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INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY

ISPP NEWSLETTER

ISSUE 56 (8) AUGUST 2026

Editor: Daniel Hüberli (**email**)

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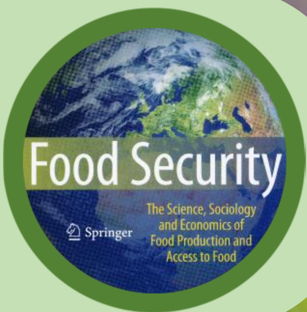

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INTERNATIONAL SOCIETY FOR PLANT PATHOLOGY (ISPP)

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PROF. ANGELO GARIBALDI, 1938–2026

MARIA LODOVICA GULLINO, MASSIMO PUGLIESE AND ANDREA MASINO, 14 JULY 2026

Prof Angelo Garibaldi passed away on July 9, 2026.

Angelo Garibaldi was born in 1938, in Cipressa (IM), on the Ligurian Coast of Italy. He was the son of flower growers. His love of flowers remained throughout his life.

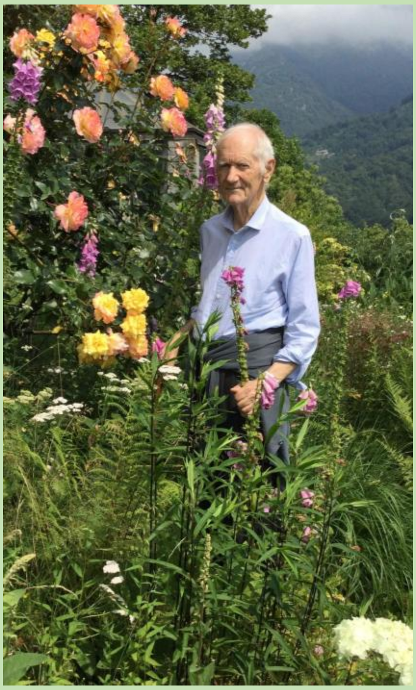
Angelo Garibaldi's academic career was dedicated to the study of plant diseases. and to university teaching in plant pathology and phytoiatry. He was Dean of the Faculty of Agriculture of Torino University from 1990 to 1996, Vice-Rector alongside Rector Rinaldo Bertolino from 1996 to 2004, and co-founder and President of the Agroinnova Competence Center, from 2002 to 2025. Throughout his long academic and scientific career, Angelo loyally served his students, and the farmers and horticulturalists of northern Italy. He trained and mentored hundreds of graduates, many of whom continued to stay in touch with him with affection and respect. He also solved many practical problems for farmers, with whom he had close affinities, resulting from his own agrarian origins.

Angelo Garibaldi's research in plant pathology was always carried out with rigour, passion, enthusiasm, and energy, combining local and international perspectives. He examined theoretical and applied aspects, knowing how to combine basic research with farming and practical applications. The topics he addressed included: diseases of flowering plants (he was a leading international expert, nicknamed "Doctor Flowers"), soil and substrate disinfestation, soil solarization, fungicide resistance, and development of practical biological control methods. The crops he worked on were numerous: from rocket to wheat, from basil to apple. He was a pioneer in technology transfer, outreach, and communication. He leaves a legacy of scientific output exceeding 1,200 publications. These included authorship and co-authorship of several books, and many popular science articles, which were based on his bonds with technicians and farmers. In 2009, he founded AgriNewTech, the first agricultural spin-off from the University of Turin with young colleagues.

Prof Garibaldi's career always maintained an international scope, including research periods in Canada, the United States of America, and Israel in the 1970s. He generously shared his international relationships, which allowed him to build a cohesive and efficient research group. The launch of the Agroinnova Center in 2002, for which he was President throughout its existence, was an innovation within the Italian university landscape, and the period of his presidency achieved fundamental and lasting results and outcomes. A particular achievement occurred in 2008, when Angelo and colleagues in Agroinnova organized and hosted the IX International Congress of Plant Pathology (ICPP 2008) in Torino.

Angelo Garibaldi remained active until his very last days. Young at heart, he continued to offer advice and ideas to youthful students and young colleagues. He was also active in social media; despite occasional hitches (he was not a "digital native"), he shared magnificent photos of flowers and plants from his garden with his many followers, which were accompanied by descriptions written in language that was clear, and poetic.

