B3 Science Solutions for Better Border Biosecurity AOTEAROA NEW ZEALAND

Euphresco

PLANT BIOSECURITY RESEARCH INITIATIVE

International plant health research partnership to address global challenges

A side session of the International Plant Health Conference
Meet us at Queen Elizabeth II Centre-Westminster room,
London, United Kingdom on 22nd of September 2022

PROTECTING PLANTS PROTECTING LIFE

Foreword

It is not possible to avoid all the challenges to plant health posed by global trade, increasing travel activities and climate change. However, it is possible to optimise strategies to address these challenges with effective cooperation and coordination. Research has a key role in underpinning plant health activities, ranging from pest risk analysis, regulation, surveillance, taxonomy, diagnostics and actions at outbreaks to eradicate the pests and control further spread. Research also helps to maintain and develop scientific expertise and infrastructures that support plant health. Transnational research collaboration can provide the best solutions to difficult situations as it enables the efficient use of national research funds and personnel resources by pooling them. Cooperation creates a more diverse and critical mass of expertise to deliver more output compared to that which can be achieved through separate small projects alone.

The success of Euphresco as an international network for phytosanitary research coordination and funding has set the ground for discussions on the development of initiative(s) to address the needs of other regions of the world and on global phytosanitary research coordination.

A vision on a global network whose objective is to facilitate international research collaboration and coordination on regulated and emerging pests was published in Nature Plants in 2020 (Giovani *et al.*, 2020), co-authored by representatives of plant health research funding, policy making and research organizations worldwide. Discussions are ongoing within Euphresco on the role that the network should come to play in the future and on its expansion, both geographically and in terms of missions of its members. The side session is an opportunity to learn about the diversity of research activities commissioned through Euphresco, to know more about their impact on plant health, from policy to operations in the field, and to discuss how to strengthen international research partnership. We look forward to meet you, learn from each other and work together.

Baldissera Giovani

Side session agenda

Chair: Baldissera Giovani

12:20-12:25	**Welcome** (Baldissera Giovani, Euphresco)
12:25-12:37	**Assessment of a generic method for the detection of begomoviruses** (Pascaline Cousseau-Suhard, ANSES, FR)
12:37-12:49	**Using high-throughput sequencing to gain insights from virus collections and strengthening the infrastructure of plant virus collections** (Don Walker, Fera Science Ltd, GB)
12:49-13:01	**Preparedness in biological control of priority biosecurity threats** (David Teulon, B3, NZ)
13:01-13:13	**Basic substances as innovative tools for a sustainable preharvest and postharvest disease management** (Gianfranco Romanazzi, UNIVPM, IT)
13:13-13:25	**Diagnosis of *Xylella fastidiosa*: detection on dormant and on Mediterranean host plants** (Jo Luck, PBRI, AU)
13:25-14:00	**Engagement with the audience: discussions on strengthening international research partnership** (Jo Luck, PBRI, AU and David Teulon, B3, NZ)
14:00	**End of the meeting**

Assessment of a generic method for the detection of begomoviruses

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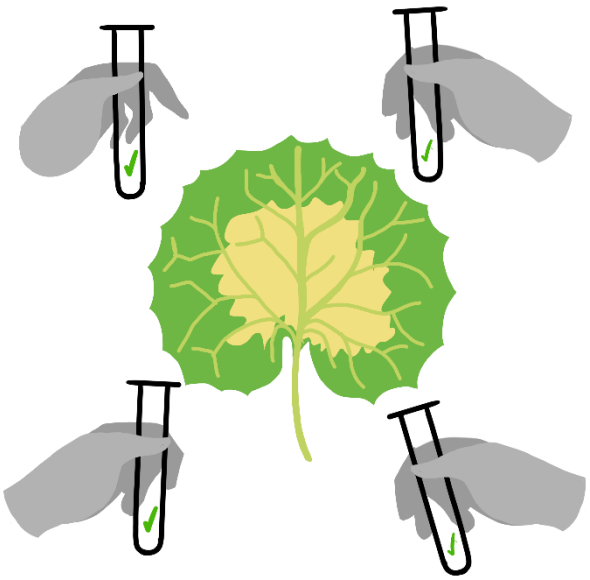
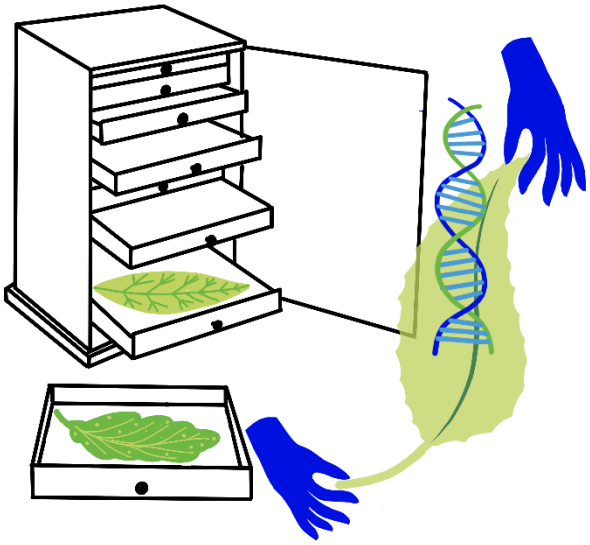


