Torre del Mar, Malaga 2024

2024 Annual Meeting of the International Pest Risk Research Group

Pest risk assessments: Embracing new technologies and understanding socio-economic impacts of plant pests amidst rapid global change

17th – 20th September 2024, Torre del Mar, Malaga, Spain

PROGRAMME BOOKLET

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in Association with the Spanish National Research Council and University of Malaga

Dear Attendee,

We are pleased to welcome you to the 2024 annual meeting of the International Pest Risk Research Group, which will be held in the picturesque city of Torre del Mar, Malaga, Spain. Known for its rich history, stunning landscapes, and warm Mediterranean climate, Malaga provides an inspiring backdrop for our important discussions.

This year's theme, *"Pest Risk Assessments: Embracing New Technologies and Understanding Socio-Economic Impacts of Plant Pests Amidst Rapid Global Change,"* is particularly timely as we navigate the challenges of an ever-evolving global landscape. Malaga, with its history of fostering innovation and collaboration, serves as a fitting venue to explore how new technologies and socio-economic considerations can enhance our approach to pest risk assessment.

Spain, with its diverse agricultural sectors and varying climates, offers a unique context for our discussions. The rapid pace of global change, influenced by climate shifts, trade dynamics, and technological advancements, has profound implications for pest management. As we gather in Torre del Mar, we are reminded of the critical need to adapt our strategies to these evolving conditions and to consider the broader socio-economic impacts of plant pests.

Our goal is to advance our collective understanding and application of new technologies in pest risk assessment while also integrating socio-economic perspectives. By bringing together researchers, industry professionals, and policymakers, we aim to build a more holistic and resilient approach to managing pest risks. The insights and collaborations developed here in Malaga will contribute to a more sustainable future, not only for Spain but for the global community.

This year's meeting will focus on the following key topics:

1. Innovations in Pest Risk Modelling
2. Socio-Economic Impacts of Plant Pests
3. Adapting Pest Risk Assessments to Climate Change
4. Policy and Decision Support Tools
5. Stakeholder Engagement in Pest Management
6. Case Studies on Successful Pest Management
7. Emerging Threats in Plant Health
8. Digital Innovations in Pest Monitoring
9. Global Networks for Pest Surveillance

Through these discussions, we intend to foster stronger collaborations across research, industry, and policy spheres, building a foundation for a sustainable future. This collaborative effort will enable us to share innovative strategies and best practices, ensuring a proactive approach to pest risk management in the face of global changes.

As we explore the key themes of this conference, our goal is to pave the way for stronger collaboration and enhanced capacity building in pest risk analysis. We will examine

innovative strategies and share best practices that address the dynamic challenges in pest risk management.

We encourage you to engage fully in the discussions, establish meaningful connections, and contribute your expertise to our collective mission. Malaga, with its welcoming atmosphere and rich cultural heritage, offers the perfect setting to foster collaboration and strengthen our efforts in this field.

The upcoming annual meeting of the International Pest Risk Research Group will take place in Torre del Mar. The conference will be hosted at the "La Mayora" research station, in Algarrobo-Costa located, 5 km east of Torre del Mar. This esteemed facility is co-managed by the Spanish National Research Council (CSIC) and the University of Malaga.

This event promises to be a dynamic gathering, bringing together experts from various disciplines to discuss and exchange insights on the latest trends, challenges, and opportunities in pest risk assessment. We are confident that this conference will offer valuable knowledge and networking opportunities that will enrich you both personally and professionally.

This meeting has been made possible through the dedicated efforts of the Spanish National Research Council, the University of Malaga, and Cervantes Agritech. We extend our sincere gratitude to all involved.

We warmly welcome you to this important event and look forward to a productive and inspiring meeting in Torre del Mar. Thank you for joining us in this significant endeavour.

Sincerely,

INTERNATIONAL PEST RISK RESEARCH GROUP EXECUTIVE COMMITTEE

CHAIR: Frank Koch (Research Triangle Park, North Carolina, USA)

VICE-CHAIR: Rose Souza Richards (Nyon, Switzerland)

SECRETARY-TREASURER: Melanie Newfield (Wellington, New Zealand)

COMMUNICATIONS OFFICER: Tomasz Kaluski (Parma, Italy)

STUDENT REPRESENTATIVE: Jessica Kriticos (Canberra, Australia)

POLICY LIAISON OFFICER: Alan MacLeod (York, UK)

LOCAL ARRANGEMENTS ORGANISERS: Eduardo de la Peña, Helena Romero, Mónica Aquilino (Malaga, Spain)

IMMEDIATE PAST CHAIR: Darren Kriticos (Canberra, Australia)

DAY 1 – TUESDAY, SEPTEMBER 17, 2024

Location: The Institute for Mediterranean and Subtropical Horticulture “La Mayora” (IHSM-UMA-CSIC)

12:30pm Shuttle service organized from Torre del Mar to “La Mayora”

13:00 – 14:00PM - LUNCH & REGISTRATION

14:00pm Welcome to the day and local announcements

14:10pm Welcome to IPRRG 2024 – Director & Eduardo de la Peña & Iñaki Hormaza

14:10pm An Overview of IPRRG

14:20pm Introduction - In 30 seconds or less, please introduce yourself by sharing your name, location, organization, and what brings you to this meeting

