

# Treatments against *Agrilus* borers (Coleoptera: Buprestidae) in wood products

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EPPO-REUFIS-BFW Conference

‘Safeguarding Forests in Europe: Emerging Risks of  
*Agrilus* Wood Borers (Buprestidae)’

(21–23 April, 2026, Vienna)

# A Context

- Importance of trade to the economy (to be ongoing and least interrupted)
- Need to prevent pests import and establishment and potential huge negative economic impact. Need for treatments to manage international **and domestic** movement of wood (**be prepared**)
- Need to protect the environment
  - Considerable carbon expense associated with treatments especially if overboard and excessive heat treatments; Skyrocketing energy costs link with feasibility of treatments!  
Avoiding fumigants that are greenhouse gas, and/or ozone depleting!
- Precautionary principle
  - High uncertainty triggers authorities to restrict or block the import or movement of plants and plant products. It can be very Conservative approach: preventing trade at all cost until very concrete science data are available; Or using modeling/assessments that may suggest excessive treatments

# Defining treatment -ISPM 5

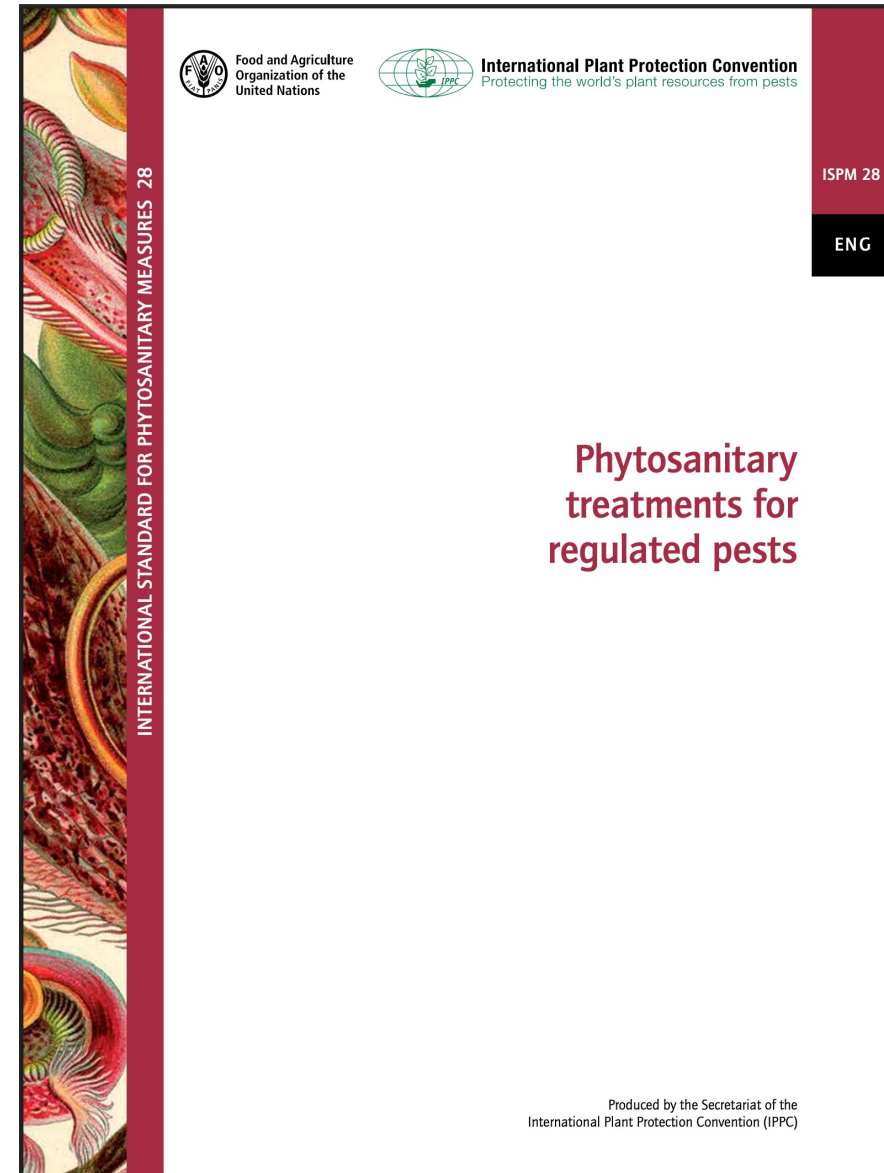
- **Treatment** (as a phytosanitary measure): Official procedure for killing, inactivating, removing, rendering infertile or devitalizing regulated pests [FAO, 1990; revised FAO, 1995; ISPM 15, 2002; ISPM 18, 2003; ICPM, 2005; CPM, 2021]
- **Treatment schedule**: The critical parameters of a treatment which need to be met to achieve the intended outcome (i.e. killing, inactivating, removing, rendering infertile or devitalizing regulated pests) at a stated efficacy [ISPM 28, 2007];

- **DOSE versus DELIVERY of the dose**

Clear distinction is needed between the precisely established dose that kills/inactivate/devitalize target pest, from the process and technology that needs to deliver that dose throughout the treated material. Once the delivery process is established there is no need to add additional safety margin (e.g. unnecessarily increase the dose).

