International Meeting # 22

September 29 – October 3, 2025, Maisons-Alfort, France

Meeting Report

Nov 4, 2025

INTERNATIONAL FOREST QUARANTINE RESEARCH GROUP
SCIENCE STEERING COMMITTEE

Meeting Report

This meeting report communicates the discussions and conclusions from the 2025 annual meeting of the International Forestry Quarantine Research Group. The meeting was held from the 29th of September to the 3rd of October 2025.

Disclaimer

Recommended citation:

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1. Opening of the meeting

1.1 Welcome Address

Mike Ormsby (IFQRG Chair) opened the meeting, and all introduced themselves. He thanked the Agence Nationale de sécurité sanitaire de l'alimentation / the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) for hosting this 22nd meeting of IFQRG. He noted that impromptu presentations on topics that come up during the week are welcome and that discussion after presentations is important.

Eric Allen (former IFQRG Chair) provided a history and overview of IFQRG.

The International Forestry Quarantine Research Group, created in 2003, had its first meeting in Rome in February 2004. Since then, 21 meetings have been held, many in Rome, but also in Canada, Portugal, Australia, Wales, China, New Zealand and Brazil.

A key client of the IFQRG is the Commission of Phytosanitary Measures (CPM) and its subsidiary bodies: technical panels, expert working groups, regional and national plant protection organizations (RPPOs and NPPOs). The relationship among these bodies is evolving, in response to specific questions or requests raised by the IPPC Standards Committee. This helps refine the role of IFQRG to bring together all available information on a particular topic and to provide a response based on the best available information. IFQRG has, through analysis and specially focused research, provided the scientific background necessary for the ongoing refinement of ISPM 15 e.g., re-infestation studies, recommendation of bark tolerances, and publication of new perspectives on treatment efficacy – probit-9.

The original vision of IFQRG was to pursue collaborative scientific activities and to foster a culture of respect and cooperation among the members. Although open debate is encouraged, the annual meeting should not be a stage for political messaging or advocacy of national policies. Finding solutions to reduce the international movement of forest pests in many cases means looking beyond the borders of our own countries or regions; it means considering the issues and challenges of all countries whether developed or developing.

IFQRG has a wide diversity of background, expertise and experience, comprising scientists, working in government institutions, universities, and industry labs as well as plant protection experts and industry leaders. Participants are encouraged to join as critical thinkers, ready to share knowledge and expertise, but to leave “positions'' at the door. Since its inception in 2003, IFQRG has matured in its role and relationship with other groups. It has been increasingly clear that the most useful function of the group as a partner in advancing forest phytosanitary issues is providing science and interpretation of science. To this end, more scientists from developing and developed countries are needed to participate in IFQRG activities.

1.2 Greetings from EPPO Director-General Ms Olga Tikka

Greetings from Ms Olga Tikka were passed on to IFQRG by Dmitrii Musolin (EPPO).

1.3 ANSES plant and forest missions and activities

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An overview of the French forest main characteristics was presented first, as well as the main threats to forest tree health issues and pests and diseases which are in the scope of ANSES activities: reference, research, support to surveillance and risk assessment. The main current biological risks at the French scale were presented, altogether with the most recent outbreaks related to forest trees. The contribution of ANSES research to forest tree health were emphasized and illustrated, our research aiming at a generalized generic surveillance, a better characterization of epidemics involving several pathogens, a clear contribution of tree health to One Health and to interaction with surveillance.

70 million ha of land in France is covered by forests. Afforestation efforts have been increasing over the last 50 years.

In France, the effects of climate change have been notable, causing water stress and contributing to the susceptibility and spread of forest pests. Current forest health issues include *Endothia* canker of chestnut, *Phytophthora ramorum*, bark beetles, *Xylella fastidiosa*, thousand canker disease, chestnut blight, oriental chestnut gall wasp. *Xylella fastidiosa,* first found in 2012 on coffee plants; the first outbreak occurred in 2015. Japanese beetle – expected for 4-5 years. The first outbreak occurred in the summer 2025. The eradication strategy includes chemical, biological and cultural control. Stinging hair caterpillars, pine processionary caterpillar, oak processionary caterpillar represent a One Health issue.

Highlighted ANSES projects:

- PORTRAPP project have found xylophagous insects e.g., the tiger longhorn beetle; 8 distinct exotic beetle species including *Xylotrechus chinensis* (Asia) on mulberry. Most recent outbreaks include: *Anoplophora chinensis* and *A. glabripennis, P. ramorum,* and interceptions of Pine wood nematode (PWN) on imported WPM (2018-2021).
- SORE in SPORE project – fungi and oomycetes INRAE collaboration using funnel traps and DNA and metabarcoding.
- Characterization of root rot in softwood forests and *Armillaria* spp. using RT-PCR primers
- Sooty bark disease of maple tree and Syco-Protect PhD project – new invasive, *Cryptostroma corticale* on maples 2023-25. Health issues (One Health).
- Pinewood nematode (PWN) surveillance

Discussion/ Questions

Q: Are these new pest incursions related to climate change? A: Yes, for example, vectors of disease, e.g., citrus greening (HLB).

Q: Do you have a group looking at climate issues specifically? A: Not currently.

Q: IFQRG focuses on forest products. How many of these pests do you think move on forest products? A: A more generic approach of surveillance is taken currently, but a focus on forest products could be something to discuss going forward.

Note: *Xylella fastidiosa* has 600 potential hosts.

Comment: Many of the ANSES projects use molecular tools. The IFQRG molecular tools working group has been considering how these tools can be used in a regulatory setting. A: Ability to identify accurately is important; both molecular and morphological identification are used (retaining a physical specimen).

Note: In this study, only PWN was detected in imported wood (wood packaging material), not the *Monochamus* spp. vector. There have been no interceptions of PWN in France since 2019.

Comment: The Portuguese NPPO have changed treatment compliance inspections. They currently require verification that every sensor reaches 56 ℃ in the core of the wood treated with heat. They've found no evidence that the heat treatment in the wood is not effective. It was noted that bark is exported for greenhouses and flowers. Within the bark commodity there can be small pieces of wood attached. It was suggested that PWN could potentially be present in these pieces of wood. In Portugal, research has shown that steam treatment for bark is effective, and they have found that without the vector, the spread of PWN is very unlikely.

Note: In Portugal they have found that only dauer larvae are associated with *Monochamus* spp. beetles. Molecular diagnostics are employed for PWN found with *Monochamus* spp. as the dauer larvae are difficult to identify morphologically. It was also noted that caution should be exercised when using molecular tools due to issues of sensitivity and contamination. It was noted that a group in Canada (iTrack) are working on eDNA/eRNA techniques for PWN (see IFQRG-22 Thompson presentation).

Q: Is *P. ramorum* established in France? A: It has been detected and has a restricted distribution.

Q: Are molecular barcodes shared in Europe for this type of ID work? A: Some sequences are openly shared, and others are not.

Q: What techniques or tools are you using to determine the change from endophyte to pathogen in the PhD Sooty bark disease project? A: Environmental triggers are being studied, the lead on this project will join the meeting later this week (See IFQRG-22 Aguayo presentation).

Q: Are there any controls being implemented for ash dieback? A: No, it has spread too quickly.

Q: Live plant movement is not restricted? A: Ash dieback is not a regulated pest because it is fully established.

Q: Recent work shows that EAB has been found as far as Belarus, has it moved further? A: It appears to be moving further fairly quickly. It was expected to move more slowly in Russia; however, it jumped. There is still some ash, particularly around cities while there is not as much in forests.

Q: NZ is looking to review their surveillance programs and are interested in the design of surveillance systems and note that the sensitivity of the trapping is an important aspect. Trapping sensitivity can be used to determine effective trap density. How much information do you have on the efficacy of a single trap? A: This is not determined by ANSES researchers but by the NPPO, however ANSES analyses the corresponding interceptions. Generally, they don't expect to capture more than 30-40% with the Monochamol lure when trapping for *Monochamus* spp.

Comment: Recommendations for PWN surveys and decaying trees were made. It was noted that it is difficult to determine which pests have caused tree death in some cases. If surveys are conducted regularly (year around) a pattern regarding tree death associated with PWN may emerge and provide insight e.g., FORSAID project. Black traps set at a 150 m radius have been successful. It was noted that traps should not be placed inside healthy forests to prevent attracting *Monochamus*.

Note: It was noted that in Portugal ~8% of *Monochamus* spp. trapped annually carry PWN. Spread limitation is a continued priority. Portuguese studies have shown that around half of the *Monochamus* spp. in an infected tree will leave the tree without the PWN.

Q: How do you extract PWN? A: For wood samples they use a plastic tray and for insect samples, they crush the beetles in water.

Noted: Early warning systems focus on the vector. *Monochamus* spp. Population fluctuations are variable for a variety of reasons. For example, high populations may persist for one to three years following a forest fire and then drop off.

Q: Can you describe what is meant by shifting the strategy from hard to soft management? A: This is a shift from an eradication to a containment approach.

Comment: Trap sensitivity question - 30% trap efficacy for *Monochamus* spp. is good. Fruit fly pheromones traps are 1 to 5% effective. With this information a subsequent trap system grid can be designed to improve the sensitivity of the trapping system to achieve the outcomes targeted.

2. Meeting Arrangements

Michael Ormsby provided information about the meeting: 05_IFQRG_2025_Info.

2.1 Election of the Rapporteur

Meghan Noseworthy and Brad Gething offered to serve as rapporteurs. They prepared the report for review by the chair and presentation to participants for adoption before the close of the meeting.

2.2 Meeting Agenda

The meeting agenda was reviewed and adopted by participants: 01_IFQRG_2025_Agenda.

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
1.	**Opening of the meeting**		
1.1	Opening remarks and introduction to IFQRG by the IFQRG Chair		CHAIR
1.2	Greetings from EPPO Director-General Ms Olga Tikka		TIKKA
1.3	ANSES plant and forest missions and activities		REIGNAULT
2.	**Meeting Arrangements**		
2.1	Election of the Rapporteur		CHAIR
2.2	Adoption of the Agenda	03_IFQRG_2025_ Agenda	CHAIR
3.	**Administrative Meeting Information**		
3.1	- Presentation Abstracts - Local Information - Participants List	05_IFQRG_2025_Abs 06_IFQRG_2025_Info 08_IFQRG_2025_Part	CHAIR
4.	**Working groups list[1]**		
4.1	IFQRG 2024 Proceedings	07_IFQRG_2025_ Proceedings 2024	CHAIR
5.	**IPPC / Regional Plant Protection Organisation Updates**		
5.1	International Plant Protection Convention (CPM / SC) report		TBD
5.2	European and Mediterranean Plant Protection Organization (EPPO): An update on activities in the field of forest quarantine - 2025		MUSOLIN
5.3	Technical Panel on Phytosanitary Treatments (TPPT) report		ORMSBY
5.4	Asia and Pacific Plant Protection Commission/ Pacific Plant Protection Organization, APPPC/ PPPO report		ORMSBY
5.5	North American Plant Protection (NAPPO) - Forestry projects report – Alternatives to MB, ISPM 15 enhancing compliance, Heat treatment interlaboratory project		NOSEWORTHY

[1] Additional resources: IFQRG Work Area – 2024 Proceedings

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
5.6	The Global Alliance for Plant Health Quint Collaboration projects overview/ Methyl bromide alternatives working group update		MARCOTTE
6.	**Research to support the development of international standards for phytosanitary measures (ISPMs) for plant protection**		
6.1	Session Opening Remarks		CHAIR
6.2	Using molecular tools to elucidate the pathways of cryptic pests on plants for planting		NOSEWORTHY
6.3	Development of the EPPO guidance to the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood: definitions, trade and pest risk		UZUNOVIC
6.4	Dry wood pests affecting forestry commodities – working session discussion		ALLEN
6.5	EUPHRESCO III		REIGNAULT
Virtual Session – Tuesday September 30th – Day 2 – 14:00 to 17:00 PM CEST			
7.	**Forestry research, regulation and policy**		
7.1	Session Opening Remarks		CHAIR
7.2	Risk-based approach to the movement of germplasm into Australia: the luxury afforded to an affluent island continent		HOWARD
7.3	Improving pinewood nematode monitoring in France based on risk analysis		GROSDIDIER
7.4	Effectiveness of shredding methods against PWN		CLOPEAU
7.5	Phosphine as a possible alternative to methyl bromide for the phytosanitary treatment of wood products		HALL
7.6	Global update – Ethanedinitrile as a fumigant for wood products		HALL
7.7	Commercial-scale validation of the efficacy of ethanenitrile and methyl bromide against the sirex wood wasp (*Sirex noctilio)*		HALL
7.8	Recap of session		CHAIR
8.	**Treatments and guidance**		
8.1	ISPM 38 International movement of seeds in forestry		ORMSBY
9	**Pathogens in trade**		
9.1	Challenges in the validation of methods for the detection of quarantine pathogens: A case of study on *Phytophthora ramorum*.		PARRA*
9.2	Challenges in the surveillance and detection of quarantine fungal tree pathogens in European Union		AGUAYO
9.3	Forest pests heat treatment research - specific lethal doses for wood borers and fungal pathogens		NOSEWORTHY

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
9.4	Preventing the spread of forest pests and pathogens by using odour sensors at import sites		BONIFÁCIO
9.5	International movement of fungi associated with forest products - Risk of establishment		ALLEN
Virtual Session – Thursday October 2nd – Day 4 – 14:00 to 17:00 PM CEST			
10.	**New tools, technology and research**		
10.1	Session Opening Remarks		CHAIR
10.2	FAO Forestry update		SATHYAPALA
10.3	Development of the EPPO guidance to the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood: assessment and management of phytosanitary risk		HOWARD
10.4	Two decades of epidemiological surveillance of the pine wood nematode in France		MARIETTE
10.5	BxCheck - A molecular tool for detecting live and dead pinewood nematode in wood products		THOMPSON
10.6	Implementation of molecular tools in international forest phytosanitary regulation: Progress on a draft white paper by the IFQRG Molecular Tools Working Group		DALE
10.7	Recap of session		CHAIR
11.	**Other**		
11.1	IFQRG Terms of Reference review		CHAIR
11.2	CPM Focus Group on Research Coordination		CHAIR
11.3	Use of molecular tools in trade		CHAIR
12.	**Other business**		ALL
13.	**Review and finalize proceedings** **Plan next meeting**		CHAIR
14.	**Close of the meeting**		CHAIR

3. Administrative Meeting Information

3.3 Introductions

IFQRG participants introduced themselves and described their work and history with IFQRG.

