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Pest categorisation of *Coniferiporia sulphurascens* and *Coniferiporia weirii*

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Abstract

Following a request from the European Commission, the EFSA Panel on Plant Health performed a pest categorisation of *Coniferiporia sulphurascens* and *Coniferiporia weirii*, two well-defined and distinguishable fungal species of the family Hymenochaetaceae. The pathogens are regulated in Council Directive 2000/29/EC (Annex IAI, under the previous name *Inonotus weirii* for both species) as a harmful organism whose introduction into the EU is banned. The two pathogens are native to North America, where *C. sulphurascens* causes laminated root rot primarily in Douglas fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*), while *C. weirii* causes cedar laminated root and butt rot mainly in cedars (*Thuja plicata* and *Cupressus nootkatensis*). *C. weirii* has been reported from Japan and China, and *C. sulphurascens* from China, Russia and Turkey. Neither species has been reported from the EU. *C. sulphurascens* may infect all conifers, while *C. weirii* is reported to mainly cause disease in tree species of *Thuja* spp. and *Cupressus* spp. The two pathogens could enter the EU mainly via wood with bark, isolated bark and plants for planting (including artificially dwarfed plants) of Pinaceae and Cupressaceae. Both fungi could establish in the EU, as hosts are present and climatic conditions are favourable. The two pathogens would be able to spread following establishment by the pathways mentioned for entry and also by dissemination of basidiospores and root contact with infected root/wood. Should the pathogen be introduced in the EU, impacts can be expected on coniferous woodlands, plantations and ornamental trees, thus leading to reduced tree growth and ecosystem service provision. The key uncertainties concern (i) the distribution of the two pathogens in Asia, (ii) the level of susceptibility of conifers native to Europe and (iii) the role of plants for planting as a pathway of entry and spread. For both pathogens, the criteria assessed by the Panel for consideration as a potential quarantine pest are met. As the two pests are not present in the EU, not all the criteria for consideration as regulated non-quarantine pests are met.

Keywords: forest pathology, laminated butt rot of conifers, pest risk, *Phellinus weirii*, quarantine, tree health

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1. Introduction

1.1. Background and Terms of Reference as provided by the requestor

1.1.1. Background

Council Directive 2000/29/EC[1] on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community establishes the present European Union plant health regime. The Directive lays down the phytosanitary provisions and the control checks to be carried out at the place of origin on plants and plant products destined for the Union or to be moved within the Union. In the Directive's 2000/29/EC annexes, the list of harmful organisms (pests) whose introduction into or spread within the Union is prohibited, is detailed together with specific requirements for import or internal movement.

Following the evaluation of the plant health regime, the new basic plant health law, Regulation (EU) 2016/2031[2] on protective measures against pests of plants, was adopted on 26 October 2016 and will apply from 14 December 2019 onwards, repealing Directive 2000/29/EC. In line with the principles of the above mentioned legislation and the follow-up work of the secondary legislation for the listing of EU regulated pests, EFSA is requested to provide pest categorizations of the harmful organisms included in the annexes of Directive 2000/29/EC, in the cases where recent pest risk assessment/pest categorisation is not available.

1.1.2. Terms of reference

EFSA is requested, pursuant to Article 22(5.b) and Article 29(1) of Regulation (EC) No 178/2002,[3] to provide scientific opinion in the field of plant health.

EFSA is requested to prepare and deliver a pest categorisation (step 1 analysis) for each of the regulated pests included in the appendices of the annex to this mandate. The methodology and template of pest categorisation have already been developed in past mandates for the organisms listed in Annex II Part A Section II of Directive 2000/29/EC. The same methodology and outcome is expected for this work as well.

The list of the harmful organisms included in the annex to this mandate comprises 133 harmful organisms or groups. A pest categorisation is expected for these 133 pests or groups and the delivery of the work would be stepwise at regular intervals through the year as detailed below. First priority covers the harmful organisms included in Appendix 1, comprising pests from Annex II Part A Section I and Annex II Part B of Directive 2000/29/EC. The delivery deadline of all pest categorisations for the pests included in Appendix 1 is June 2018. The second priority is the pests included in Appendix 2, comprising the group of *Cicadellidae* (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), the group of *Tephritidae* (non-EU), the group of potato viruses and virus-like organisms, the group of viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L. and the group of *Margarodes* (non-EU species). The delivery deadline of all pest categorisations for the pests included in Appendix 2 is end 2019. The pests included in Appendix 3 cover pests of Annex I part A section I and all pests categorisations should be delivered by end 2020.

