INTERNATIONAL NEWSLETTER ON PLANT PATHOLOGY

ISPP Newsletter 46 (12) December 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.
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In this issue:

Seasonal greetings from DownUnder

In this issue I thought it would be appropriate to put the spotlight on the hidden world that can surprise us with fruitful bounties. Increasing the yield potential in an ever decreasing and marginalised environment will ultimately come from unlocking the secretes below the ground. This holiday season let us celebrate these successes with our friends!

Peter Williamson and I send our summery Aussie greetings for the holiday season to all ISPP members and their families and colleagues. The ISPP President, Greg Johnson, will be sending his special annual message and greetings to everyone in the January issue of the ISPP Newsletter. Best wishes for a happy and safe 2017 from DownUnder!

Back street of Northbridge - Collagraph print with watercolour (D. Hüberli, 2016)

Daniel Hüberli, ISPP Newsletter Editor

Announcement of the venue for the 12th International Congress of Plant Pathology (ICPP2023)
One of the objectives of the International Society for Plant Pathology is to "sponsor a series of International Congresses of Plant Pathology", normally at intervals of 5 years. Selection of the location and date of each Congress is the responsibility of ISPP's Council at least 5 years in advance. The selection process for the Congress in 2023 (ICPP2023) has now been completed.

During October-November 2016, ISPP Councillors were invited to express their preference in a two-stage vote to choose between bids from the French, Indian, Netherlands and Thai plant pathology societies. After the first round vote, which ended on 31 October 2016, Councillors were asked to select between the bids of the two societies which had received most votes - The French Society for Phytopathology (SFP) and the Royal Netherlands Society for Plant Pathology (KNPV). The second round vote ended on 29 November 2016.

The RESULT of the vote was announced on 30 November, 2016 at www.isppweb.org, and will be formally announced at the 11th Congress, to be held in Boston Massachusetts, USA, from July 29-August 3 2018.

***This ballot result has determined that the 12th International Congress of Plant Pathology will be held in Lyon, France*.**

Brenda Wingfield
Secretary General ISPP

News from the ISPP Executive Meeting in Boston
The ISPP Executive met in Boston Massachusetts, the host city for ICPP2018 during October 2016. The Executive usually meets in the host city of the next International Congress one or two years ahead of the congress. This provides an opportunity to consult with the Congress organisers on the scientific program planning and to visit the Congress Center. Following the meeting and visit, the Executive are confident that ICPP2018 attendees will be treated to a great scientific program and a wonderful venue and city.

(ISPP Executive)

Date extension for nominations for Eriksson Prize
The call for nominations for the premier award for achievement in plant pathology, the Jakob Eriksson Prize, has been extended to January 15 2017. The Prize will be awarded at the International Congress of Plant Pathology held in Boston Massachusetts USA from July 29 to August 3, 2018. The Royal Swedish Academy of Sciences administers the Jakob Eriksson Prize Fund which provides for a gold medal award at Congresses of the International Society for Plant Pathology

Information about the selection process are available here.

(Jakob Eriksson Prize Commission)

1V International Symposium on Postharvest Pathology - Deadline for Abstracts extended to 15 December 2016
The deadline for submission of abstracts for the IV International Symposium for the International Society for Horticultural Sciences (ISHS) and for the International Society for Plant Pathology (ISPP) hosted in the Kruger National Park at Skukuza camp, South Africa from 28 May to 2 June 2017. See http://www.postharvest2017.co.za/

