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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Editor: Daniel Hüberli (**email**)

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IN THIS ISSUE:

CALL FOR BIDS TO HOST THE 13TH INTERNATIONAL CONGRESS OF PLANT PATHOLOGY, ICPP2028

Associated Societies of ISPP are invited to present bids to host the 13th International Congress of Plant Pathology in 2028. Traditionally the ICPP is held in August.

ISPP councillors are urged to consider and discuss this opportunity with their Society.

The deadline for receipt of bids is 31 August, 2021. They should be sent to the Business Manager of ISPP, with c.c. to the Secretary ISPP, as e-mail attachments and/or Web addresses.

Andrea Masino
Business Manager, International Society for Plant Pathology
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Dr Brenda Wingfield
Secretary-General, International Society for Plant Pathology
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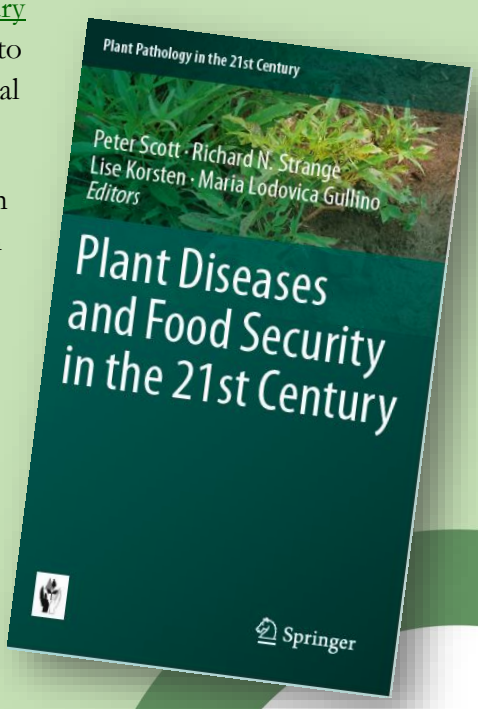
If a Society is considering a bid for the 13th International Congress of Plant Pathology, 2028, please read the bid and congress guidelines and requirements carefully. They can be accessed here.

PLANT DISEASES AND FOOD SECURITY IN THE 21ST CENTURY

EDITORS: PETER SCOTT, RICHARD STRANGE, LISE KORSTEN, LODOVICA GULLINO

This new volume in the ISPP book series Plant Pathology in the 21st Century opens with a Foreword by ISPP President Jan Leach, describing it as a call to arms for plant pathologists, identifying the conceptual, tangible and technical challenges we face in this century.



Those who attended the 11th International Congress of Plant Pathology in Boston may recognise the structure introduced by ISPP's Commission on Global Food Security: the 5-part pattern has been retained as an outline structure for this publication. Each of its 13 chapters has been specially prepared for publication; they include major topics not covered in Boston.

Part I: Crop diseases threaten global food security and your breakfast

JB Ristaino: Potatoes, citrus and coffee under threat

RC Ploetz: Gone bananas? Current and future impact of Fusarium wilt on production

Part II: Emerging plant diseases and global food security

S Rajaram, HJ Dubin: Plant diseases, global food security and the role of R. Glenn Anderson

F Fabre, J Coville, NJ Cunniffe: Optimizing reactive disease management using spatially explicit models at the landscape scale

Part III: Global impacts of plant disease epidemics

J Kreuze, W Cuellar, J Low: Challenge of virus disease threats to ensuring sustained uptake of vitamin-A-rich sweetpotato in Africa

NP Castilla, JB Macasero, JE Villa, AH Sparks, L Willoquet, S Savary: The impact of rice diseases in tropical Asia

T Petronaitis, S Simpfendorfer, D Hüberli: Importance of *Fusarium* spp. in wheat to food security: a global perspective

M Jeger et al.: Quantitative assessment of consequences of quarantine plant pathogen introductions: from crop losses to environmental impact

Part IV: Innovative techniques for monitoring emerging diseases

SF Ortega, D Spadaro, ML Gullino: Diagnosis and assessment of some fungal pathogens of rice: novel methods bring new opportunities

J Shao, F Ding, F Fu, JS Hartung: Automated detection of 'Ca. Liberibacter asiaticus' infection in citrus using immune tissue prints and machine learning

C Beverley, M Thakur: Plantwise: a knowledge and intelligence tool for food security through crop protection

Part V: Plant diseases and food safety

C Tiu: Pesticide residues in food: a never-ending challenge

N Holden: How can plant pathology help in the control of human pathogens associated with edible crop plants?