For the above mentioned groups, each covering a large number of pests, the pest categorisation will be performed for the group and not the individual harmful organisms listed under "such as" notation in the Annexes of the Directive 2000/29/EC. The criteria to be taken particularly under consideration for these cases, is the analysis of host pest combination, investigation of pathways, the damages occurring and the relevant impact.

Finally, as indicated in the text above, all references to 'non-European' should be avoided and replaced by 'non-EU' and refer to all territories with exception of the Union territories as defined in Article 1 point 3 of Regulation (EU) 2016/2031.

[1] Council Directive 2000/29/EC of 8 May 2000 on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community. OJ L 169/1, 10.7.2000, p. 1–112.

[2] Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants. OJ L 317, 23.11.2016, p. 4–104.

[3] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31/1, 1.2.2002, p. 1–24.

1.1.2.1. Terms of Reference: Appendix 1

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

Aleurocantus spp.
Anthonomus bisignifer (Schenkling)
Anthonomus signatus (Say)
Aschistonyx eppoi Inouye
Carposina niponensis Walsingham
Enarmonia packardi (Zeller)
Enarmonia prunivora Walsh
Grapholita inopinata Heinrich
Hishomonus phycitis
Leucaspis japonica Ckll.
Listronotus bonariensis (Kuschel)
Numonia pyrivorella (Matsumura)
Oligonychus perditus Pritchard and Baker
Pissodes spp. (non-EU)
Scirtothrips aurantii Faure
Scirtothrips citri (Moultex)
Scolytidae spp. (non-EU)
Scrobipalpopsis solanivora Povolny
Tachypterellus quadrigibbus Say
Toxoptera citricida Kirk.
Unaspis citri Comstock

(b) Bacteria

Citrus variegated chlorosis
Erwinia stewartii (Smith) Dye
Xanthomonas campestris pv. *oryzae* (Ishiyama) Dye and pv. *oryzicola* (Fang. et al.) Dye

(c) Fungi

Alternaria alternata (Fr.) Keissler (non-EU pathogenic isolates)
Anisogramma anomala (Peck) E. Müller
Apiosporina morbosa (Schwein.) v. Arx
Ceratocystis virescens (Davidson) Moreau
Cercoseptoria pini-densiflorae (Hori and Nambu) Deighton
Cercospora angolensis Carv. and Mendes
Elsinoe spp. Bitanc. and Jenk. Mendes
Fusarium oxysporum f. sp. *albedinis* (Kilian and Maire) Gordon
Guignardia piricola (Nosa) Yamamoto
Puccinia pittieriana Hennings
Stegophora ulmea (Schweinitz: Fries) Sydow & Sydow
Venturia nashicola Tanaka and Yamamoto

(d) Virus and virus-like organisms

Beet curly top virus (non-EU isolates)
Black raspberry latent virus
Blight and blight-like
Cadang-Cadang viroid
Citrus tristeza virus (non-EU isolates)
Leprosis
Little cherry pathogen (non- EU isolates)
Naturally spreading psorosis
Palm lethal yellowing mycoplasm
Satsuma dwarf virus
Tatter leaf virus
Witches' broom (MLO)

Annex IIB

(a) Insect mites and nematodes, at all stages of their development

Anthonomus grandis (Boh.)
Cephalcia lariciphila (Klug)
Dendroctonus micans Kugelan
Gilphinia hercyniae (Hartig)
Gonipterus scutellatus Gyll.
Ips amitinus Eichhof
Ips cembrae Heer
Ips duplicatus Sahlberg
Ips sexdentatus Börner
Ips typographus Heer
Sternochetus mangiferae Fabricius

(b) Bacteria

Curtobacterium flaccumfaciens pv. flaccumfaciens (Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton
Gremmeniella abietina (Lag.) Morelet
Hypoxylon mammatum (Wahl.) J. Miller

1.1.2.2. Terms of Reference: Appendix 2

List of harmful organisms for which pest categorisation is requested per group. The list below follows the categorisation included in the annexes of Directive 2000/29/EC.