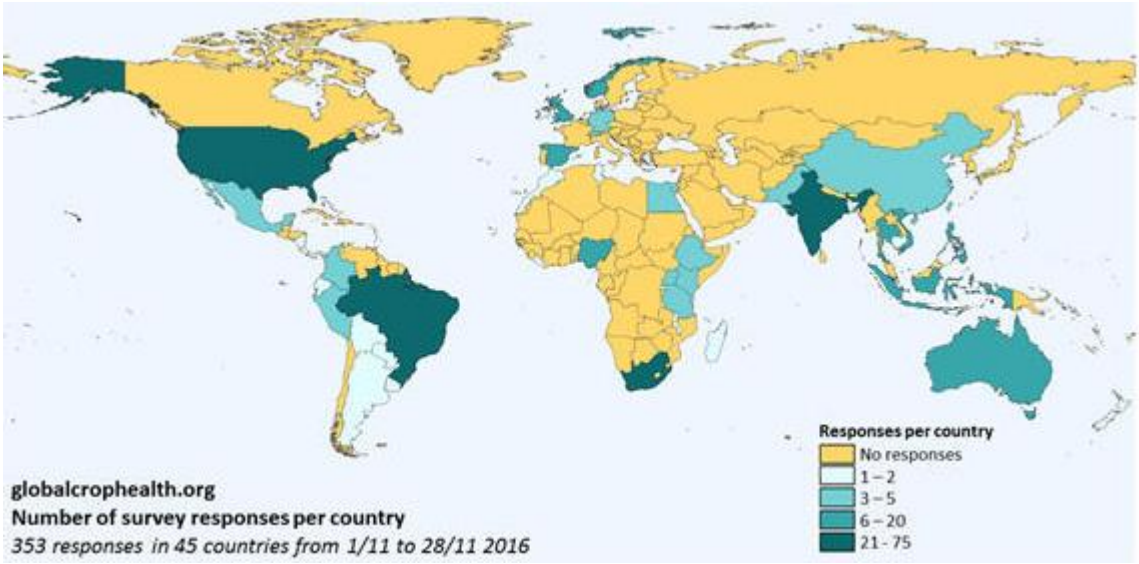
Lisa Korsten and Samir Droby ISPP Subject Matter Committee on Postharvest Pathology

ISPP Global Crop Loss Survey: Good start, more inputs needed
The survey procedure works and the turn-out is good
The ISPP Global Crop Loss Survey, which was launched last month, has made a good start. Over 350 replies have been recorded worldwide on wheat, rice, maize, soybean, and potato pests and diseases. We want to thank all the contributors who have answered the survey. Several contributors have been very active and submitted more than once. Importantly, the feed-backs we have received have been very positive. Also, and critically, the survey protocol leads to fast, easy responses, which appear to lead to quite cohesive and consistent information.

Some of the questions (and our answers) we received are listed below:

- "This is very ambitious. I may not have the right field data to answer the questionnaire". **R**: This is a survey of experts' assessments. The level of precision required is low. Hard, field data are not required. What is required is experience. Contributors are asked to provide answers within broad ranges (in terms of losses, in terms of frequency), which should enable a reasonable accuracy of each response.
- "This type of work has already been done". **R**: There is no substitute to hard data. This effort is not meant in any way to replace the extremely valuable efforts leading to precise measurements of crop losses in a given area, for a particular crop, and for a given disease. What this effort may lead to, hopefully, is a one-stop collection of information that provides collective knowledge on the status of crop health, globally.
- "I have several entries to make - several diseases of a crop, or several crops - would a spreadsheet not help?" **R**: It might. But it could reduce the simplicity of the questionnaire, and reduce its overall efficacy. Multiple entries are fast to do.
- "This country / This crop / This disease, has already been covered, is it still useful for me to respond?" **R**: Yes, absolutely. All responses are valuable. Multiple responses for a given disease of a given crop in a specific area will provide increased robustness. Some very large countries (Brazil, Canada, China, Russia, India, USA) cover so many different areas that multiple responses are very useful.
- "How long does it take?" **R**: For the first single entry, 5 minutes. Two or three minutes per entry if one wants to make multiple responses.

We need more engagement, more inputs
The map below provides an overview of the patterns of responses so far. There is interesting coverage for some crops in some regions in the world, such as rice in South and South-East Asia.



But we need more inputs to better reflect the global picture of crop losses in these five major crops. In

particular, responses for potato, soybean, and maize will help a lot. Data for any disease on any crop in Western Europe, East Asia, Africa, Central Asia, are still far too few. Very large agricultural countries - China, Indonesia, Russia - are still not sufficiently well represented.