14:45pm GROUP PHOTO

TECHNICAL SESSION 1: HORIZON SCANNING AND RISK MODELLING

15:00 - 15:30pm Horizon Scanning: A UK Perspective

Presenter: Duncan Allen (York Biotech Campus, Defra, UK)

15:30 – 16:00pm Potential of Generative Models to Model Likely Establishment Locations from Past Reports of First Establishments

Presenter: Wopke van der Werf (Wageningen University, Netherlands)

16:00 -16:30PM COFFEE BREAK

16:30 – 17:00pm Modelling Invasion Risk of Plant Pests Using Self-Organising Maps to Support Pest Risk Assessment Activities

Presenter: Libertad Sanchez-Presa (CABI, UK)

17:00 - 17:30pm Multi-Layer Method for Quantitative Horizon Scanning and Rapid Risk Assessment

Presenter: Joseph Stinziano (Canadian Food Inspection Agency, Canada)

17:30 – 18:00pm EPPO Information on Pests: Where to Find Them, How to Best Use Them?

Presenter: Muriel Suffert (EPPO)

DAY 2 – WEDNESDAY, SEPTEMBER 18, 2024

TECHNICAL SESSION 2: INNOVATIONS IN PEST MONITORING AND MANAGEMENT

08:30am – 9:00am Comparison of Methodologies for Assessing the Risk of Potential Distribution of Quarantine Pests due to Climatic Factors: A Case Study of Taiwan's Qualitative Analysis Method and the MaxEnt Model

Presenter Fang-Yu Ning (Animal and Plant Health Inspection Agency, Ministry of Agriculture, Taiwan)

09:00 – 09:30am New Strategies for Monitoring Pests in Tropical Crops: Insights from DNA Barcoding and Field Surveys

Presenter: Eduardo de la Peña (CSIC, Spain)

09:30 – 10:00am Optimisation of Plant Pest Survey Efforts

Presenter: Tomasz Kaluski (European Food Safety Authority, Italy)

10:00 - 10:30am A Field-Level, Epidemiological Risk Forecast Model for Sclerotinia in Winter Rapeseed in Germany

Presenter: Anto Raja Dominic (Julius Kühn Institute, Germany)

10:30 - 11:00AM COFFEE BREAK

TECHNICAL SESSION 3: POLICY AND DECISION SUPPORT TOOLS

11:00 - 11:30am Identifying the Top Damaging Pests in Country's Cropping Systems: Two Case Studies

Presenter: Gabriella "Gaby" Oliver (CABI, UK)

11:30 – 12:00pm Integrating Plant Pest Risk Registers with National Pest Surveillance Programs

Presenter: Conor Francis McGee (Department of Agriculture, Food and the Marine, Ireland)

12:00 - 13:30PM LUNCH

TECHNICAL SESSION 4: IPRRG EARTH OBSERVATION (EO) SESSION - DEDICATED EO & PEST RISK SESSION

13:30 – 17:00PM (INCLUDING WORKING COFFEE)

1. **Introduction**

Presenter: Tim Beale (CABI)

2. **Anthropogenic climate-modifying pest risk factors: Sketching out the pest risk challenges and the current options for modelling them**

Presenter: Darren Kriticos (Cervantes Agritech)

3. **Current and future uses of Earth Observation data in Pest Risk Assessment:**
   - Outline some existing EO applications
   - Describe some of the latest and future EO products, their opportunities, limitations and relative costs

Presenter: Gerardo Lopez Saldana (Assimila)

4. **Case studies: EO projects improving datasets for pest risk modelling and early warning**
   - Case Study 1: EO4Ag Irrigation data layer
   - Case Study 2: EO4Ag Protected Agriculture data layer
   - Case Study 3: EO4Ag Canopy temperature

- Case Study 4: Wheat Blast project

Presenters: Alex Cornelius (Assimila), Gerardo Lopez Saldana (Assimila), Tim Beale (CABI), Libertad Sanchez Presa (CABI), Darren Kriticos (Cervantes Agritech), Connor McGurk (STFC), Matt Payne (University of Leicester).

5. **Group sessions:**

Logistics are to be confirmed, but based on the group size and available facilities, we will divide the attendees into smaller groups to discuss the key topics outlined below.

A. Collect Feedback on EO4Ag Data Layers

- Discuss potential use cases.

B. Identify Current Data Challenges in Pest Risk Assessment

- Explore data gaps, quality, and availability issues.

C. Explore How EO Technologies Can Support the Assessment of Pest Entry, Establishment, and Spread

- Focus on habitats, pathways, and climate factors.

D. Assess How EO Technologies Can Aid in Evaluating Pest Impact

- Consider impacts on hosts, damage, and crop yield.

E. Investigate How EO Technologies Can Support Pest Management

- Address management strategies concerning hosts, damage, and crop yield.

REGROUP, REPORT BACK, AND SUMMARIZE DISCUSSIONS

NOTE: The project team intends to draft a stakeholder engagement report after the session. If there is interest from IPRRG members, this effort could potentially be expanded into a publication. We should also explore methods for developing a paper based on insights from stakeholder workshops.