4. Working groups list[1]

The molecular tools working group membership and meeting reports are documented in the IFQRG work area.

The IFQRG 2024 Proceedings are on the public IFQRG page: 07_IFQRG-2025_Proceedings_2024. https://www.ippc.int/en/partners/internationalforestryquarantineresearchgroup/publications/2025/01/report-ifqrg-2024-21-rome/

5. IPPC / Regional Plant Protection Organisation Updates

5.1 International Plant Protection Convention (IPPC) activities update.

Michael Ormsby (IFQRG Chair)

Michael Ormsby provided an update on IPPC activities.

Highlights of IPPC focus areas and activities included:

- The Standard Setting Unit process: Following the submission for a treatment standard, a steward is appointed who helps navigate submission through the process. An example of a wood product treatment submission to ISPM 28 - dielectric heating of wood. Standards are translated into five languages. https://www.ippc.int/en/about/core-activities/standards-setting/
- E-phyto: Electronic phytosanitary certificates aim to reduce fraud, enhance safe trade and may help developing countries.
- Pest Outbreak Alert System: https://www.ippc.int/en/core-activities/capacity-development/programmes/strenghtening-pest-outbreak-alert-and-response-systems/
- Global phytosanitary research coordination: https://www.ippc.int/en/commission/cpm-focus-group-reports/cpm-focus-group-on-global-phytosanitary-research-coordination/
- Newly adopted ISPMs: First annex to the commodity standard ISPM 46 for mango; Systems Approach annex to ISPM 39 International movement of wood; Diagnostic protocols for *Heterbasidion annosum* sensu lato (annex to ISPM 27).
- Specification for the safe provision of humanitarian aid in phytosanitary context https://assets.ippc.int/static/media/files/publication/en/2025/06/Spec_77_SafeAid_En_2025-06-05.pdf
- Consultations: First consultation of *Musa* spp. (banana) fruit annex to ISPM 46; Draft annex for the International movement of *Colocassia esculenta* fruit (taro) ISPM 46; Second consultation of ISPM 26 Pest free area for fruit flies; Draft annex to ISPM 23 Guidelines of Inspection - Field Inspection - issue of trapping sensitivity to increase the pest freedom declaration; Draft annex to ISPM 28: Irradiation treatment for *Pseudococcus baliteus.*
- Standards Committee (SC) Specifications: Remote audits (2023-031) to ISPM 47 (Audit in the phytosanitary context); Revision of ISPM 12 (Phytosanitary certificates) (2023-020); Revision of ISPM 23 (Guidelines for inspection) (2023-014); Drafts for 2026 consultation: International movement of citrus fruit (2023-019); International movement of seeds of *Phaseolus vulgaris*.

Q: Will chemical treatments for wood be submitted under the new chemical treatment standard?
A: The standard may include for example, chemical treatments for wood used for construction, addressing borers and termites, and to prevent moulds etc.

Q: In some cases, WPM may require chemical preservatives (e.g., the military agencies often use preservatives for wood), does this count as a treatment? A: Currently preservatives are not considered a treatment. There is some work done on the efficacy of wood preservatives. These would not be added to ISPM 15 due to the potential environmental impacts from wood burning.

Q: Is the focus of the chemical standard to review and determine specifics for use, health related issues etc.? A: The IPPC does not have the role to determine environmental or health risks, although if these have been established, they will be taken into account when adopting standards. This standard will provide guidance on how to apply a chemical treatment and its efficaciousness.

Note: Research has been conducted on surface vs impregnated chemical treatments.

Note: Many chemical treatments are designed to prevent infestation rather than to kill the pest in the wood.

Q: Has anyone come across research on chemical treatments for wood? A: Yes, however chemical treatment research does not tend to be a priority. Some research has been performed E.g., University of Oregon (Shauwecker, see IFQR 2010 document) https://www.ippc.int/static/media/files/publications/en/2013/06/05/1285057351_2010_IFQRG-8-28_Uzunovic_et_al._.pdf

Note: New chemical treatments will be annexed to ISPM 28.

Note: Wood composites have a chemical component as well as heat and pressure components. No known research has been conducted or documented on the chemical component of this process as a potential treatment.

Note: Human health considerations will continue to be investigated. It was noted that treated wood commodities must be safe as they are often associated with food commodities.

Note: Thermal modification [heating of wood that changes its structure or chemical composition] is another potential treatment that has not been researched or documented as a phytosanitary treatment.

5.2 European and Mediterranean Plant Protection Organization (EPPO): an update on activities in the field of forest quarantine

Dmitrii Musolin (European and Mediterranean Plant Protection Organization, EPPO)

The work of EPPO during 2024–2025 was presented, with a focus on activities in the area of forest quarantine. In particular, updates were provided on: (1) pest species of woody plants that were recently added to the EPPO Alert List, as well as to the A1 and A2 Lists of species recommended by EPPO for regulation as quarantine pests by member countries; (2) recent EPPO Pest Risk Analyses (PRAs) for pests of particular relevance to forestry (*Xylotrechus pyrrhoderus, Pseudips mexicanus, Pochazia shantungensis* & *P. chinensis*); and (3) the activities of the EPPO expert network involved in the surveillance, monitoring, and control of *Agrilus planipennis* (Emerald ash borer).

Additional notes:

EPPO currently comprises 52 member countries and there is hope for a few more countries to join. The group works on plant quarantine and plant protection products including:

- The EPPO early warning system: EPPO Alert List – Employs literature scanning and other sources of information. New: *Monema flavescens* (2025) and *Euzophera semifuneralis* American plum borer from NA, 2009 found in Türkiye. Pathways include plants for planting, round and sawn wood, cut branches. *Monema flavescens* – native to east Asia, introduced to the U.S. and is polyphagus. *M. flavescens* moves on the plants for planting pathway, cut branches, cut foliage and cut wood. A1/ A2 list (A1, not in the region; A2, in the region with limited distribution): *Ceratocystis ficicola* (A2, 2025) *Ceratocystis ficicola* on *Ficus* are important (native *Ficus*). *Xylotrechus pyrrhoderus* – A1, plants for planting.
- The Emerald Ash Borer (EAB - *Agrilus planipennis*) network was initiated in 2022. There is a website page on EPPO site with a newsletter which reports on information on EAB or other organisms related to this species. The focus of this work is to safeguard forests in Europe.
- Please note the upcoming *Safeguarding Forests in Europe: Emerging Risks of Agrilus Wood Borers (Buprestidae)* https://www.eppo.int/MEETINGS/2026_meetings/conf_agrilus

Note**:** Discussion on whether *Pochazia shantungensis* is sap feeder or xylem feeder. If it is not a sap insect it could be a vector for *Xylella fastidiosa*. Potential follow up recommended.

Note: *Xylotrechus pyrrhoderus* is an example of P4P pathway pest. The larvae mine both vines and branches.

5.3 Technical panel on phytosanitary treatments (TPPT) update

Michael Ormsby (Ministry of Primary Industries, NZ)

The Technical Panel on Phytosanitary Treatments (TPPT) evaluates data submissions from national and regional plant protection organizations (NPPOs) and reviews, revises and develops phytosanitary treatments (PTs). This group also provides guidance to the Standards Committee regarding specific phytosanitary treatment issues. The TPPT evaluates treatment submissions against requirements in the International Standard for Phytosanitary Measures ISPM 28 – Phytosanitary treatments for regulated pests. An overview of the submission process, need for phytosanitary treatments and the current status of PTs were provided.

The TPPT met in Yokohama Japan in June 2025 (20th year of the TPPT).

- Four draft treatments are currently under consultation, 12 treatments are under development, and four new submissions have been recommended by the TPPT for consideration for the work program.
- One submission has been made for the use of EDN on logs for two bark beetles.
- Treatment adoption is usually straightforward, however new treatments may be more difficult to move through the process. Initially submitting a treatment for all pests in wood using EDN may be challenging. At the IFQRG-21 2024 meeting this topic was discussed and suggested that it may be better to start with one pest or group of pests to enable countries to become more informed and comfortable with the approval of this fumigant.

5.4 Asia and Pacific Plant Protection Commission/Pacific Plant Protection Organization, APPPC/ PPPO report

Mike Ormsby (Ministry of Primary Industries, NZ)

The Asia and Pacific Plant Protection Commission (APPPC) has 24 country members that account for around 35% of world raw wood import trade and 19% of world raw wood export trade. The APPPC coordinates and promotes the development of regional plant protection systems, assisting its 25 member countries (Australia, Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Fiji, France, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Samoa (Western), Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Viet Nam) to develop effective plant protection regimes, setting standards for phytosanitary measures, and facilitating information sharing are among its key objectives. The Commission convenes at least once every two years. An update of APPPC activities was provided.

Additional discussion:

APPPC have been quite active in the development of commodity standards (e.g. rubber, they do not have the important rubber disease (SALB)).

The PPPO Pacific Plant Protection Organization: is responsible for 9.2% of the wood imports and 19.5% of the wood exports. The PPPO works on the safe movement of shipping containers that have a high sanitary risk. They have considered options like phytosanitary certificates for containers. One major concern for containers is contamination by ants (e.g., red imported fire ants). It was noted that often regional solutions and standards become a blueprint for international standards.

Initiatives to redesign sea containers have been proposed to help reduce contaminating pests, e.g. floor design and materials. At a recent North American Sea Container Initiative (NASCI) meeting this topic was discussed https://inspection.canada.ca/en/plant-health/invasive-species/sea-container-cleanliness. It was noted that changing design can be costly. Sea containers' typical durability is 10-12 years, but with care and maintenance they may last upwards of 20 years.

5.5 North American Plant Protection Organization (NAPPO) forestry projects report

Meghan Noseworthy (Canadian Forest Service, CFS), Scott Geffros (CWPA), Brad Gething (NWPA), Adnan Uzunovic (Canada Wood) and Eric Allen

NAPPO projects related to forestry products were presented. (1) The categorization of risk associated with wood packaging material was initiated in 2022. The expert group (EG) have been working to determine risk and define and harmonize terminology. (2) The NAPPO heat treatment water bath interlaboratory study is in the initiation phase of the project. This group is building heat treatment baths in different locations in North America to test forest product pests from different regions. A standard operating procedure to build, treat, collect and analyse data is being developed and research undertaken. (3) The NAPPO Alternatives to methyl bromide group is in its final year and is preparing recommendations for alternatives based on the EG's work.

Additional notes:

NAPPO has a Pest Alert System (PAS) which includes emerging pest alerts and official pest reports. To subscribe https://www.pestalerts.org/nappo/

Comment: The standard mode of measuring treatments focuses on the movement of the treatment through the medium (e.g., wood). For example, temperature probes are used for internal temperature monitoring of heat in the wood. Gas detectors are used to measure fumigant concentrations within a fumigant enclosure. For irradiation treatment, what has passed through the product is measured. Most treatment measurements do not look specifically at the pest. To accurately measure the effect of a treatment on the pest requires separation of the treatment dose from the treatment medium or application. For example, if emerald ash borer EAB survivors are found after treatment of 56 ˚C for 30 minutes (56/30), how do you determine whether the heat treatment dose or the application is the issue. In the fumigation realm, using MB as an example, there is ample research that shows that the effective dose is very is similar for a variety of pests (BMSB is one of the hardest to kill) - 70 grams is recommended and effective for most pests, however 130 grams is effective for BMSB.

Discussion: In NA there are continued questions regarding the efficacy of 56/30 and 60/60 is proposed as an alternative treatment. The precautionary principle seems to be at play in this situation. It was noted that the use of 60/60 for firewood was a special case, because firewood is not uniform, it is often comprised of various shapes and sizes of wood and in some cases of mixed species. Firewood is packaged and treated in large batches. Unfortunately following the 60/60 recommendation and implementation there was misunderstanding that this dose was required for efficacy rather than a fudge factor for treatment delivery of 56/30.

Often over treatment is aimed at ensuring the thorough delivery of the 56/30 dose throughout the chamber and its contents, penetrating the core of the wood in all wood pieces in a kiln. It was noted that frequent monitoring of treatment facilities and the treatment data records will reduce incidents of mis- or under-treatment. This is the case for PWN in Portugal. There is agreement that 56/30 is effective and that delivery monitoring is an important aspect of proper treatment programs. The delivery is dependent on proper oversight. Variables such as species differences, moisture content, wood density, product type, and load orientation need to be considered as well as ensuring that sure kilns are being properly operated.

It was noted that in the Haack et.al. (2014) paper, they concluded that pests moving on WPM were most likely due to fraudulent treatment, inadequate treatment or perhaps some pests are more tolerant than others.

It was also noted that the water bath study results have been helpful in supporting market access negotiations. The bath was named after Lee Humble the designer and will be able to address questions about the physiology of death, sublethal effects and used for assessing RNA probes.