Please contribute
If you have not found the time yet to contribute, please try and do so. This project was first discussed by the Crop Loss Subject Matter Committee of the International Society of Plant Pathology during its first meeting in August 2013 in Beijing. It is a project which any plant health specialist may be part of, and which hopefully will contribute to collective knowledge and enhanced awareness of the problems plant pathologists deal with worldwide.

You are invited to contribute to this survey. If you would like to participate in this global effort, please use this link: https://globalcrophealth.org/
The link will direct you to a survey questionnaire. The questionnaire has been devised to be simple and flexible, so that you would need very little of your time to provide inputs. If you have any queries about this survey, please email us.

About the survey
This survey is intended to help document crop losses in major world crops. The information sought on each crop disease or pest (location, frequency and loss) is very simplified, in order to both reduce the time required in answering the questionnaire, and to generate homogeneous information across multiple diseases and pests of several crops.

At this stage, the survey focuses on five major crops worldwide: wheat, rice, potato, soybean, and maize. It might be expanded to other crops in the future. For each of these five crops, up to 10 pests and diseases have been listed. These are only suggestions, and the survey forms provide opportunity to submit information on other pests and diseases as well. Common names and scientific names of suggested pathogens and pests are tabulated below.

The survey asks contributors to provide their name, institute and e-mail address. Providing this information is optional. However, this will enable the recognition of contributions in future reports.

Hopefully, this survey will collect as many inputs from numerous contributors worldwide, on as many diseases and pests as possible. The survey will end on 31 Jan 2017. If the survey is successful in eliciting a sufficient number of responses, a report will be made public by 31 Apr 2017, where the detail of individual contributions will not be presented, but where contributions will be explicitly acknowledged.

Thanking everyone for your support in this effort,

Serge Savary, INRA, Centre INRA de Toulouse, France; Chair, Crop Loss Subject Matter Committee of the ISPP;
Andrew Nelson, ITC, University of Twente, The Netherlands;
Laetitia Willocquet, INRA, Centre INRA de Toulouse, France ;
Sarah Pethybridge, Cornell University, USA;
Asimina Mila, North Carolina State University, USA;
Paul Esker, University of Costa Rica;
Neil McRoberts, UC Davis, USA.

Lists of pests and diseases for the web-based survey of global crop health assessment
Potato

Disease or pest: common name	**Scientific (Latin) name**
Late blight	*Phytophthora infestans*
Cyst nematode	*Globodera rostochiensis, G. pallida*
Early blight	*Alternaria solani*
Early dying/Verticillium wilt	*Verticillium albo-atrum, V. dahliae, Pratylenchus penetrans*
Colorado potato beetle	*Leptinotarsa decemlineata*
Potato leafhopper	*Empoasca fabae*
Potato spindle tuber viroid	
Common scab	*Streptomyces scabies*
Powdery scab	*Spongospora subterranea*
Other	

Maize

Disease or pest: common name	**Scientific (Latin) name**
Northern corn leaf blight	*Exserohilum turcicum, Setosphaeria turcica*
Southern rust	*Puccinia polysora*
Maize streak	*Maize streak virus*
African stem borer	*Busseola fusca, Sesamia calamistris*

European stem borer	*Ostrinia nubialis*
Diabrotica beetle and rootworm	*Diabrotica balteata, D. virgifera, D. longicornis, D. speciosa*
Diplodia ear and stem rot	*Diplodia frumenti*
Fusarium and Gibberella stalk rots	*Fusarium moniliforme, F. graminearum*
Fusarium and Gibberella ear rots	*Fusarium moniliforme, F. graminearum*
Other	

Soybean

Disease or pest: common name	**Scientific (Latin) name**
White mold	*Sclerotinia sclerotiorum*
Soybean rust	*Phakopsora pachyrhizi*
Cyst nematode	*Heterodera glycines*
Sudden death	*Fusarium virguliforme, F. tucumaniae, Heterodera glycines*
Armyworm	*Spodospora exigua, S. praefica*
Phytophthora root and stem rot	*Phytophthora sojae*
Rhizoctonia root rot, web blight	*Rhizoctonia solani*
Pythium damping-off	*Pythium spp.*
Soybean mosaic	Soybean mosaic virus
Other	

