

ONE Planet

PROTECTING PLANTS IN THE ERA OF GLOBAL CHANGE

Summary

Globalisation poses many challenges to plant health. The most obvious threat comes from the ever-widening circulation of goods and services and the associated growth of trade and movement of people. Global trade is well recognised as one of the main drivers of biological invasions, which in turn are threats to biodiversity and plant health. Biological invasions often consist of organisms having parasitic or competitive relationships with cultivated plants or autochthonous plant communities. The impact of biological invasions can be exacerbated by climate change, which is altering the distribution and life cycle of plant pests and diseases. The recent examples of *Xylella fastidiosa*, the pine wood nematode or the stink bug show the severe economic, environmental and social damage that invasive pests can cause. These cases demonstrate the importance of pest and commodity risk assessment, pest prioritisation, horizon scanning, early detection and surveillance. In this session, we will explore how threats associated with global change can be managed within a policy context framed by the EU Green Deal and SDGs. Specifically, we will look at how scientific, technological and social progress can support this epochal challenge, and the importance of international and scientific cooperation in finding common, collaborative solutions to current and emerging plant health threats.

Vision

The vision of this session is to discuss how to develop the EU's plant health system to ensure it is better prepared for the challenges posed by global change i.e. planetary-scale changes to the Earth's life systems and cycles such as through increased international trade, tourism and climate change. We will also consider to what extent the EU's plant health system is aligned with the objectives of the EU's Green Deal, and in particular the Farm to Fork and Biodiversity strategies. From experience gained in recent years, increased preparedness and greater international cooperation have been shown to be instrumental in tackling emerging plant health challenges. Scientific and technological innovation will also play an essential role in the prevention of plant health crises and the effective management of plant pest outbreaks in the future.

Background – Challenges and opportunities

Humans have always altered their environments but there are milestones in human evolution that brought wide reaching changes to their habitats. The agricultural revolution that took place 10,000 years ago and the industrial revolution in the 18th

century are some examples of this, but the pace of global change has increased most dramatically since the end of the Second World War.

In 2002 the [Amsterdam Declaration](#) stated that "In addition to the threat of significant climate change, there is growing concern over the ever-increasing human modification of other aspects of the global environment and the consequent implications for human well-being. Basic goods and services supplied by the planetary life support system, such as food, water, clean air and an environment conducive to human health, are being affected increasingly by global change."

Plants are the basis of life on Earth. They are essential for basic human needs such as our food, medicines and the air we breathe, and their health can be strongly affected by so-called global change i.e. planetary-scale changes to the Earth's life systems and cycles.

Three main processes are affecting plant health worldwide:

- Biological invasions of new species.
- The influence of climate change on plant pests and diseases.
- The influence of global change on land use and crop patterns.

The rise in biological invasions of new species is being driven by an increasingly interconnected world and by the increase in the human population. Climate change is another key component in this process, and among the most studied. It not only affects the distribution patterns of living organisms on the planet, but could shrink the areas suitable for hosting plants and animals. The most obvious example of one of these processes is the introduction of alien pests to new territories, for which we have learnt tragic lessons from the past (e.g. potato blight in Ireland), but also with more recent examples (*Xylella fastidiosa*, *Spodoptera frugiperda*). Other important drivers for plant health risks include population dynamics, transport, global trade, changes in land use, the use of resources, pollution, all of which will have an influence on plant health.

This challenging scenario nevertheless offers us opportunities for strengthening biosecurity in the EU and worldwide, for developing more sustainable approaches in our agriculture and forestry, and for protecting our natural ecosystems. We may also benefit from the development of advanced tools for the detection and diagnosis of plant pests and diseases, greater availability of biological agents for pest control, improved genetic tools to tackle pests or enhance biological control agents. The development of such technologies and the promotion of a broader scientific and operational scientific cooperation could increase overall efficiency in our biosecurity approach. The most promising and concrete results will however derive from a more holistic approach to our agriculture.

Scope and objectives

The session on plant health will bring together leading scientists from different disciplines to analyse possible effects of global change on plant health and biodiversity as well as ecosystems more generally. What will be the main threats and drivers? And what solutions can fast evolving science offer? Climate change and the pressures of an increasing global population will be among the most significant drivers that define a new scenario for plant health and this in turn will affect the capability of ecosystems (agroecosystems mainly, but not only) to ensure the provision of ecosystem services.

The objective of the session will be to analyse the status of plant health in the EU and beyond, and to envision the future in terms of threats, drivers, and solutions. More specifically:

- Setting the Global Change scenario: how climate change, a fast growing human population and change in lifestyles will shape the future of our planet.
- How climate change will affect the movement and the spread of plant pest and diseases directly and indirectly.
- How globalisation and its increasing displacement of goods and people will affect the rate of biological invasions.
- What innovative tools will scientific progress, technological innovation and changes in society provide that will help in tackling plant health challenges.

