plant health regulation. Also, historical isolates can provide an invaluable resource facilitating biosecurity investigations involving virus introductions, entry pathways, and baseline surveillance.

Read paper.

PATHWAYS FOR ADVANCING PESTICIDE POLICIES

A paper by Niklas Möhring *et al.* titled "Pathways for advancing pesticide policies" was published on 15 September 2020 by *Nature Food* (vol. 1, pp. 535–540). The abstract is as follows:-

Numerous pesticide policies have been introduced to mitigate the risks of pesticide use, but most have not been successful in reaching usage reduction goals. Here, we name key challenges for the reduction of environmental and health risks from agricultural pesticide use and develop a framework for improving current policies. We demonstrate the need for policies to encompass all actors in the food value chain. By adopting a multi-disciplinary approach, we suggest ten key steps to achieve a reduction in pesticide risks. We highlight how new technologies and regulatory frameworks can be implemented and aligned with all actors in food value chains. Finally, we discuss major trade-offs and areas of tension with other agricultural policy goals and propose a holistic approach to advancing pesticide policies.

Read paper.

HOW DO TIPS OF PLANTS STAY VIRUS-FREE?

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA, 8 OCTOBER 2020

Plants are able to keep growing indefinitely because they have tissues made of meristems which have the unique ability to transform themselves into the various specialised cells that make up the plant, dividing whenever appropriate and producing new cells of whatever type as needed. Meristems exist at the tips of all plants, allowing them to grow new stems or new roots, and, in trees, also in the trunk, where they add extra girth.

WUSCHEL proteins resist the viral invasion by inhibiting the protein assembly line of the plant stem cell (Photo credit: LIANG Yan and CHEN Lei, University of Science and Technology of China).

It has been known since the 1950s that the meristems at the tips of plants, or shoot apical meristems (SAM), have the remarkable ability to remain virus-free as they give birth to their specialised daughter cells, even if the rest of the plant is thoroughly infected by a virus. This happens not just for one virus, but a range of them. This virus-beating ability has been exploited by scientists and farmers to cultivate new plants from donor plants that are infected, but without passing on the virus. They simply snip a tiny part of the tip, raise it for a time in a test tube or petri dish, and repeat it several times, the plant cutting typically grows pathogen-free.

Researchers at the University of Science and Technology of China (USTC) have offered new insights into this incredible ability in a recent study published in *Science*. The research team inoculated *Arabidopsis thaliana* with Cucumber Mosaic Virus and watched what happened. As the virus spread towards the SAM, they noticed that it halted just before it got to a region called the WUSCHEL-expression domain. Taking a very close look at the distribution of the WUSCHEL regulator proteins here, they noticed more had appeared where the virus had tried to establish itself upon inoculation. WUSCHEL is an extremely important protein that plays a key, regulating role in determining stem cell fate, at the early stages of the development of a plant embryo, and also oversees the meristems, maintaining them in an undifferentiated state and specifying what sort of daughter cells they will

Then they inoculated the virus directly into the cress's stem cell and just below it, and found that the virus only spread in the latter region. "There's a chemical called dexamethasone that can induce production of these WUSCHEL proteins in our tested plants," said ZHAO Zhong, paper author and a professor from the School of Life Science at USTC. "Next, we inoculated more cress with the virus and then gave some of the plants dexamethasone treatment, and some we just left alone. Some 89 percent of the plants without the treatment were infected with the virus, but 90 percent of those with the treatment were free from virus invasion."

How did WUSCHEL beat virus? They found surprisingly that the WUSCHEL proteins worked to inhibit production of viral proteins. Viruses can't make their own proteins, but rather hijack the protein assembly line of an organism and make it produce copies of the virus. The WUSCHEL proteins, which do so much to regulate the SAM, had in essence frozen all protein production—whether by the plant for itself or when hijacked by the virus—thus preventing the viruses from replicating. Genes similar to those that direct production of WUSCHEL proteins in the thale cress are very widespread across the plant kingdom, so the researchers are interested in seeing whether this strategy can be applied in breeding to obtain broad-spectrum antiviral crop varieties in the future says ZHAO. Read more.