# Development, evaluation and adoption of a treatment

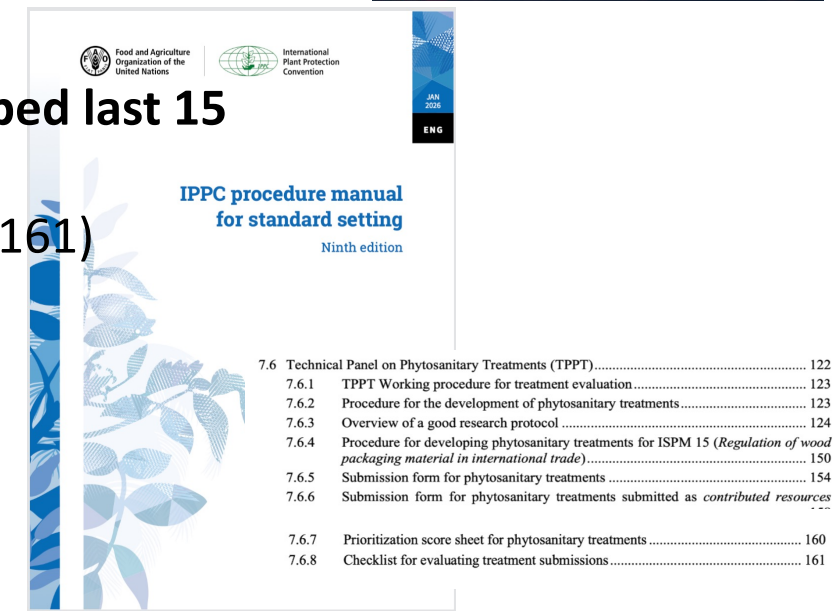
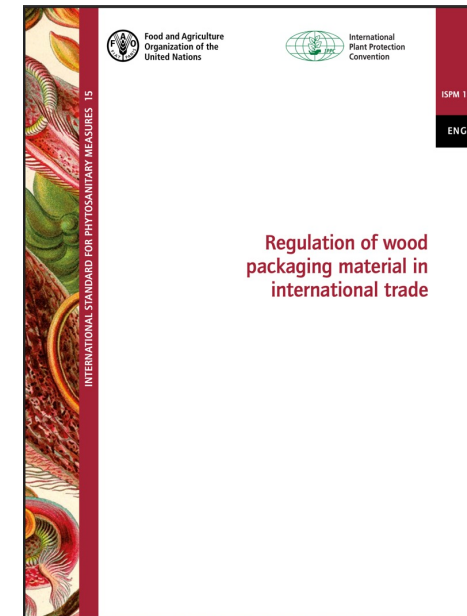
- **ISPM 28** (Phytosanitary treatments for regulated pests):
  - The standard describes a treatment submission process and adaption (requirements, efficacy data under laboratory and operational conditions, feasibility and applicability).
  - Under ISPM 28 typically, treatments are developed for one pest or genus and/or specific commodity and once adopted it becomes an annex to ISPM 28 . Currently out of 46 annexes only 1 is for wood pests (annex 22 and 23): fumigant SF against *Bursaphelenchus xylophilus* (PWN), (*Anoplophora glabripennis* (ALB), *Anobium punctatum* and *Arhopalus tristis*).
  - ISPM 28 treatments are not seen as a general treatments for many pests (However, over time with more efficacy data available for different pests it may be accepted as an universal treatment!) . There is no specific treatments for *Agrilus* spp in ISPM 28.



# ISPM 15: (Regulation of wood packaging material in international trade)

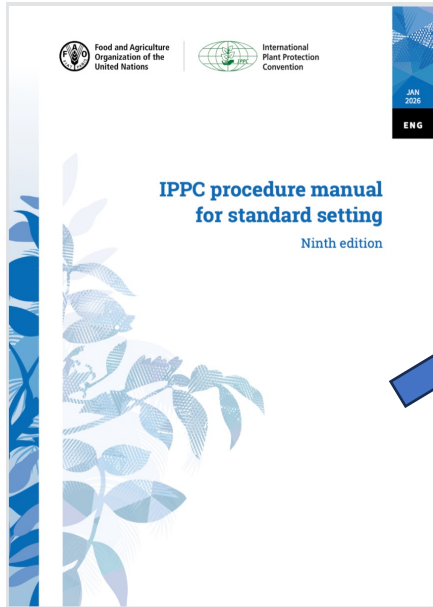
- A universal commodity treatment, considered to be significantly effective against most pests of living trees associated with wood packaging material used in international trade
- Annex 1: describes approved treatments (including requirement for prior debarking) and contains guidelines on how to achieve the DELIVERY of the established DOSE; Treatment providers should be approved by the NPPO and numerous factors need to be considered:
  - **(HT)** Heat treatment 56°C for 30 minutes throughout the treated wood
  - **(DH)** Dielectric Heating (microwaves or radio waves) to be heated to minimum 60°C for 1 minute throughout the treated wood
  - **(MB)** Methyl Bromide fumigation
  - **(SF)** Sulphuryl fluoride fumigation
  - **Procedure for evaluating new treatments for ISPM 15 is being developed last 15 years**