17:00 - 18:00: SOCIAL PROGRAMME: MANGO TASTING

DAY 3 – THURSDAY, SEPTEMBER 19, 2024 - EXCURSION - HOURS ARE TENTATIVE

9:00am - 12:00pm - Visit to the historical village of Frigiliana in the Axarquía - https://www.andalucia.org/en/frigiliana

12:00 - 14:00PM LUNCH

14:00 – 17:00pm - Visit to la Mayora Experimental Station and germplasm collections of subtropical fruit crops

19:00PM CONFERENCE DINNER AT THE SEASIDE

DAY 4 – FRIDAY, SEPTEMBER 20, 2024 (HALF DAY):

TECHNICAL SESSION 5: CASE STUDIES ON PEST MANAGEMENT

08:30 - 09:00am Utilizing Population Dynamics to Optimize Integrated Pest Management (IPM) Strategies: *Phthorimaea absoluta* on Tomatoes in Kenya Case Study

Presenter: Alyssa Lowry (CABI, UK)

09:00 - 09:30am Comparing Inward and Outward Strategies for Delimiting Non-Native Plant Pest Outbreaks

Presenter: Hongyu Sun (Wageningen University, Netherlands)

09:30 - 10:00am Assessing Potential IPM Strategies for Cabbage Stem Flea Beetle and the Implications from Climate Change in the UK

Presenter: Catherine Bradshaw (Met Office Hadley Centre, UK)

10:00 - 10:30AM COFFEE BREAK

10:30 - 11:00am Approaches to Estimating Factors Contributing to Yield Losses in the Global Burden of Crop Loss Project

Presenter: Anna M Szyniszewska (CABI, UK)

11:00 - 11:30am Prioritizing Species from the List of EU Quarantine Pests for a Full Analysis

Presenter: Kevin Schneider (European Commission, Spain)

TECHNICAL SESSION 6: POSTER/FLASH TALK SESSION

11:30 – 11:45am Towards Sustainable Coffee Farming: Enhancing CBB Control Using Earth Observation Data and Predictive Modelling

Presenter: Alyssa Lowry

11:45am – 12:00pm Characterization of Arthropod Species Associated with Mango and Cherimoya in a Mediterranean Context

Presenter: Helena Romero

12:00 - 12:15pm Knowing the Full Value of the Trees in Your Country - A Review for Environmental Risk Assessments of Non-native Plant Pests in Sweden

Presenter: Johanna Boberg

12:15 – 12:30pm CLIMEX and DYMEX 4.1: New Advances and Strategic Outlook for an

Important PRA Toolkit

Presenter: Darren Kriticos

12:30 – 13:30pm IPRRG business meeting, Executive Committee election results, discussion about the next venue for the annual IPRRG meeting

13:30 Lunch

ORAL PRESENTATION/POSTER ABSTRACTS

(ARRANGED IN ORDER OF PRESENTATION)

TECHNICAL SESSION 1: HORIZON SCANNING AND RISK MODELLING

Horizon scanning: a UK perspective

Authors: Duncan Allen[1]

York Biotech Campus, Defra, Room 11G19, Sand Hutton YO411LZ United Kingdom[1].

Presenting Author's email: Duncan.Allen@defra.gov.uk

This presentation will be an introduction to our approach to horizon scanning in the UK. What it is, and how do we go about it. I will describe the different information sources that are used while horizon scanning and give examples of pests and diseases that have been found via horizon scanning. I will also explain how collected information is processed and how decisions are made on which pests to follow up using the UK Plant Health Risk Register as a rapid screening tool, along with some examples of Pest Risk Analyses that have been conducted as a result of horizon scanning activities. I will highlight some of the more serious pests that have become regulated in the UK's plant health legislation as a result of horizon scanning efforts and look ahead to technologies that can support horizon scanning. I will close with a brief overview of the International Natural Hazard Forward Look and how the Defra Risk and Horizon scanning team intend to contribute to this cross government forward look of potential international hazards.

Potential of generative models to model likely establishment locations from past reports of first establishments

Authors: Robbert T van den Dool[1], Alejandro Morales[1], Wopke van der Werf[1], Jacob C Douma[1]

Wageningen University, Centre for Crop Systems Analysis, Wageningen University, Centre for Crop Systems Analysis, P.O. Box 430, 6700 AK Wageningen, The Netherlands[1]

Presenting Author's email: wopke.vanderwerf@wur.nl

Non-native tree pests impact the health of perennial crops, ornamental trees and forest trees. Understanding where first establishment occurs and characterizing the attributes of these locations can help shift management attention to areas that are most at risk, thus allocating resources more efficiently. Earlier analyses have suggested that areas that are heavily influenced by human activity are more at risk of establishment of new exotic pests. Especially cities are most likely first establishment sites. Since most observations of first establishments are accidental, and non-observations are not recorded, the data are presence-only with a likely bias towards areas with increased sampling intensity, usually areas with higher human density. Conclusions from such data may be wrong if no allowance is made for the sampling bias. In a recent 4-year project, we explored the potential of generative models to model likely establishment locations from past reports of first establishments. Generative models are composed of a model for the attributes of the actual establishment reports and another model for the attributes of locations where observations are likely to be made, e.g. due to proximity to cities, or based on records such as GBIF. The two models are combined into a final model for likely establishment locations

based on the application of Bayes' rule. In the presentation we will explain the methodology and show its application to correcting for sampling bias.