ENGAGING STUDENTS ONLINE

The Covid-19 pandemic has revealed the need for novel and engaging online pedagogy. In this two-part webinar series, Synchronous and Asynchronous Virtual Learning strategies and experiences will be presented. Two award-winning professors will share ideas on how to make online plant pathology, physiology, and phytobacteriology courses more engaging for plant pathology undergraduate/graduate students.

Part 1: Process Oriented Guided Inquiry Learning (POGIL) in the Synchronous Virtual Classroom with Dr. Tracey Murray, PhD

During this interactive session, Tracey Murray will introduce the benefits of using Process Oriented Guided Inquiry Learning (POGIL) in your synchronous online classroom. Dr. Murray will introduce you to POGIL roles, the Learning Cycle, and student development of processing skills.

Part 2: Perspectives on Asynchronous Virtual Classroom Engagement with Dr. Marc Cubeta, PhD

During this session, Marc Cubeta will share his experiences and perspectives on asynchronous teaching methods that he developed and implemented at NC State University. He will share his distance education philosophy, course structures, experiential learning exercises, and lessons learned thus far.

PLANT HEALTH PROGRESS 2021 FOCUS ISSUE ON OOMYCETES

Phytophthora and *Pythium* species are well known oomycete plant pathogens that have devastated agricultural and horticultural crops for eons since the time Anton de Bary first described *Phytophthora*. There are many other oomycete plant pathogen genera that cause downy mildews, rusts, and other diseases. Management strategies for all these are different, yet there are some similarities. Plant Health Progress is seeking to spotlight diseases caused by these difficult-to-manage plant pathogens and the challenges they pose to practical plant pathologists as they advance toward developing efficient techniques.

Given the recent advances in the development of new fungicides, diagnostic tools, population biology, resistant varieties, and integrated management strategies, *Plant Health Progress* has chosen Managing Stubborn Oomycete Plant Pathogens as the topic for its July 2021 focus issue. If you are working on related research, submit your manuscript to Plant Health Progress and indicate in Manuscript Central that you would like your manuscript to be considered for the focus issue.

All submissions for the focus issue should address original biological and practical questions that advance our conceptual knowledge of management strategies. Submissions can include diagnostic guides, short review articles that synthesize current knowledge of management strategies, development and identification of new germplasm, fungicide evaluations, population biology from a management perspective, integrated practices, diagnostic tools, and others.

CURRENT VACANCIES

No current vacancies.

ACKNOWLEDGEMENTS

Thanks to Greg Johnson and Jan Leach for contributions.

COMING EVENTS

International Seed Testing Association Seed Health Workshop: Seed health methods to detect fungi, bacteria and viruses
Postponed – date to be announced
Pretoria, South Africa
Website: www.seedtest.org/en/event-detail---0--0--0--111.html

7th International Conference of Pakistan Phytopathological Society
Postponed – date to be announced
University of Agriculture Faisalabad and Ayub Agricultural Research Institute, Faisalabad, Pakistan
Website: pakps.com/web/7icpps

4th International Conference on Global Food Security, online
6 December - 9 December, 2020
Montpellier, France
Website: www.globalfoodsecurityconference.com

10th International IPM Symposium
15 March - 18 March, 2021
Denver, Colorado, USA
Website: ipmsymposium.org/2021

Meeting of the 66th Annual Conference on Soilborne Plant Pathogens and the 51st Annual Statewide California Nematology Workshop
23 March - 24 March, 2021
To be held virtually on Zoom
Website: soilfungus.wsu.edu

16th Congress of the Mediterranean Phytopathological Union
20 April - 22 April, 2021
Limassol, Cyprus
Website: cyprusconferences.org/mpu2020

International Symposium on Cereal Leaf Blights
19 May - 21 May, 2021
Hammamet, Tunisia
Website: www.isclb2021.com

4th International *Erwinia* Workshop
5 June - 6 June, 2021
Assisi, Italy
Website: www.icppb2020.com

14th International Conference on Plant Pathogenic Bacteria
6 June - 11 June, 2021
Assisi, Italy
Website: www.icppb2020.com

Joint 18th International *Botrytis* Symposium & 17th International *Sclerotinia* Workshop
7 June - 11 June, 2021
Avignon, France
Website: colloque.inra.fr/botrytis-sclerotinia-2020