This ISPP book can be regarded as a companion volume to Emerging Plant Diseases and Global Food Security, editors Jean Beagle Ristaino and Angela Records, published by APS Press, which also has links with the Boston Congress.

Plant Diseases and Food Security in the 21st Century is published for ISPP by Springer: click here for details and to order.

IN HONOR OF JOHN BISSETT: AUTHORITATIVE GUIDELINES ON MOLECULAR IDENTIFICATION OF TRICHODERMA

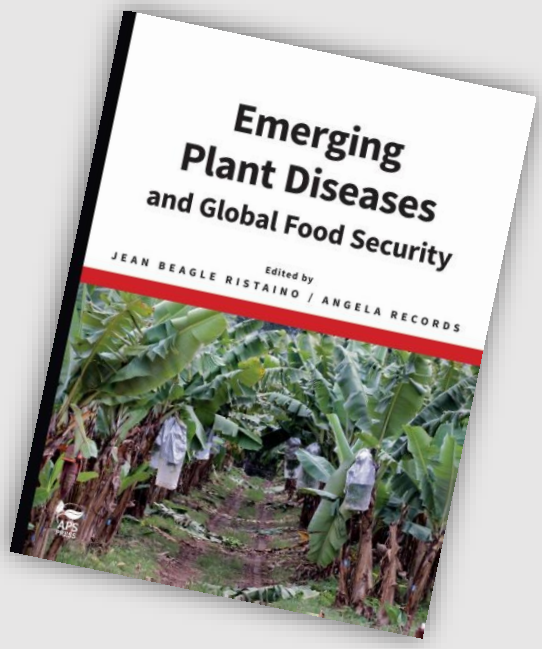
A paper by Feng Cai and Irina S. Druzhinina titled "In honor of John Bissett: authoritative guidelines on molecular identification of *Trichoderma*" was published on 5 February 2021 by *Fungal Diversity* (vol. 107, pp. 1-69). The abstract is as follows:-

Modern taxonomy has developed towards the establishment of global authoritative lists of species that assume the standardized principles of species recognition, at least in a given taxonomic group. However, in fungi, species delimitation is frequently subjective because it depends on the choice of a species concept and the criteria selected by a taxonomist. Contrary to it, identification of fungal species is expected to be accurate and precise because it should predict the properties that are required for applications or that are relevant in pathology. The industrial and plant-beneficial fungi from the genus *Trichoderma* (Hypocreales) offer a suitable model to address this collision between species delimitation and species identification. A few decades ago, *Trichoderma* diversity was limited to a few dozen species. The introduction of molecular evolutionary methods resulted in the exponential expansion of *Trichoderma* taxonomy, with up to 50 new species recognized per year. Here, we have reviewed the genus-wide taxonomy of *Trichoderma* and compiled a complete inventory of all *Trichoderma* species and DNA barcoding material deposited in public databases (the inventory is available at the website of the International Subcommission on Taxonomy of *Trichoderma* www.trichoderma.info). Among the 375 species with valid names as of July 2020, 361 (96%) have been cultivated in vitro and DNA barcoded. Thus, we have developed a protocol for molecular identification of *Trichoderma* that requires analysis of the three DNA barcodes (ITS, tef1, and rpb2), and it is supported by online tools that are available on www.trichokey.info. We then used all the whole-genome sequenced (WGS) *Trichoderma* strains that are available in public databases to provide versatile practical examples of molecular identification, reveal shortcomings, and discuss possible ambiguities. Based on the *Trichoderma* example, this study shows why the identification of a fungal species is an intricate and laborious task that requires a background in mycology, molecular biological skills, training in molecular evolutionary analysis, and knowledge of taxonomic literature. We provide an in-depth discussion of species concepts that are applied in *Trichoderma* taxonomy, and conclude that these fungi are particularly suitable for the implementation of a polyphasic approach that was first introduced in *Trichoderma* taxonomy by John Bissett (1948–2020), whose work inspired the current study. We also propose a regulatory and unifying role of international commissions on the taxonomy of particular fungal groups. An important outcome of this work is the demonstration of an urgent need for cooperation between *Trichoderma* researchers to get prepared to the efficient use of the upcoming wave of *Trichoderma* genomic data.