People behind the session

Session Coordinator: Ciro Gardi (EFSA)

Chairpersons: Claude Bragard, Université Catholique de Louvain (UCL); Ana Cristina Cardoso, Joint Research Centre (JRC)

Moderators: Claire Doole, Claire Doole Communications

Rapporteurs Alice Delbianco, European Food Safety Authority (EFSA); Ciro Gardi, European Food Safety Authority (EFSA); Patricia Nascimento, European Food Safety Authority (EFSA); Maria Chiara Rosace, Catholic University of the Sacred Heart; Evgenia Sarakatsani, European Food Safety Authority (EFSA)

ONE Planet – Session affiliate profiles

PROTECTING PLANTS IN THE ERA OF GLOBAL CHANGE

Ciro Gardi, European Food Safety Authority (EFSA)

Rapporteur

Ciro Gardi currently works as a senior scientific officer in the Risk Assessment Team of the European Food Safety Authority's PLANTS unit. He coordinates the activities of the High Risk Plants Working Groups that carry out risk assessment on specific plant commodities. Previously at EFSA, he worked on quantitative risk assessment of globally important pests such as *Spodoptera frugiperda* and on the *Xylella fastidiosa* host plant database. He is involved in several horizontal collaborations within EFSA, on aspects related to the use of plant protection products, and with other organizations active on plant health.

Before joining EFSA he was at the Joint Research Center of the European Commission, actively involved in all aspects of soil conservation and degradation, from research to policy advocacy and awareness raising. He has taught soil science at the University of Parma and in international masters and courses. His previous main research activities concerned the relationships between land use, agronomic management and soil quality.

Agronomist, soil scientist/ecologist, with a PhD in crop sciences and specialization in plant pathology, he has acquired over the years a deep knowledge of agricultural systems and the interactions between land management, soil quality, crops, vegetation and provision of ecosystem services. He has been a consultant and worked as an independent expert for the European Commission and the World Bank.

Max Schulman, Central Union of Agricultural Producers and Forest Owners (MTK)

Panellist

Max Schulman has worked as an arable farmer in the south of Finland since 1986. The farm has been in the family for 400 years. He has worked for the last 15 years as an adviser for cereal, oil seed and protein crops at the Central Union of Agricultural Producers and Forest Owners (MTK). He served as Chairman of the Copa Cogeca Working Group on Arable Crops from 2013 until 2019 and is now part of the chair group. He is also a member of the Arable Crops Market Observatory. He has served as Vice Chair of Copa Cogeca's Phytosanitary working group and as Chairman of the Civil Dialog Group on Arable Crops from 2018 until 2020. His other roles include Chair of the Agri Food Chain Round Table on pesticide protection products, and member of the board and co-founder of Grain Sense, a portable protein and quality

analyzer. He is also Chairman of the Finnish Grain Committee, VYR. He owns Farm-XPort Ltd, a grain trading company for special consignments.

Ana Cristina Cardoso, Joint Research Centre (JRC)

Moderator

Ana Cristina Cardoso is a marine biologist, with a 'Licenciatura' (long cycle degree) in marine biology and fisheries, and a Ph.D. in marine biology. She has joined the European Commission, Joint Research Centre, in 1995 as a scientific officer. Since then, she has contributed and coordinated several institutional research and science-policy projects in the fields of freshwater, marine ecology and biodiversity. She has also participated in several EU-funded or other international and national research projects in these fields. She is (co)author of more than 100 publications and more than 50 in peer-reviewed international journals. Current research interests include the assessment of invasive alien species and their impacts on natural ecosystems. She was involved in European Alien Species Information Network (EASIN) conceptual design and she is responsible for its coordination. EASIN supports the Commission and the Member States (MS) in the implementation of the Regulation (EU) 1143/2014 on the prevention and management of the introduction and spread of IAS (IAS Regulation), other alien species policy requirement, and contributes to the research on alien species.

Anna Berlin, Swedish University of Agricultural Sciences (SLU)

Speaker

Dr. Anna Berlin is associate professor in Biology with specialization in Plant Pathology at the Dept. Forest Mycology and Plant Pathology at the Swedish University of Agricultural Sciences (SLU) in Uppsala. She received her PhD in Plant Pathology from SLU in 2012. Since then, Berlin has worked as a researcher in plant pathology, with a focus on plant disease epidemiology in future agricultural and climatic scenarios. Berlin has studied pathogen population dynamics to understand the occurrence, distribution, management and risk assessment of specific plant diseases. She has also been involved in studies based on fungal communities in the air and on plants, with the aim to understand how microbial communities influence plant health. During the last years, Berlin has led the development of systematic maps for plant disease protection strategies in arable crops. She is also engaged in teaching as Director of studies for the BSc and MSc education in agricultural crop production and soil management at SLU.