International Plant Health Conference "Protecting Plant Health in a changing world"
28 June - 1 July, 2021
Paasitorni Conference Centre, Helsinki, Finland
Website: www.fao.org/plant-health-2020/events/events-detail/en/c/1250609/

International Phytobiomes Conference 2021
14 September - 17 September, 2021
Denver, Colorado, USA
Website: phytobiomesconference.org/

13th Arab Congress of Plant Protection
31 October - 5 November, 2021
Le Royal Hotel, Hammamat, Tunisia
Contact: Dr. Asma Jajar, Chairperson of Organising Committee info@acpp-aspp.com
Website: acpp-aspp.com

7th International Congress of Nematology
1 May - 6 May, 2022
Antibes Juan-les-Pins, France
Website: www.alphavisa.com/icn/2020/index.php

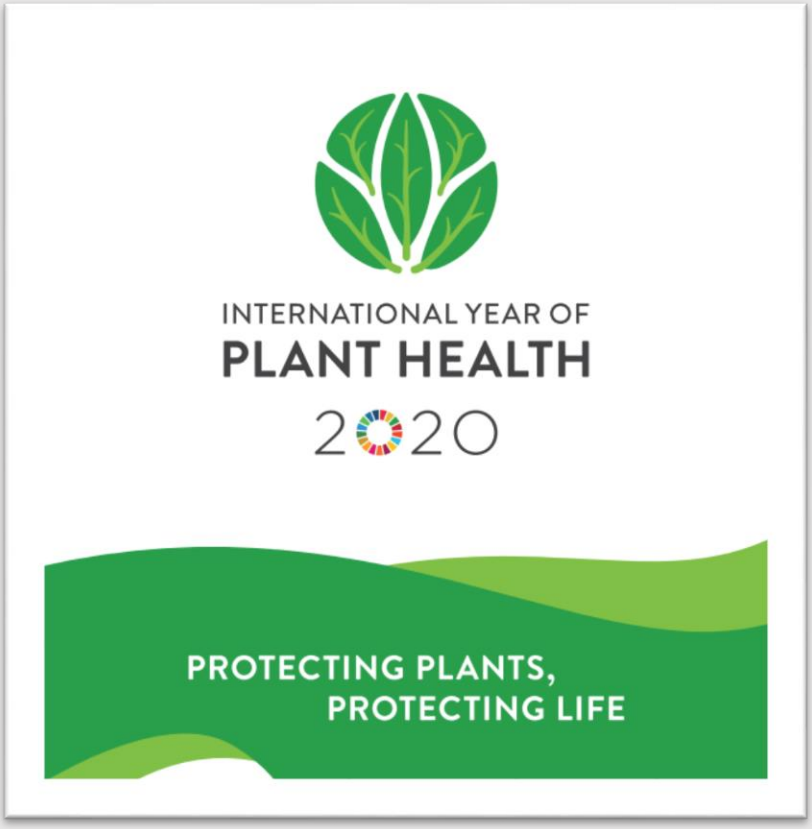
11th Australasian Soilborne Diseases Symposium
Mid-late 2022
Cairns, Queensland, Australia
Website: asds2020.w.yrd.currinda.com

XX International Plant Protection Congress
10 June - 15 June, 2023
Athens, Greece
Website: www.ippcathens2023.gr

12th International Congress of Plant Pathology (ICPP2023)
20 August - 25 August, 2023
Lyon, France
Website: www.icpp2023.org

9th ISHS International Postharvest Symposium
11 November – 15 November, 2024
Rotorua, New Zealand
Website: scienceevents.co.nz/postharvest2024

INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY (ISPP)



WWW.ISPPWEB.ORG

The ISPP List is an e-mail list server which broadcasts messages and announcements to its subscribers. Its goal is to facilitate communication among members of the International Society for Plant Pathology and its Associated Societies. Advertised vacancies in plant pathology and ISPP Newsletter alerts are also sent to members of the ISPP List.

In accordance with the guidelines and recommendations established by the new EU General Data Protection Regulation 679/2016 (GDPR), the International Society for Plant Pathology has created a Privacy Information Notice containing all the information you need to know about how we collect, use and protect your personal data.

This policy explains when and why we collect personal information about our users, how we use it, the conditions under which we may disclose it to third parties, how we keep it safe and secure and your rights and choices in relation to your personal information.

Should you need further information please contact business.manager@issppweb.org

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