5.6 The Global Alliance for Plant Health QUADS+ Collaboration projects overview/ Methyl bromide alternatives working group

Mireille Marcotte* (CFIA), Mike Ormsby (MPI), Meghan Noseworthy (CFS)

The Global Alliance for Plant Health (GAPH – formerly Plant Health Quadrilaterals – PH Quads) is a forum of National Plant Protection Organizations (NPPOs) – Australia, Canada, New Zealand, the United Kingdom, and the United States. Under this collaboration research projects and working groups have been formed to address biosecurity issues, share information, find solutions to

phytosanitary issues, and develop and share new tools and technologies for plant protection. An overview of the projects under this collaboration were provided with a special focus on the Methyl Bromide Alternatives Working Group (MBAWG).

Montreal Protocol on Substances that Deplete the Ozone Layer (MP) required a phase-out of methyl bromide (MB) for non-quarantine and pre-shipment uses except for specific critical exemptions by 2005 in developed countries and 2015 for developing countries. This phase out has generally been very successful. Quarantine and pre-shipment (QPS) is currently the predominant use of MB. In 2008 the Commission on Phytosanitary Measures (CPM) of the International Plant Protection Convention (IPPC) made a recommendation to replace or reduce the use of MB as a phytosanitary measure. The Methyl Bromide Alternatives Working Group (MBAWG) was established by the Plant Health Quads+ Collaboration Working Group (PHQCWG) to share data and information for scientific collaboration including research gaps and synergies, priority alternatives to MB, facilitate sharing information, and collect usage data. The project scope and findings will be presented, and feedback requested.

Additional Notes:

The goal of this group is to promote coordination of phytosanitary measures with a harmonized position. The group was formed in 2006 as a science working group; in 2016 a policy component was added.

Objectives include, discussing current related research projects, needs, treatments, new fumigants, heat treatment, updating usage data, and reduction plans. There is a repository of research trials conducted on alternatives including both success and failures to share information and reduce duplication. The group supports development of submissions for ISPM 28 (e.g., EDN). Current focus includes consideration of systems approaches (e.g., adding a treatment to other steps to result in reduction of risk).

Note: The highest use of MB was on wood products and therefore the greatest opportunity for use reduction. There is a misconception regarding the efficacy of MB - in many cases it is not as effective as assumed. It was noted that in general treatments are applied as part of a system.

Q: The NAPPO MB Alternatives Expert Group had a similar discussion. In looking for one replacement fumigant they noted that there may be options for specific products (e.g., EDN for wood, ethyl formate EF for fruits). Some people asked, why not use MB for some products where there is no alternative given that the levels have been reduced to pre-Montreal Protocol levels, have Quads+ discussed this? A: Agree that MB may not be phased out completely because no feasible alternative exists. The higher cost and reduced availability of MB may lead to the emergence of alternatives. Because many countries won't accept MB-treated products there is an incentive to find alternatives.

Note: It was noted that MB is naturally produced by the breakdown of brown algae. The quarantine purpose (QP) use has been noted to be within the seasonal fluctuations of naturally produced MB. In NZ there are no restrictions on QP use however there are health considerations for use on ports in urban areas.

6. Research to support the development of international standards for phytosanitary measures (ISPMs) for plant protection

6.2 EUPHRESCO III - Strengthening phytosanitary research programming and collaboration: from European to global phytosanitary research coordination

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The likelihood of pest introductions has grown as a result of increased global trade and transport, and climate change. Nonetheless, public resources to invest in research have declined. The Euphresco network was developed in 2014 to play the role of a platform for international coordination of phytosanitary research and funding, aimed at reducing the fragmentation and minimizing duplication of national and regional research activities. As Euphresco has largely been seen as a European coordination structure with a few non-European members included, the need for a global research coordination network has been identified by the phytosanitary authorities in many countries.

By building on the foundations developed by the Euphresco Network, the EUPHRESCO III project aims, for the period 2024 to 2026, to enhance national and regional phytosanitary research coordination and to set the foundations for global phytosanitary research coordination. The establishment of global plant health research coordination will gain from the regional experience and by integrating existing networks into a global structure. The EUPHRESCO III network builds upon the activities of organizations with a long history of coordinating plant health in their region: ACIAR, APAARI, CABI, CFIA, CIHEAM-Bari, EUPHRESCO, INIA-CSIC, KHA, NIBIO, NVWA, PBRI, PFR, USDA; but also from dedicated networks for specific “disciplines” (e.g. forests, seed production).

The 35 EUPHRESCO III partners work together to enhance the coordination of phytosanitary research programmes in order to better align the research funding and policy making activities. The main activities undertaken over the period 2024-2026 are:

The identification of common research and innovation priorities agreed among the participating national and regional R&I programmes

The implementation of multiannual joint calls, resulting in the commissioning of transnational collaborative R&I projects

Supporting plant health policy development, technology development, market introduction and societal uptake of results

Additional Notes:

NPPOs rely on scientific expertise but the services providing this expertise are lacking due to staff funds and training. **EU**ropean **PH**ytosanitary **RES**earch **CO**ordination EUPHRESCO was launched in 2006. It has evolved to extend geographically, renamed EUPHRESCO II in 2011 and EUPHRESCO III 2024. The success of EUPHRESCO is partially due to the recognition of the needs of other regions of the world as well as the focus on global phytosanitary research coordination.

EUPHRESCO III goals include a blended system of regional and national goals. Global work packages have been identified for a wider geographical range with short, medium and long-term outreach plans. Examples of research topics proposed this year include: on-site diagnostics, testing and validation tools for generic surveillance of wood boring beetles, risk assessment and mitigation in wood chips and fuel wood international trade, and using modelling approaches to improve detection, eradication and management of Asian long-horned beetle.

Note: EUPHRESCO does not sponsor funding for research but rather coordinates the research projects.

Website: https://www.phrescoglobal.net/index

Q: Is there an ongoing call for projects? A: Yes, there are four steps involved including identification of topics and identifying a leader for a topic.

Q: What has been previous experience with EUPHRESCO 1 and 2 for policy making. A: They are focussed on work on plant health as a whole. However, many topics have been diagnostics-focused which has had a direct impact on policy (e.g. EPPO standards development).

Q: Recent interest in designing phytosanitary research programs has highlighted challenges such as how to measure performance and ensure concepts are relevant, and support needs. There is a disconnect between leaders' focus and needs from research, and researchers using tools for needs that are current. How has EUPHRESCO dealt with this? A: This is a consideration of needs and time available as well as funding. Looking forward, this is a consideration.

Q: Great to do this type of work and it is important that the projects are EU-centric, but also international in scope e.g., NAPPO heat treatment interlaboratory project. A: Agree this is a consideration and a main objective is to mobilize resources while avoiding redundant research.

Q: Regarding the IPPC goal for collaborative research, will EUPHRESCO be involved? A: Yes, they will be interviewed as well.

6.3 Challenges in the validation of methods for the detection of quarantine pathogens: A case of study on *Phytophthora ramorum*.

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Validation data is crucial for the selection of reliable assays for the detection of plant pathogens either for routine diagnostic testing of endemic or quarantine organisms (QOs). The selection of the assay is heavily influenced by the equipment and the experience built in a given laboratory. However, the selection may be also guided by the availability and costs of the reagents or even the preference for home-brew assays. Despite most of the detection assays published in peer-review journals assess basic reliability criteria, the data sometimes seem to be insufficient or outdated when new lineages, populations, races, hosts associations or species in the genus are described. This landscape makes the validation of detection assays for QOs a fertile and dynamic field of research. *Phytophthora ramorum* affects more than 180 plant species and is listed as an EU-QO and a EPPO A2 pest; and despite several detection assays having been developed in the last years, there are some questions

that remain unresolved. As part of the efforts to help mitigate its impacts and prevent new introductions in the EU territory, the EURL for Plant Pathogenic Fungi and Oomycetes (EURL Fungi) assessed key reliability criteria for three publicly available assays targeting the sudden oak death pathogen, including the ability to detect recently described lineages. Moreover, we assessed the reliability of the assays on both artificially and naturally contaminated material. Our results indicate that the methods have similar levels of sensitivity when positive controls plasmids are used as target, but differed in inclusivity, specificity and transferability levels. Also, we observed a high variability in the results obtained from naturally contaminated material. None of the assays achieved full reliability, either because there is inclusivity, specificity or transferability drawbacks. However, the data generated by the EURL Fungi provides insights on the provisions and considerations that national reference laboratories and other users must have when deciding what assay to include in their routine diagnostic pipeline.

Keywords: *Reliability, regulation, European Union, Reference Laboratories.*

Additional notes:

The mycology EU reference laboratory provides technical assistance to EFSA. The EU reference collection comprises quarantine pathogens collected with help from colleagues around the world. There are 40 fungal taxa currently listed in the EU quarantine pest list. Most of them are not present in the EU territory. Thus, they are tasked with a great deal of paperwork to attain samples for the reference library and design the best detection assay.

Phytophthora ramorum case study: The next steps include collection of more reference specimens. Currently there isn't a perfect assay, but validation data will help to establish contingency plans and tackle flaws in the assay(s). Given this review of assays the question remains whether a new assay is needed.

Q: What do you think of eDNA for assay use? A: Fine-tuning is needed; it is prone to false positives. In some cases, resolution cannot be achieved. Time can be limited when needing to respond to a request (shipment release) not sure if it will be efficient and reliable.

Note: If one pathogen dies and another takes over both may show up. A: Real-time (RT) PCR will pick up both if it was there. Thus, detection and follow-up isolation is important/ essential.

Q: How do you show that it was alive? A: Isolation can take a long time (24h to a week) which can be an issue. Historic data is important in these situations i.e. symptomatic fruit. So, if the pathogen isn't alive due to pesticide use the pathogen may be present and if it is from a pest free area (PFA) then there is an issue.

Q: Diagnostics are measures used in inspection. In the context of risk assessment, specificity is important. False positives on import are acceptable as over management still prevents establishment. For exports false positives are a problem as they incorrectly indicate system failure. Diagnostic labs have many challenges and thus research is essential. A: Validations have proficiency tests for all EU labs to ensure homogenization of detection capacities.

6.4 Dry wood insect pests affecting forest commodities

Eric Allen*, Meghan Noseworthy, Thomas Schröder and Chris Howard

Dry wood pests pose a threat to agricultural and forestry commodities worldwide, impacting plant protection efforts and international trade. These pests, including various species of beetles such as Anobiidae and Bostrichidae, are characterized by their ability to infest seasoned, dry wood, often causing internal damage that is not immediately visible. Their life cycles typically involve larvae and adults boring into wood, leading to structural weakening and economic losses. Despite the implementation of ISPM 15 —which mandates phytosanitary treatments for wood packaging material (WPM) to mitigate pest spread—dry wood pests detected on ISPM 15-treated WPM do not necessarily indicate treatment failure, as these pests may attack post treatment. This creates a regulatory gap and complicates trade inspections, leading to differing concerns among countries regarding pest risks and quarantine measures. Effective management of dry wood pests requires improved detection methods, updated regulatory frameworks, and international cooperation to address these challenges. Key questions to explore include: How can detection and monitoring be enhanced to identify these pests? What are the best integrated pest management strategies for dry wood pests? Do existing international standards adequately address risks associated with these pests? Addressing these questions is essential to protect forestry commodities, facilitate safe trade, and harmonize phytosanitary measures globally.

Additional information:

Finding economic data on the impact of dry wood pests would be useful to provide perspective on the potential scope of the issue. It was recommended that data on termites could be useful for context in a preliminary analysis.

Potential project: Draft a position paper on recommendations for how to handle dry wood beetles going forward. What is the true risk associated with these pests, and what is the acceptable level?

Understanding moisture level changes over time in wood packaging would be useful. It would be good to hear from regions where dry wood beetles are more prevalent (tropical regions), as well as other commodities that can be affected, e.g. handicrafts.

Climate change will likely increase the climatic-suitable area and thus increase pest prevalence.

Understanding how post-treatment infestation occurs is needed to provide guidance for best practices for storage. This information could also apply to contaminating pests more broadly.

The recent COSAVE CPM report was discussed, and the following was noted:

- The report includes interception data on dry wood insects and implies that ISPM 15 is deficient because of their presence, however ISPM 15 does not address post-treatment infestation.

Q: Are there vectored organisms on these pests? A: It may be useful to understand the potential for dry wood beetles to be a vector for pathogens.

Note: Regarding the graph on MC of wood, PWN would not survive under 20%

Note: There is different pest risk associated with heat treated (HT) versus kiln-dried heat-treated (KDHT) wood post treatment. For example, PWN can transfer to heat treated wet wood.

Action: The dry wood pest EG will continue to develop a potential white paper incorporating the discussion captured above.

6.3 Development of the EPPO guidance to the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood: definitions, trade and pest risk

Adnan Uzunovic (Canada Wood), Tom McDonald (DAFM), Jean-Marc Henin (Walloon Agricultural Research Centre), Christopher Howard (DAFF), Xavier Tassus (Anses), Dmitrii Musolin (EPPO)

The global trade in wood chips and other types of fragmented wood is extensive and rapidly evolving. The movement of these commodities poses a significant risk of introducing and spreading pests—primarily insects, but also other organisms such as nematodes and fungi associated with bark and wood.

To address the current phytosanitary concerns linked to the trade in wood chips and other types of fragmented wood, the Panel on Quarantine Pests for Forestry of the European and Mediterranean Plant Protection Organization (EPPO) has initiated the development of a guidance document. This document will focus on assessing and managing the risks associated with the international movement of such commodities.