Title of talk: Fungal plant diseases and food security from a cereal rust's perspective

Abstract of talk

Cereal rusts are regarded as one of the most serious disease threats to cereal production. The diseases are caused by fungi in the family Pucciniales. The life cycles of cereal rust fungi include one telial host (a grass or cereal crop species) and one aecial host (usually a different plant species). Two of most severe cereal rust diseases during the last decades are yellow rust and stem rust of wheat. They share the same aecial hosts, barberry (*Berberis* spp.). Rusts are typically divided into races, which are defined by the ability to overcome different resistance genes. The sexual cycle of the fungi, which is completed on the aecial hosts, creates new races of the rusts through genetic recombination. This creates a large amount of genetic diversity from each successful completion of the rust fungal life cycle. Concurrently, the asexual, clonal propagation on the cereal crop enables successful fungal individuals to produce enormous amounts of spores of the same genotype. The spore stage on cereals is wind dispersed and can be transported by wind over large distances. New virulent rust races may spread rapidly and due to its potential for long-distance dispersal it is difficult to track the origin of new races.

Barberry eradication programmes during the 1900s was a way of controlling stem rust epidemics. The rationale behind barberry eradication was to reduce the risk of epidemics and decrease both early inoculum and the rust race diversity. However, after introduction of a resistance gene from rye in wheat and with barberry almost eradicated, the cereal rusts did not cause any epidemics and the disease fell into oblivion. When stem rust epidemics did no longer occur, the eradication of barberry was stopped being implemented and the number of barberry bushes in the landscape increased. Still, after decades of limited problems with stem rust, new races of the rust appeared and the cereal rusts are again on the agenda.

To mitigate the threat from the diseases, it is important to keep track of the pathogen to allow for early detection of new races. Diagnosis of rust races often requires genotyping and pathotyping, to trace the origin. In commercial fields, cereal rusts can be treated with fungicide to hinder epidemics, but organic producers lack means of direct control. Substantial efforts are made by the international research community to identify new resistance genes and introduce these into commercially grown cultivars.

Helen Elizabeth Roy, UK Centre for Ecology & Hydrology (CEH)

Speaker

Professor Helen Roy MBE is an ecologist at the UK Centre for Ecology & Hydrology. She is fascinated by the interactions between insects and other species. Helen also enjoys science communication and public engagement with research which led to her interest in citizen science. She has a passion for ladybirds and has led the UK Ladybird Survey alongside Peter Brown (Anglia Ruskin University) for more than 15 years. Recently they co-authored the Field Guide to Ladybirds of Britain and Ireland.

Helen is delighted to be the current President of the Royal Entomological Society. Helen leads many collaborative national and international research projects. She is leading research for the EC on enhancing understanding and awareness of invasive alien species. Helen leads a Defra-funded project to produce a comprehensive information portal on non-native species in Great Britain which also includes annual reports on status and trends of invasive alien species and the development of an alert system for people to report sightings of concern. Over the last few years she has had the privilege of working with the UK Overseas Territories to predict and prioritise invasive non-native species. Her research on invasive non-native species has received international recognition and she is currently leading a global assessment on invasive non-native species for the Intergovernmental Panel on Biodiversity and Ecosystem Services. Helen was awarded an MBE in 2018.

Title of talk: Predicting the future risk of biological invasions to plant health

Abstract of talk

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment's message is stark: biodiversity (the diversity within species, between species, and of ecosystems) is declining faster than at any time in human history. Alongside climate change, land and sea-use change, invasive alien species were identified as one of the five top direct causes of biodiversity change. Biological invasions can threaten biodiversity and ecosystems but also human health and economies, particularly through their interactions with other drivers such as climate change. The number of alien species arriving in new regions is increasing globally and there is no sign of slowing.

It is widely recognised that the most effective action against biological invasions is to prevent the arrival of invasive alien species. Therefore, there has been increasing focus on horizon scanning to predict which invasive alien species pose an imminent emerging threat. Prioritising invasive alien species in the context of the pathways by which they might arrive can be informative for decision-making. Horizon scanning for invasive alien species that could arrive and pose a threat to biodiversity and ecosystems across Europe has underpinned the prioritisation of invasive alien species for risk assessment and subsequently consideration for inclusion within lists of invasive alien species of concern. Some of the invasive alien species identified impact plant health. Indeed, invasive alien species can have multiple impacts that span plant, animal, human and wildlife health. Cross-sectoral sharing of information is critical to effective action.

I will share insights into invasion ecology, from broad patterns and processes to approaches in surveillance and monitoring, including citizen science, with a focus on plant health. I will highlight the importance of collaborative, interdisciplinary partnerships, including the forthcoming IPBES global thematic assessment on

invasive alien species. Networks established through these initiatives have benefits for people, science and nature.