Wheat

Disease or pest: common name	**Scientific (Latin) name**
Septoria (Zymoseptoria) tritici blotch	*Zymoseptoria tritici*
Stagonospora nodorum blotch	*Stagonospora avenae f. sp. tritici, Parastagonospora (Phaeosphaeria) nodorum*
Leaf (brown) rust	*Puccinia triticina*
Stem (black) rust	*Puccinia graminis f. sp. tritici*
Stripe (yellow) rust	*Puccinia striiformis f. sp. tritici*
Fusarium head blight - Scab	*Fusarium spp., Microdochium spp.*
Tan spot	*Pyrenophora tritici-repentis*
Spot blotch	*Cochliobolus sativus*
Barley yellow dwarf (BYD)	BYD viruses
Aphids	*Sitobion avenae, Rhopalosiphum padi, Diuraphis noxia*
Other	

Rice

Disease or pest: common name	**Scientific (Latin) name**
Bacterial blight	*Xanthomonas oryzae pv. oryzae*
Leaf, neck, or panicle blast	*Pyricularia oryzae*
Sheath blight	*Rhizoctonia solani*
Rice tungro	RTB virus and RTS virus
Ragged stunt	RRS virus
Brown spot	*Cochliobolus miyabeanus*
Sheath rot	*Sarocladium oryzae*
Stem borers	*Scirpophaga incertulas, Chilo suppressalis, Sesamia inferens*
Brown plant hopper	*Nilaparvata lugens*
Other	

How a fungus inhibits the immune system of plants

The fungus *Piriformospora indica* colonises the roots of different plants such as orchids, tobacco, barley, or even moss. It penetrates into the roots and promotes the growth of its plant partners. These interactions between the fungus and its partners are already known to the scientific community.

Research groups from Cologne and Würzburg are now reporting a new facet of the fungus-plant relationship in Nature Communications: The researchers identified a protein with which the fungus suppresses the immune defence of the populated plants. The protein "Fungal Glucan Binding 1" (FGB1) causes the plant not to produce an "oxidative burst". This usually generates aggressive oxygen radicals, which destroy potential pathogens and activate the immune system of the plant.

How does the protein lame the immune response of the plant? "It binds highly affine and very specific to sugar molecules that sit in the cell wall of the fungi and which are normally recognised as 'foreign' by the plant," explains Professor of Molecular Biology Alga Zuccaro from the University of Cologne. FGB1 acts like a camouflage coat and conceals the foreign sugar molecules from the immune system. The relevant sugar molecules are beta-1,3 / 1,6-glucans, according to Jürgen Seibel, a professor of Organic Chemistry at the

Julius-Maximilians-Universität (JMU) Würzburg. The fact that fungal glucans have a positive effect on human immune systems has been known for a long time. It is less known that they can also stimulate the immune system of plants.

The new findings may be useful in medicine and plant breeding. Given that the newly discovered protein FGB1 has such a high affinity and specificity to beta-1,6-glucans from fungi cell walls, it is possibly suitable for the diagnosis of human infections. In addition, the new knowledge could contribute to the cultivation of plants with increased disease resistance in the long term.

Read more.

(EurekAlert, 27 October 2016)

The 9th Australasian Soilborne Diseases Symposium- Lincoln University, Lincoln, New Zealand
The 9th Australasian Soilborne Diseases Symposium (9thASDS) and was held at Lincoln University, near Christchurch, New Zealand, from 14 to 17 November, 2016. This Symposium continued the series of similar conferences that have been held under the auspices of the Australasian Plant Pathology Society (APPS) since 1999.

The 9thASDS continued the tradition of these excellent science meetings, organised in association with the Soilborne Diseases special interest topic of the APPS. Papers presented at the Symposium covered the full spectrum of soil and root plant pathology, contributing to an excellent "state of current knowledge" conference. The subject matter was dominated by aspects of soil health and soilborne diseases relating to economically important food and timber crops in New Zealand and Australia. The meeting also presented new information relating to temperate and tropical crops from Asia, North America, Africa and Europe. A further theme was the soilborne pathogens of indigenous Australian and New Zealand plants, and their impacts in natural environments.