EMERGING PLANT DISEASES AND GLOBAL FOOD SECURITY – NEW BOOK

Jean Beagle Ristaino and Angela Records, Editors (2020). Emerging Plant Diseases and Global Food Security, APS Press, USA. 305 pp.

Managing the threats of emerging plant diseases that affect agricultural crops requires expertise in a range of areas—from population genetics, epidemiology, and modeling to climate change analysis and global development policy. That expertise is provided in Emerging Plant Diseases and Global Food Security, which synthesizes developments in emerging plant disease biology and discusses innovative technologies and knowledge about the ecology, evolution, and management of emerging infectious diseases.



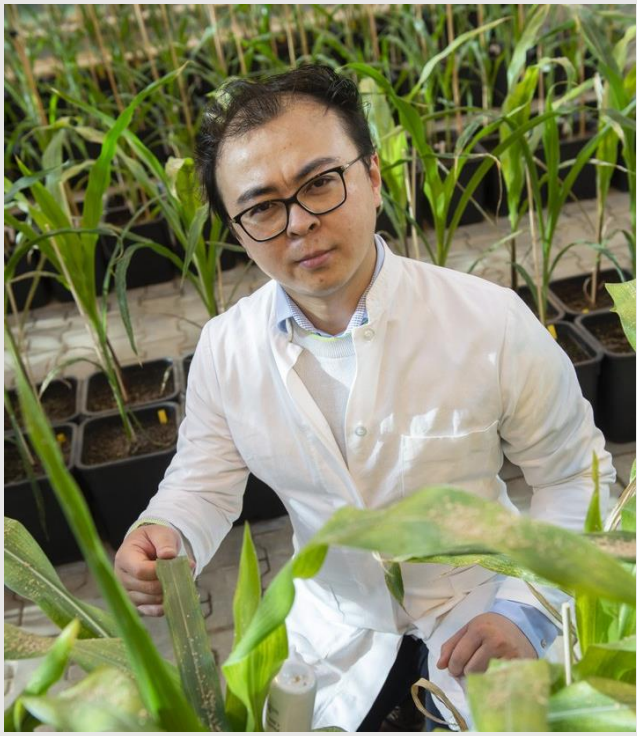
This book is divided into three sections. The first section provides a global context, describing the importance of emerging plant diseases to global food security, discussing the mitigation of disease outbreaks in a changing climate, and exploring how crop diseases impact crop loss and the analytical methods used to assess this loss. The second section presents six case studies on plant diseases, including cereal rusts and Fusarium wilt of banana, that present the ecology, epidemiology, and population biology of each emerging disease. The third section covers detection, modeling, and evolution and introduces innovative technologies used to model and mitigate the spread of plant pathogens.

Editors Jean Beagle Ristaino and Angela Records gathered an international team of plant pathologists, modelers, epidemiologists, population biologists, and practitioners to develop this comprehensive reference for researchers, policymakers, regulatory professionals, and others involved in the management of global food production and improvement of food security. This helpful, timely resource is available in the APS Press bookstore.

BACTERIA HELP PLANTS GROW BETTER

UNIVERSITY OF BONN NEWS, 8 APRIL 2021

A current study by scientists of the University of Bonn and Southwest University in China sheds light on an unusual interdependence: Maize can attract special soil bacteria that, in turn, help the plants to grow better. In the long term, the results could be used to breed new varieties that use less fertiliser and therefore have less impact on the environment. The study is published in the journal *Nature Plants*.



Amid young Maize plants: - Dr. Peng Yu from the Institute of Crop Sciences and Resource Conservation (INRES) at the University of Bonn (Photo credit: Barbara Fromman, University of Bonn).

The participating researchers studied several maize varieties that differ significantly in their yield. In their search for the cause, they came across an enzyme, flavone synthase 2. "The high-yield inbred line 787 we studied contains large amounts of this enzyme in its roots", explains Dr. Peng Yu of the Institute of Crop Science and Resource Conservation (INRES) at the University of Bonn. "It uses this enzyme to make certain molecules from the flavonoid group and releases them into the soil."