In this presentation, we will provide updates on the definitions of the relevant commodities, highlight trends in their international trade, and share the results of a recent survey. The survey asked National Plant Protection Organizations whether they had any records of quarantine pest interceptions in imported wood chips, as well as any instances of pest establishment likely linked to such imports. We will also discuss approaches to phytosanitary risk assessment in this context.

Additional notes:

- Generally, there seems to be a lack of available phytosanitary treatments for this commodity.
- Definitions of wood chips were developed based on existing descriptions from standards (ISPM 5) and ISOs.
- Note: wood fragments that have little oversight, are variable in size, have bark content, and are often created at the harvesting site are usually destined for bioenergy, while more uniform consistent chips are destined for pulp and paper.
- Wood chip pest risk is a function of: wood source, pest status prior to fragmentation, potential infestation post fragmentation, size and type of fragmented wood, moisture, bark content, and the processes involved in processing, management, treatment, handling, storage and end use.
- Potential management practices include: control of source wood, removal of bark, chipping processes, storage and transport considerations and planning end use.
- Potential treatments: HT - kiln and dielectric, MB, Phosphine, SF, EDN, ionizing radiation

- Heat Treatment processes for wood chips have been submitted to the TPPT without an existing treatment schedule in ISPM 28. One example was a conveyor belt approach. These approaches cannot be approved without an existing approved treatment schedule.

Q: Do you know what the status of ISPM 28 bark steam treatment is? A: It is lacking some data; it describes the process but not a schedule.

Note: End use is a good option, however, is there concern regarding the loss of control of the product post entry in the importing country. Perhaps more rigour applied in the importing country would improve this option and make it more attractive.

Note: Using contractual agreements as incentives to create products that are in keeping with the export/import requirements may be a way to ensure the product is safe.

Note: An example of heat treatment applied to wood chips was noted using a heat source already existing (e.g. sugar processing mills) as a good option.

Note: Systems approaches were considered however they seemed to be too complicated and often target a single pest, which would not satisfy the requirements that the current guidance is trying to satisfy. It was mentioned during the discussion that systems approaches are a good option for trade where risk can be reduced at different stages of the production chain. For example, harvested material from PFA, harvesting during periods when pests are not present etc. The various options and points along the production chain where steps in a systems approach could be implemented was outlined in the IFQRG 21 meeting in 2024.

Note: Sulphur for fertilizer is a visual attractant (colour) for a single beetle. A pile of wood chips could attract pests in the same way.

Note: Paper mills require a lot of heat and may use wood residue to make heat for this process.

Q: Do you consider wood shavings as a category of wood chips? Wood shavings are created post-heat treatment when planing sawn wood. Is it possible to start with a safe product and start trade and then expand to other categories based on analysis of the production continuum and a systems approach? A: It was noted that there are current examples of wood shaving export created from heat treated wood with no issues (end use animal bedding).

Note: Other aspects that could be included are some case studies, workable scenarios, systems approaches.

Virtual Session – Day 2, Tuesday September 30th, 2025: 14:00 – 17:00 CEST

Meeting joined by virtual participants (approximately 25)

7. Forestry research, regulation and policy

Chair, Mike Ormsby welcomed the in-person and virtual attendees to the second virtual session on forestry research, regulation and policy.

7.2 Risk-based approach to the movement of germplasm into Australia: the luxury afforded to an affluent island continent

Chris Howard: Australian Government Department of Agriculture, Fisheries and Forestry.

Geographically and botanically isolated, the island continent of Australia has an advantage in being able to strictly control the movement of germplasm across its borders. However, these strict and enviable controls come at a significant cost to importers and the regulator. This presentation summarised two factors that enable the safe movement of forest product germplasm into Australia: 1) the risk-based approach to germplasm entry requirements; and 2) the significant Australian Government investment towards building and running a dedicated and state-of-the-art post entry quarantine facility. Further, the presentation will seek to promote discussion about how the International Standards for Phytosanitary Measures (ISPM) No. 36 – 'Integrated measures for plants for planting' can be effectively implemented to enable nations not able to adopt the Australian models above to import pest-free germplasm, and whether the development of IPPC guidance material may be helpful with implementing this phytosanitary standard.

Additional Notes:

Q: From your perspective can you comment on the following: in the US pest propagule pressure from plants for planting (P4P) and WPM are looked at together. Is this the case for Australia? A: The two categories are considered to be different from the standpoint that plants are a much more prominent pathway for pathogens.

Q: How do you manage the plants for planting pathway in Australia? A: The commodity is first isolated to ensure it isn't infested. Diagnostic testing with rapid detection and response is conducted. Potentially encourage countries with more resources to help the importing country manage the commodity.

Q: Do you think limiting large landscape plants for planting would help? A: Yes, can we recommend this approach? Identify the pathway and come up with recommendations.

7.3 Improving pinewood nematode monitoring in France based on risk analysis

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The Plant Epidemiological Surveillance Platform (ESV Platform) is in charge of improving plant health surveillance in France. The platform is made up of experts from 7 partners (INRAE, Anses, DGAl (Ministry of agriculture), Chamber of Agriculture, FREDON, Agricultural technical institute, Cirad). Surveillance, analysis, and advice are the main areas of action for public policy and plant health professionals. The ESV Platform includes many working groups dedicated to a specific topic (*Xylella fastidiosa*, Huanglongbing, pinewood nematode (PWN), vine dieback). PWN, *Bursaphelenchus xylophilus*, is an EU priority quarantine pest, obliging each state member to monitor and to manage

this pathogen on its territory. The PWN monitoring working group brings together experts and professionals to work on improving surveillance of this pest.

As part of this effort, a relative risk analysis was conducted. After identifying the risk criteria, a multi-criteria analysis was carried out with the experts of the working group, resulting in maps that can be used by risk managers. Thus, areas at risk of PWN entry and establishment have been identified, as well as areas at risk of disease expression in France. Based on these results, surveillance conducted in recent years was evaluated, and a sampling plan is proposed.

Moreover, the insect vector population was estimated according to two models to better target the risk of establishment and improve insect monitoring through trapping.

Additional Notes:

This project evaluates current surveillance systems, including traffic: air flow, maritime flow, rail flow and road flow. They looked at the host area, forest fire area, disease expression in symptomatic and asymptomatic areas. They worked on developing a PWN relative risk analysis. This information is available on the website of the platform: Zones à risques relatifs / Nématode du pin https://plateforme-esv.fr/sites/default/files/2023-11/Dasboard_PWN_Nov2023.html

They conducted spatio-temporal modelling of vector populations using variables, including distance to forest fires, hosts, etc.

Note: *Monochamus* is attracted to fire and burned wood.

Q: In the introductory slides, you mention focus on long distance transfer by wood with the insect vector. Is the approach to focus on insect vector? A: Yes, the position of the working group is to focus on the vector and the wood infested by *Monochamus* spp., however they survey for the nematode as well.

Q: Can you test the model with surrogates? A: Not yet it is too soon, as we have just finished making the model.

Q: In the context of interception vs establishment potential, can you talk about how the interception map is related to establishment? A: The risk of establishment rating on the map is related to the area covered in pine and proximity to ports where WPM is present. For example, the map of risk analysis is related to the forest coverage, species of pine and the presence of the beetle. Marseille is considered high risk because of the port in the area (WPM) and the presence of the beetle *Monochamus galloprovincialis*.

Note: This research group might consider validating the model in areas where PWN is established in Portugal or Japan.

7.4 Effectiveness of shredding methods against the spread of pinewood nematode

Armand Clopeau (FCBA, The technological institute for forest cellulose wood-construction furniture)

The national emergency health response plan for the pinewood nematode requires the shredding of symptomatic trees and slash from the current year's and the previous year's forestry operations into chips with 3 dimensions of less than 3cm. It is estimated that around 300,000 m3 of wood would have to be chipped for each application of the emergency plan. The DéchiChamus project has made it possible to assess the effectiveness of different shredding treatments in killing *Monochamus*

galloprovincialis larvae. The results obtained provide information on the potential success of the emergency plan and the types of equipment that can be used to combat the pinewood nematode.

The survival rate of larvae to the adult stage was 64% in the unprocessed control logs and 0% in the shredded logs. Theoretically, 136 to 161 larvae were present in the crushed batches. Shredding was therefore fully effective in destroying *Monochamus galloprovincialis* larvae, even for chips exceeding the recommended size of 3 x 3 x 3 cm.

The study also showed that, for an equivalent volume of wood, small-diameter branches are just as important sources of infestation as larger-diameter branches.

For more information: https://www.fcba.fr/travaux/dechichamus-dechiquetage-de-monochamus-galloprovincialis/

Additional notes:

Note: The emergency response plan against the spread of PWN was developed in 2019.

Note: Researchers also looked at egg laying on branches. They noted small diameter branches were susceptible.

Debarking was considered as a measure to use in the future.

Q: What machines were available? Note a 50 cm diameter branch is very large, 25 or smaller would be better. A: More machinery will be available for this size. Small branches can support the development of *Monochamus* spp. larvae. An important aspect of felling symptomatic trees is that all branches should be collected.

Note: Bark thickness of pines should be a factor in establishing the size limit when chipping. Larger diameter logs are less attractive to *Monochamus* spp.

Q: That may be why there were fewer beetles in larger diameter logs as you found. A: We have good models for estimating thickness of maritime pine *Pinus pinaster*.

Note: It was noted that in Portugal, felled trees potentially infected with PWN are preferably immediately shredded into chips (focusing on wood less than 30 cm). Big logs are left for other uses since *Monochamus* beetles do not colonize large diameter wood.

Q: What is the risk of *Monochamus* spp. oviposition in chips A: If the bark is removed *Monochamus* spp. won't lay eggs in chips. Even if a female finds a chip with bark, they are still not likely to lay eggs on it. Q: If the female did lay eggs on a chip with bark, how would the larvae survive? Development requires many months which would not be possible.

Q: All *Monochamus* spp. larvae were killed by chipping, but did you observe smaller insects? A: Didn't see any other insects, however we are not 100% sure.

Note: Canada conducted chipping research using wood embedded with fake rubber insects and live bark beetles. They observed one out of 2,300 scolytids emerged after chipping. They presumed that the gravitational forces associated with chipping were so great that the insects were destroyed.

USDA APHIS has recently approved chipping/shredding of WPM in their treatment manual. It was noted that PWN would likely not have been considered as it is native to the US.
https://acir.aphis.usda.gov/apex/CIRD_Print_Document_Detail?rowId=a0jSJ00000KnBQFYA3&Document_Type=Treatment%20Schedules

The size of the hammer-milled chips created in this process may be beyond the acceptable size in ISPM 39, however the process as noted above is very destructive. It was noted that hammer milling is not as effective as chipping and is not recommended. In this study hammer milling resulted in 70% 3x3 cm chips with occasional long pieces.

7.5 Phosphine as a possible alternative to methyl bromide for the phytosanitary treatment of wood products

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Phosphine (PH3) has gained momentum as a phytosanitary treatment to control quarantine pests in exported wood products. Originally used as a grain fumigant, its use increased after methyl bromide was banned for its ozone-depleting properties. While the effectiveness of PH3 against grain pests is well-established, its efficacy for wood products requires review due to growing adoption. We observed insufficient evidence supporting PH3 as a broad-spectrum quarantine treatment for wood products from peer-reviewed/grey literature and international groups. We assessed 41 research articles covering 29 insect species, 1 nematode, and 11 fungi, and observed that while PH3 is effective against some forest insects, it generally fails to meet quarantine treatment standards and is ineffective against nematodes and fungi. Our analysis highlights concern over the effectiveness of PH3 as a broad-spectrum treatment for wood products. Many studies lack the quality needed to meet contemporary standards. We strongly recommend that National Plant Protection Organizations review the efficacy data supporting PH3 use for wood products to strengthen biosecurity systems.

Keywords: Chemical treatment, Fumigation, Invasive species, Montreal protocol, Phosphine, Stored products

Additional information:

Note: Phosphine can be successfully used as part of a systems approach where many factors are combined to achieve the ALOP.

7.6 Global Update – Ethanedinitrile as a fumigant for wood products

Matthew K.D. Hall[1]*, Adnan Uzunovic[2]

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Ethanedinitrile (EDN) has gained significant momentum in recent years, with eight countries registering this fumigant as a treatment for wood products since 2019. EDN is currently registered in Australia (2013), the Republic of Korea (2019), Malaysia (2020), Russia (2021), New Zealand (2022), Turkey (2022), Uruguay (2023), South Africa (2024) and Uzbekistan (2025). The majority of EDN is currently used in Korea during the winter to treat logs when the ambient temperature is too low for methyl bromide (MB). EDN can be effectively used at lower temperatures due to its boiling point of - 21°C (- 5.8°F), compared to 4°C (39.2°F) for MB. The annual use of EDN in Korea is ~100 tonnes. In 2025, South Africa approved EDN as a phytosanitary treatment for all wood products imported from Australia, Malaysia, New Zealand, Turkey and Uruguay; and Uruguay approved EDN as a phytosanitary treatment for all wood products imported from all countries. In 2025, the draft ISPM (International Standards for Phytosanitary Measures) 28 application was updated (last updated in 2022) and is currently being reviewed by the Korean NPPO (National Plant Protection Organisation) before submission to the TPPT (Technical Panel on Phytosanitary Treatments). The EDN efficacy dataset consists of 36 insect, 14 nematode and 58 fungal species. It is anticipated that the ISPM 28 application will be submitted by the end of 2025.

Keywords: Chemical treatment, Fumigation, Registration, Market Access, Wood products

Additional Information:

The researchers have amassed a 320-page report on efficacy data. They are considering hiring a liaison to help with the review and submission to ISPM 28. They would like EDN to be considered a broad-spectrum treatment rather than a narrow-scope approval as a first step.