There will be other occasions for more profound remembrance. Here, we register our remembrance of Angelo's kind ways, his elegance, his generosity, his attentiveness toward people, and the tolerance and patience he always demonstrated, including during recent months.


Prof Angelo Garibaldi's legacy and contributions to plant pathology will remain for many years, guiding generations to come. May the earth rest lightly upon him, and may it be covered with those flowers that he loved, studied (inoculated with so many pathogens), and cared for.

Associated Societies of ISPP are invited to present bids to host the 14th International Congress of Plant Pathology, ICPP2032

ANDREA MASINO AND TERESA COUTINHO, 1 MARCH 2026

Associated Societies of ISPP are invited to present bids to host the 14th International Congress of Plant Pathology in 2032 (ICPP2032). Traditionally the ICPP is held in August. ISPP councillors are urged to consider and discuss this opportunity with their Society.

In calling for bids to host ICPP2032 the Executive recommends that bidding should be restricted to Societies that have been financial members of ISPP for at least three years. ISPP should also give consideration to giving priority in 2032 to a Society that has not previously hosted ICPP.

Attention to options for virtual attendance should also continue, both to broaden participation opportunities and strengthen the financial viability of Congresses and strengthen engagement with ISPP between Congresses.

The deadline for receipt of bids is **31 August 2026**. 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.

If a Society is considering a bid for the 14th International Congress of Plant Pathology, 2032, please read the bid and congress guidelines and requirements carefully. They can be accessed here.

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DICTIONARY OF PLANT PATHOLOGY

MARIANO CAMBRA, 11 JULY 2026

Plant pathogens and disease-causing agents—including viruses and viroids, bacteria, fungi and oomycetes, nematodes, algae and parasitic plants—as well as abiotic factors, are responsible for diseases and physiological disorders affecting agricultural crops and forest ecosystems worldwide, with major socio-economic consequences.

The Spanish Society for Plant Pathology (SEF) and its Specialised Working Group on Detection, Diagnosis and Identification (GEDDI) are pleased to announce the publication of the enhanced second edition of the **Dictionary of Plant Pathology**, compiled, updated and thoroughly revised over the past decade. This new online edition reflects the Society's continuing commitment to promoting and disseminating high-quality knowledge in plant pathology and provides an authoritative reference work for researchers, educators, students and professionals working in plant health.

This digital **Dictionary of Plant Pathology** is a unique reference work in Spanish because of its breadth—more than 8,000 entries—and its comprehensive coverage. To ensure that it remains current, the dictionary will be updated and reviewed every two years. It provides extensive information on plant pathology, plant health and crop protection, together with English translations of all entries, including both British and American English equivalents where they differ.

The dictionary encompasses common names of diseases and physiological disorders, vectors, symptoms and signs, botanical descriptions of affected tissues and organs, as well as terminology related to detection, diagnosis and identification; biological control; biosecurity; biotechnology; certification; quality management; remote sensing; and the names, abbreviations and acronyms of institutions and organisations associated with plant pathology, plant health and related disciplines. Although the dictionary places particular emphasis on institutions in Spain, Latin America and the European Union (EU), it also includes extensive references to plant health organisations and institutions worldwide.

Particular care has been taken, in accordance with the recommendations of the Royal Spanish Academy (RAE), to reflect the correct terminology used throughout Spain, Latin America and other Spanish-speaking regions. Spanish is the world's second most widely spoken native language, with more than 500 million native speakers and a global community of over 600 million users. This broad linguistic reach underlines the importance of providing a comprehensive and up-to-date reference work on plant pathology and plant health in Spanish. The dictionary also incorporates the phytosanitary terminology adopted by the Food and Agriculture Organization of the United Nations (FAO), together with numerous English-derived terms that have become widely accepted in scientific and technical usage.

The authors—Mariano Cambra, María M. López, Francisco Montes, Juana I. Páez, Ana Palacio-Bielsa, Javier Romero (†2023), and Jesús Murillo—with the invaluable collaboration of the North American scientific translator Theresa H. Osinga, are distinguished Spanish plant pathologists with internationally recognised careers and extensive professional experience. Together, they have produced a thoroughly updated and authoritative reference work for researchers, students, diagnosticians, extension specialists, technical professionals and crop consultants working in Spanish, while also providing direct access to the corresponding English terminology.