The 9thASDS Organising Committee was established in 2014, shortly after completion of the 8thASDS. Members of the Committee were: Mr Mark Brathwaite, Dr Soonie Chng, Prof Richard Falloon, Assoc Prof Eirian Jones, Dr Wadia Kandula, Ms Kate McLaughlin, Assoc Prof Hayley Ridgway and Dr Farhat Shah. The Lincoln University Conference and Event Management group provided administrative support.

The Symposium attracted over 70 delegates, from New Zealand, Australia, Austria, China, Germany, Malaysia, the Netherlands, South Africa, Sri Lanka, the United Kingdom, and the United States of America.

A total of 59 papers were presented by the 9thASDS delegates. Six oral papers were presented by invited keynote speakers, addressing the five Symposium themes (Soil Health, Disease Management, Biological Control, Biosecurity, New Technologies). Offered papers were delivered as oral presentations or posters, and were grouped in sessions following these themes plus two others (Host Resistance for Disease Management, Pathogen Distribution and Disease Epidemiology). The Proceedings of the 9th Australasian Soilborne Diseases Symposium was published prior to the Symposium and delivered to each attending delegate, and is available at the Australasian Plant Pathology Society website (http://www.appsnet.org/publications/proceedings/default.aspx).

Sponsorship funding for the Symposium was used to secure the conference venue and administration support, and to cover travel, accommodation and registration expenses incurred by the invited speakers. Sponsors for the 9thASDS were:
The Australasian Plant Pathology Society (seeding loan)
The Agricultural and Marketing Research and Development Trust (AGMARDT, New Zealand)
The Grains Research and Development Corporation (GRDC, Australia)
The New Zealand Institute for Plant and Food Research Limited
The Foundation for Arable Research (FAR, New Zealand)
The Bio-Protection Research Centre, Lincoln University (New Zealand)
Lincoln University (New Zealand)
Zelam Ltd.

The Symposium was originally planned to be held at Hanmer Springs, but the severe North Canterbury earthquakes of 14 November meant that the Symposium venue had to be changed at very short notice. The Lincoln University Conference and Event Management group achieved an organisational miracle, completely changing the Symposium venue to Lincoln University. This was achieved within hours of the earthquakes occurring, and the conference continued without interruption. The only changes were the very well-informed seismological topics sharing those of soil pathology, in the informal discussions amongst delegates!!

Delegates attending the 9th Australasian Soilborne Diseases Symposium, Lincoln University, New Zealand, 15 November, 2016.

Prof Richard Falloon, Chairperson, 9thASDS Organising Committee

Deena Errampalli appointed on Global Plant Council

Dr. Deena Errampalli has been appointed to the Global Plant Council (GPC) Executive Board for a two year term in October 2016. She will represent North America on the Board.

Plant Canada Federation of Canadian Plant Science Societies (Errampalli is the current President) is a founding member of the GPC. Deena is also the Past President of Canadian Phytopathological Society, a member society of Plant Canada.

The Global Plant Council is a coalition of national, regional and international societies and affiliates representing plant, crop and agricultural and environmental sciences across the globe. The GPC seeks to bring together all those involved in plant and crop research, education and training, to facilitate the development of plant science for global challenges such as world hunger, energy, climate change, health and well-being, sustainability and environmental protection.

(Deena Errampalli)

Announcement of International Conference on Global Crop Losses caused by Diseases, Pests, and Weeds

L'Institut National de la Recherche Agronomique (INRA) is pleased to announce the International Conference on Crop Losses Caused by Diseases, Pests, and Weeds, which will take place on 16-18 October 2017 in Paris, France.

The aim of this conference is to assess how plant diseases, pests, and weeds negatively affect crop health, crop performances, ecosystems, and society. Although these negative impacts are well recognised, their quantification is yet fragmented or incomplete. The conference will bring together key players in global agricultural and crop health research in order to explore and discuss opportunities related to analysing, quantifying, and modelling crop losses to diseases and pests.