Flavonoids give flowers and fruits their colour. In the soil, however, they perform a different function: They ensure that very specific bacteria accumulate around the roots. And these microbes, in turn, cause the formation of more lateral branches on these roots, called lateral roots. "This allows the maize plant to absorb more nitrogen from the environment," explains Prof. Dr. Frank Hochholdinger of the Institute of Crop Science and Resource Conservation (INRES). "This means the plant grows faster, especially when nitrogen supplies are scarce." Sterilised soil did not cause a growth spurt.

Nitrogen is extremely important for plant growth - so much so, that farmers artificially increase its amount in the soil by applying fertilizer. However, some of the fertilizer is washed off the fields into streams with the rain or enters the groundwater. It can also enter the atmosphere in the form of nitrogen oxides or as ammonium gas, where it contributes to the greenhouse effect. The production of nitrogenous fertilizers furthermore requires a great deal of energy. "If we breed crops that can improve their nitrogen usage with the help of bacteria, we might be able to significantly reduce environmental pollution," Yu hopes.

The study shows that plants help to shape the conditions of the soil in which they grow, in ways that ultimately benefit them. However, this aspect has been neglected in breeding until now. Dr. Peng Yu adds that, in general, many interactions of the root system with soil organisms are not yet well enough understood. He wants to help change that: He has just taken over the leadership of an Emmy Noether junior research group at the University of Bonn, which is dedicated to precisely this topic. With its Emmy Noether Program, the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) offers young researchers an opportunity to qualify for a university professorship within six years.

VIRUSES IN CUCURBIT SEEDS FROM ON-LINE MAIL-ORDER PROVIDERS

A paper by Fiona Constable *et al.* titled "Viruses in cucurbit seeds from on-line mail-order providers" was published on 9 April 2021 by *Australasian Plant Disease Notes* (vol. 16, p. 10). The abstract is as follows:-

Seeds of three important cucurbit species (cucumber, melon and zucchini) were obtained through on-line mail-order providers and tested for selected viruses of biosecurity and agronomic concern. One or more of the targeted viruses were detected in 23 of the 31 seed lots tested. The quarantine pest melon necrotic spot virus was detected by ELISA in melon seeds. Multiple instances of contamination with the quarantine pest cucumber green mottle mosaic virus were also detected, and its presence in seeds of all three plant species was confirmed by inoculation and re-isolation from indicator plants. Cucumber mosaic virus, squash mosaic virus and potyviruses were repeatedly detected, and instances of insect pest and plant trash contamination were also observed. Seeds imported into Australia from some on-line sources have potential to introduce organisms of biosecurity concern.

Read paper.

POTATO LATE BLIGHT IN ASIA: PHYTOPHTHORA INFESTANS OVER A CENTURY AND A HALF

A paper by Sanjoy Guha Roy *et al.* titled "The dynamics of *Phytophthora infestans* populations in the major potato-growing regions of Asia – A review" was published on 12 February 2021 by *Plant Pathology* (early view). The abstract is as follows:-

Asia is now the largest potato-producing region of the world and late blight, caused by Phytophthora infestans, is the most important pathogen limiting production. This review documents, in both the historical and the current context, the population structure of P. infestans in the major areas of potato production in Asia. Information from diverse sources regarding the stated or inferred clonal pathogen lineages present, population changes, and possible migration routes of the pathogen into the countries of this region have been reviewed to aid researchers and those involved in managing late blight in Asia. The single most important factor for population change and resultant epidemics in this region has been found to be migration of pathogen genotypes from Europe and the Americas. Reducing the impact of such migration in the future will necessitate putting in place improved phytosanitary measures. To achieve this, data sharing using global networks such as AsiaBlight and EuroBlight is imperative.

Read paper.

ANTIBIOTICS PROTECT APPLES FROM FIRE BLIGHT, BUT DO THEY DESTROY THE NATIVE MICROBIOME?

AMERICAN PHYTOPATHOLOGICAL SOCIETY NEWS RELEASE, 21 APRIL 2021

Like humans, certain plants are treated with antibiotics to ward off pathogens and protect the host. Overuse has led to several microbes developing resistance to the antibiotic, rendering it useless, and created "superbugs" that overpower medication. But do we find that same phenomenon in plants and our food industry? This was the question Dr. Anna Wallis and colleagues investigated in their recent research "Endophytic bacterial communities in apple leaves are minimally impacted by streptomycin use for fire blight management," published in *Phytobiomes Journal* in April 2021.