Claude Bragard, Université Catholique de Louvain (UCL)

Chair/Co-chair

Claude Bragard is full professor in plant health at UCLouvain in Belgium. He is also chair of the EFSA Plant Health panel since 2018, as well as of the EFSA Scientific Committee. Following a PhD on bacterial leaf streak of small grain cereals with the International Wheat and Maize Improvement Center (CIMMYT) and UCLouvain, C. Bragard benefited from a CEE Marie Curie grant for a postdoc in plant virology at the Scottish Crop Research Institute. Claude Bragard is also associate member of the Belgian Royal Academy of Overseas Sciences and of the French National Research Institute for Sustainable Development. His research aims at understanding how plant pathogens like bacteria or viruses interact with both their host plant and vector, in order to provoke major diseases sometimes turning to epidemics. Such knowledge is also used to stimulate and foster innovative strategies and technologies for diagnostics, risk assessment and a sustainable biological control of tropical and temperate viral and bacterial plant diseases. C. Bragard is collaborating actively in different world areas in plant pathology, with more than 50 missions in plant pathology in tropical and subtropical areas, mostly in Northern, West and Central Africa (Benin, Burkina Faso, Burundi, the Democratic Republic of Congo, Egypt, Kenya, Ivory Coast, La Réunion, Mali, Morocco, Niger, Rwanda, Tanzania), in Asia (Lebanon, India, Vietnam, China) and Central America (Mexico).

Elizabete Marchante, University of Coimbra

Panellist

Elizabete Marchante holds a PhD in Biology, specializing in Ecology, from the University of Coimbra (UC), in collaboration with the University of Copenhagen (DK). She is a researcher at the Center for Functional Ecology/UC, where she co-coordinates a Research Group on Biological Invasions, focusing on invasive alien plants. In the last 20 years, she has published ca. 60 ISI articles, books and book chapters, in which she has collaborated with dozens of researchers around the world, presented her work at more than 170 conferences and seminars and supervised 15 Master's students, 4 PhD students and ca. 40 undergraduate students and research fellows. She has been involved in 25 national and international projects, as a PI or team member, and is involved in the process of releasing the first biocontrol agent against an invasive alien plant in Portugal. Additionally, she is actively engaged in public awareness and scientific dissemination (over 220 lectures, mini-courses, workshops, social networks, etc.) and in the management of invasive plants and ecosystem restoration (with private companies and public

entities), being one of the coordinators of the citizen science platform INVASORAS.PT, a Portuguese platform that disseminates information on invasive plants and promotes citizen science and various initiatives involving different audiences. Internationally, she has collaborated with the Directorate-General for Environment (DG ENV) of the European Commission, IPBES, IUCN, EASIN-JRC, EPPO among other.

Sarah Brunel, Food and Agriculture Organization of the United Nations (FAO)

Speaker and Panellist

Sarah Brunel is a French engineer in Agriculture. She has over 20 years of progressive national, regional and global experiences in plant protection, as well as environmental protection and capacity development. She authored over 50 publications in these fields.

In her current position as Officer in charge for daily matters of the Implementation and Facilitation Unit of the International Plant Protection Convention (IPPC) Secretariat, she is in charge of overseeing the activities of the Implementation and Capacity Development Committee (IC). She oversees all IPPC implementation and capacity development projects - currently 6 projects for an amount of seven million dollars from different donors - and she is the lead for the new IPPC development agenda on "Strengthening Pest Outbreak Alert and Response Systems". She leads the Phytosanitary Capacity Evaluations and supervises the application of this tool in various regions of the world, namely Barbados, Comoros, Fiji, Guinea, Nepal, Madagascar, Palestine, Nicaragua, Sri Lanka, South Sudan and Tunisia. She is also the IPPC focal point for the One Health FAO Programme Priority Area.

She has proven records of fruitful collaboration and resource mobilization with institutions, in particular with the Comité de Liaison Europe-Afrique-Carabes-Pacifique (COLEACP), which translated in the signing of a Memorandum of Understanding with FAO.

Title of talk: Tackling the protection of plants at the source: placing people at the center

Abstract of talk

Tackling the protection of plants at the source: placing people at the centre. Can society come together to effectively confront plant health challenges in the era of global change using science and technology? The IPPC Secretariat, in line with the new FAO strategic framework, strongly relies on science and human resources to achieve better production, better nutrition, better environment and better life. From the start of the COVID-19 pandemic, the IPPC Secretariat recognised the necessity of meeting the needs of its target audience in terms of phytosanitary

capacity development and of leveraging its activities virtually. A design-thinking study was undertaken and has provided innovative proposals:

- Organising pro-active communication with NPPOs across all communication channels (e.g. social media);
- Setting up a targeted training platform for NPPO roles;
- Setting up a gamified training application;
- Developing simplified and field-specific training materials.

The IPPC Secretariat is certainly implementing these recommendations by organising webinars and improving its webpages. A whole menu of freely available guides and e-Learning courses is offered, including for instance the new e-Learning course on Pest Risk Analysis.