The conference will address the following questions:

- What are the effects of pests, diseases, and weeds on crop performances?
- How can we understand, quantify, assess, and model these effects?
- How and what can modelling contribute in the assessment of the impacts of pests and diseases, especially on food security?
- What could be the effects of climate and global changes on crop losses caused by plant diseases and pests?

With the practical implication:

- Can we establish a global, open-source, data base on crop losses, which will enable answering these questions?

For more information and pre-registration, use the following link: http://www.smach.inra.fr/en/Events/crop-losses

With best wishes,

Serge Savary, INRA, France Chair, Scientific Committee
Sylvie Colleu, INRA, France Project manager

Springer Plant Stars
Springer invites you to browse the most read, top mentioned, and highly cited articles and chapters from select journals and books in plant sciences: The Plant Stars! At least three of the most frequently downloaded papers and top mentioned articles are from Food Security.

Open access content is freely available on a permanent basis and all other articles and chapters are available for free trial access until 31 December 2016.

Letter to the Editor of the New York Times on genetically modified crops
In "Doubts About a Promised Bounty" ("Uncertain Harvest" series, front page, Oct. 30), you say "genetic modification in the United States and Canada has not accelerated increases in crop yields or led to an overall reduction in the use of chemical pesticides."

We misjudge genetic modification's potential by considering just yield and pesticide use over 20 years.

"Fooling with nature" is nothing new: Crops are genetic variants of wild plants selected by humans over millenniums. Our latest tools include G.M. - allowing precision and wider choice of useful qualities. Given the challenge of global food security, it is foolish to overlook any new tool in the breeder's toolbox.

Early G.M. users overplayed their hand if they predicted an imminent "bounty." Use of G.M. is focused on a handful of genes conferring insect resistance or herbicide tolerance. This gives little indication of G.M.'s potential to deliver new qualities to crops of the future.

Here is one example: Rice-based diets are deficient in a precursor of vitamin A, causing blindness and death in children. G.M. is delivering "golden rice" with novel genes that correct the deficiency.

We should take a broader view, as described in the August issue of Food Security.

Peter Scott Continue reading the main story.

(New York Times, 7 November 2016)

Canadian Phytopathological Society Honorary Member Award for Michael Edward Wisniewski
Dr. Michael E. Wisniewski a Lead Scientist at the USDA-ARS, Appalachian Fruit Research Station in Kearneysville, WV, USA, was awarded the 2016 Canadian Phytopathological Society (CPS) Honorary Member Award for his eminent contributions to plant pathology over the past 30 years in his role as a researcher in the area of biological control of postharvest diseases.

The award was presented at the CPS Annual Meeting Awards Ceremony held on June 14, 2016 in Moncton, New Brunswick, Canada. Dr. Wisniewski made a presentation on his work and achievements during the conference.

Dr. Wisniewski is a renowned world authority on the Biological Management of Postharvest Diseases. Along

with Dr. Charles Wilson, he was the first to demonstrate that yeasts could be used as antagonists against a variety of postharvest pathogens. Along with two of his colleagues, he patented this discovery and working with an industry partner to develop the first yeast-based postharvest biocontrol product, Aspire. He was the first to demonstrate that yeasts could attach to and parasitize the hyphae of mycelial fungi, and that sodium and calcium salts could be used to enhance biocontrol efficacy. More recently, he has used a mapping population of apple to discover genetic markers for resistance to blue mold in *Malus sieversii*, a progenitor of the modern apple, that can be used by breeders to select for postharvest disease resistance, and is validating those markers and transferring the resistance to higher quality apple genoytpes using a rapid cycling breeding system in apple. Most recently, he has initiated metagenomic studies to determine the effect of various management practices on the microflora of apple and to determine whether or not specific microbiomes are associated with different rootstock/scion combinations. He has currently authored or co-authored 164 refereed publications, 79 in plant pathology and 85 in stress physiology, and holds 4 patents. He has also authored 30 book chapters.