Begomoviruses belong to the largest genus of plant viruses. They infect economically important crops and represents an emerging problem worldwide. An EPPO Diagnostic Protocol already exists for two begomoviruses (tomato yellow leaf curl virus and tomato mottle virus) but it has not been evaluated for other begomoviruses. In this context, the Euphresco project 2016-A-212 'Assessment of a generic method for the detection of begomoviruses (BegomoVal)' aimed to validate several conventional PCR tests for the detection of begomoviruses. Nine laboratories from Austria, France, the United Kingdom, Greece, Guatemala, Italy, the Netherlands, Peru, and Slovenia participated in the project. The tests from Accotto *et al*., 2000; Li *et al*., 2004; Saison and Gentit, 2015; and Wyatt & Brown, 1996 were evaluated using a coded panel of thirty samples and following the EPPO Standards PM 7/98 and PM 7/122. The results showed that the tests from Wyatt & Brown, 1996 and Saison *et al*., 2015 were able to detect all isolates in the panel of samples with high repeatability and reproducibility. Thanks to the involvement of all partners, the Begomoval project allowed the characterisation of tests capable of detecting a wide range of begomoviruses. The project results have supported the development of an EPPO Diagnostic Protocol for the detection and identification of begomoviruses on cucurbits, eggplants, pepper and tomato.

Using high-throughput sequencing to gain insights from virus collections and strengthening the infrastructure of plant virus collections

Don Walker, Fera Science Ltd, GB. E-mail: Don.Walker@fera.co.uk



Over the last decade the use of high throughput sequencing technologies in plant virus diagnostics has led to an increasing number of previously unknown viruses being revealed. Additionally, viruses are being found in new territories and from hosts they were not previously known to infect. Where these virus infections give rise to symptoms it is possible that these may have been previously studied in the era before sequencing technologies. Where they are inadvertent discoveries, these viruses may have been present but undetected for many years. Additionally, more than 70 recognised virus species have no supporting sequence data available, and a further 150 have only partial sequence data associated with them. Many laboratories maintain virus isolate collections, often with historical isolates which were studied in the pre-sequencing era. Linking these historical isolates with novel findings can resolve taxonomic duplication. It can clarify our understanding of distribution and host range and allow prior biological characterisation to be used to support plant health risk assessment. Additionally, it can expand the known diversity of viruses of regulatory concern.

The Euphresco project 'VirusCurate' has aimed to create a network of laboratories with access to historical isolates and sequencing capabilities to answer questions on the plant health risks of these 'unknown' viruses. This network of 16 laboratories in 11 countries has generated genome sequences of more than 150 virus isolates leading to 13 collaborative publications in peer reviewed journals.