Q: How do you perceive the future for EDN even if the submission under ISPM 28 goes through especially regarding registration by environmental agencies? A: Registration is challenging in many countries. Legacy products were approved many years ago under different standards. Based on what we have gone through with one agency and data and experiments required, we don't see any business picking up a bill for research and development to justify registration. In the past we believed that if you provide good science, it will go through, but in some cases science is not enough. In addition, commercial interest to adopt alternatives are not there as MB use for QPS is not regulated. Where MB is still available it is cheap, and people can continue using it. Any change in governmental organisation and individual businesses for MB requires significant effort. We're not sure what the future will bring, but it is taking much longer than anticipated. Still, we remain hopeful.

Note: It was mentioned that there is a TPPT submission (2025) on EDN for logs infected with bark beetles (2025).

7.7 Commercial-scale validation of the efficacy of ethanedinitrile and methyl bromide against the sirex woodwasp (*Sirex noctilio*)

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Two field experiments were conducted to test the toxicity of ethanedinitrile (EDN) against the sirex wood wasp (*Sirex noctilio*) located within naturally infested pine (*Pinus radiata* D.Don) wood. The first experiment was conducted by placing infested wood within log stacks fumigated under a tarpaulin. Log stacks (151.4 ± 8.8 g/m3) were fumigated at ambient temperatures with an EDN dose of 100 g/m3 for 24 h. The second experiment compared the effectiveness of EDN and methyl bromide (MB) at ambient temperatures and was conducted by placing infested wood within 10-foot shipping containers (15.9 m3). A dose of 100 g/m3 EDN and 64 g/m3 MB for 24 h was applied to containers. Mortality assessments were conducted by (1) counting the number of emergence holes in the control and treated billets; and (2) some billets from each replicate were scanned using computed tomography. This was to improve the estimation of infestation rates and to quantify which life stages were present within the billets. The results of this research will be discussed.

Keywords: alternatives, CT scan, fumigation, ISPM 28, sustainable fumigant, wood-boring

Additional Information:

EDN looks to be equally effective against *Sirex noctilio* compared to MB, however neither appears to be 100% effective.

Note: the papers supporting these presentations are posted on the IFQRG Work Area.

https://doi.org/10.1016/j.jspr.2025.102672

END of Virtual Session – Day 2, Tuesday September 30th, 2024: 14:00 – 17:00 CEST

RECAP of Virtual Session I:

Comments: From regulators perspective the wood chips talk was very useful. IFQRG connections across the world and building research relationships are important to this group.

Discussion on diagnostic protocols: EPPO tries to include all the verified methods available.

Action: Please let EPPO (Dmitrii) know if any EPPO DPs require revisions.

8. Research, treatments and guidance

8.1 Using molecular tools to elucidate the pathways of cryptic pests on plants for planting

Isabel Leal[1], Meghan K. Noseworthy[1], Dario Ojeda[2], Shayla Thom[1], Jessie Power[1], Annie Dicaire[1], Etsuko Shoda-Kagaya[3], Esme P. John[1] and Leland Medley Humble[1]

[1]Pacific Forestry Centre, Natural Resources Canada, Victoria, British Columbia, Canada

[2]Finnish Museum of Natural History, Botany and Mycology unit (LUOMUS), University of Helsinki, Finland

[3]Forestry and Forest Products Research Institute, Tsukuba, Ibaraki, Japan

The movement of live plants for planting (P4P) provides a potential pathway for pests to move to novel environments. Cryptic pests can move on live plants undetected. Using genetic tools, the introduction pathways for two root-feeding weevils, introduced to North America were examined. The arborvitae weevil, *Parascythopus intrusus* and European snout weevil, *Phyllobius oblongus* populations in their place of origin in Japan and Europe respectively and their introduced regions in Canada, were examined to determine if established populations found in Eastern and Western Canada moved from their origin region directly, or if they moved into Canada and then across the country naturally or via domestic live plant trade.

Additional Notes:

Molecular analysis concluded that *P. intrusus* was introduced through two separate events whereas *P. oblongus* slowly dispersed across Canada from the east to west.

While ISPM 36 provides guidance for plants for planting, more guidance or recommendations on implementation may be recommended to better mitigate pest movement on this pathway.

Q: Life stages? How do they overwinter? A: In the soil. They feed on roots.

Q: What is the pathway? A: Not clear but could be along the movement of cedar plantings because of their commercial value.

Note: Online e-commerce is possible for live plant trade and is risky. This continues to be a challenge. (Note IPPC e-commerce EG)

Note: Regarding the concern associated with endophytes and pathogens, how do we determine what might be or become a pathogen if it isn't currently?

Australia and New Zealand have strong regulations for nursery stock (plant in pot to tissue culture), however there are many gaps. If they don't restrict the import of nursery stock, there is a cost for this including a lack of quarantine facilities. Consequently, they opt to import small amounts. For example, the risky germplasm is imported and bulked up in the country. If the market was opened it would be bad for the established bulking facilities. The use of quarantine facilities for screening plants for planting play a very important role.

Unknowns, particularly pathogens are an issue and are difficult to manage in a biosecurity system that relies on knowledge of what is out there.

Cryptic organisms are difficult to sample and test for. If it is in the branch and you sample the leaf you may miss this organism. Some researchers force expression of a suspected pathogen by applying environmental stressors.

Suggestion: Develop a protocol for generalized pathogen detection. Is this possible? Is there a better way to screen pathogens? Should this be a pre-export requirement?

Suggestion: Sentinel networks (botanical gardens) where native and non-native plants grow together to investigate potential expression and host shifts of invasives recommended. This requires diligent inspection regimes.

Note: Some countries have different regulations for neighbouring countries versus offshore countries. For the former, strict *in vitro* risk assessment may not be conducted. In addition, more work is conducted on viruses but not as much is known or developed for pathogen screening. What has NZ done on this?

Action: NZ report on tissue culture may be shared in the Work Area if it is available (MO).

Q: Why is WPM still a focus rather than P4P? A: This may be due to the type of pests moving on the P4P pathway compared to those that moved on the WPM pathway historically or the variety of sources of WPM which are varied.

Note: ISPM 36 was hard to get developed. The economics of the pathway are less understood and more difficult to quantify. Perhaps getting economists involved to provide an assessment of the potential impact of this pathway would be helpful.

The aesthetic value of plants vs WPM may explain some of the differences we see on the focus dichotomy.

Treatment is easier for WPM. What is available for plants for planting? Irradiation may damage plants, fungicides may induce resistance, heat is a possible but not enough work has been conducted on HT.

The group looked and discussed ISPM 32 - Appendix 1, Categorization of commodities according to their pest risk. WPM is category two, P4P is four.
https://www.ippc.int/static/media/files/publication/en/2016/11/ISPM_32_2009_E.pdf

Note: P4P is more difficult to manage, there are many unknowns, this subject and pathway need work. What can IFQRG do about this?

- NPPO lab doing testing - trusted source
- Pre-export inspection and pre-import inspection? It is more cost effective for the importer to use the exporters screening facility. If it is requested, potentially industry may align. One of the issues with this strategy is that there are few facilities that can offer this service (e.g., Scotland, France, Canada, NZ, South Africa, US).
- Can a high-risk host be refused? E.g., in the early days of *P. ramorum*, there was talk of blocking the top five hosts for this reason. Legislation may not allow it if there isn't a proven pest risk. Prohibition of a genus would not be allowed legally in some countries unless the pest is known in the export area (and is not in a PFA).

The balance between managing risk and not disrupting trade is challenging and may contribute to risk tolerance. E.g. WPM ISPM 15 exemption in NA.

Regarding regulating a genus - the SPS agreement allows a degree of caution within the scope of risk analysis. Understanding the breadth of the risk and having to deal with uncertainty. You can be risk accepting or risk averse (bound). Look at the number of species in the genus with *P. ramorum* to assess level of risk with a genus. Not using precaution when setting measures, but within the risk analysis. Therefore, some genera listed species that were restricted but in other cases a whole genus

was restricted. Note: some plant species may only be hosts as a result of propagule pressure (e.g., pitch canker and grasses).

Outstanding issue - Unknown unknowns (risks that we do not know we do not know)

Solutions: test for potential pathogens - needs to be cost effective (test), available to trading nations, time efficient (holding up shipments), need a library of potential pests (shared library), technology as well as policy to build a library and ease of testing.

8.2 ISPM 38: International movement of seeds in forestry

Mike Ormsby (Ministry of Primary Industries, NZ)

ISPM 38 provides guidance on assessing and managing the pest risk associated with the international movement of seeds as a commodity. Both the current standard and the original specification were described and included aspects that are not in the standard but are worth further consideration.

There are four groups or forms of pest risk associated with seeds: (1) from seed to sprouting plant (e.g., *Fusarium circinatum*), (2) transferred from seed to the environment (into the planting medium) and then into the seedling (e.g., *Phytophthora*), (3) in seed but unable to infect plants from the seed (e.g., rusts - host specific), (4) not in or on the seed (e.g., Dutch elm disease). For the latter two the seed is not a pathway.

Trees produce seed in a way that reduces the likelihood of infestation by pathogens by having no direct connection between the tree vascular system and the seed germplasm. Some pathogens can still cross into the seed germplasm from the tree or can infect the germplasm at the time of fertilization (e.g., pine pitch canker, PPC). If the seed comes in contact with the ground, some soil pathogens may be able to also infest the seed.

The draft for tree seed included aspects that not in ISPM 38 such as tree-seed specific information, pests not on the path, seed storage (information on dry seed conditions and special considerations), measures options and cautions (e.g. fungicide coating protects against transference of a fungus, but does not prevent infection of a seed itself).

Inspection (sampling, detection) and treatment (chemical, physical, mechanical, and biological) are the two most widely used measures to reduce risk associated with seed trade.

Detection using molecular tools have been developed for specific pests.

EUPHRESCO Project (Franic et al 2023) https://link.springer.com/article/10.1007/s40725-023-00211-3) describes incidence of disease in tree seeds as well as the post-introduction establishment and spread scenarios.

Because trees are not annual crops, crop rotation and/or harvesting isn't an option for mitigating pests.

Contaminating pests on seed are documented (e.g. pathogens not associated with a tree may be moved with traded tree seed).

ISTA provides sampling sizes for tree seeds (10,000) however this is still not large enough and will have a low level of confidence. The seed is destroyed as the testing is molecular. Thus, commodity loss is substantial and potentially cost prohibitive. Currently there are no sampling benchmarks for seeds available for phytosanitary testing.

Treatments include heat treatment (Ramsfield et al 2010) have been developed however they are not as successful as chemical treatments.

Post entry quarantine can be costly and in many cases confidence in pest detection isn't well understood. It was assumed that seed trade was relatively low risk, but it has been discovered that the seed pathway is riskier than once thought.

Concluding thoughts: Risk mitigation of seed borne disease is challenging and relatively high risk. ISPM 38 doesn't recognize the difference between annuals and perennials like trees.

Q: It was initially thought that seeds were a relatively safe pathway, when was it realized that it wasn't? A: The Pine pitch canker story (*Fusarium circinatum*) (originally from Mexico but first recognised in California on *Pinus radiata*). These seeds have been moved around the world. NZ imported seed before the movement from Mexico and is disease free. Initial sampling sizes did not detect the low infestation rate and thus the evidence of infestation was not confirmed until larger sample sizes were used. Note larger seeds have a higher disease risk than small seeds.

Q: How are mycorrhizal fungi captured in this? A: They are included in the seed. Note treatments applied to the trees may unintentionally kill beneficial fungi and required mycorrhizal fungi. A: This could be overcome when planting and inoculating with the mycorrhizal fungi.

Note: recommendation to consider an annex to ISPM 38 for tree seeds.

9. Phytosanitary challenges and treatments

9.2 Challenges in the surveillance and detection of quarantine fungal tree pathogens in European Union

P. P. Parra, R. Ioos and J. Aguayo

ANSES Plant Health Laboratory, Mycology Unit. European Union Reference Laboratory for Plant Pathogenic Fungi and Oomycetes. Domaine de Pixérécourt Bâtiment E. 54220 Malzéville, France. Email : jaime.aguayo@anses.fr

Protection of forest resources is key in the context of global changes. In the European Union, the legal framework for the protection of forest resources is given in the EU Regulation 2016/2031. This regulation provides a list of quarantine pathogens in the Implementing Regulation EU 2019/2072, for which all the country members should set up measures to prevent the introduction and establishment of these organisms in the EU territory. Concerning trees and forest resources, the list comprises 15 fungal and oomycete quarantine organisms (QO) that are officially absent in the EU. However, the implementation of these regulations is challenging. In surveillance, information concerning the biology, including the host range, the invasion pathways and the spreading mechanisms for some QOs of the list is inexistant or scarce. Concerning laboratory testing, lack of information on the taxonomy of some QOs, the unavailability of reference strains and of genomic sequences makes difficult setting up reliable detection and/or identification methods that target QOs. We advocate for coordinated efforts at the national and international scales to generate scientific information that will allow the generation of this information allowing the protection of EU territory from these QOs.

Additional Notes:

It is important to have morphology-based diagnostic methods and controls when using molecular biology-based methods to detect fungi.

Take-home message: Implementing diagnostics for the quarantine organisms is challenging, requiring integrated and coordinated efforts (national and international) to provide reliable diagnostic methods. The generation of quality scientific information on biology, epidemiology, pathogenicity, and taxonomy is basic to develop detection methods. Biological reference material and sequences are needed for this purpose with respect to international treaties.

Consistency for data collection and analysis is important.

Note: To publish on relevant genes to use, most research till now have been housekeeping genes like Fungus ITS. We now know that these aren't enough to describe some species. E.g., ITS is not enough to describe *Fusarium* spp.