Photo Caption: CPS President, Brent McCallum (Left) and CPS Past President, Deena Errampalli (right) presenting the CPS Honorary Member Award to Michael E. Wisniewski.

(Deena Errampalli)

Young innovators' AgTalks: "Whassup with agriculture?"
AgTalks, organised by International Fund for Agricultural Development (IFAD), present the latest innovative ideas and actions for small-scale farming. The live session on 29 November 2016, titled "Whassup with Agriculture? Young innovators tell their stories" stared young role models involved in agriculture, who inspire and engage their peers in the sector.

More and better equipped young people in agriculture responds to food and nutrition security challenges the World faces today, while offering chances to tackle youth unemployment and to build stronger livelihoods for the youth. Still, this requires adequate education, skills development, access to knowledge and information so that young people can develop agricultural entrepreneurial ventures among others.

A number of initiatives are sprouting up in different countries to harness the great potential of young people and innovation in agriculture to contribute to increasing incomes and food security. Four speakers, familiar faces within Young Professionals for Agricultural Development (YPARD) community, told their stories, their aspirations and actions to engage youth in agriculture.

More details.

(The Global Forum on Agricultural Research, 24 November 2016)

Assessing leadership needs to improve 21st century plant pathology
A paper by J. Beckerman and W. Schneider titled "Mining the gap: Assessing leadership needs to improve 21st century plant pathology" was published in December 2016 by Plant Disease. The abstract is as follows:-

Scientists and plant pathologists are trained in scientific knowledge and critical thinking as part of their career preparation process. However, the extensive training in science-related skills may come at a cost to "soft skills," the competencies needed for interpersonal skills, communication, management, and leadership. A survey of the American Phytopathological Society indicated that the vast majority of its members (91%) were in leadership and management roles. Despite this, a minority of survey participants felt that their scientific training had prepared them to lead (30%) or manage others (36%). Plant pathologists had received the most training in topics that were tied to science. Less common were critical topics such as resilience, entrepreneurship, visioning, and persuasion, and participants were likely to choose skills considered necessary for management, as opposed to leadership. While scientific training is the primary purpose of graduate training, the lack of leadership training and professional development represents a critical deficiency at a time when science is increasingly moving toward larger collaborative projects. Soft skills training options are available, but utilization of these resources needs to be encouraged. An increased emphasis on augmenting leadership and management skills is critical to prepare scientists for a competitive, dynamic, and increasingly collaborative science landscape.

Read paper.

***Wolbachia* in *Pratylenchus penetrans* - potential for biocontrol?**
A bacterium, in the genus *Wolbachia*, common in insects has been discovered in a plant-parasitic nematode, *Pratylenchus penetrans*, opening up the possibility of a new, environmentally friendly way of controlling the crop-damaging pest. *P. penetrans*, is one of the lesion nematodes that extract nutrients from the roots of plants, damaging them in the process. It uses more than 150 species as hosts including potato.

The newly discovered bacterium is a strain in the genus *Wolbachia*, one of the world's most widespread endosymbionts. *Wolbachia* is present in roughly 60 percent of the globe's arthropods, among them insects, spiders and crustaceans. Depending on the host species, *Wolbachia* can be an obligate or a reproductive parasite that manipulates the host's reproductive outcomes in ways that harm the host and benefit the

bacteria. Parasitic *Wolbachia* can cause its host populations to heavily skew toward female. Brown and her colleagues found the bacteria-host relationship appears to not be one of obligate mutualism.

The discovery opens up the potential for managing the nematode's population via biocontrol rather than environment-damaging fumigants, such as methyl bromide, that are being phased out by the U.S. Environmental Protection Agency. *Wolbachia* is already being used as a biocontrol strategy in Colombia and Brazil, where infected mosquitoes are being released in an effort to control the Zika, dengue and malaria viruses. Mosquitoes are a vector for those diseases, but *Wolbachia*-infected mosquitoes pass the bacteria to their offspring, who lose their ability to transmit the diseases. *Wolbachia* also can interfere with the mosquitoes' ability to reproduce at all.