Further to ensuring adequate global training tools, the IPPC Secretariat facilitates the strengthening of national Phytosanitary systems through the conduct of Phytosanitary Capacity Evaluations (PCE). This process has been implemented in over 70 countries in the last 20 years with proven records of success on all continents, translating into the passing of new phytosanitary laws or in the mobilisation of resources to implement priority phytosanitary activities. The strength of the PCE process lies in the ownership and empowerment it gives to the country. It operates through consensus workshops involving all relevant stakeholders such as representatives from the ministries of agriculture, the environment, customs, the private sector (importers, exporters) and the research sector, ensuring everybody is heard and considered.

It is by placing people at the centre, providing scientific training and legislative support, enabling organisational evolution through broad consultation and consensus, and by creating an environment that is conducive to long-lasting phytosanitary capacity development, that society can realise the benefits that are critical to enabling safe trade whilst protecting our food, environment and natural resources.

Alice Delbianco, European Food Safety Authority (EFSA)

Rapporteur

Alice Delbianco is a biologist with PhD in plant pathology and molecular biology. She worked on the characterization of molecular mechanisms involved in the pathogenesis of beet soil-borne viruses at the Universities of Bologna and Strasbourg, and on fungal grapevine trunk diseases at the Italian National Research Council. She is currently working as Scientific officer in the Plant Health Monitoring team of the European Food Safety Authority. She worked on different activities related to *Xylella fastidiosa*, namely the updated pest categorization and risk assessment, and she is responsible for the EFSA host plant database of *Xylella* spp. She contributed to the organization of three European conferences on *Xylella fastidiosa* organized by EFSA in 2017 in Palma de Mallorca (ES), in 2019 in Ajaccio

(FR) and as online event in 2021. She is also currently working on plant pest surveillance, in particular on the development of pest-specific survey cards aimed to support the EU MSs in the survey preparation of quarantine plant pests.

Evgenia Sarakatsani, European Food Safety Authority (EFSA)

Rapporteur

I am a trainee in the Plant Health & Pesticide Residues (PLANTS) Unit, Plant Health Monitoring team of EFSA. I am involved in the Horizon Scanning: Identification of new, emerging, or recurring pests that may be of concern for the EU territory through the daily screening of media and scientific literature articles via the Medisys platform (details on the project can be found). The new non-regulated pests identified as potential emerging threats for the EU are ranked applying a methodology specific to this scope.

Additional working experience:

Dec 2019 - Aug 2020: Intern in the Business Unit Greenhouse Horticulture of Wageningen University & Research, Bleiswijk, South Holland, the Netherlands.

Investigation of the combined effect of linyphiid spiders and mirid bugs on the suppression of aphids and thrips infesting ornamental and vegetable crops

Sept 2019-Nov 2019: Student assistant at University of Amsterdam, the Netherlands.

Entomology

Sept 2017-Jul 2018: Journalist at Greenbox Publishing SA and at AgroTypos SA, Athens

Education

Sept 2018 - Sept 2020: Universiteit van Amsterdam (UvA), Biological Sciences:

Ecology & Evolution

Sept 2012 - Nov 2017: Agricultural University of Athens (AUA), Bachelor of Science equivalent to MSc in Agricultural Science, Crop Science, Specialization: Plant Protection & Environment

Patricia Nascimento, European Food Safety Authority (EFSA)

Rapporteur

Patricia Nascimento is a biologist and currently working as a Risk Assessment and Scientific Assistance trainee at EFSA, in the Plants Unit, on commodity risk assessment for High Risk Plants. Prior to the traineeship, she was a research fellow on the monitoring and management of Auchenorrhyncha pests in Portugal, at the Science Faculty at the University of Lisbon. She has a Master's degree in Human and Environmental Biology and a Bachelor's degree in Biology. Her master thesis was on Pest Management in orchards, in particular, on the Auchenorrhyncha suborder. Other relevant working experiences are with the Invertebrates Red List in Portugal, triaging insects and other arthropods, and with the Agricultural and Horticultural Exchange

Program in the Netherlands. She spent her curricular internship at the Gulbenkian Science Institute in Lisbon on Evolutionary and Developmental Biology with *Drosophila melanogaster*. I have also participated in a few volunteering projects on biology tutoring. She is very interested in the Pest Management and Monitoring fields as well as its relation with Food Safety and Food Science. When she is not working, you can find her traveling around or somewhere in nature with my camera attempting to take photos of every living thing.

Maruthi Prasanna Boddupalli, International Maize and Wheat Improvement Center (CIMMYT)

Speaker

Dr Prasanna Boddupalli is the Director of the Global Maize Program of CIMMYT (International Maize and Wheat Improvement Center), and is the member of the CIMMYT Leadership Team. Based in Nairobi, Kenya, Prasanna has been leading the multi-disciplinary CIMMYT Global Maize Program team since 2010, with focus on maize improvement in sub-Saharan Africa, Latin America, and Asia. From June 2015 to December 2021 Prasanna also served as the Director of the CGIAR Research Program on Maize Agri-food Systems (MAIZE).