The dictionary is currently available in PDF format and will soon be freely accessible to SEF members via the society's website for online consultation.

To ensure the widest possible dissemination of this unique resource, the Spanish Society for Plant Pathology (SEF) has made the dictionary available through APS at a modest, nominal price. Universities, research institutions, professional organisations, libraries, and sister scientific societies are encouraged to make it accessible through their institutional websites, thereby enhancing its visibility and facilitating its use throughout the international plant pathology community.

Compiled, updated, and thoroughly reviewed over the past decade, this comprehensive and authoritative dictionary is expected to become an indispensable resource for the international plant pathology community, facilitating communication and promoting the consistent use of scientific terminology among Spanish- and English-speaking plant health professionals worldwide.

GENOME EVOLUTION IN PLANT PATHOGENIC BACTERIA

A paper by Kylie S Weis *et al.* titled "Genome evolution in plant pathogenic bacteria" was published on 10 July 2026 by *Genome Biology and Evolution* (Vol. 18, Issue 7, evag174). The abstract is as follows:-

Bacterial plant pathogens have ravaged crops since the dawn of agriculture and continue to pose a serious threat today. Bacteria and their plant hosts have co-evolved in an evolutionary arms race, with artificial selection due to agriculture tipping the scale in favor of the pathogen. This review gives an overview of plant pathogenic bacterial diversity, showing that pathogenicity has independently evolved numerous times, and that there is not one unifying trait determining plant pathogenicity. Instead, these bacteria represent repeated, independent evolutionary transitions driven by life in complex ecological networks that include plant hosts, insect vectors, microbial competitors, and highly heterogeneous abiotic environments. Their genomes reflect this interplay through a dynamic balance of architecture and flux. These structural features, along with highly variable pangenomes, capture the balance between genome stability and flux imposed by ecological constraints and epidemiological dynamics. Horizontal gene transfer via conjugative plasmids, prophages, integrative and conjugative elements, transposons, and in some lineages, natural competence, remains the major source of adaptive novelty, enabling rapid remodeling of virulence repertoires, metabolic capabilities, and antibiotic or heavy metal resistance genes. These changes create distinct selective landscapes. Agricultural practices such as chemical use, host resistance deployment, or seed trade, can drive recurrent bottlenecks, expansions, and admixture events that leave strong genomic signatures in pathogens. Finally, this review explores the genomic differences enabling the divergence of lifestyles, while also acknowledging knowledge gaps and future directions of research on the evolution of bacterial plant pathogens.

Read paper.

DEMONSTRATING CARBON TRANSFER THROUGH UNDERGROUND FUNGAL NETWORKS IN PLANTS

CHIBA UNIVERSITY NEWS, 6 JULY 2026

Some plants are thought to supplement their carbon needs by obtaining carbon through underground fungal networks connected to other plants. This symbiotic relationship is known as mycoheterotrophy. Researchers from Chiba University found evidence that Gentiana squarrosa, a Gentian family plant, can receive carbon through arbuscular mycorrhizal fungal networks in addition to photosynthesis. The findings support the existence of partial mycoheterotrophy and could improve understanding of underground plant–fungus interactions.

Beneath forests, grasslands, and wetlands lies a hidden underground network of fungi known as mycorrhizal networks, sometimes nicknamed the "wood-wide web." These fungi live in partnership with plant roots, helping plants absorb nutrients from the soil in exchange for carbon compounds produced through photosynthesis. These fungal connections can also link neighboring different plant species.

Some plants rely partly or entirely on these fungal networks for carbon compounds through a process called mycoheterotrophy. Fully mycoheterotrophic plants obtain carbon from fungi instead of conducting photosynthesis. Others are thought to be partially mycoheterotrophic, meaning they produce their own carbon through photosynthesis but also receive some from fungi. This strategy may be especially important for plants growing on shaded forest floors.