Included in IPPC Procedure manual for Standards setting (pages 122-161)



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# Developing phytosanitary treatments for ISPM 15



## 7.6.4 Procedure for developing phytosanitary treatments for ISPM 15 (*Regulation of wood packaging material in international trade*)<sup>192</sup>

Taking into account the other subsections of section 7.6, the following procedure provides specific guidance on how to develop phytosanitary treatments for ISPM 15 (*Regulation of wood packaging material in international trade*).

- **Step 1. Screening for pest tolerance** – screening intended to identify the pest and its life stage (associated with wood packaging material) most tolerant to the phytosanitary treatment tested and the effective schedule for that treatment (i.e. dose, concentration, rate of application, duration, etc. that results in complete mortality<sup>193</sup> of that pest at that life stage);
- **Step 2. Effect of physical parameters** – identification of the performance of the phytosanitary treatment under differing physical parameters of the environment in which the treatment is applied;
- **Step 3. Validation of the effective treatment schedule** – validation of the effective treatment schedule found in Steps 1 and 2 which result in complete mortality under laboratory conditions; and
- **Step 4. Validation under operational conditions** – testing under operational conditions to confirm the efficacy of the treatment during its use in the production of wood packaging material.

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ORIGINAL ARTICLE



### Elucidating the efficacy of phytosanitary measures for invasive alien species moving in wood packaging material

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**Keywords** Treatments · Phytosanitary IPPC · Wood packaging material · Efficacy

#### Introduction

Invasive alien species (IAS) are commonly associated with commodities transported around the globe (Brockerhoff

you must be able to ascertain how effective it is in managing risk and conversely how effective it needs to be to provide the appropriate level of protection. One measure of success is to determine the pest contamination threshold

**Table 1.** Pests to be used in the treatment testing process

Type of pest	Species, genera or families to be used
Insect	Bostrychidae, Buprestidae, Cerambycidae, Curculionidae (Scolytinae) and Siricidae
Fungus	<i>Heterobasidion</i> spp. and Ceratocystidaceae
Nematode	<i>Bursaphelenchus xylophilus</i>

# Heat treatment 56°C/30min

- Well established system to successfully deliver the dose in different products all throughout (HT schedules and programs)
- Used for treatment of wood packaging, but often accepted as a treatment for other wood products (e.g. lumber). In specific situations, when agreed among trading NPPO's used in lieu of phytosanitary certificates.
- Several recent publication confirmed 55 °C /30min or 56 °C /15min to be lethal dose for *Agrilus planipennis*
  - For example, in vitro study against prepupae: .Noseworthy et al, 2024. Testing the heat treatment dose for *Agrilus planipennis* (Coleoptera: Buprestidae) prepupae using the Humble water bath. *Journal of Economic Entomology*, 117(1), 199–208.

# EU current requirement for heat treatment of ash

authorising Member States to provide for a temporary derogation from certain provisions of Council Directive 2000/29/EC in respect of ash wood originating or processed in Canada

(notified under document C(2016) 1635)

## SCIENTIFIC OPINION

**Scientific Opinion on a technical file submitted by the US Authorities to support a request to list a new option among the EU import requirements for wood of *Agrilus planipennis* host plants<sup>1</sup>**

**EFSA Panel on Plant Health (PLH)<sup>2,3</sup>**

European Food Safety Authority (EFSA), Parma, Italy

### ABSTRACT

This document presents the scientific opinion of the Panel on Plant Health on the technical file submitted by the US Authorities to support a request to list a new option among the EU import requirements for wood of *Agrilus planipennis* host plants. The option under consideration is a heat treatment at 60 °C for 60 min to eliminate possible infestations of the wood by the emerald ash borer (EAB). The experiments leading the US Authorities to propose this option are presented in a scientific peer reviewed publication, Myers et al. (2009). The analysis of the aggregated data published by Myers et al. (2009) and based on a Probit regression model showed that the proposed treatment cannot guarantee a control level of 99 % or higher. The analysis of the individual data either from the original measurements or from a corrected dataset, using a Probit regression model, showed that it is likely to observe one live EAB out of an infestation of 100 after the proposed heat treatment of 60 °C/60 min. To ensure a control level of 99 % the temperature of the heat treatment of 60 min should be higher than 70 °C. Results obtained with a Poisson log linear model based on individual data showed that the estimated probability that one insect or more per m<sup>2</sup> survive the proposed heat treatment was higher than 0.6 and that there is a 0.1 probability that three insects or more per m<sup>2</sup> survive the proposed heat treatment. Based on these results, the Panel concludes that *A. planipennis* is likely to survive the proposed heat treatment of 60 °C/60 min with a low uncertainty, and that the alternative option proposed in the technical file submitted by the US Authorities for wood does not guarantee the wood to be free of *A. planipennis*.