Prior to joining CIMMYT, Prasanna served the Indian Council of Agricultural Research (ICAR) at the Indian Agricultural Research Institute (IARI), New Delhi, for over two decades in various capacities, including as ICAR National Fellow.

Prasanna has been presently leading the OneCGIAR Plant Health Initiative. He is coordinating CIMMYT's R4D efforts, together with global partners, on integrated management of transboundary pathogens and insect-pests affecting maize in the tropics, especially Maize Lethal Necrosis (MLN) in Africa (since 2011) and the Fall Armyworm in Africa (since 2017) and Asia (since 2018).

Prasanna's research work has been published in over 195 refereed international journal articles, 28 books/Technical Manuals, and 69 book chapters. He is a recipient of several awards for his research work on maize genetics and breeding.

Title of talk: Tackling transboundary plant health threats: Fall armyworm case study

Abstract of talk

Globalisation and changing climates are exacerbating the occurrence and spread of devastating crop pests, threatening agri-food systems and food security of farming communities. Effective plant health management requires holistic approaches that focus on preventing the entry, establishment and spread of invasive pests, and mitigating the impacts of outbreaks through eco-friendly, socially inclusive, and sustainable management approaches. It is imperative to take 'proactive actions' on transboundary pest management through globally coordinated surveillance,

diagnostics, and deployment of plant health solutions, in addition to dynamic communications, and data sharing among relevant stakeholders.

The implementation of multi-disciplinary and multi-institutional plant health management strategies has enabled protection against some of the most devastating diseases and insect-pests, including wheat rusts, maize lethal necrosis (MLN) in Africa, banana bunchy top virus in Africa, and cassava mosaic viruses in Africa and Asia. The fall armyworm (*Spodoptera frugiperda*; FAW) is an important example that highlights the need for more effective national, regional, and transcontinental coordination in managing a highly destructive and invasive pest. Although there is a wide array of proven technologies for the control of FAW (and other lepidopteran pests), these are not equally accessible, affordable, or scalable to diverse farming communities across Africa or Asia. It is, therefore, critical that researchers design, validate and scale-up appropriate IPM packages suitable for smallholders' farming contexts, especially based on five criteria: cost, efficacy, safety, accessibility, and scalability.

The core pillars of the plant health management strategy should be: a) evidence-based decision making at the national, regional and continental levels; b) building sustainable local capacities to develop, validate, and deploy appropriate technologies; c) private sector engagement to increase efficiency, achieve scale, spur innovation, and support sustainable dissemination systems; and d) strategic coordination to effectively leverage the capacities of partners. To maximise impact and efficiency, there is a strong need to identify short- and medium-term, high-priority actions to mitigate and manage transboundary pests, while rapidly mainstreaming best practices and technologies at the national level.

Maria Chiara Rosace, Catholic University of the Sacred Heart
Rapporteur

Maria Chiara Rosace is a research fellow and PhD student in Agro-Food System at Università Cattolica del Sacro Cuore, Piacenza, Italy. She is currently involved in the "HoPPI: Hotspots for plant pests introduction" project, which aims at developing a method for the identification of EU plant pests' introduction hotspots. Before Piacenza, she graduated in Natural and Environmental Science (BSc) and Ecology and Conservation of Nature (MSc) at the University of Parma and completed a Master of Research (MRes) in Sustainable Agricultural Technology at Harper Adams University (UK) achieving the 2019 British Society of Soil Science prize for the best postgraduate dissertation on a soil-related topic. Following an experience as a research assistant in the UK, she worked first as a trainee and then as a consultant in the Plant Health Team of the European Food Safety Authority (EFSA), mainly on three scientific topics: risk assessments of high-risk plant commodities, prioritisation of quarantine plant pests and plant pest surveillance. She later worked for an Italian company, Horta, in the grapevine sector technical area, dealing with

grapevine trunk diseases. She participated as a speaker at international conferences and symposia. Her main interests include ecosystem functioning, soil organisms, and raising awareness on the importance of protecting plants to safeguard our future.

Pieter Beck, Joint Research Centre (JRC)

Speaker

Pieter Beck is an ecologist who specializes in the remote sensing and modelling of vegetation. He studies the effects that climate and disturbance have on the seasonality, distribution, and growth of forests, and how we can monitor these effects efficiently. His work relies heavily on Earth Observation, from satellites as well as aircraft, harnessing the ever-broader information streams they provide, from the level of individual plants to the entire globe. Pieter holds a doctoral degree from the University of Tromsø, Norway, and worked at the Woods Hole Research Center (now Woodwell Climate Research Center) in Massachusetts prior to joining the European Commission's Joint Research Centre (JRC) in 2013. At the JRC, he has worked on the use of remote sensing to support plant health policy and now pilots its use for environmental compliance assurance and contributes to the development of the EU Observatory on Deforestation and Forest Degradation, particularly as it pertains to European forests.