Although scientists have long suspected that some green plants receive carbon through fungal networks, proving this has been difficult. Researchers often examine carbon-13 (^{13}C) enrichment to test whether plants obtain carbon through fungi in some (partially) mycoheterotrophic plants in the Orchidaceae and the Ericaceae having symbioses with Basidiomycetes or Ascomycetes fungi. However, in arbuscular mycorrhizal (AM) fungi, the most ubiquitous mycorrhizal fungi, carbon isotope signatures often resemble those of host plants, making it difficult to detect carbon transfer.

Now, researchers from Chiba University and Kobe University, Japan, have found that *Gentiana squarrosa* Ledeb., a small flowering plant in the Gentianaceae, is partially mycoheterotrophic. The study, published in the journal *Mycorrhiza*, reveals that the plant not only produces carbon through photosynthesis but also receives carbon through underground fungal networks.

The research team was led by Professor Masahide Yamato, together with Ms. Moe Sasuga from the Graduate School of Education, Chiba University; Mr. Keito Shimabukuro from the Faculty of Education, Chiba University; Dr. Ryota Kusakabe from the Graduate School of Horticulture, Chiba University; and Dr. Kenji Suetsugu from the Department of Biology, Graduate School of Science, Kobe University, Japan.

To trace carbon movement through fungal networks, the researchers used carbon donor plants that naturally contained different amounts of carbon-13. They chose C3 or C4 plants, where C4 plants naturally contain more carbon-13 than C3 plants. The researchers hypothesised that if carbon moved through fungal networks, the carbon signature of the donor plant would be reflected in *G. squarrosa*.

"Specifically, if carbon transfer occurs through AM fungal connections, the carbon-13 isotope ratio should be higher in *G. squarrosa* seedlings grown with a C4 companion plant than in those grown with a C3 companion plant," explains Prof. Yamato.

For their experiments, the researchers grew *G. squarrosa* seedlings with either C3 or C4 companion plants in a specially designed U-shaped pot system. Here, the roots of the companion plant and *G. squarrosa* were separated by a fine nylon mesh that prevented roots from passing through while allowing the mycelium of AM fungi to pass through.

The experiments supported this hypothesis, with shoot carbon-13 values in *G. squarrosa* significantly higher when seedlings were connected to a C4 companion plant than to a C3 companion plant. Moreover, among plants grown with a C4 companion, shoot growth was positively correlated with carbon-13 levels, suggesting that the mycoheterotrophy contributed to growth under the experimental conditions tested.

The results support the existence of partial mycoheterotrophy in *G. squarrosa*, suggesting that the species obtains carbon through both photosynthesis and fungal symbiosis.

"The U-shaped pot cultivation experimental system developed in this study will enable us to verify the presence or absence of carbon transfer between plants via AM fungi in various plant species. If confirmed in diverse plants, the hyphal network may not simply be a pathway for nutrient absorption but may also function as a site for 'energy distribution' where carbon compounds move between plants," says Prof. Yamato.

As researchers continue to study plant–fungus relationships, these findings could provide new insights into how plants interact with mycorrhizal networks.

Scientists solve 50-year mystery of plant immunity by unlocking debneyol's blueprint

PEKING UNIVERSITY, PHYS.ORG, 20 MAY 2026

In a silent war that has raged for millions of years, plants have evolved a sophisticated chemical arsenal to fight back against invading pathogens. Now, a team of researchers from Peking University and Tsinghua University has finally mapped out the blueprints for one of nature's most effective deterrents, solving a biological puzzle that has baffled scientists for nearly half a century.

The study, published in the journal *Cell*, reveals how certain plants manufacture a potent compound known as debneyol. First identified in 1979 in tobacco and pepper plants, debneyol is a "phytoalexin"—a natural antibiotic produced by plants under stress. Although it was long recognised for its powerful ability to kill a wide range of fungi and bacteria, the exact instructions for how plants build it remained a secret until now.

THE MASTER COORDINATOR

The breakthrough came when Professor Lei Xiaoguang's team at Peking University and Professor Liu Yule's team at Tsinghua University identified the three specific enzymes that form the core of the debneyol production line: EAS, EAE, and EH1.

However, the real surprise was the discovery of a protein called MCD1, which is regulated by a molecular switch known as miR1919. The researchers found that MCD1 acts as a "metabolic organizer." Instead of letting the enzymes float aimlessly within the plant cell, MCD1 physically pulls them together into a single, high-efficiency production unit called a "metabolon."