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Statistical modeling by risk managers indicates that even 60C/60 minutes is not enough to meet desired control level

## Processing requirements

- **Debarking (as per ISPM 15)**
- **Sawing (sawn wood from debarked round wood)**
- **Heat treatment to the core for at least 71C for 1200 min (20 hours)**
- **Drying, industrial kiln schedule, 2w to below 10% moisture**
- **Requirement for facilities , heat chamber approved by NPPO**
- **Pre-export inspection**

This is current working agreement for trade of ash wood, recommended by Canada and accepted by EU. It is based on the drying procedure/schedule for ash used at the time by the industry

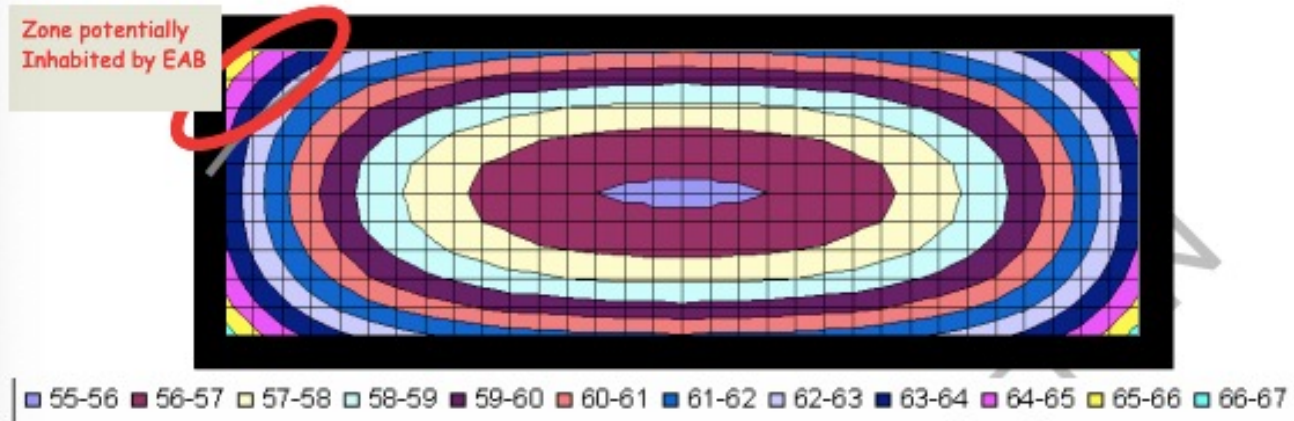
# Published literature on EAB thermotolerance and the reality

- The studies alleging thermotolerance were conducted on firewood and wood chips and did not test as per ISPM 15 HT guideline (throughout the whole profile of the wood to achieve 56/30)
- McCullough et al 2007; This study monitored chamber temperature and not in situ
- Myers et al 2009. Temperature monitoring probes were inserted in firewood to 3.5 cm (maximum penetration depth of the beetle). Larvae survived up to 60C for 30 min. This is not treatment to ISPM 15 standard where probes need to be inserted to the core of treated wood to meet 56/30 standard requirement.

The International Forestry Quarantine Research Group reviewed the published literature on *A. planipennis* (EAB) thermotolerance (2012 IFQRG -10-10).

The figure below shows thermal image of a cross section of a lumber piece in pile treated at 56/30 in an industrial process

Fig 1. Heat Treatment of Ash lumber to a core temperature



Ash wood treated under hardwood treatment schedules targeting 56/30 to the core of the wood, in the CFIA manual PI-07, receives exposure to temperatures in excess of 60°C for several hours. Time to reach 56/30 to the core is 314 min (Forintek, 2007)

Recommended treatment temperatures set by risk managers include desired control levels e.g. mortality rate (e.g. 99%, 99.9% or 99.99683). Models are used to analyse data and the choice of statistical confidence level (e.g. 90%, 95%, or 99%). Such statistical manipulations are useful in providing quantifiable reliability of experimental data. However, the resultant treatment doses may be unnecessarily high, sometimes overboard, possibly overlooking biological considerations that limit survival.

# Dielectric heating-concept

- Dielectric heating raises the temperature of the commodity by subjecting it to high frequency electromagnetic waves that cause rotation of a polar molecules, especially water causing instant heating.
- Dielectric heating generates heat throughout the material, including the internal part, and the heat additionally spreads by convection and conduction outwards from moist to less moist areas, reducing treatment time. The inside of the commodity tends to be hotter than the surface due to heat radiation from the surface
- Key goal is to achieve uniform temperature throughout, and especially on the surface

# Dielectric Heating (DH): Microwave (MW); Radio Frequency (RF)

- The DH standard was officially adopted in 2013 under ISPM 15 (based on the efficacy data for few tested pests) targeting 60°C/1min throughout.
- No specific efficacy data on *Agrilus spp*

Journal of Nematology 42(2):101–110. 2010.  
© The Society of Nematologists 2010.