Title of talk: Can remote sensing help us understand forest health in Europe?

Abstract of talk

Forests are characterised by trees that can live for decades, and often centuries. A seedling in the forest today will experience a drastic change in climate throughout its lifetime, a change that may see it struggle to survive. Evidence is growing that, across the world, heat and drought are increasing tree mortality. Such direct impacts from climate change come intertwined with other disturbances. Drought-stressed trees, for example, typically become more vulnerable to several pests and diseases. Climatic zones will move faster than most trees are able to migrate naturally. Therefore, understanding whether tree species will be adapted to the climate they will experience in the future is an urgent matter. To help with this, a new data set, EU-Trees4F, shows, based on model projections, where in Europe particular forest tree species may be able to grow in the future. It can inform assisted migration strategies, but also indicate when and where in Europe climatic conditions may compromise the health of currently growing tree species. Close monitoring is key to managing ecosystems during a time of unprecedented change. Remote sensing (the analysis of images obtained from aircraft or satellites) is unique in its ability to monitor large areas regularly. It enables the mapping of forest characteristics, and specifically changes in structural or biochemical traits,

that may indicate compromised health. Conducting such mapping periodically for all of Europe is challenging, but within the realm of possibilities thanks to the availability of free and open satellite data, including from the Copernicus programme, and big data analysis techniques. In this talk, I will review forest health indicators that can be derived from remote sensing, and assess the remaining obstacles to their operational use for monitoring.

While satellite data provide regular up-to-date images of the entire globe, they do not provide the detail required to track the subtle plant physiological changes typically associated with early stages of disease or pest infections, let alone at the level of individual plants. However, pest management strategies often rely precisely on early detection of new infections. In this talk, I will highlight recent studies that explore how remote sensing from manned and unmanned aircraft can be used to evaluate the health of individual trees, particularly in the context of pest and disease outbreaks.

Lorenzo Marini, University of Padova

Speaker

Prof. Marini has developed wide and diversified research interests in biodiversity and ecosystem services, global change biology, and insect invasion biology. His overarching research aim is to understand the impact of multiple human-induced pressures on insects and associated ecosystem services/disservices and to provide management solutions to mitigate their negative effects. He addresses pressing environmental questions in both agricultural and natural ecosystems using arthropods as model organisms. He works mainly on five research areas:

- invasion ecology of exotic pests;
- conservation biocontrol and pollination;
- landscape and community ecology of pests, natural enemies and pollinators;
- insect species diversity and conservation;
- population dynamics of insect pests in forest ecosystems.

Prof. Marini graduated from the University of Padova in Forest Sciences and hold a PhD in Environmental Agronomy. Following his PhD, he has developed these innovative research lines completely independently, opening up new opportunities for entomological research at the University of Padova. He has started his research group opening several PhDs and postdoc positions by attracting European (FP7, H2020), national and regional research funding. Several of his students are now successful scientists in Italy and abroad.

Title of talk: Young researcher pitch #1 | HoPPI: Hotspots for plant pests introduction

Organiser

Co-organisers

Abstract of talk

Identifying plant pests' entry points, ranking and prioritising the possible hotspots of pest outbreak in combination with the characterisation of the pest climatic niche can offer some early insights to prevent new plant pest invasions as well as supporting the surveillance activities carried out in the EU. Against this background, the main objectives of the HoPPI project are: i) to make an inventory of the hotspots for plant pests in the EU; ii) to develop a method for the identification and characterisation of these hotspots; iii) to analyse and identify the risk factors that determine their occurrence; iv) develop spatial-explicit methods for mapping hotspots under current situation and under different scenarios by using GIS approaches; and finally v) to develop a tool for integrating hotspot analysis in current quantitative pest risk assessments carried out by EFSA. Here, I will show the early results of the project focusing on the presentation of the available datasets and on the methodological approaches that will be used to identify pest hotspots and to quantify the associated risk factors. The key datasets collected, harmonized and organized in HoPPI included spatial information on pest detections and first introductions and trade data linked to the different pest pathways. First, using data on the locations of first discovery, interceptions and regional-level occurrence data for pests across Europe, spatial patterns in discovery points and regional species richness will be quantified with traditional spatial hotspot analyses. Potential drivers for pests' pressure (e.g. human population density, trade) and abiotic filters associated with these observed hotspot patterns will also be identified. Second, using trade data we will identify central locations (e.g. ports or airports) with the highest risk of pest introductions using network analysis tools. The identification of these central locations will be validated using pest detection and first introduction data. The ambition of HoPPI is to identify the risk factors relevant to define a hotspot for the introduction of different pests to help defining priority areas for surveillance where the probability of introducing new pests into the EU is higher.