Annex IAI

(a) Insects, mites and nematodes, at all stages of their development

Group of Cicadellidae (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), such as:

1) *Carneocephala fulgida* Nottingham
2) *Draeculacephala minerva* Ball
3) *Graphocephala atropunctata* (Signoret)

Group of Tephritidae (non-EU) such as:

1) *Anastrepha fraterculus* (Wiedemann)
2) *Anastrepha ludens* (Loew)
3) *Anastrepha obliqua* Macquart
4) *Anastrepha suspensa* (Loew)
5) *Dacus ciliatus* Loew
6) *Dacus curcurbitae* Coquillet
7) *Dacus dorsalis* Hendel
8) *Dacus tryoni* (Froggatt)
9) *Dacus tsuneonis* Miyake
10) *Dacus zonatus* Saund.
11) *Epochra canadensis* (Loew)
12) *Pardalaspis cyanescens* Bezzi
13) *Pardalaspis quinaria* Bezzi
14) *Pterandrus rosa* (Karsch)
15) *Rhacochlaena japonica* Ito
16) *Rhagoletis completa* Cresson
17) *Rhagoletis fausta* (Osten-Sacken)
18) *Rhagoletis indifferens* Curran
19) *Rhagoletis mendax* Curran
20) *Rhagoletis pomonella* Walsh
21) *Rhagoletis suavis* (Loew)

(c) Viruses and virus-like organisms

Group of potato viruses and virus-like organisms such as:

1) Andean potato latent virus
2) Andean potato mottle virus
3) Arracacha virus B, oca strain
4) Potato black ringspot virus
5) Potato virus T
6) non-EU isolates of potato viruses A, M, S, V, X and Y (including Yo, Yn and Yc) and Potato leafroll virus

Group of viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L., such as:

1) Blueberry leaf mottle virus
2) Cherry rasp leaf virus (American)
3) Peach mosaic virus (American)
4) Peach phony rickettsia
5) Peach rosette mosaic virus
6) Peach rosette mycoplasm
7) Peach X-disease mycoplasm
8) Peach yellows mycoplasm
9) Plum line pattern virus (American)
10) Raspberry leaf curl virus (American)
11) Strawberry witches' broom mycoplasma
12) Non-EU viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L.

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

Group of *Margarodes* (non-EU species) such as:

1) *Margarodes vitis* (Phillipi)
2) *Margarodes vredendalensis* de Klerk
3) *Margarodes prieskaensis* Jakubski

1.1.2.3. Terms of Reference: Appendix 3

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IAI

(a) Insects, mites and nematodes, at all stages of their development

Acleris spp. (non-EU)
Amauromyza maculosa (Malloch)
Anomala orientalis Waterhouse
Arrhenodes minutus Drury
Choristoneura spp. (non-EU)
Conotrachelus nenuphar (Herbst)
Dendrolimus sibiricus Tschetverikov
Diabrotica barberi Smith and Lawrence
Diabrotica undecimpunctata howardi Barber
Diabrotica undecimpunctata undecimpunctata Mannerheim
Diabrotica virgifera zeae Krysan & Smith
Diaphorina citri Kuway
Heliothis zea (Boddie)
Hirschmanniella spp., other than *Hirschmanniella gracilis* (de Man) Luc and Goodey
Liriomyza sativae Blanchard
Longidorus diadecturus Eveleigh and Allen
Monochamus spp. (non-EU)
Myndus crudus Van Duzee
Nacobbus aberrans (Thorne) Thorne and Allen
Naupactus leucoloma Boheman
Premnotrypes spp. (non-EU)
Pseudopityophthorus minutissimus (Zimmermann)
Pseudopityophthorus pruinosus (Eichhoff)
Scaphoideus luteolus (Van Duzee)
Spodoptera eridania (Cramer)
Spodoptera frugiperda (Smith)
Spodoptera litura (Fabricus)
Thrips palmi Karny
Xiphinema americanum Cobb sensu lato (non-EU populations)
Xiphinema californicum Lamberti and Bleve-Zacheo