## Lethal Temperature for Pinewood Nematode, *Bursaphelenchus xylophilus*, in Infested Wood Using Microwave Energy

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**Abstract:** To reduce the risks associated with global transport of wood infested with pinewood nematode *Bursaphelenchus xylophilus*, microwave irradiation was tested at 14 temperatures in replicated wood samples to determine the temperature that would kill 99.9968% of nematodes in a sample of  $\geq 100,000$  organisms, meeting a level of efficacy of Probit 9. Treatment of these heavily infested wood samples (mean of  $> 1,000$  nematodes/g of sapwood) produced 100% mortality at 56 °C and above, held for 1 min. Because this “brute force” approach to Probit 9 treats individual nematodes as the observational unit regardless of the number of wood samples it takes to treat this number of organisms, we also used a modeling approach. The best fit was to a Probit function, which estimated lethal temperature at 62.2 (95% confidence interval 59.0-70.0) °C. This discrepancy between the observed and predicted temperature to achieve Probit 9 efficacy may have been the result of an inherently limited sample size when predicting the true mean from the total population. The rate of temperature increase in the small wood samples (rise time) did not affect final nematode mortality at 56 °C. In addition, microwave treatment of industrial size, infested wood blocks killed 100% of  $> 200,000$  nematodes at  $\geq 56$  °C held for 1 min in replicated wood samples. The 3<sup>rd</sup>-stage juvenile (J3) of the nematode, that is resistant to cold temperatures and desiccation, was abundant in our wood samples and did not show any resistance to microwave treatment. Regression analysis of internal wood temperatures as a function of surface temperature produced a regression equation that could be used with a relatively high degree of accuracy to predict internal wood temperatures, under the conditions of this study. These results provide strong evidence of the ability of microwave treatment to successfully eradicate *B. xylophilus* in infested wood at or above 56 °C held for 1 min.

**Key words:** Pinewood nematode, quarantine, microwave, dielectric heating, international trade, embargo, eradication, Probit 9, International Standard of Phytosanitary Measures No. 15.

*Lethal temperature for pinewood nematode, Bursaphelenchus xylophilus, in infested wood using radio frequency (RF) energy*

**Adnan Uzunovic, Brad Gething, Aaron Coelho, Angela Dale, John J. Janowiak, Ron Mack & Kelli Hoover**

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The Japan Wood Research Society

# Recently completed work on uniformed commercial delivery of the 60/1 dose and verification (2024)

## Approach to Validate ISPM-15 Compliance for Commercial Treatment Certification of Dielectric Standard Heating of Bulk Solid Wood Packing Materials using Radio Frequency

Karolina K. Szymona    John J. Janowiak    Ron Mack    Mark Hamelin  
Mark Gagnon    Kelli Hoover

### Abstract

To substantially reduce the risk of alien invasive species moving to new geographic areas, phytosanitary treatment of wood packaging materials (WPM) in compliance with the International Standard of Phytosanitary Measures No. 15 (ISPM-15) is required by trading partners. Approved treatments include conventional heating, methyl bromide and sulfuryl fluoride fumigation, and dielectric heating (DH). The DH standard was officially adopted in 2013 but has not been practiced commercially due primarily to insufficient operational validation at commercial scale. In 2022, we converted our 50-kW radio frequency (RF) unit with a 1,200-board foot capacity from an oscillator electromagnetic field power generator to a solid-state power supply, which allows for selective power input adjustments during treatment; we also switched from a five-plate to a three-plate winged electrode system to improve heating uniformity. Each loading cycle can treat sufficient material to build ~94 standard Grocery Manufacturers Association pallets. Our research team characterized the dielectric heating pattern and options for monitoring wood temperatures over a wide-ranging test matrix of WPM that varied by wood species, dimension, moisture content, and loading configuration. We found that this upgraded RF system markedly reduced treatment times and improved heating uniformity, allowing us to develop methods that can be used to verify compliance with ISPM-15 for improved technology transfer to industry. We also discuss the operational cost of RF treatment and make general cost comparisons to conventional heat treatment for WPM.

### Wood bulk volumetric configuration for DH treatment

Wood materials were loaded on the RF feed cart in two sections (top and bottom) divided by the middle-winged electrode (Fig. 1). First, we ran replicated dunnage tests, layered nine pieces high in each section and seven pieces



Figure 1.—Stringer load with three-plate, middle-wing electrode system with installed fiber-optic temperature probes ready to be loaded into the radio frequency-chamber.