Q: Another side of molecular diagnostics wondering about sampling. You suggested 200 collaborators send samples; do you have heterogeneity issues? A: There are many issues associated with this. Some samples of symptomatic trees that are degraded and no longer contain the causal agent, therefore sometimes the quality isn't good enough. Thus, we advocate for more genomic and genetic data. Need to cultivate, isolate and apply the barcode.

Note: We often say that identification with DNA relaxes the need for trained taxonomists. But interpreting results from DNA sequencing and blast still requires a level of expertise. It should not be done by people with no experience.

9.3 Forest pests heat treatment research - specific lethal doses for wood borers and fungal pathogens – Update

Meghan Noseworthy[1], Angela Dale[1], Esme John[1], Eric Allen[2], Chris MacQuarrie[3], Veronique Martel[4], Josie Roberts[5], Tyranna Souque[1]

[1] Canadian Forest Service, Natural Resources Canada, Pacific Forestry Centre

[2] Retired

[3] Canadian Forest Service, Natural Resources Canada, Great Lakes Forestry Centre

[4] Canadian Forest Service, Natural Resources Canada, Laurentian Forestry Centre

[5] Canadian Food Inspection Agency

Efficacy data for treatments that reduce pest risks are integral to the development of standards for phytosanitary measures. Quantifying the lethal dose for pests of wood products provides confidence in current heat treatment schedules used to trade wood safely. Research to identify the precise lethal dose (temperature and time) required to address pests in wood products using a carefully calibrated heat treatment apparatus is ongoing in Canada with both *in vitro* and *in vivo* applications. Findings of the past 5 years are presented, including the precise lethal dose for wood borers, pathogens and contaminating pests both indigenous and invasive to Canada.

Additional Notes:

Q: How will statistical considerations be handled to ensure lethal temperature verification? A: Refer to Ormsby's 2022 paper to determine appropriate population/sample size. Probit 9 is not necessary nor attainable for most pests. For pathogens, blocks of inoculated wood (with three different isolates) are considered a single sample and replicated.

https://assets.ippc.int/static/media/files/publication/en/2024/05/15_TPPT_2024_Jun_Ormsby_2022_Elucidating_the_efficacy_of_phytosanitary_measures_for_IAS_moving_in_WPM.pdf

(Ormsby provided a historical background on the development of the protocol. See IFQRG -21 Report section 6.6 https://www.ippc.int/ru/partners/internationalforestryquarantineresearchgroup/publications/2025/01/report-ifqrg-2024-21-rome/ and IFQRG-20 Report section 4.6 https://assets.ippc.int/static/media/files/partner_publication/2024/03/18/Report_IFQRG_2023_-20_Virtual_Symposium_Proceedings.pdf on ISPM 15 new treatment development)

Q: How do you approach temperature verification for a different wood commodity other than WPM? A: The CPM will likely have confidence in the same approach for other commodities. When submitting a proposal for an acceptable treatment, it's important to consider the difference between the confirmatory study (that determines efficacy) and the practical study that determines the treatment that attains the time/temperature regime achieved in the confirmatory study.

Q: How are you performing the *in vitro* versus *in vivo* (in wood) comparison to ensure that the difference in environment does not introduce an artifact in the lethal dosage verification? A: A twofold approach of looking at testing infested wood in apparatus as well as highly controlled tests on bench scale kilns.

Q: How is the effect of ramping rate considered? Different ramping rates have not been fully explored, but a ramping rate based on a typical kiln schedule has been used (Haack and Petrice (2022) paper consulted). Different ramping rates could affect overall treatment mortality.

Note: The TPPT has reviewed how environmental conditions may affect treatment and has a relatively broad understanding of the topic. They can be consulted to determine where limitations exist and can provide guidance on how to overcome those limitations either through experimentation or other approaches.

9.4 Plant pest prevention through technology-guided monitoring and site-specific control

Luís Filipe P. Bonifácio (Instituto Nacional de Investigação Agrária e Veterinária, I.P.

Unidade Estratégica de Investigação e Serviços de Sistemas Agrários e Florestais e Sanidade Vegetal, Portugal)

Plant pest detection can be very challenging, given the delay in visible symptom development and limited inspection time during border control. The Horizon Europe project 'Purpest' www.purpest.eu is identifying volatile organic compounds produced by different tree hosts attacked by the pinewood nematode or *Phytophthora ramorum*. These target compounds are being used to develop a reliable and rapid sensor system for non-contact pest detection during plant health inspections. This approach is intended to allow 90-100% of imported plant material to be reliably inspected, without individual sampling taken for molecular analysis.

Additional information:

Andrea Ficke is the organizer of this project.

Use of VOCs released by pests and spectrometry analysis for signatures. Target pests PWN, Cotton bollworm, BMSB, Fall armyworm, *P. ramorum*. Three signature VOCs isolated for PWN. *P. pinaster, P nigra* and *P. sylvestris* (all hosts in Portugal). 2,4-dimethylheptane appears to be related to the presence of PWN. *Phytophthora* spp. on *Larix* - alpha, alpha-demethyl Benzenemethanol identified for *P. ramorum.* Next steps include developing sensor detectors. Challenges include concentrating the VOCs and separating them from other VOCs related to the trees (host volatiles).

Contact: Luis.bonifacio@iniav.pt

Note: Project will be completed this year. There is potential use outside of forests for detection of these pathogens and in wood commodities.

Note: in a container full of plants this might be a good option for concentrated sample. It would ID a container for treatment.

Q: This will identify all six species studied? A: not sure if the six will be combined in one device.

9.5 International movement of fungi associated with forest products - Risk of establishment

Eric Allen - Natural Resources Canada (retired)

Wood-inhabiting fungi and fungus-like organisms associated with the international trade of wood commodities and live plant materials have caused significant damage to forest ecosystems (e.g. chestnut blight, Dutch elm disease, white pine blister rust, ash dieback). Understanding the biological characteristics of organisms and how they affect the potential for spread and establishment is critical for the development of effective strategies to reduce pest risk. This presentation examines the dynamics of pest transmission and establishment of different groups of organisms, across a range of commonly traded wood commodities, and considers the implications for regulatory policy.

Additional information:

Note: Recent publications on forest bio-invasion (Paap et al 2022)
https://www.researchgate.net/publication/358764386_Invasion_Frameworks_a_Forest_Pathogen_Perspective

How things can or cannot get off a pathway should inform our risk analysis which will improve trade and reduce overestimates of risk.

Note: Different factors impact risk of establishment, such as climate and presence of host.

Q: Can you provide examples of the successful entry, transfer and establishment of fungi on wood chips? A: There are limited examples of Basidiomycetes moving in trade. *Armillaria mellea* moved to South Africa and established with an extremely limited range expansion. *Heterobasidion annosum* moved to Italy during WWII. Ascomycete movement is much more common.

Comment: Ascomycetes in wood chips and other commodities would require water. A: Wood chip piles can be moist and warm; these conditions are conducive to fungal growth. Basidiomycetes are unlikely to move with wood chips because they won't produce sporophores.

Note: The risk of one wood chip versus a pile is different. Obligate parasites require living tissue but will be taken over by saprophytes (e.g., *Trichoderma*). *Ophiostoma* can remain in chips and move via spores however there is no evidence of them moving and infecting trees.

Discussion: The group discussed how *Bretziella fagacearum* moved into Canada.

Q: Can wood chips be a pathway? A: *B. fagacearum* is a poor competitor against saprophytes. Do we know how *B.f.* moved from US to Canada? Potential pathways might be: firewood, nursery stock, weather events, wind, sap beetles. There are several hundred kilometres between known infected trees in the US and the first recent detection in Canada. eDNA was found first in traps - 2 years before found in wood. It is not known how *Bretziella fagacearum* entered Canada.

Q: From an import/export perspective, the lack of scientific literature for this makes it an issue. We need to do these experiments and publish them. Regarding wood chips - what is the risk for PWN and pathogens? Creating pellets out of wood waste was a phytosanitary solution for large volumes of chips associated with the large volumes of pine harvested after the mountain pine beetle outbreak in Canada.

Recommendation: Bring mycologists that specialize in Ascomycetes together to address these questions.

Side note: PWN is only associated with *Monochamus* spp. 1999 was the first finding of PWN associated with *M. galloprovincialis*. If other European *Monochamus* spp. could carry PWN it would be devastating because they have other host trees that could potentially be infected (e.g., Norway spruce). Work has been done on the susceptibility of other hosts (*Pinus sylvestris*) as well. Bark beetles are known to carry other *Bursaphelenchus* (e.g., *Ips*) including *B. mucronatus*.

Recommendation: Organize a side session on vectors for IFQRG meeting where we can discuss examples, what we know, what we don't.

Virtual Session – Thursday October 2nd 2025 – Day 4 – 14:00 to 17:00 PM CEST

Meeting joined by virtual participants (approximately 28)

10. New tools, technology and research

Chair, Michael Ormsby welcomed the in-person and virtual attendees (28) to the second virtual session on new tools, technology and research. This session is aimed at detection and molecular tools.

10.2 Food and Agriculture Organization (FAO) Forestry update

Dr Shiroma Sathyapala, Forestry Officer FAO

In 2025, FAO and partners advanced global forest health through a diverse set of initiatives. The "Voices of Future Forest Health Leaders" webinar series engaged over 400 young professionals across Asia-Pacific, Europe, Africa, and the Near East, fostering leadership and knowledge exchange, and awarding scholarships to outstanding participants. The FAO Forest Health Programme also contributed to major international fora, including the Second International Conference on Biological Control (India) and the International Day of Forests Symposium (Russia).

Field-based technical support in Armenia, Saudi Arabia, Kyrgyzstan, and Kosovo strengthened forest health monitoring and the protection of critical ecosystems. Regional focal point meetings (APFISN, NENFHIS, REUFIS, FHISLAC) and technical groups enhanced collaboration on invasive species and biosecurity, including progress on the development of a global forest biosecurity guideline. Most recently, the side event "Emerging Threats to Forest Health in Latin America: A Regional Call to Action", held within the 34th Session of the Latin American and Caribbean Forestry Commission (LACFC), convened over 100 participants to address urgent challenges such as the spread of the red palm weevil.

Collectively, these efforts reinforced global and regional capacities to respond to emerging forest health challenges.

Additional notes:

Note: If you would be interested in providing a peer review for Forest Biosecurity Guidelines please let Shiroma know.

Regional networks on forest health and invasive species have 100 countries currently.

Q: It appears that FAO Forestry does not have any projects in NA, what is the limiting factor? A: The FAO mainly works in developing countries but call on the knowledge of all countries to develop guidance and support.

Q: How much does this guide overlap with the Guide to implementation of phytosanitary standards in forestry. A: The newly developed FAO *Forest biosecurity - Guidelines for application* is more encompassing than the implementation of phytosanitary guidelines for forestry publication.

10.3 Development of the EPPO guidance to the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood: assessment and management of phytosanitary risk

Christopher Howard (DAFF), Tom McDonald (DAFM), Adnan Uzunovic (Canada Wood), Jean-Marc Henin (Walloon Agricultural Research Centre), Xavier Tassus (Anses), Dmitrii Musolin (EPPO)

To address the current phytosanitary concerns linked to the trade in wood chips and other types of fragmented wood, the Panel on Quarantine Pests for Forestry of the European and Mediterranean Plant Protection Organization (EPPO) has initiated the development of a guidance document.

Following the description of pest risk that these commodities present, the EPPO guidance material will provide criteria to determine effective phytosanitary risk management options to assist regulators to manage phytosanitary risk associated with trade of these commodities.

A risk matrix approach is proposed to enable risk assessment and management in a harmonised way where possible. Factors that are considered are: pest status in country/region of origin; production practices; storage; modes of arrival (bulk, packaged); end use; etc. This presentation provides a summary of the proposed matrix and invite discussion on the approach.

Additional information:

A guide is being developed for the trade of wood chips. The focus of this work is to reduce the application of the precautionary principle.

One aspect of the recommendation for addressing the wood chips pathway includes suggesting a risk score for each step of the production process to feed into the resultant PRA.

Next steps:

(1) Continue to develop and test the system, (2) Develop a consistent scoring-system for application to each aspect under consideration. (3) Determine what to do when multiple pests need to be considered. (4) Develop case studies to test the system (5) Incorporate feedback prior to progress report at the EPPO Forestry Panel. Recruit any interested subject matter experts – please contact Dmitrii.

Q: Are you doing more research to support this work? A: They have interviewed other NPPOs to see if there was any feedback on strategies on how chips are dealt with and received minimal response.

Also, the group realizes there are many unknowns. Experience with other commodities should help to guide the progress. Looking for research and papers on the process. For example, it came up this week that the chipping process itself is destructive. Not sure if small insects will be affected the same way. NPPOs had very few examples of interceptions of pests on wood chips. There is an insect bias and they haven't looked at fungi.

Q: Nice to hear the update on this. The UK has a case study with Dominic Eyre and Dmitrii on this. It would be good to see differentiation between post-consumer waste wood and other types of wood chip products and the associated risk. A: They have thought about waste wood but only WPM. Good to know this is a reality in the UK.

10.4 Two decades of epidemiological surveillance of the pine wood nematode in France

Nicolas Mariette[1], Hoël Hotte[1], Anne Marie Chappé[1], Marie Grosdidier[2], Géraldine Anthoine[3], Corinne Sarniguet[1], Odile Colnard[4], Emmanuel Kersaudy[5], Marie Thérèse Paris[1], Emmanuel Koen[6] and Laurent Folcher[1]

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[5]Pole Sante des Forêts, Direction régionale de l'alimentation, de l'agriculture et de la forêt de Nouvelle-Aquitaine, 51 rue Kieser, CS 31387, 33077 Bordeaux Cedex, France.