Preparedness in biological control of priority biosecurity threats

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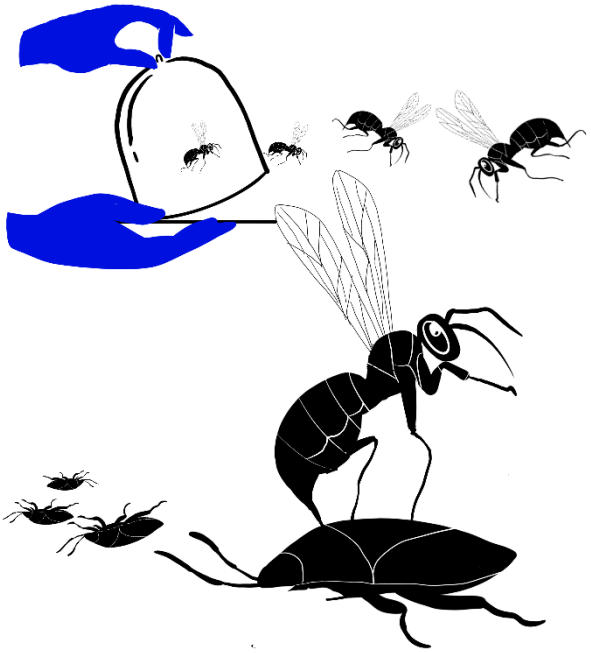

The brown marmorated stink bug (BMSB) is an invasive insect originally from east-Asia but now established in North and South America and Europe, where it has become a major pest. BMSB is disseminated through trade and is frequently intercepted at- and post-border in Australia and New Zealand, but has not yet established in either country. The expected substantial negative impact from BMSB and the lack of effective management tools, led B3 scientists to consider the use of biological control agents for incursion response and in parallel, biosafety considerations, to be explored prior to the establishment of BMSB in New Zealand. The pre-emptive approach aims to address a major limitation in biological control, i.e. the lengthy pre-release risk assessment research in containment required for approval by regulators which gives additional time for a pest to establish, build up population density and spread further. New Zealand pre-emptive approach on BMSB supported an application by industry, and approval (with controls) by the New Zealand regulator (Environmental Protection Authority), for the release of the biological control agent *Trissolcus japonicus* in the event of a BMSB incursion (https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203336/0ed5350647/APP203336-Decision.pdf). It is understood that this pre-emptive approach is a world first although the opportunity to release *Trissolcus japonicus* has not yet eventuated as a significant BMSB incursion has not occurred.

Substantial support for the pre-emptive approach came about through the NZ-US Joint Commission on Science and Technology Collaboration (or JCM) and CABI China. The Euphresco project 2020-C-361 'Preparedness in biological control of priority pests' was commissioned in 2020 with the aim to establish a biological control network to share knowledge and information on priority biosecurity threats and BCAs to increase preparedness for incursions of invasive invertebrate species. The project partners are currently reviewing priority pests and the potential for pre-emptive biological control options and producing a standard to assess the feasibility to conduct pre-emptive risk assessment for the introduction of BCAs.

Basic substances as innovative tools for a sustainable preharvest and postharvest disease management

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The Farm to Fork Strategy of the European Green Deal aims to accelerate the transition to a sustainable European food system, in line with the UN Sustainable Development Goals. The strategy sets a number of regulatory and non-regulatory initiatives, including the reduction by half of the use of synthetic pesticides, cutting by half food waste linked to post-harvest decay infections and increasing by 25% organic agriculture by 2030. The strategy puts under pressure the current agricultural production systems, since productivity of high-quality fruits and vegetables will have to be maintained while reducing chemical inputs. Basic substances represent a promising alternative to synthetic pesticides. Basic substances are compounds available as foodstuff that also show an activity as biopesticides.

As of September 2022, 24 basic substances have been approved (EU Pesticides Database (v.2.2) Search Active substances, safeners and synergists (europa.eu), and for several of them protocols for application have been developed (https://www.mdpi.com/1420-3049/27/11/3484). There is a need to validate the use of new basic substances and to extend the use of those already validated for specific applications. Unfortunately, despite the potential of basic substances as sustainable plant protection products, little opportunities have arisen in the EU to validate scientifically their use. The Euphresco project 2020-C-353 'Basic substances as an environmentally friendly alternative to synthetic pesticides for plant protection (BasicS)' has been an opportunity to bring together more than 100 researchers from ca. 30 research organizations in 16 Countries to allow them to work together to provide innovative solutions for the management of preharvest and postharvest pests through the application of alternatives to synthetic pesticides based on the use of approved basic substances and potential basic substances. Preliminary results have shown that in some conditions basic substances ensure a protection against pests comparable to the protection obtained with fungicides. The BasicS consortium has been also active in increasing awareness on the use of basic substances, for example through webinars.