Victoria Isabella Valenzi, Food and Agriculture Organization of the United Nations (FAO)

Speaker

Victoria is a dual American and Italian citizen, passionate about gender equality, food security, and international diplomacy. Originally from New Jersey but currently residing in Rome, she is the 'Making Every Voice Count for Adaptive Management' (MEV-CAM) Facilitator at the Food and Agriculture Organization of the United Nations, as well as an Event Supporter and Rapporteur with the International Fund for Agricultural Development, where she previously interned with the IFAD Staff Association. In her spare time, Victoria also volunteers with the World Food Forum as the Innovation Track Masterclass Co-Lead, and is an active member of the IFAD Youth Network. She is also the Youth Representative for the International Year of

Plant Health, and assisted in drafting its Youth Declaration. She holds a bachelor's degree in Political Science and Philosophy from Rutgers University and a master's degree in International Relations from St. John's University. Prior to coming to Rome, Victoria spent several years working as a paralegal at various law firms in New York City. Her long-term goal is to combine her legal and developmental experience to continue fighting for the voices on the ground.

Title of talk: Young research pitch #2 | The Youth Declaration on Plant Health

Abstract of talk

Plant health is being increasingly affected by the global spread of pests and diseases. Climate change and globalization, especially growth in international travel and trade, are increasing the risk of pest and disease dispersal. According to estimates of the Food and Agriculture Organization of the United Nations (FAO), plant pests and diseases destroy up to forty percent of global crop production annually, with losses totalling over USD 200 billion each year. This has devastating consequences for livelihoods and incomes, especially for groups that are marginalised or vulnerable to these risks, such as smallholders and family farmers. Unhealthy plants can also lead to biodiversity loss and potentially catastrophic consequences for the future of our planet, placing future generations at risk. By agreeing in 2015 to the 2030 Agenda for Sustainable Development, the international community committed to achieving 17 Sustainable Development Goals (SDGs) but, in the words of António Guterres, Secretary-General of the United Nations, 'we are seriously off-track'.

The General Assembly of the United Nations declared 2020 the International Year of Plant Health (IYPH), mandating FAO and the Secretariat of the International Plant Protection Convention (IPPC) to promote the Year globally. As youth representatives in our respective organizations, we responded to the call by the IYPH International Steering Committee to draft a Youth Declaration on Plant Health, through which we reaffirm the importance of taking global action to protect plants from pests and diseases. We encourage all stakeholders to recognise that implementing the 2030 Agenda for Sustainable Development – particularly SDGs 1, 2, 8, 12, 13, 15 and 17 – requires the inclusion of plant health considerations as well as the involvement of global youth in these considerations.

We invite all stakeholders to join us in promoting the importance of plant health, particularly through science and evidence-based international standards, such as those produced under the aegis of the International Plant Protection Convention (IPPC).

Claire Doole, Claire Doole Communications
Moderator

As a former BBC correspondent (Brussels, Berlin, Geneva, London) and radio presenter, Claire Doole is skilled at shaping an informed and lively discussion, driving the conversation forward and engaging the audience in the virtual and hybrid world. Claire is a sought-after moderator and Master of Ceremonies, having facilitated captivating and informative panel discussions with Presidents, Prime Ministers, government ministers, CEOs of Fortune 500 companies, heads of international and non-governmental organisations and senior economists, scientists and healthcare professionals.

A former spokesperson for the UN Refugee Agency, WWF International and the International Federation of the Red Cross, Claire specialises in moderating discussions on many geopolitical and socio-economic issues facing our world, such as sustainability, equity, inclusion and diversity.

She has moderated many panel discussions on health (COVID 19, pandemic preparedness, antimicrobial resistance) and on environmental/sustainability issues (climate change and its links to conflict/peace building/human rights/migration/food security).

Claire runs workshops and coaches on the art of talking to the media, speaking in public, storytelling and moderating.

A British/Swiss national, Claire is based in Geneva and is fluent in English and French.

Nico Horn, European and Mediterranean Plant Protection Organization (EPPO) Panellist

Nico Horn is the Director-General of EPPO, the European and Mediterranean Plant Protection Organization which has 52 member countries in Europe, North-Africa and Central-Asia. He has a PhD in Plant Virology, worked for 7 years in plant pathology Asia followed by over 20 years for the National Plant Protection Organization of the Netherlands on EU legislation on plant health, export and import of plants and plant products, international harmonization under the IPPC and international relations. He was involved in many international activities in the area of plant health, like drafting International Standards, developing harmonisation of electronic certificates, assessing and addressing the risks of sea containers in spreading pests, drafting EU legislation, developing risk-based inspection. He also organized training in several aspects of plant health in Europe and in Asia. In his current position as Director-General of EPPO since 2019, he focuses on plant health in the EPPO region in interaction with other parts of the world.