Read more.

More information: Amanda M. V. Brown et al, Genomic evidence for plant-parasitic nematodes as the earliest *Wolbachia* hosts, Scientific Reports (2016). DOI: 10.1038/srep34955

(Grahame Jackson, Pestnet, 24 November 2016)

Quest to map Africa's soil microbiome begins
Funded by the US Agency for International Development (USAID), the African project will take soil samples in South Africa, Namibia, Botswana, Zimbabwe, Mozambique, Zambia, Kenya, Ethiopia, Côte d'Ivoire, and Nigeria. Don Cowan, director of the Centre for Microbial Ecology and Genomics at the University of Pretoria in South Africa, launched the project on 8 October 2016 at the consortium's first meeting in Pretoria.

The goal of the three-year initiative is to create a broad survey of soil chemistry and microbiology across a range of regions and climates. Its researchers, led by Cowan, will use climate, topography and geology to choose 1,000 sample locations most likely to capture the maximum diversity. At each point, scientists will record data about the area, including temperature and altitude, and take photos of the site as well as digging the samples, which they will send back to Cowan's lab in South Africa. Each country is responsible for its own sample collection using a standardised method.

Cowan's team, in collaboration with researchers sent from partner countries, will extract the DNA from the samples - and amplify and sequence sections containing specific DNA tags that mark them out as bacteria. The researchers expect to find unknown bacterial genomes as well as known ones. In the project's next phase, they will look at soil fungi.

The project "represents a key step to charting the diversity of the soil microbiome and mapping the hidden biodiversity found below ground", says Fierer. Although valuable for creating a baseline for further studies, these kinds of data can provide only a superficial understanding of the microbiome, notes plant molecular biologist Simona Radutoiu at Aarhus University in Denmark. Her work involves in-depth studies of how soil bacteria interact with plants, which is necessary to understand the role of microbes in plant health. "This is a very good initiative," she says, "but is a start and should be continued, improved and sustained."

Cowan hopes that the project will develop as more African scientists are trained to perform microbiome analyses, allowing more samples to be taken and a higher resolution of sampling. "We know our partners are struggling to build cutting-edge labs," he says. "We can't help them build their laboratories, but we can bring students here to train them in the practicalities."

Read more.

(Nature News, 9 November 2016)

Tomato plants are more resistant against nematodes when colonised by a fungus
Similar to microbial communities in the human gut, microbial communities associated with roots can provide their hosts with essential functions related to nutrient acquisition and protection against infections. One example for such an association has now been reported by an international team of researchers in the journal New Phytologist: an endophytic fungus of the genus *Trichoderma* that helps its tomato host defend against infestations by parasitic nematodes. "The fungus boosts plant immunity by enhancing the production of toxic chemical compounds upon nematode attack. This limits the invasion of the roots by nematodes, reduces the nematodes' fecundity and compromises the formation of root galls", explains Dr. Ainhoa Martinez-Medina, first author of the study and scientist at the German Centre for Integrative Biodiversity Research (iDiv) and the Friedrich-Schiller-University Jena (FSU).

The results show that the *Trichoderma* fungus "primes" the plant, which can then defend itself faster against nematodes. "Such a 'priming' is comparable to a vaccination for us humans, through which our immune system learns and subsequently can react more effectively to an infection", explains Martínez-Medina. In the future, the knowledge about beneficial fungi could also help to develop sustainable solutions for agriculture, the scientist say "Inoculants based on these beneficial microbes help to 'immunize' the plants against pathogens and pests, thereby reducing yield losses due to infections, in a sustainable way."

Interestingly, the fungus-induced resistance is a plastic phenomenon. This means that it adapts according to

the stage of the nematode infection: in the beginning, the fungus boosts salicylic-dependent defences in the roots, leading to higher resistance against the nematode invasion. Subsequently, during the nematode feeding stage, the fungus increases plant defences regulated by jasmonic acid, leading to reduced nematode development and reproduction.

Read more.

(Grahame Jackson, Pestnet, 24 November 2016)

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