Modelling invasion risk of plant pests using Self-Organising Maps to support pest risk assessment activities

Authors: Libertad Sanchez-Presa[1], Tim Beale[1], Hannah Fielder[1], Lucinda Charles[1], Roger Day[1]

CABI, Wallingford, United Kingdom[1]

Presenting Author's email: l.sanchez@cabi.org

Horizon scanning activities that identify potential plant health threats to a country or region can generate long and unmanageable lists of pest species. With limited resources, organisations responsible for pest risk assessment and management cannot address them all. To prioritise long lists of pests with the potential to invade or establish in an area, we used Self-Organising Maps (SOM), an artificial neural network model used to identify pest species assemblages and identify species that have the potential to invade a particular geographical area. We modelled the risk of invasion of pests to an area to monitor the pests that represent a high risk of invasion or are possibly already present in an area but not yet identified. A global data set extracted from CABI's Distribution Database comprising 182,535 records in 485 geographic areas and 8,492 pests containing insects, fungi, microbes and other groups except weeds were included in the analysis. SOMs allowed us to identify areas with similar pest assemblages and determine the potential risk of invasion of pests based on their strength of association with other species within the clusters of geographical areas. We tested this method with plant health experts in Ghana, Kenya and Zambia and assessed the suitability of this method for broad-scale pest risk assessment and prioritisation.

Multi-layer method for quantitative horizon scanning and rapid risk assessment identifies several high priority candidates for formal risk assessment from an initial list of over 10,000 species

Authors: Joseph R Stinziano[1], Wanying Zheng[1], Megan Abergel[1], Martin Damus[1].

Plant Health Science Directorate, Canadian Food Inspection Agency, Ottawa, Canada[1]

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Wood-boring beetles are a significant threat to forests, imposing high economic and environmental costs. With a high level of biodiversity, it is difficult to assess all wood-boring beetles for their potential to invade a particular region, making horizon scanning a viable option for prioritizing targets. While horizon scanning has the potential to focus risk assessment and regulatory efforts, it is often conducted in a resource-intensive manner, creating potential blind spots in the horizon scan due to resource constraints. Here we use a multi-layered horizon scan, including Self-Organizing Maps and climate suitability modeling combined with rapid risk assessment, to produce a short-list of high priority wood-boring beetles for formal risk assessment in Canada. This method relies entirely on open-source data and is readily applicable to any country. From an initial list of 10,824 species with available observations, our method yielded short lists of between 9 and 13 species, representing a 99.9% target reduction efficiency. As well, the method can identify

already-regulated species within Canada as priority targets, suggesting that this method is appropriate for identifying potential regulatable pests and suggests that formal risk assessment procedures in Canada have successfully identified between 22% and 46% of the highest-priority wood boring beetle pests. The primary limitations on the method are the availability of confirmed established species occurrence data, relevance of climate norms for species establishment, available data for rapid risk assessment, and available computational power.

EPPO information on pests: where to find them, how to best use them?

Authors: Muriel Suffert[1]

EPPO[1]

Presenting Author's email: ms@eppo.int

EPPO is a Regional Plant Protection Organization covering 52 countries in Europe, the Mediterranean Basin and Central Asia. To help its member countries address pest risks, EPPO collects and process information on regulated and emerging pests. The presentation will briefly present the lessons learned from the EPPO datasheets projects during which 321 datasheets of regulated pests were revised over 4 years. We will also present the different EPPO databases that may be useful for pest risk analysts (EPPO Global Database, EPPO Platform of PRAs), and useful tips to make best use of them. We will finally present the online tools that have been developed to help assessors in their tasks (e.g. produce pest lists, check quarantine status in other countries), as well as the future plans. We will welcome feedback of users to continue improving our databases and tools.

TECHNICAL SESSION 2: INNOVATIONS IN PEST MONITORING AND MANAGEMENT

Comparison of Methodologies for Assessing the Risk of Potential Distribution of Quarantine Pests due to Climatic Factors: A Case Study of Taiwan's Qualitative Analysis Method and the MaxEnt Model

Authors: Fang-Yu Ning[1,2], Po-Kuan Lu[3], Chun-Hung Chen[1], Jhih-Rong Liao[4]

Plant Quarantine Division, Animal and Plant Health Inspection Agency, Ministry of Agriculture, Taipei City, Taiwan[1]; Department of Entomology, National Taiwan University, Taipei City, Taiwan[2]; Hualien Inspection Station, Keelung Branch, Animal and Plant Health Inspection Agency, Ministry of Agriculture, Hualien City, Hualien County, Taiwan[3]; Systematic Zoology Laboratory, Department of Biological Sciences, Tokyo Metropolitan University, Hachioji City, Tokyo, Japan[4]