Diagnosis of *Xylella fastidiosa*: detection on dormant and on Mediterranean host plants

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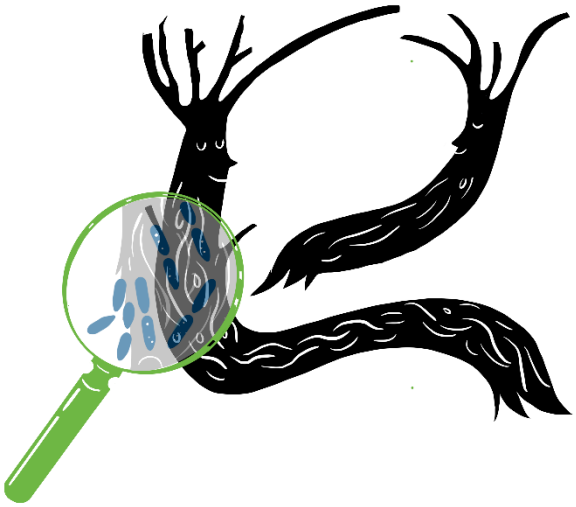

Xylella fastidiosa is a gram-negative, xylem-limited, and slow-growing bacterium transmitted by some xylem-feeding vectors, and it is the causal agent of several plant diseases. Although *Xylella* has not been detected in Australia, it remains a serious biosecurity threat to many plant industries and the natural environment. It is considered the number one threat to plant health in Australia, placing a high importance on research collaboration on detection methods with Mediterranean countries affected by *Xylella fastidiosa*. The concentration of the bacterium in a plant depends upon environmental factors, strains and the host plant species or cultivars. This is particularly true for deciduous plant species. According to Hopkins (1981), sampling should preferably be performed during the period of active growth of the plant to maximize the likelihood of detection. Recent experiments have shown that in Mediterranean countries Xylella fastidiosa can be detected in plants (such as almond and cherry) all over the year and especially during the asymptomatic phases or the dormancy, the period with the lowest bacterial concentration. This knowledge would support the trade of fruit trees, especially for dormant material. Although detecting *Xylella fastidiosa* in dormant plants was shown possible in some cases, the performance of the tests is dependent on the plant species and the geographical locations. The Euphresco topic 2022-A-406 'Diagnosis of *Xylella fastidiosa*: detection on dormant plants, important for Mediterranean countries' has been proposed in 2022 to develop knowledge to support the detection and identification of *Xylella fastidiosa*. If commissioned (decision is expected by 2022-11), the project will:

- Make an inventory of Mediterranean plants that could be infected by *Xylella fastidiosa*;
- Make an inventory of methods used by the different laboratories for the detection of *Xylella fastidiosa* in dormant plants;
- Collect and share dormant plant material important for the Mediterranean region;
- Evaluate protocols for the diagnosis of *Xylella fastidiosa* on plant matrices collected at different periods of the year (including during the dormancy period) at low bacterial concentrations;
- Evaluate the distribution dynamics of *Xylella fastidiosa* in woody stems naturally infected throughout the year (including during the dormancy period).

Engagement with the audience: discussions on strengthening international research partnership

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A summary of the workshop on shaping plant health research coordination organized by B3, Euphresco and PBRI on 2020-09-20 will be presented. Several international organizations and networks were invited to discuss the structure, the operations and the resources for global phytosanitary research coordination, starting from the models developed in the framework of ongoing Euphresco activities and taking into account the specificities of other international initiatives and organizations.

The discussion with the public aims to gather ideas and information to support future work on strengthening international research partnership. The following questions have been identified:

- Which organizations or networks (e.g. long-term networks, global or regional networks) should be considered for membership?
- What makes an international network successful?
- What activities should the network focus on to expand international collaboration ?
- How should the network and its activities be resourced?

The engagement with the public will be facilitated through Mentimeter. The app can be used on smartphones, it needs no installations or downloads, as it is entirely browser based.