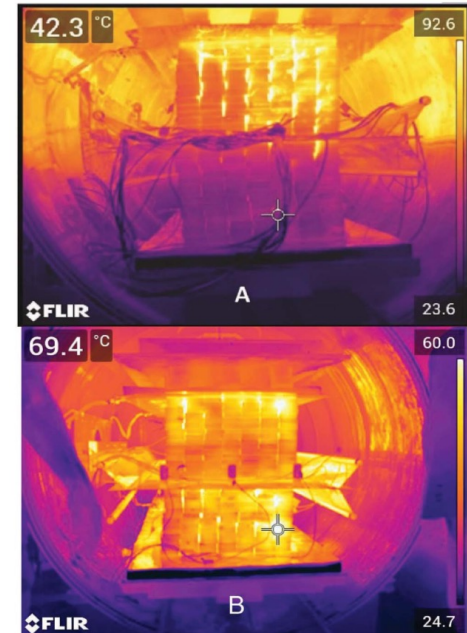
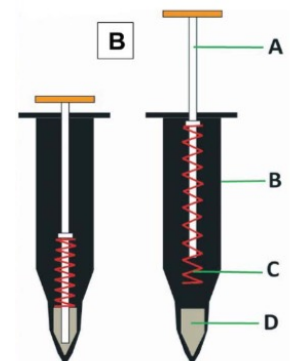


Figure 2.—Example of FLIR thermal images of a wood load after treatment. Images were taken approximately 10 minutes after shutting off the power. Lag time was caused by the pro-



# Fumigation as a treatment

- Fumigation is convenient, economical and efficient way of treating commodities. It is one of best and easiest treatment to be used in a field to manage emergencies. Methyl bromide (MB) and Sulfuryl fluoride SF are approved treatments for ISPM 15 and SF is in the annex of ISPM 28 against few wood pests. Many fumigants have been studied and assessed as a replacement for ozone depleting and banned Methyl Bromide
- Key alternatives to MB include:
  - Phosphine
  - Ethane Dinitrile (EDN)
  - **Other include:** Ethyl formate, Hydrogen Cyanide, Methyl iodide, Nitric oxide, Ethylene, Propylene Oxide, Carbonyl sulfide, ozone)

# Phosphine

- Cheap and easy to apply
- Mostly used on grain and seeds but NZ uses it on logs in ship holds in transit
- **Slow acting** 10 to 15 days, requires room temperature when treated
- **Inefficient against some pests**
- Some grain **pests are resistant** due to poor fumigations
- Can cause explosions at high ppm and fires from residues if exposed to water
- Fails to meet quarantine treatment standards as a general fumigant
- **Efficacy data on wood and wood pests lacking including against Buprestidae (*Agrilus* spp)**

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

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## ABSTRACT

Phosphine (PH<sub>3</sub>) 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 PH<sub>3</sub> against grain pests is well-established, its efficacy for wood products requires review due to growing adoption. We observed insufficient evidence supporting PH<sub>3</sub> as a broad-spectrum quarantine treatment for wood products from peer-reviewed/gray literature and international groups. We assessed 41 research articles covering 29 insect species, 1 nematode, and 11 fungi, and observed that while PH<sub>3</sub> is effective against some forest insects, it generally fails to meet quarantine treatment standards and is ineffective against nematodes and fungi. Our analysis highlights concerns over the effectiveness of PH<sub>3</sub> 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 PH<sub>3</sub> use for wood products to strengthen biosecurity systems.

# Sulfuryl Fluoride

- Better penetration than methyl bromide
- Egg life stage requires a higher dose and warmer temperature than MB e.g. ISPM 15
- **Greenhouse gas** with a global warming potential (GWP)
- **EU will apply carbon tax to imports** in 2030, carbon price expected to get to € 100/tonne
- **No efficacy data on *Agilus* spp.**



# Ethanedinitrile (EDN)

- **Broad-spectrum fumigant**, highly effective against timber insects, nematodes and pathogens, weed seeds & nematodes in soil treatment at low temperature (5°C) due to -21°C boiling temp
- **Environmentally friendly**, not ozone depleting, nor green house gas, no need for scrubbing, Smaller buffer zones than MB and recapture not required
- Colourless, **½ as heavy as MB, small molecule**; Tears produced at 16ppm, jury out on smell produced.
- **Drop-in replacement for MB on wood** ; **Quick fumigation period up to 24 h, advanced application methods under tarp, in container or ship holds**
- **Good penetration, sorbs quickly** into logs highly reduced ppm at the end of 24 hours 100g/m<sup>3</sup> for 24 hours to ~700ppm.
- **Low temperatures OK** with the same dose, **shorter time** e.g. less than 24 hours exposure can be efficient
- Flammable and explosive at high concentrations
- **No efficacy data on *Agilus* spp.**