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Taiwan conducted Pest Risk Analysis (PRA) for imported plant products by a qualitative analysis method. This method evaluates the consequences and likelihood of harmful organisms being introduced. Recently, Species Distribution Models (SDMs) have gained recognition for assessing habitat suitability of invasive organisms, focusing on climate factors and host plant interactions. It is important to note that habitat suitability represents the suitability of the environment for the organism's survival, not a direct

reflection of invasion risk. This study targets five quarantine pests (Anarsia lineatella, Ceratitis capitata, Cydia pomonella, Dasineura mali, and Grapholita molesta) using the MaxEnt model to predict their potential suitable habitat distribution in Taiwan. We compare these predictions with current PRA results. The qualitative analysis primarily evaluates biogeographic realm, host distribution and temperature impacts on their developments, lacking objective analysis process of other climatic factors and host plant interactions. In contrast, the MaxEnt model provides accurate potential distribution predictions through computer mapping, combining with township distribution maps of host plants. Integrating quantitative analysis techniques with current qualitative methods is essential for future PRA optimization.

New strategies for monitoring pests in tropical crops: Insights from DNA barcoding and field surveys

Authors: Helena Romero[1], Mónica Aquilino[2], Rosario Planelló[2], Eduardo de la Peña[1].

Instituto de Hortofruticultura Subtropical y Mediterránea "La Mayora" (IHSM-UMA-CSIC) Spanish National Research Council (CSIC), Finca Experimental La Mayora, Algarrobo-Costa, Málaga, 29750, Spain[1]; Entomology, Biomarkers and Environmental Stress Group, Faculty of Science, Universidad Nacional de Educación a Distancia (UNED), 28232, Las Rozas de Madrid, Spain[2]

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The early detection and monitoring of crop pests are crucial for preventing the introduction and spread of phytophagous pests and ensuring their effective management. Traditional sampling surveys and morphological identification methods pose significant challenges, especially for pest species from unexplored or hyper-diverse regions, such as tropical areas. Molecular techniques, such as DNA barcoding, have revolutionized the characterization of insect communities, offering an efficient alternative for pest identification. However, the use of DNA barcoding for detecting quarantine or regulated pest insect species still requires validation under realistic field conditions. In recent years, the increasing global demand for tropical crops, such as mango and cherimoya in Europe, has led to a rise in the import of fruits and plants for planting, which heightens the risk of introducing new pests that could also affect native crops. Therefore, it is essential to establish effective detection protocols for pest surveys in these areas. The main aim of this study was to assess the diversity of phytophagous insects associated with mango and cherimoya in production orchards in a Mediterranean context and to validate the use of DNA barcoding for detecting two specific pest species: Aulacaspis tubercularis in mango and Parasaissetia nigra in cherimoya. Through several field surveys, we visually examined trees and identified the presence of these pests in several production orchards. Simultaneously, we conducted non-specific field samplings using Malaise traps to sample insect macro-communities occurring in the same orchards. These samples were then analyzed using DNA barcoding to determine whether these two species or other relevant pests were present. The results of the two approaches will be discussed, highlighting the pros and cons of these detection methods.

Optimisation of plant pest survey efforts

Authors: Tomasz Kaluski[1], Sybren Vos[1]

European Food Safety Authority, Parma, Italy[1]

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The European Food Safety Authority (EFSA) has been mandated by the European Commission (EC) to support Member States (MSs) in the planning and designing of plant pest surveys. In response to this mandate, EFSA has developed a suite of tools and guidelines, including general and specific guidelines, Pest Survey Cards, the Risk-based Pest Survey Tool (RiPEST), and the multipest optimisation tool (OptiPest).

While RiPEST allows users to design for each pest statistically sound and risk-based surveys, the OptiPest tool, launched in July 2024, represents a significant advancement in the optimisation of survey efforts as it is designed to help MSs make better use of available resources by optimizing the allocation of survey efforts when surveying for multiple pests within a same crop.

To support the implementation and effective use of these tools, EFSA has scheduled a series of training sessions. These include a Network meeting in October, a Better Training for Safer Food (BTSF) training session in September, and a dedicated workshop focusing on the surveys of pests affecting broadleaved trees, citrus, and potatoes. These training sessions aim to enhance the capacity of MSs to conduct risk-based and optimised pest surveys, contributing to better pest management and protection of plant health in the European Union

A field-level, epidemiological risk forecast model for sclerotinia in winter rapeseed in Germany

Authors: Vera Krause[1], Nazanin Zamani-Noor[2], Lena Müller[3], Kathleen Kohrs[3], Julianne Schmitt[3], Anto Raja Dominic[4]

Julius Kühn Institute, Federal Research Centre for Cultivated Plants, Institute for Strategies and Technology Assesment, Stahnsdorfer Damm 81, Kleinmachnow, Germany[1]; Julius Kühn Institute, Federal Research Centre for Cultivated Plants, Institute for Plant Protection in Field Crops and Grassland, Braunschweig, Germany[2]; Central Institute for Decision Support Systems in Crop Protection, Bad Kreuznach, Germany[3]; Julius Kühn Institute, Federal Research Centre for Cultivated Plants, Institute for Strategies and Technology Assesment, Stahnsdorfer Damm 81, Kleinmachnow, Germany[4]