Anna Wallis in apple orchard (Photo credit: Anna Wallis).

Pathogens like *Erwinia amylovora*, the causal agent of fire blight in apples, can have severe impacts on fruit production. Current management practices include using the antibiotic streptomycin to protect apples from this disease but the long-term impacts on the microbiome are poorly understood. Antibiotics are often broad-spectrum, meaning they destroy all susceptible bacteria, both good and bad. In many cases, antibiotics give relief from an immediate problem but can result in long-term negative effects as beneficial microbes are demolished from the environment.

To assess if this was true in apple orchards, Wallis and her advisor Dr. Kerik D. Cox analysed the microbiome of apple leaves over two years in two orchards in Geneva, New York, USA. Some were treated with various amounts of streptomycin and others were under organic management strategies without any antibiotics. Cox and a former student, Dr. Kiersten Tancos, had previously looked at the surface (epiphytic) microbiome of apple trees being treated with streptomycin and saw large effects with this application. When Wallis and Cox decided to look at the endophytic microbiomes (microbes living within the plant), they were expecting to see a similar trend.

Surprisingly, Wallis and Cox found little evidence that streptomycin altered the leaf bacterial microbiome and instead found that geographical location, even though the orchards were in close proximity, played a bigger role in bacterial composition than management strategy. While it is well-known that geography plays a role in microbial community assemblage, it is surprising this factor is a stronger influencer on the microbial composition than an antibiotic.

The authors hypothesisze the endophytic microbiomes are more resilient to the streptomycin application because of the possibility of naturally obtaining resistance to the antibiotic application. Soil and plant microbiomes are filled with several microbes that have the innate ability to produce antibiotics. So, while *Erwinia amylovora* remains susceptible to streptomycin, it is likely the soil and endophytic microbiome have naturally acquired resistance to streptomycin prior to commercial applications.

Interestingly, several other papers have shown that soil amendments and other crop manipulations dramatically impact the microbial communities and may make them beneficial to the crop. Because streptomycin is naturally occurring in soils and agricultural environments, it is not known if the endophytic microbiome has gained antibiotic resistance to streptomycin in the last few years or if the innate apple microbiome has long had resistance to this antibiotic. Current evidence suggests streptomycin is a sustainable management strategy for fire blight of apple.

THE INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY (ISPP) PROPOSES A CODE OF ETHICS FOR PLANT HEALTH EMERGENCIES

An article by Antonio Vincent titled "The International Society for Plant Pathology (ISPP) proposes a code of ethics for plant health emergencie" was published on 29 March 2021 by Zenodo (https://zenodo.org/record/4644764#.YJFR0XduLIU). A brief introduction follows:-

In August 2018, the Council of the International Society for Plant Pathology (ISPP), to which the Spanish Phytopathological Society (SEF) belongs, agreed to propose a code of ethics for plant health emergencies which was published in the ISPP Newsletter in December 2018. The code is now under public consultation which is why we decided to include a commented version of the code in the fourth issue of our SEF magazine, Fitopatología (Article published in Spanish). We remarked that some aspects may need to be considered further.

Read article.

STUDENT VIEW: MAKING A DIFFERENCE IN THE FOOD WE EAT

MICHIGAN STATE UNIVERSITY TODAY, 8 APRIL 2021

Samantha Thompson graduated in December 2020 with a bachelor's degree in crop and soil sciences through the Department of Plant, Soil and Microbial Sciences. She is currently working toward a postdoctoral degree in plant pathology and molecular plant sciences at MSU.

"Science related to agriculture interests me because it's challenging and is a gateway to understanding all of the processes involved in growing the food that we eat. Crop and soil sciences became my main interest because of the captivating topics from past and present studies. These include soil fertility and health, management practices in both large and small production systems, soil biota and the importance of microbial communities in nutrient acquisition, and the importance of the soil as a biological, chemical and physical structure. The list goes on and on.

Working in STEM makes me a more critical thinker and teaches me to accept failure as part of the process. You build confidence as a decision maker when finding innovative solutions that may not always work out. I find that working in science has changed my perspective on academics. I've gained a focus on the scientific process without attachment to the results."

Read more.