[6]Sous direction de la santé et de la protection des végétaux, Direction générale de l'alimentation, Ministère de l'agriculture et de l'alimentation, 251 rue de Vaugirard, 75 732 Paris Cedex 15, France.

The installation of a plant pest into a new area can have economic, environmental and/or social consequences. This is the case for the pine wood nematode (PWN) *Bursaphelenchus xylophilus* which is one of the most important coniferous pests worldwide, causing massive tree mortality wherever it has been established. It thus receives a great scrutiny like in European Union where it is categorised as a priority quarantine pest, obliging each state member to monitor and to manage this pathogen on its territory. Our study takes stock of the first 20 years (2000-2019) of the monitoring implemented in metropolitan France to track PWN. Our work had two main objectives. The first one was to describe PWN monitoring, namely how it is organised and whether it has led to the nematode's detection. Secondly, we wished to investigate what the levels of PWD expression for host pines infected by *B. xylophilus* could be in France. To meet these objectives, we used and analysed data from samples collected in the framework of the French monitoring program implemented from 2000 to 2019 to track both PWN in its host pines, its insect vector and in wood-based commodities imported or in circulation in metropolitan France. This monitoring, which was regularly reinforced across the time, consisted to sample and analyse more than 17,000 wood samples and 66,000 insects over this period. Although PWN has not been detected in pine stands or within its insect vector, some wood-based commodities inspected during the monitoring were contaminated. If metropolitan France is still free of PWN, this study emphasizes the need to stay vigilant, as climatic conditions of metropolitan France would be particularly suitable to this pest. Besides, we propose some improvements that could be implemented to the monitoring to make it more efficient. Finally, such a monitoring is also the occasion to enhance our knowledge of the *Bursaphelenchus* genus.

Keywords: *Bursaphelenchus xylophilus*, Priority quarantine pest, National monitoring program, *Monochamus* spp., First report, Forest

Additional notes:

The researchers sampled wood, forests and *Monochamus* spp. over 10 years. They used molecular and morphological methods to detect and identify the specimens.

They found 41 wood-based samples had PWN (mainly from Portugal).

They also noted an effect of climate on disease expression. Using climate models they predicted potential symptomatic areas in the south of France.

This work has been a major sampling of effort. Currently France is still free of PWN. The researchers concluded that there is a risk of introduction associated with WPM, however this is not considered a high risk because the wood is devoid of the insect vector, *Monochamus.* There continues to be concern for PWN in France because they have shown that there are large susceptible forested areas and the presence of indigenous *Monochamus galloprovincialis*. that could carry PWN in all regions of France.

More info in https://annforsci.biomedcentral.com/articles/10.1186/s13595-023-01186-8

Q: Did you look at RNA or determine if the PWN was alive or dead? A: DNA detection was conducted only, also took wood samples and collected morphological samples for confirmation.

Q: Are you considering looking at climate modelling nearby? A: Not yet.

Q: Are others nearby looking for PWN? Y: Yes, it is a requirement of the EU.

Q: You found WPM with PWN from Portugal, what were the markings, was it HT or fumigated? A: It was stamped as heat treated. There were PWN in the pallet without vectors.

Q: Can you clarify what sampling you have done? A: PCR and if positive they did morphological detections on the extracted live nematodes.

Note: On the model map, the green coloured forested area indicated trees that will not express symptoms, however this doesn't suggest that this area will be free of PWN.

10.5 BxCheck - A molecular tool for detecting live and dead pinewood nematode in wood products

Vanessa C. Thompson[1], Hajeong Lee[1], Jacob J. Imbery[1], Stacey Kus[2], Esme John[3], Holly Williams[3], Inbal Harim[1], Adnan Uzunovic[4], Luís Fonseca[5], Joana Cardoso[5], Gwylim Blackburn[3], Isabel Leal[3], and Caren C. Helbing[1]

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[2]FPInnovations, Vancouver, British Columbia, Canada

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[4]Canada Wood Group, Vancouver, British Columbia, Canada

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The pinewood nematode (PWN), *Bursaphelenchus xylophilus,* is well known as a wood product quarantine pest, requiring stringent phytosanitary measures. Monitoring for presence of live PWN in traded wood is important to ensure confidence in the applied phytosanitary measures, in particular, the commonly used heat treatment of 56 °C for 30 min. However, classical detection of live *B. xylophilus* is laborious and time-consuming, requiring highly trained taxonomists. We have made progress on a rapid field test to detect phytosanitation effectiveness using environmental DNA (eDNA) and RNA (eRNA) assays in PWN inoculated wood. Analysis of genes and transcripts in the *B. xylophilus* genome identified two genes with RNA expression profiles potentially suitable to discriminate between live and dead *B. xylophilus* after heat treatment. These genes were used to develop, validate, and optimize both eDNA and eRNA qPCR-based assays. The resulting BxCheck system integrates four components, IntegritE-DNA® and IntegritE-RNA™ controls, as well as the eDNA and eRNA assays. BxCheck successfully discriminates between live and dead *B. xylophilus* and distinguishes *B. xylophilus* from closely related nematode forms. The assay proves accurate and sensitive in wood samples heat-treated at 56 °C for 30 min in a Humble water bath or following a more intensive, standard kiln schedule that is optimized to kill *B. xylophilus* in lumber. The application of these assays will improve confidence in detecting live PWN in wood and determining the efficacy of applied phytosanitary measures.

Additional information:

The researchers tested the effects of heat treatment (56 °C/30 min) on eggs, JIII and adult life stages.

They tested PWN in small wood blocks of lodgepole pine at 56 °C/30 min in the Humble water bath to test the efficacy of the treatment, post treatment detection, and the time for RNA to break down after death and have tested PWN infested lodgepole pine lumber in a laboratory kiln at 60 °C for a longer period.

Q: We are trying to develop similar technology for viability in seeds after heat treatment. Are you conducting assays for integrity? A: Yes, we did qPCR for all of these using taqMan. To determine which sequence we did the RNA sequence then used publicly available genome sequences for all the nematodes we could find.

Q: How do you deal with the different stages of development? How do you know that the stage is being targeted? A: They looked at three stages together. Unsure if the RNA is indicated in every life stage at this point.

Q: How do you know the sequence of RNA is specific to the pest species? A: the primers and probe are designed to be specific as possible to the species. This is the culmination of the many assays they did. Early on, each contig had 9 assays. Not all were validated; there is trial, and error involved. There was a lot of work to get to this assay.

Q: Surprised to see zero detection of RNA immediately after treatment. Does this vary between species, substrates etc. A: We were excited to see these results. It was a candidate chosen, an RNA transcript expressed at lower levels after 56 °C. We were also surprised it wasn't detected at zero hours.

Q: Was this gene-dependent? A: Yes, it is likely. Note at high temperatures there is still detection of the gene. This was a requirement of the assay.

Comment: This tool seems to be ready to go but there are more questions to ask and procedures to do. We are interested in input now or later.

10.6 Implementation of molecular tools in international forest phytosanitary regulation: Progress on a draft white paper by the IFQRG Molecular Tools Working Group

Angela Dale, NRCan Canadian Forest Service

Molecular diagnostics of plant pests in international trade offer powerful and rapid tools for testing and identifying quarantine pathogens however questions remain on their potential effect on the flow of international goods and around best practices when implementing them for forest and wood commodities. The molecular tools working group within the International Forest Quarantine Research Group was formed in 2023 to discuss the needs and concerns of the community and review potential action items. After sharing these findings with the larger IFQRG membership, it was decided that the group should proceed with a white paper. This presentation will provide an overview of the white paper and the activities of the group to date including an example of the steps that would be taken if a quarantine pest was discovered using molecular diagnostic tools.

Additional Information:

The molecular tool group is developing a white paper with recommendations on how to assess detections of pests with DNA and RNA tools for forestry. The group is not conducting research, testing tools, protocols or developing standards.

Information on the development and adoption of diagnostic protocols by the IPPC is available: https://www.ippc.int/static/media/files/publication/en/2019/02/10_01_CPM_2019_CPM_Recommendations_Attachment-2019-02-21.pdf

CPM High-Throughput Sequencing (HTS) CPM recommendation: https://www.ippc.int/static/media/files/publication/en/2019/02/10_01_CPM_2019_CPM_Recommendations_Attachment-2019-02-21.pdf .

The white paper will include background, needs and data sharing recommendations as well as tools available in a regulatory setting, how to respond to positive DNA, proof of viability and post-detection analyses.

One concern discussed is the risk that the use of these tools could potentially be an issue for market access if used as an unjustified barrier to fare trade.

Data sharing considerations have been discussed, data security at the political level and accessibility including proprietary data. Note: not all database sequences are curated and some have older, incorrect data.

The group is recommending minimum data reporting requirements and considered how an international data repository might function.

A concern raised by the group regarding the DNA detection was how to deal with DNA (HTS) from unknown organisms? CPM provides recommendations for this, and they recognize it is not just for HTS but eDNA (see link above).

The group hopes to provide recommendations on next steps, including post-detection analyses, and confidence in results.

A flow chart for the process of finding a positive quarantine organism was presented with steps using molecular and morphological techniques with examples.

Proof of viability was considered as well as how to choose the right test, taking into consideration RNA degradation after death.

Q: Exciting to see this work. Now we need a large group to develop SOPs for RNA targets on different organisms to make this practical. How do we get this done? How do we build this database in an internationally collaborative way to share the workload? A: We could start by establishing a list of priority pests. Any eRNA tools could be run through the Technical Panel on Diagnostic Protocols?

Q: Agree, the Quads group on molecular tools are thinking about what the targets should be as well. We need to start looking at common priority species. This is important and it will take years. It's difficult to think about one pest. IFQRG is an important platform for this, but we need more of these platforms to get together to find common ground and generate larger working groups. A: Yes, this work is important for the larger community, not just the forest phytosanitary community.

Q: Looking at what NPPOs should know and receive on a notification of non-compliance (NNC) is great, but how much specific detail can we expect to receive? We don’t get to dictate this right now. If these NNC reporting requirements were standardized, then we could build a database of this information to be shared.

Comment: Communication between regulators, industry and science to connect for relevant input, information sharing and future development is important. Silos between these groups seem to have been broken down in recent years which is so good.

Comment: Perhaps an NPPO at the next CPM could suggest this type of information be added to ISPM 13? Starting the process would be great.

END of Virtual Session – Thursday November 7th – Day 4 – 15:00 to 17:00 PM CET

11. Other Items

11.1 IFQRG Terms of Reference review

IFQRG has Rules of Procedure and Terms of reference on the IFQRG public page. The SSC is made up of 7-9 representatives.

The Chair read the list of IFQRG members nominated for the SSC in compliance with the IFQRG Rules of Procedures that included representation from five IPPC regions and asked for feedback from meeting participants.

All IFQRG members present at the time of the discussion approved the motion to appoint the following IFQRG members as members of the IFQRG Science Steering Committee (SSC), in no particular order:

- Dr. Eric Allen, Canada (NAPPO)
- Dr. Chris Howard, Australia((PPPO)
- Ron Mack, USA (NAPPO, PPPO)
- Dr. Maya Nehme, Lebanon (NEPPO)
- Meghan Noseworthy, Canada (NAPPO)
- Dr. Michael Ormsby, New Zealand (APPPC, PPPO)
- Dr. Stephen Pawson, New Zealand (APPPC, PPPO)
- Dr. Thomas Schroeder, Germany (EPPO)
- Dr. Adnan Uzunovic, Canada (NAPPO)

The IFQRG Terms of Reference were reviewed and amended by the group.

The IFQRG Rules of Procedures were reviewed, amended and agreed to by the group.

The IFQRG Terms of Reference are available on the IFQRG public IPPC web page https://www.ippc.int/ru/partners/organizations-page-in-ipp/internationalforestryquarantineresearchgroup/ and the amended documents will be posted on the IFQRG 22 Work Area.

Action: Contact Maya Nehme (NEPPO) to see if she would like to continue on the SSC. Kelli Hoover resigned from the IFQRG SSC last year (2024).

The group discussed that it would be nice to have a few more regions in the SSC and continue to make an effort to involve all regions in the IFQRG membership.

11.2 CPM Focus Group on Research Coordination

The group discussed this initiative under the CPM. The IFQRG SSC will be interviewed by the group at the end of October.

The primary role of the FG is to conduct a scoping study to explore the current international and regional phytosanitary research structures and policies to identify gaps to be filled.

The group discussed the presentation of the focus of IFQRG, that we focus on research to support phytosanitary standards.

IFQRG is a good example of a currently connected research group with the IPPC. The experiences and organization of this group may serve as a good example of a research coordination focussed on support of phytosanitary standards and trade.

The group discussed other known research groups such as the Phytosanitary Measures Research Group (PMRG) https://www.ippc.int/en/partners/organizations-page-in-ipp/phytosanitarymeasuresresearchgroup/ and IUFRO and the differences between these groups and others.

It was noted that opportunities to take advantage of current research initiatives to let them know that phytosanitary research is ongoing, coordinated and they could get involved should be maximized.

EUPHRESCO is another example of a group that coordinates research and does not provide funding, this group could benefit from the output of the CPM FG findings and dissemination of this knowledge for priority setting.

E.g., IUFRO Working Group Alien invasive species and international trade https://www.iufro.org/divisions/70000-forest-health/70300-entomology/70312-alien-invasive-species-and-international-trade

The CPM Focus Group has the following goals: Network Formation and Establishment; Network Structure and Dynamics; Participation and Membership; Research Focus and Activities (if your network has a plant focus); Funding and Sustainability; Representation and Policy Engagement; and Best Practices.