This spatial organisation creates what scientists call substrate channeling. By grouping the enzymes into a tight complex, the plant can pass chemical building blocks directly from one stage to the next. This prevents raw materials from being wasted on other, less effective defenses, ensuring the plant can rapidly mass-produce its chemical shield the moment it is attacked.

A SMART DEFENSE FOR GLOBAL AGRICULTURE

The implications for the future of farming are significant. The study proved that plants equipped with this optimized defense system show extraordinary broad-spectrum resistance, meaning they can simultaneously fend off viruses, fungi, and bacteria.

Crucially, the team discovered a way to make this defense "smart." By using a specific genetic switch, they can ensure the plant only activates its chemical shield when it detects an actual attack. This prevents the plant from wasting energy on defense during normal growth, allowing it to remain healthy and productive while staying ready for battle.

THE PATH AHEAD

This research provides a new toolkit for breeders looking to create "super crops" that require far fewer chemical pesticides. Beyond the field, the ability to reconstruct this entire pathway in a lab setting opens the door for using synthetic biology to produce debneyol on a commercial scale, potentially leading to new types of natural antimicrobial treatments.

"For nearly half a century, this chemical defense was something of a 'black box' in plant biology. By discovering how the MCD1 protein organises enzymes into a high-speed assembly line, we finally have the blueprint to help crops shield themselves from a multitude of threats without the need for heavy chemical intervention," said Professor Lei.

This work represents a major leap in our understanding of how the natural world uses chemistry to survive. It offers a more sustainable path forward for global food security, learning from the very plants that have been protecting themselves for eons.

BACTERIAL WILT IN MELON CAUSED BY A COMPLEX OF NOVEL PATHOGENS

A paper by Mina Parhoon *et al*. titled "Bacterial wilt in melon caused by a complex of novel pathogens" was published on 31 July 2026 by *Scientific Reports* (https://doi.org/10.1038/s41598-026-59191-6). The abstract is as follows:-

Melons (*Cucumis melo*) are considered a rich source of vitamins, dietary fiber, and antioxidants. Melon's production has been severely impacted by a wilt disease outbreak in Tehran and Markazi provinces, Iran, over the past two decades. Fifty samples were collected from melon plants showing wilt symptoms in fields and greenhouses during 2021–2023. The initial symptoms included leaf scorching and blade necrosis, which were followed by leaf desiccation. Infected plants wilted, leading to complete collapse. Up to 80% of plants exhibited symptoms in some fields. To identify the causal agents of the disease, 130 strains forming cream-colored, round colonies on nutrient agar (NA) were isolated from symptomatic tissues. The pathogenicity of all isolated isolates was examined, among which 114 isolates caused wilting and withering of entire plants after six weeks. The pathogenic isolates were delineated into six distinct clusters based on an integrative assessment of phenotypic traits and multilocus sequence data. Phylogenetic reconstruction further demonstrated that these clusters were taxonomically affiliated with the genera *Enterobacter*, *Pseudomonas*, and *Stenotrophomonas*. Comparative analysis of partial housekeeping gene sequences confirmed the presence of *Enterobacter ludwigii*, *Pseudomonas corrugata*, and *Stenotrophomonas indicatrix*, along with three potentially novel species within the *Pseudomonas* and *Stenotrophomonas* lineages. In conclusion, this study highlights that melon wilting is a complex disease involving a consortium of bacterial species, including *E. ludwigii*, *P. corrugata*, *S. indicatrix*, and newly identified members of the genera *Pseudomonas* and *Stenotrophomonas*. This complexity challenges bacterial wilt management and highlights the need for integrated strategies that consider host–microbe–environment interactions.

Read paper.

MICROSCOPIC ATLAS REVEALS HOW CITRUS HUANGLONGBING DISEASE PROGRESSES THROUGH TREES

AMERICAN PHYTOPATHOLOGICAL SOCIETY NEWS RELEASE, EUREK ALERT, 27 JULY 2026

What happens inside a citrus tree long before leaves turn yellow, roots decline, and fruit quality suffers? Researchers from the University of Florida Citrus Research and Education Center, Diann S. Achor, Camila Ribeiro, Jinyun Li, and Nian Wang, have created a detailed microscopic atlas that provides one of the clearest pictures to date of how citrus huanglongbing (HLB), also known as citrus greening disease, develops over time and affects different parts of a tree.