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Sclerotinia stem rot, caused by Sclerotinia sclerotiorum, poses an increasing threat to winter oilseed rape (Brassica napus) in Germany, potentially reducing yields by 20-30%. Decision Support Systems (DSS) for pest management offer field-specific recommendations to reduce pesticide use and optimize yields. However, the performance of the current Sclerotinia risk forecasting model, SkleroPro, has declined under the changing climatic conditions. We introduce an improved model that enhances prediction accuracy for fungicide application recommendations during flowering. This new model incorporates a phenological model based on daily temperature and photoperiod to simulate the BBCH flowering phases. Additionally, we developed a sclerotia germination and spore availability

module using the random forest algorithm to identify key weather variables influencing sclerotia germination. A generalized linear model then predicts infection risk using daily maximum temperatures and relative humidity levels of specific time windows.

Our model assumes spores can survive up to 7 days post-germination, when infection is possible under optimal conditions. We also adjusted infection thresholds to account for crop rotation effects. Testing on data from 2020 to 2023 demonstrated the phenological model's accuracy in predicting flowering stages (BBCH 58-69) within ±4 days, starting simulations on February 1st. The enhanced SkleroPro model achieved a 78% accuracy rate in predicting Sclerotinia infections and recommending fungicide applications. These improvements promise more precise and timely fungicide treatments, reducing unnecessary sprays and yield losses. Field trials in 2024 are planned to validate the model before its DSS implementation.

TECHNICAL SESSION 3: POLICY AND DECISION SUPPORT TOOLS

Identifying the top damaging pests in country's cropping systems: two case studies

Authors: Gabriella "Gaby" Oliver[1], Anna Szyniszewska[1], Tim Beale[1], Alyssa Lowry[1], Alice Milne[2], Andrew Mead[2], Richard Hull[2], Sarah Gilhespy[2], Dan Bebber[3]

CABI, Wallingford, UK[1]; Rothamsted Research, Harpenden, UK[2]; University of Exeter, Exeter, UK[3]

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Identifying the pests causing the majority of the damage in a cropping system in a particular location with data-based evidence presents a significant challenge due to a lack of systematic surveillance and knowledge gaps. This presentation intends to explore some of the challenges and opportunities involved in developing an effective pest ranking system, with insights drawn from two distinct case studies conducted by the Global Burden of Crop Loss project. Key considerations such as data collection and integration will be examined. We identify sources of information available to determine the distribution, incidence, and potential impact of pests on crops. Two pest impact ranking studies are presented: one focusing on wheat conducted across three European countries, the UK, France, and Germany. The process involves reviewing pest species of wheat retrieved from CABI Crop Protection Compendia (CPC) and identifying those present in selected regions, reviewing literature on reported pest impact on yield, and seeking information from reputable reports and expert opinions to identify the top species. The second case study focuses on the top pests affecting maize in Kenya. We integrate a range of data and proxies to estimate the relative importance of the species, including a literature review on pest distribution and impacts, climatic niche models, and CABI Plant Clinics data. This segment underscores the methodological adaptations of pest ranking with differing available data sources. Through these case studies, the presentation aims to explores the opportunities and methodologies in identifying the most impactful pests using data and data proxies.

Integrating plant pest risk registers with national pest surveillance programs

Authors: Conor Francis McGeea[1]

Pest risk analysis unit, Plant Sciences Division, Department of Agriculture, Food and the Matine, Ireland[1]

Presenting Author's email: conorfmcgee@gmail.com

The Irish pest risk analysis unit (PRAU) was recently tasked with assessing the risk posed to Irish biosecurity by the EU quarantine plant pests listed in EU Reg 2072/2019. The Irish NPPO is required to undertake surveillance for EU quarantine pests on a multi-annual basis over 7-years period to comply with EU legislation unless it can be justified that the Irish climate is unsuited to the pest's biology or host plants are not cultivated in Ireland. The PRAU used this opportunity to develop a national pant pest risk register for EU quarantine pests, align it with national pest surveillance activities and integrate it with plant health inspector training. The aim of the Irish plant pest register was to (1) assess each pest's climatic tolerances using a combination of qualitative assessment and quantitative climatic matching to determine their ability to complete a lifecycle in the Irish climate (2) analyse the known host plants to identify the most high-risk plants to improve efficacy of surveillance activities. The pest risk rating and justification given by the PRAU was made available to plant health inspectorate divisions for justification of their pest selection for the EU multi-annual surveillance program. The goal of this project was to (1) improve inspection efficacy by selecting only relevant pests for surveillance and targeting these inspections at the most relevant plant sectors (2) make the risk register a public live database and (3) develop plant pest booklets covering the relevant pests to aid inspectors in the field when undertaking surveillance activities.

TECHNICAL SESSION 5: CASE STUDIES ON PEST MANAGEMENT

Utilizing population dynamics to optimise Integrated Pest Management (IPM) strategies - *Phthorimaea absoluta* on Tomatoes in Kenya case study

Authors: Alyssa Lowry[1], Bryony Taylor[1], Charlotte Day[1], Tim Beale[1], Joe Beeken[1], Suzy Wood[2], Jackline Chirchir[3], Stacey Odunga[4], Mary-Lucy Oronje[4].