12th INTERNATIONAL CONGRESS ON PLANT PATHOLOGY

ICPP 2023

ONE HEALTH for all plants, crops and trees

LYON

20-25 August, France

ISPP INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

www.icpp2023.org

SFP Société Française de Phytopathologie

The International Society for Plant Pathology & the French Phytopathological Society

CURRENT VACANCIES

No current vacancies.

ACKNOWLEDGEMENTS

Thanks to Greg Johnson and Jan Leach for contributions.

COMING EVENTS

16th Congress of the Mediterranean Phytopathological Union
Postponed – the conference will be rescheduled either for Autumn 2021 or Summer 2022
Limassol, Cyprus

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

BotrySclero Webinar
8 June - 10 June, 2021
Avignon, France
Website: colloque.inra.fr/botrytis-sclerotinia-2020

7th International Conference of Pakistan Phytopathological Society
17 October - 20 October, 2021
University of Agriculture Faisalabad and Ayub Agricultural Research Institute, Faisalabad, Pakistan
Website: 7icpps.pakps.com

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

Australasian Plant Pathology Society Conference – Staying Connected for Plant Health
23 November - 26 November, 2021
Online conference
Website: appsconference.com.au/home

International Plant & Animal Genome XXIX
8 January -12 January, 2022
San Diego, California, USA
Website: www.intlpag.org/2021/

10th International IPM Symposium
28 February - 3 March, 2022
Denver, Colorado, USA
Website: ipmsymposium.org/2021

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

International Plant Health Conference "Protecting Plant Health in a changing world"
Week of 12 May 2022
Location to be advised
Website: www.fao.org/plant-health-2020/events/events-detail/en/c/1250609/

4th International *Erwinia* Workshop
2 July - 3 July, 2022
Assisi, Italy
Website: www.icppb2020.com

14th International Conference on Plant Pathogenic Bacteria
3 July - 8 July, 2022
Assisi, Italy
Website: www.icppb2020.com

International Phytobiomes Conference 2022
13 September - 15 September, 2022
Denver, Colorado, USA
Website: phytobiomesconference.org/

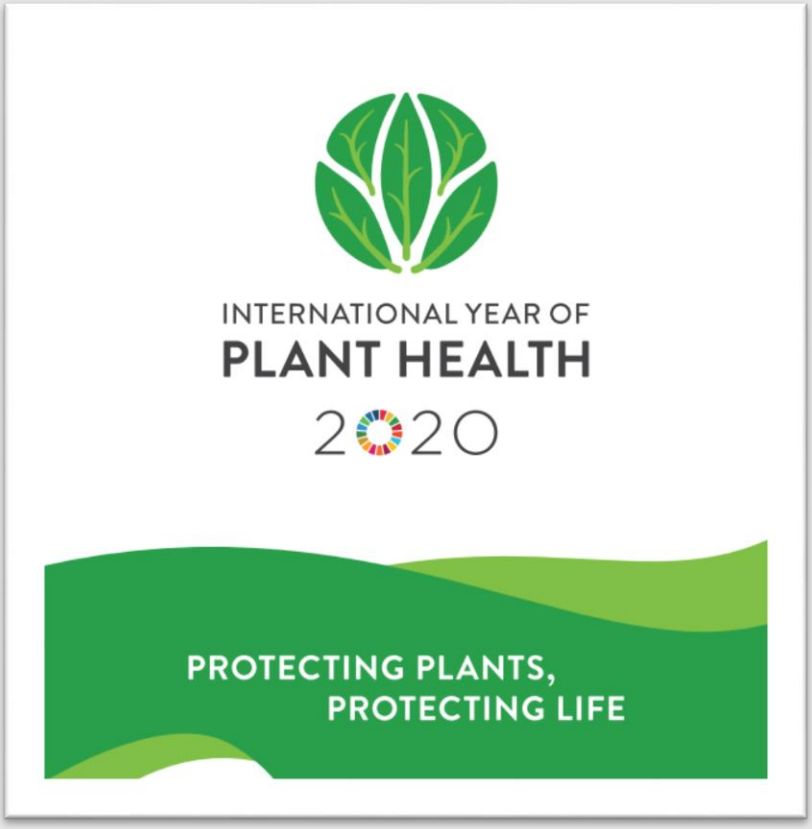
11th Australasian Soilborne Diseases Symposium
Mid-late 2022
Cairns, Queensland, Australia
Website: asds2020.w.yrd.currinda.com

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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