"Microscopic Atlas of Citrus Huanglongbing Unravels Its Sequential Disease Development Mechanism," published in *Phytopathology*, describes how the HLB pathogen damages different citrus tissues in distinctly different ways. These findings help explain the sequence of biological events that ultimately lead to tree decline and death.

HLB is caused by '*Candidatus* Liberibacter asiaticus' (CLas), which infects the plant's phloem—the tissue responsible for transporting nutrients throughout the tree. Although HLB is known to affect all phloem-containing organs, the mechanisms behind disease development in different tissues have remained poorly understood.

To better understand the disease, the researchers conducted extensive microscopic analyses of citrus tissues collected from infected and healthy trees grown in both grove and greenhouse conditions. Over the course of a year, samples were collected at four different times and examined using transmission electron microscopy and light microscopy. The study included leaves, roots, stem bark, trunk bark, fruit albedo, pedicels, columella tissues, and seed coats. The resulting collection of images serves as a comprehensive microscopic atlas of HLB, offering an unprecedented view of how the disease progresses throughout the plant.

The researchers found that CLas infection causes significant increases in phloem cell death and callose deposition—a plant response that can block nutrient transport—in leaves, fruit tissues, and bark tissues of branches and trunks. In contrast, roots and seed coat tissues showed little or no such damage. These observations revealed an important distinction: The pathogen affects photosynthetic tissues differently from nonphotosynthetic tissues.

By examining multiple citrus tissues over four time points, the researchers uncovered a step-by-step pathway of HLB development. CLas infection triggers phloem cell death and callose deposition, restricting nutrient transport and causing starch to accumulate in leaves and branch bark. This buildup contributes to chloroplast degeneration and the characteristic blotchy mottling and yellowing symptoms of HLB. In contrast, roots experience starch depletion, suggesting that carbon starvation drives root decay and further contributes to nutrient deficiencies, tree decline, and eventual death.

The authors hope the microscopic atlas will serve as a valuable resource for researchers seeking to better understand HLB. As they describe it, the atlas "guides readers through the HLB maze," while also providing clues for identifying sieve elements in citrus phloem tissue at the ultrastructural level. By revealing how disease effects unfold across different tissues and over time, this work provides a clearer framework for understanding the progression of HLB and the biological processes that drive one of the citrus industry's greatest challenges.

Current Vacancies

There are no current vacancies.

Acknowledgements

Thanks to Mariano Cambra, Teresa Coutinho, M. Lodovica Gullino, Grahame Jackson, Greg Johnson, Andrea Masino, and Massimo Pugliese for contributions.

COMING EVENTS

Plant Pathology 2026
8 September – 10 September, 2026
John Innes Centre Conference Centre, Norwich, UK
Website: Not yet available

13th Australasian Soilborne Diseases Symposium
14 September – 18 September, 2026
Melbourne, Australia
Website: www.asds-apps.com

20th IOBC – WPRS Working Group meeting on: "Integrated Control in Oilseed Crops"
29 September – 1 October, 2026
Swedish University of Agricultural Sciences (SLU), Campus Alnarp, Lomma, Sweden
Website: www.slu.se/ICOC20

7th International Symposium on Fusarium Head Blight
5 October – 8 October, 2026
Department of Agricultural, Food and Environmental Sciences, University of Perugia
Perugia, Italy
Website: www.7isfhb.org

International Phytobiomes Conference 2026
3 November – 5 November, 2026
Niagara-on-the-Lake, Ontario, Canada
Website: https://phytobiomesconference.org/

XXI International Plant Protection Congress (IPPC) 2027 in conjunction with 26th Australasian Plant Pathology Conference (APPC)
1 November – 5 November, 2027
Te Pae Christchurch Convention Centre, Christchurch, New Zealand
Website: www.ippc2027.com

13th International Congress of Plant Pathology 2028
19 August – 25 August, 2028
Gold Coast, Queensland, Australia
Website: www.icpp2028.org


ICPP2028
13th
International
Congress of
Plant Pathology
19-25 August, Gold Coast Convention & Exhibition Centre, Queensland, Australia

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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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