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Phthorimaea absoluta, a notorious pest of tomato crops, has become a significant threat to tomato production in Africa, causing severe yield losses and economic damage. This study investigates the within-season population dynamics of Phthorimaea absoluta on tomatoes at in Kenya from 2019 to 2022, encompassing both short and long rain seasons. Utilizing EO data to model pests in the field, our research aimed to understand the temporal patterns of P. absoluta adults and larvae to inform better Integrated Pest Management (IPM) strategies. Results indicated that adult P. absoluta populations were consistently high from the time of planting, whereas larval populations, which are the primary damaging stage, took significantly longer to accumulate. Currently, IPM practices rely on adult P. absoluta numbers as the main indicator for initiating control measures, such as spraying. However, our findings demonstrate that adult trap catches do not directly correlate with larval numbers, particularly during the initial stages of infestation.

Therefore, relying on adult trap data may lead to mistimed interventions. We recommend that larval-specific scouting be incorporated into pest management protocols to accurately determine the appropriate timing for control actions. This adjustment in monitoring practices could lead to more effective and timely management of P. absoluta, ultimately reducing the damage to tomato crops and improving yields. Our study underscores the importance of understanding the pest specific life cycle when attempting to understand within season pest risk, when developing responsive and effective IPM strategies for P. absoluta in Kenyan tomato cultivation.

Comparing inward and outward strategies for delimiting non-native plant pest outbreaks

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The delimitation of outbreaks is an essential step in the containment and eradication of non-native plant pests. Outbreaks are habitually delimited by sampling around the initial finding, moving away from this locus in several directions as long as infestations are found (outward strategy). An alternative, inward, strategy would entail starting delimitation with an initial estimate of the location of the frontier, and then sampling inward until the first infestations are found or outward until no more infestations are found. We used individual-based modelling to compare the effectiveness and sampling effort of the two strategies. Both strategies successfully contained > 99% of infested plants within the delimited infested zone, but both also had a low probability (< 15%) of enclosing all the infested plants. The number of samples of the inward strategy depended greatly on the size of the initially hypothesized infested zone. Best performance of this strategy was obtained with an accurate initial estimate of the infested zone width while the number of samples was quite high if the initial estimate was far beyond the true location of the frontier. On average, the outward strategy used fewer samples than the inward strategy. Both strategies were prone to error when delimiting outbreaks caused by pests with fat-tailed dispersal. Whether the inward or outward strategy is more effective depends on the certainty about the true position of the leading frontier of the outbreak. Possibilities are discussed for maximizing the cost-effectiveness of sampling for outbreak delimitation.

Assessing potential IPM strategies for cabbage stem flea beetle and the implications from climate change in the UK

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Oilseed rape is a major source of vegetable oil and biodiesel feedstock. The crop is subject to biotic stresses from 16 diseases, 37 insect pests, nematodes, slugs, and snails, but Cabbage stem flea beetle (CSFB), Psylliodes chrysocephala, is ranked the top major pest of winter oilseed rape in Europe. In the past, early immigrating adults were controlled by neonicotinoid seed treatments, however, the ban of neonicotinoids in the European Union in 2013 meant that there was a shift to synthetic pyrethroids and early invading beetles have more time to cause damage. However, there is now thought to be widespread resistance against pyrethroids. Some UK populations of CSFB now have 100% resistance and as a result production of oilseed rape has markedly declined and there has been a lot of focus on potential alternative IPM strategies.

A simple proof-of-concept case modelling study has been conducted for CSFB in oilseed rape, in which the impacts of temperature have been incorporated into some aspects of the lifecycle of the pest, and a predator and a set of IPM strategies have been tested under present day climate and under a potential future climate scenario. The results show that IPM strategies are likely to be crucial for CSFB control in the absence of neonicotinoids or a suitable alternative pesticide, and that a combination of IPM strategies is likely to be required as the climate warms.

Approaches to estimating factors contributing to yield losses in the Global Burden of Crop Loss project

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Agricultural activities contribute significantly to global greenhouse gas emissions, with the expansion of land use for food production further exacerbating environmental pressures. FAO estimates that pests reduce global crop production by 20% to 40%. However, precise data on the magnitude and causes of yield loss tend to be outdated, lack broad spatio-temporal coverage and are often based solely on expert opinion. While crop loss due to biotic and abiotic factors causes significant impacts on food systems globally, we lack robust, actionable evidence on the problem. We present our framework for estimating attainable yield in local context for maize, yield loss and apportioning losses to abiotic and biotic factors. We also present the framework and data opportunities for estimating the contribution of individual pests to the losses.