# EDN efficacy data against insects : 11 families (28 species)

Type	Family	Scientific name	Common name	References
Insect	Bostrichidae	<i>Rhyzopertha dominica</i>	Lesser grain borer	1,2,3,4
Insect	Cerambycidae	<i>Anoplophora glabripennis</i>	Asian long-horned beetle	4,5
Insect	Cerambycidae	<i>Arhopalus ferus</i>	Burnt pine longhorn beetle	6,7,8
Insect	Cerambycidae	<i>Hylotrupes bajulus</i>	House longhorn beetle	9,10
Insect	Cerambycidae	<i>Monochamus alternatus</i>	Japanese pine sawyer	11,12,13,14
Insect	Cerambycidae	<i>Tetropium fuscum</i>	Brown spruce longhorn beetle	15
Insect	Curculionidae	<i>Crypahalus fulvus</i>	Minute pine bark beetle	16,17
Insect	Curculionidae	<i>Dryocoetes autographus</i>	Hairy spruce bark beetle	15,18
Insect	Curculionidae	<i>Dryocoetes hectographus</i>	-	18
Insect	Curculionidae	<i>Hylastes ater</i>	Black pine bark beetle	8,19
Insect	Curculionidae	<i>Hylurgops palliatus</i>	Lesser spruce shoot beetle	18
Insect	Curculionidae	<i>Hylurgus ligniperda</i>	Golden-haired bark beetle	8,19
Insect	Curculionidae	<i>Ips typographus</i>	European spruce bark beetle	15, 18
Insect	Curculionidae	<i>Pityogenes chalcographus</i>	Spruce wood engrave	15,18
Insect	Curculionidae	<i>Polygraphus poligraphus</i>	-	15
Insect	Curculionidae	<i>Tomicus piniperda</i>	Common pine shoot beetle	17,21
Insect	Dermeestidae	<i>Trogoderma variabile</i>	Khapra beetle	2
Insect	Dryophthoridae	<i>Sitophilus granarius</i>	Wheat weevil	1
Insect	Dryophthoridae	<i>Sitophilus oryzae</i>	Rice weevil	1,2
Insect	Erebidae	<i>Hyphantria cunea</i>	Fall webworm	17,21

Type	Family	Scientific name	Common name	References
Insect	Kalotermitidae	<i>Cryptotermes brevis</i>	West Indian drywood termite	4
Insect	Ptinidae	<i>Lasioderma serricorne</i>	Cigarette beetle	2,3
Insect	Rhinotermitidae	<i>Reticulitermes speratus</i>	Japanese termite	16,17,21
Insect	Siricidae	<i>Sirex noctilio</i>	Sirex woodwasp	22
Insect	Siricidae	<i>Sirex juvenus</i>	Steel-blue woodwasp	23
Insect	Siricidae	<i>Urocerus gigas</i>	Giant woodwasp	23
Insect	Tenebrionidae	<i>Tribolium castaneum</i>	Red flour beetle	1,2
Insect	Tenebrionidae	<i>Tribolium confusum</i>	Confused flour beetle	1



# EDN efficacy data against nematodes : 5 families (8 species)

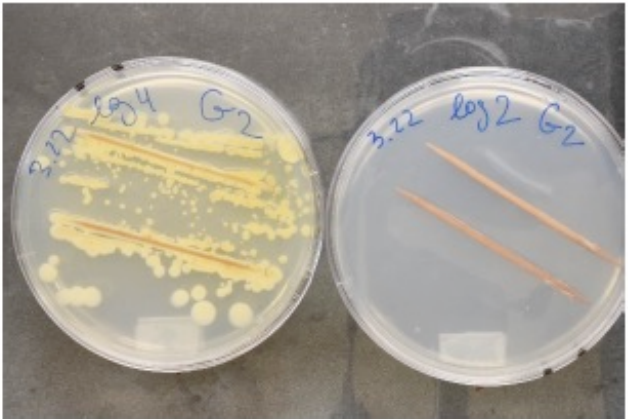
Type	Family	Scientific name	Common name	References
Nematode	Heteroderidae	<i>Meloidogyne incognita</i>	Southern root-knot nematode	24
Nematode	Hoplolaimidae	<i>Hoplolaimus galeatus</i>	Lance nematode	24
Nematode	Hoplolaimidae	<i>Helicotylenchus</i> spp.	Spiral nematodes	24
Nematode	Parasitaphelenchidae	<i>Bursaphelenchus xylophilus</i>	Pine wood nematode	10, 11, 12, 14, 24, 25, 26, 27, 28
Nematode	Pratylenchidae	<i>Pratylenchus</i> spp.	Lesion nematodes	24
Nematode	Rhabditidae	<i>Cruz nema tripartitum</i>	-	24
Nematode	Rhabditidae	<i>Oscheius</i> sp.	-	24
Nematode	Rhabditidae	<i>Rhabditis</i> sp.	-	24



# EDN efficacy data against pathogens: 12 families (24 species)

Type	Family	Scientific name	Common name	References
Fungi	Peronosporaceae	<i>Phytophthora kernoviae</i>	-	30
Fungi	Peronosporaceae	<i>Phytophthora pluvialis</i>	Red needle cast	30
Fungi	Peronosporaceae	<i>Phytophthora ramorum</i>	Sudden oak death	25
Fungi	Rhytismataceae	<i>Lophodermium pinastri</i>	Lophodermium needle cast	30