A positive output of the CPM focus group might be to showcase the network that is gathered as a part of this process.

The group agreed that the IFQRG SSC will meet with the coordinators (Philippe Reignault) of the CPM focus group at the end of October.

12. Other Business

The group discussed future research focus potential.

The Chair created a table of potential tasks for the group to address and whether anyone is interested in tackling these needs/gaps in research, for example:

1. Wood chips: pathway management etc.
2. Germplasm (includes seeds and plants for planting): trade data, pathway categorization, treatment research and gaps, industry dynamics
3. Molecular tools: see Molecular Tools Working Group
4. Marking of WPM for pools and retreatment requirements
5. EDN: coordinating research
6. Heat treatment delivery and dose recognition of the separation of these parameters.

Members are encouraged to tackle any of the unassigned tasks and present their findings or progress at IFQRG 23 (2026).

Table: Potential tasks for IFQRG to address

Task	Subtask	Description	Who?	When?
Wood Chips	Fungi in chips	Literature review: Fungal reproduction in wood/wood chips - conditions that create risk (ref. science advice from J-F Dubuc).		IFQRG 23
	PWN in chips	Literature review: Presence in and transfer from chips (pathways) - Hopf *et al*. & EU Project on PWN.	Schröder	IFQRG 23
	Review EPPO guide	Review draft text of EPPO guide on the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood.	IFQRG Members	
	Publish chipping work (Armand Clopeau (FCBA))	Help with publishing work on chipping control of pests (and Ron Mack data/publish update)	Luis/Xavier	IFQRG 23
	Pathway management	Feasibility of pathway control - characterise systems (e.g. grain for processing control (NZ), logs from US (Canada))		IFQRG 23
Forest Germplasm	Trade data	Data/mapping of international trade in P4P	Ormsby	IFQRG 23
	Pathway risk categorisation	Look at ISPM 36 list - flesh that out		IFQRG 23
	Treatment (PM) research gaps	What gaps are there in treatment availability for the management of pests (fungi) in seed?	Ormsby	IFQRG 23
	Industry dynamics	Describe industry dynamics that impact risk		IFQRG 23

Task	Subtask	Description	Who?	When?
Molecular Tools	Leave to working group			IFQRG 23
ISPM 15 (marking)	Pools and multiple marking	Feasibility of single mark system (traceability etc.) for pallet pools.		IFQRG 23
	Risk of old pallets (~>6 months)	Does wood from old pallets need to be re-treated (during remanufacture) e.g., how risky is old dry wood to re-infestation? Remarking requirements if not re-treated?		IFQRG 23
EDN	Coordination	Support submission, and support development of new generic submission	Ormsby/ Howard	IFQRG 23
	Residual issue	MB or EDN issues? Publication to support residue risk for Brad.	Ormsby (Hall)	IFQRG 23
Treatments	Dose and commodity	Look at establishing dose independence from commodity (evidence for)	Noseworthy / Marcotte	IFQRG 23
	Thermal modification	Research thermal modification [heating of wood that changes its structure or chemical composition] as another potential treatment.		IFQRG 23

NEXT MEETING:

Will be most likely be in Rome sometime in October 2026.

13. Review and finalize the Meeting Report

The IFQRG members present, reviewed and finalized the meeting report.

14. Close of Meeting

The Chair, Michael Ormsby thanked the group for attending and actively participating in what was a successful meeting. The Chair also thanked again ANSES for hosting the meeting and managing the technical side of the presentations, thanked Meghan Noseworthy for organization of the meeting, and Meghan Noseworthy, Brad Gething and Eric Allen for being the Rapporteur, and to the members present for progressing forest quarantine. Members concurred.

Papers Cited in Meeting Report

EPPO (2025) The assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood. Guide (draft) yet to be released.

Haack RA, Britton KO, Brockerhoff EG, Cavey JF, Garrett LJ, et al. (2014) Effectiveness of the International Phytosanitary Standard ISPM No. 15 on reducing wood borer infestation rates in wood packaging material entering the United States. PLoS ONE 9(5): e96611. doi:10.1371/journal.pone.0096611

Haack RA, Petrice TR (2022) Mortality of bark- and wood-boring beetles (Coleoptera: Buprestidae, Cerambycidae, and Curculionidae) in naturally infested heat-treated ash, birch, oak, and pine bolts. *Journal of Economic Entomology*, Volume 115, Issue 6, 1964–1975. https://doi.org/10.1093/jee/toac138

Ormsby MD (2022) Elucidating the efficacy of phytosanitary measures for invasive alien species moving in wood packaging material. *J Plant Dis Prot* 129, 339–348. https://doi.org/10.1007/s41348-022-00571-1

Paap T, Wingfield MJ, Burgess TI et al. (2022) Invasion frameworks: a forest pathogen perspective. *Curr Forestry Rep* 8, 74–89. https://doi.org/10.1007/s40725-021-00157-4

2025 Meeting Participants

(Name, Country, Affiliation)

Name	Country	Affiliation
Jaime Aguayo	France	French Agency for Food, Environmental and Occupational Health & Safety (ANSES)
Eric Allen	Canada	Canadian Forest Service - Retired
Luis Bonifacio	Portugal	Portuguese National Research Institute for Agrarian and Veterinary
Armand Clopeau	France	The technological institute for forest cellulose wood-construction furniture
Paul Conway	USA	American Lumber Standards Accreditation Board
Jean-Francois Dubuc	Canada	Canadian Food Inspection Agency
Scott Geffros	Canada	Canadian Wood Pallet and Container Association
Brad Gething	USA	National Wooden Pallet and Container Association
Jean-Marc Henin	Belgium	Centre wallon de Recherches agronomiques
Mireille Marcotte	Canada	Canadian Food Inspection Agency
Nicolas Mariette	France	ANSES
Dmitrii Musolin	France	EPPO
Meghan Noseworthy	Canada	Canadian Forest Service
Mike Ormsby	New Zealand	New Zealand Ministry for Primary Industries
Pablo Pedro Parra	France	ANSES
Phillippe Reignault	France	ANSES
Gerardo Sanchez Pena	Spain	Ministry of Agriculture, Fisheries and Food
Xavier Tassus	France	ANSES
Adnan Uzunovic	Canada	Canada Wood Group

Virtual Participants

Name	Country	Affiliation
Geraldine Anthoine	France	ANSES
Geraldine Anthoine	France	ANSES
Dan Berry	UK	CHEP
Gwylim Blackburn	Canada	Canadian Forest Service Natural Resources, Canada (CFS NRCan)
Faith Campbell	USA	Centre for Invasive Species Protection
Anne Chandelier	Belgium	Centre wallon de Recherches agronomiques
Michelle Cleary	Sweden	Swedish University of Agricultural Sciences
Angie Dale	Canada	Canadian Forest Service
Brittany Day	Canada	Canadian Food Inspection Agency
Maria de Lurdes Inacio	Portugal	National Institute for Agriculture and Veterinary Research

Name	Country	Affiliation
Jessica Devitt	New Zealand	New Zealand Ministry for Primary Industries
Papa Massar Fall	Senegal	Sengal, Responsible de la Quarantine
Andrea Ficke	Norway	Norwegian Institute for Bioeconomy Research NIBIO, Cereal Plant Pathologist
Iva Franic	Switzerland	Swiss Federal Institute for Forest, Snow and Landscape Research (WSL)
Leonardo Galindo Ganzalez	Canada	Canadian Food Inspection Agency
Marie Grosdidier	France	National Research Institute for Agriculture, Food and Environment
Sven Gustavson	Canada	Quebec Wood Export Bureau
Matt Hall	Australia	Draslovka Ltd
Craig Homer	New Zealand	New Zealand Ministry for Primary Industries
Chris Howard	Australia	Department of Agriculture, Fisheries and Forestry
Brett Hurley	South Africa	Forestry and Agriculture Biotechnology Institute
Esme John	Canada	Canadian Forest Service NRCan
Tyrone Jones	USA	United States Department of Agriculture
Etsuko Kagaya	Japan	Agriculture, Forestry and Fisheries Research Council
Emmanuel Kersaudy	France	French Ministry of Agriculture (forest health department)
Stacey Kus	Canada	Forestry Products Innovations
Ferenc Lakatos	Hungary	University of Sopron
Chris MacQuarrie	Canada	Canadian Forest Service
Laticia McDonald	Canada	Government of Alberta
Nicole Mielewczyk	Canada	Canadian Food Inspection Agency
Yacine Osmani	France	ANSES
Jana Orbach	Switzerland	Swiss Federal Institute for Forest, Snow and Landscape Research
Katie Parker	UK	Forestry Commission
Steve Pawson	New Zealand	Canterbury University
Josie Roberts	Canada	Canadian Food Inspection Agency
Eric Sarazin	Canada	Canadian Food Inspection Agency
Shiroma Sathyapala	Rome	FAO Forestry
Thomas Schröder	Germany	Federal Ministry of Food and Agriculture
Katarzyna Sikora	Poland	European Plant Protection Organization
Tyranna Souque	Canada	Canadian Forestry Service
Vanessa Thompson	Canada	University of Victoria
Elodie Urlacher	New Zealand	New Zealand Ministry for Primary Industries
Biplang Yadok	New Zealand	New Zealand Ministry for Primary Industries

Photo: IFQRG participants, Day 1 at the 2025 IFQRG-22 meeting at Anses in Maisons-Alfort, France. From left to right: Philippe Reignault, Jean-Marc Henin, Dmitrii Musolin, Eric Allen, Meghan Noseworthy, Jean-Francois Dubuc, Brad Gething, Mike Orsmby, Paul Conway, Scott Geffros, Mireille Marcotte, Xavier Tasuss.

Photo: IFQRG participants, Day 4 at the 2025 IFQRG-22 meeting at Anses in Maisons-Alfort, France. From left to right: Xavier Tassus, Scott Geffros, Jean-Marc Henin, Paul Conway, Gerardo Sanchez Pena, Mike Ormsby (Chair), Dmitrii Musolin, Adnan Uzunovic, Meghan Noseworthy, Luis Bonifacio, Eric Allen, Mireille Marcotte, Brad Gething, Paulo Verdasca, Jean-Francois Dubuc, Philippe Reignault.

List of Abbreviations

ALSC	American Lumber Standards Committee
ANSES	Agence Nationale de Sécurité Sanitaire Alimentation, environnement, travail
APPPC	Asia Pacific Plant Protection Commission
CFIA	Canadian Food Inspection Agency
CFS	Canadian Forest Service
CLSAB	Canadian Lumber Standards Accreditation Board
CPM	IPPC Commission on Phytosanitary Measures
CRADA	Cooperative research and development agreement
CWPCA	Canadian Wood Pallet and Container Association
DH	Dielectric Heating
EAB	Emerald Ash Borer (*Agrilus planipennis*)
EDN™	Ethanedinitrile (C_2N_2)
EPPO	European and Mediterranean Plant Protection Organisation
FAO	Food and Agriculture Organization
FPSA	Forest Products System Approach
HACCP	Hazard Analysis and Critical Control Points
HT	Heat Treatment
IFC	IPPC Implementation and Facilitation Committee
IFQRG	International Forestry Quarantine Research Group
IFU	Implementation and Facilitation Unit
IPPC	International Plant Protection Convention
IPRRG	International Pest Risk Research Group
IRSS	Implementation Review and Support System
ISPM	International Standards for Phytosanitary Measures
ISPM 15	ISPM No. 15 *Regulation of wood packaging material in international trade*
ISPM 28	ISPM No. 28 *Phytosanitary treatments for regulated pests*
ISPM 42	ISPM No. 42 *Requirements for the use of Temperature Treatment as Phytosanitary Measures*
IUFRO	International Union of Forestry Research Organizations
IYPH	International Year of Plant Health
MBr	Methyl bromide
MPI	Ministry of Primary Industries
MW	Microwave
NAPPO	North American Plant Protection Organization
NEPPO	Near East Plant Protection Organization
NGS	Next Generation Sequencing
NPPO	National Plant Protection Organisation

OECD	Organisation for Economic Co-operation and Development
OTUs	Operational taxonomic units
PCE	Phytosanitary Capacity Evaluation
PMRG	Phytosanitary Measures Research Group
PWN	Pine Wood Nematode (*Bursaphelenchus xylophilus*)
RoP	Rules of Procedure
RPPO	Regional Plant Protection Organisation
SC	IPPC Standards Committee
SSC	IFQRG Science Steering Committee
STDF	Standards and Trade Development Facility
ToR	Terms of Reference
TPFQ	IPPC Technical Panel for Forest Quarantine
TPPT	IPPC Technical Panel for Phytosanitary Treatments
USDA-APHIS	United States Department of Agriculture- Animal and Plant Health Inspection

The Mission of IFQRG

The mission of the International Forestry Quarantine Research Group (IFQRG) is to support and address critical forestry quarantine issues for the global plant health community through scientific analysis, discussion and collaborative research.

IFQRG is an independent, open international body providing scientific analysis and review of global forestry-related phytosanitary issues. The IFQRG serves as a forum for the discussion and clarification of key issues related to the phytosanitary implications of global trade with forest plants and products.

IFQRG's goal is for membership to include global representation from scientific, industrial and phytosanitary organizations from both developed and developing nations. Membership is open to suitably qualified individuals who have demonstrated expertise in disciplines relevant to plant health. IFQRG endeavours to recruit members from all FAO regions.

To become a member of IFQRG, the individual submits a short biography or curriculum vitae to the Science Steering Committee (SSC) outlining research or other relevant experience. Membership applications will be accepted by the SSC if information on the applicant indicates they would be a suitable member of IFQRG. There is no membership fee.