Prioritizing species from the List of EU Quarantine Pests for a full analysis

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The Commission adopted Commission Delegated Regulation (EU) 2019/1702, establishing a list of Union Quarantine pests, which qualify as priority pests, as by Article 6(2) of

Regulation (EU) 2016/2031 on protective measures against pests of plants. This list of pests was partially based on scientific evidence generated through the I2P2 model, which requires a time-consuming expert-knowledge elicitation process. Here, we present work that aims at assessing the full List of EU Quarantine Pests for supporting a decision on regulation at EU-level. As full-fledged I2P2 analyses on all 400 organisms are not feasible, a shortlisting step is required to inform the decision-making process on which pests should be analysed in detail. EFSA compiled a database on hosts for all pests on the list, which we subsequently linked to the entire Eurostat and FAOstat databases and national forestry surveys to obtain data on area, production, and prices. Furthermore, EFSA constructed an index of pests' invasiveness based on scientific information. We ranked pests based on a composite index for two scenarios: i) host value and invasiveness, and ii) host area and invasiveness. We assessed robustness of these rankings via different scenarios of host ranges. The top-ranked pests were subsequently discussed by the Member States and a subset was requested for a full-fledged I2P2 analysis. Our results highlight how data-driven approaches may support the decision-making process by guiding attention toward a subset of species.

TECHNICAL SESSION 6: POSTER/TALK SESSION

Towards Sustainable Coffee Farming: Enhancing CBB Control Using Earth Observation Data and Predictive Modelling

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Coffee Berry Borer (CBB) is the most damaging insect pest of coffee worldwide, causing an estimated $500 million in damages to the coffee sector annually. Despite extensive research, particularly over the past 20 years, CBB remains notoriously difficult to control. This challenge stems from its life cycle, as the pest predominantly resides inside the coffee berry, rendering most pesticides and bio-controls ineffective. The current study builds on a system developed during a pilot program in 2019 in Aguadas, a key coffee-growing region in Caldas, Colombia. The initial modelling system utilizes Earth Observation (EO) data to predict the emergence patterns of CBB, aiming to improve targeted intervention strategies. By analysing environmental factors such as temperature, humidity, and crop growth indices, we developed a robust system that forecasts CBB emergence, allowing for more precise timing of control measures. Preliminary results from the pilot program indicate that the EO-based model significantly enhances the accuracy of predicting CBB emergence. Building on these findings, the next phase of the program is returning to Caldas, Colombia, to pilot the model's outputs with the original cohort of farmers. In addition phase two aims to further improve the use of bio-pesticides by utilizing predictive EO products, such as rainfall and temperature data, to inform farmers of the optimal time to apply these control measures for maximum efficacy. This will be implemented alongside the original system to provide a comprehensive approach to the management of CBB. These efforts seek to refine and expand the application of EO-based modelling for more effective management of CBB, promoting sustainable coffee farming practices.

Characterization of arthropod species associated with Mango and Cherimoya in a Mediterranean context

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Understanding plant-arthropod interactions within specific geographical contexts is essential for effective crop management. By doing so, targeted management practices can be implemented for pest control while minimizing impacts on other functional groups crucial for crop management, such as pollinators and natural enemies of pests. The demand for tropical fruits like mango and cherimoya has risen in Europe in recent years, leading to an increase in the importation of fruits and planting material. This activity heightens the risk of introducing new pests, which could negatively impact native crops. Additionally, native arthropod species may also become pests of these introduced crops. In this study, we aimed to characterize the arthropod diversity associated with mango and cherimoya in Mediterranean orchards to better understand the potential risks and inform sustainable pest management strategies. We utilized Malaise traps for macro-community sampling and DNA barcoding for species identification. Here, we present the initial results of this approach.

Knowing the full value of the trees in your country - a review for environmental risk assessments of non-native plant pests in Sweden

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Plant pests, particularly non-native species, can have a profound impact on their host plants. Trees are the foundation of forest ecosystems and also serve as important structures in agricultural landscapes and urban areas. In Sweden, forests cover around 70% of the land area and serve as an important natural resource for both the economy and the environment. Consequently, introductions of non-native tree pests can not only cause significant economic impact but also far reaching environmental damage by affecting the biodiversity and ecosystem services provided by trees and forests. When conducting PRAs, there are general guidelines for the assessment of the potential impact a new pest could cause, including economic, environmental, and social aspects. There is, however, no consensus of how environmental assessments in PRAs should be performed and generally there is a need for a more comprehensive understanding of the environmental consequences of plant pest invasions.

The aim of this review was to summarize the main values provided by trees to provide guidance for estimating risks in the context of pest risk assessments. We compiled the

available information on i) the biodiversity associated with different tree species and ii) the ecosystem services to which different trees contribute for all major tree and shrub species in Sweden.

CLIMEX and DYMEX 4.1: New advances and strategic outlook for an important PRA toolkit

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The latest versions of CLIMEX and DYMEX include an exciting series of new features and functions, as well as exceptional performance enhancements. At the time of this presentation the software has been released for beta testing, with a commercial release expected within a month. While the most immediate apparent difference is the facelift to the interface, most of the advances are beneath the surface, addressing usability issues and extending the capability of the tools. Since taking over responsibility for the development of CLIMEX and DYMEX, Cervantes Agritech has invested heavily in upgrading these software packages and has committed to a new program of relatively frequent software updates. In this presentation we briefly describe the new features and functionality in V4.1 and outline exciting developments