Type	Family	Scientific name	Common name	References
Fungi	Acarosporaceae	<i>Diplodia sapinea</i>	Sphaeropsis blight	30
Fungi	Amylostereaceae	<i>Amylostereum areolatum</i>	-	30
Fungi	Bionectriaceae	<i>Geosmithia morbida</i>	Thousand cankers black walnut disease	25,29
Fungi	Bondarzewiaceae	<i>Heterobasidion annosum</i>	-	25
Fungi	Bondarzewiaceae	<i>Heterobasidion insulara</i>	-	30
Fungi	Capnodiales	<i>Teratosphaeria cryptica</i>	Eucalyptus leaf blotch	30
Fungi	Ceratocystidaceae	<i>Ceratocystis fimbriata</i>	Sweet potato pathogen	30
Fungi	Fagaceae	<i>Ceratocystis fagacearum</i>	Oak wilt	25,29
Fungi	Mycosphaerellaceae	<i>Dothistroma septosporum</i>	Red band needle blight	30
Fungi	Nectriaceae	<i>Thyronectria fuckeliana</i>	Canker	30
Fungi	Nectriaceae	<i>Thyronectria pinicola</i>	-	30
Fungi	Ophiostomataceae	<i>Grosmannia huntii</i>	-	30
Fungi	Ophiostomataceae	<i>Grosmannia radiaticola</i>	-	30
Fungi	Ophiostomataceae	<i>Leptographium procerum</i>	White pine root decline	30
Fungi	Ophiostomataceae	<i>Leptographium truncatum</i>	Black stain root disease	30
Fungi	Ophiostomataceae	<i>Ophiostoma floccosum</i>	-	30
Fungi	Ophiostomataceae	<i>Ophiostoma piceae</i>	Vascular mycosis of oak	30
Fungi	Peronosporaceae	<i>Phytophthora aleatoria</i>	-	30
Fungi	Peronosporaceae	<i>Phytophthora citricola</i>	Black hop root rot	30
Fungi	Peronosporaceae	<i>Phytophthora cryptogea</i>	Tomato foot rot	30



# Registration challenge under heightened scrutiny by environmental agencies

Global registration of EDN™ is progressing and is focused on forestry products. Detailed environmental and toxicological data available and shared with countries. Where efficacy is needed papers available to show EDN™ to be effective against a wide range of forestry pests - 60 species across 28 families . Ongoing request for more toxicological data by different agencies has slowed pending registrations

## Active registrations

Country / Region	Year	Registered Use
Australia	2013	Timber & logs and preplant soil treatment
South Korea	2019	Timber & logs
Malaysia	2020	Timber & logs and preplant soil treatment
Russia	2021	Timber & logs
New Zealand	2022	Timber & logs
Türkiye	2022	Timber & logs & and preplant soil treatment

## Pending registrations

Country / Region	Anticipated year of approval	Requested Registered Use
Uruguay	2023	Timber & Logs
Panama	2024	Timber & Logs
USA	2024	Timber & Logs
South Africa	2024	Timber & Logs
Canada	2025	Timber & Logs
India	2026	Timber & Preplant
China	2026	Timber & Logs

# Guidance to the assessment and management of the phytosanitary risks associated with international trade in wood chips and other types of fragmented wood (To be finalized by the end of 2026)



## EPPO Panel on Quarantine Pests for Forestry – Working group

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# Power of contract/Chain of Custody

- Contractual side (Ability to control through the chain of custody ) controlling wood fragments trade, especially those with specific end use such as pulp and paper, through contracts.
- This may include the control of wood source/pest status, size and type of fragments (chips, sawdust, shavings, fines) , handling and management while in storage and transport (e.g. moving in closed containers, vents properly done, no escape for pests) and end use (e.g. goes directly into digester and factory).
- Some NPPOs may require a treatment or documented steps of systems approach including practices that reduce pest risk.
- Onus is on receiving NPPO to endorse it and police end use

# Concluding remarks

- There are no treatments specifically developed for *Agrilus* spp but there are some universal treatments with great history and scientific back up to be used against *Agrilus* spp.
- These include treatments as specified under ISPM 15 to be delivered throughout the wood including Heat treatment 56/30; Dielectric heating 60/1; and Methyl Bromide and Sulfuryl fluoride fumigation per specific guidelines.
- EDN offers great promise but needs to go through national and international registration process. As it is very promising it may need to be prioritized if solutions are needed. This may require joint efforts by NPPO, Environmental Agencies, and the Industry
- Systems approach is a possibility for some scenarios and products especially if going through power of contract (e.g. chips for pulp and paper)

# Concluding remarks

- Understanding the required DOSE separate from the successful DELIVERY of that dose throughout the treated commodity may prevent calls for unnecessary increases in the dose. Unnecessary increase will negatively affect trade, the environment and treatment feasibility both for international and domestic pest management.
- Modeling and statistical manipulations used by risk managers may result in treatment doses that are unnecessarily high, possibly overlooking biological considerations.
- Failure to treat properly, or fraud are the key to possible pest transfers and establishment events, rather than the efficacy of the established treatments. Requiring excessive treatment may lead to more fraudulent uses due to treatment availability and feasibility.
- Work with reliable trade partners that can guarantee the delivery of the established dose. Some exporters (bad players) may be risky so specific measures may need to be imposed on them rather than to penalise all the management and trade system with requirements for excessive treatments through precautionary principle.

Thank you