(b) Fungi

Ceratocystis fagacearum (Bretz) Hunt
Chrysomyxa arctostaphyli Dietel
Cronartium spp. (non-EU)
Endocronartium spp. (non-EU)
Guignardia laricina (Saw.) Yamamoto and Ito
Gymnosporangium spp. (non-EU)
Inonotus weirii (Murril) Kotlaba and Pouzar
Melampsora farlowii (Arthur) Davis
Mycosphaerella larici-leptolepis Ito et al.
Mycosphaerella populorum G. E. Thompson
Phoma andina Turkensteen
Phyllosticta solitaria Ell. and Ev.
Septoria lycopersici Speg. var. *malagutii* Ciccarone and Boerema
Thecaphora solani Barrus
Trechispora brinkmannii (Bresad.) Rogers

(c) Viruses and virus-like organisms

Tobacco ringspot virus
Tomato ringspot virus
Bean golden mosaic virus
Cowpea mild mottle virus
Lettuce infectious yellows virus
Pepper mild tigré virus
Squash leaf curl virus
Euphorbia mosaic virus
Florida tomato virus

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAII

(a) Insects, mites and nematodes, at all stages of their development

Meloidogyne fallax Karssen
Popillia japonica Newman
Rhizoecus hibisci Kawai and Takagi

(b) Bacteria

Clavibacter michiganensis (Smith) Davis et al. ssp. *sepedonicus* (Spieckermann and Kotthoff) Davis et al.
Ralstonia solanacearum (Smith) Yabuuchi et al.

(c) Fungi

Melampsora medusae Thümen
Synchytrium endobioticum (Schilbersky) Percival

Annex I B

(a) Insects, mites and nematodes, at all stages of their development

Leptinotarsa decemlineata Say
Liriomyza bryoniae (Kaltenbach)

(b) Viruses and virus-like organisms

Beet necrotic yellow vein virus

1.2. Interpretation of the Terms of Reference

Inonotus weirii is one of a number of pests listed in the Appendices to the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a quarantine pest or those of a regulated non-quarantine pest for the area of the European Union (EU).

Following a phylogenetic analysis (Zhou et al., 2016) (see Section 3.1), the two observed forms of *I. weirii* were assigned to two different species, *Coniferiporia sulphurascens* and *Coniferiporia weirii*. This pest categorisation will thus deal with *C. sulphurascens* and *C. weirii*.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *C. sulphurascens* and *C. weirii* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the two pests as search term, as well as their previous names and synonyms (see Section 3.1). Relevant papers were reviewed and further references and information were obtained from experts, as well as from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the European and Mediterranean Plan Protection Organization (EPPO) Global Database (EPPO, 2018) and relevant publications.

Data about the import of commodity types that could potentially provide a pathway for the pest to enter the EU and about the area of hosts grown in the EU were obtained from EUROSTAT (Statistical Office of the European Communities).

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network run by the Directorate General for Health and Food Safety (DG SANTÉ) of the European Commission, and is a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. The Europhyt database manages notifications of interceptions of plants or plant products that do not comply with EU legislation, as well as notifications of plant pests detected in the territory of the Member States (MS) and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *C. sulphurascens* and *C. weirii* following guiding principles and steps presented in the EFSA guidance on the harmonised framework for pest risk assessment (EFSA PLH Panel, 2010) and as defined in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) and No 21 (FAO, 2004).

In accordance with the guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work was started following an evaluation of the EU plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union quarantine pest and for a Union regulated non-quarantine pest in accordance with Regulation (EU) 2016/2031 on protective measures against pests of plants, and includes additional information required in accordance with the specific terms of reference received by the European Commission. In addition, for each conclusion, the Panel provides a short description of its associated uncertainty.

Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. All relevant criteria have to be met for the pest to potentially qualify either as a quarantine pest or as a regulated non-quarantine pest (RNQP). If one of the criteria is not met, the pest will not qualify. A pest that does not qualify as a quarantine pest may still qualify as a RNQP that needs to be addressed in the opinion. For the pests regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone; thus, the criteria refer to the protected zone instead of the EU territory.

It should be noted that the Panel's conclusions are formulated respecting its remit and particularly with regard to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU) No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, the Panel will present a summary of the observed pest impacts. Economic impacts are expressed in terms of yield and quality losses and not in monetary terms, whereas addressing social impacts is outside the remit of the Panel, in agreement with the EFSA guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010).

Table 1: Pest categorisation criteria under evaluation, as defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Identity of the pest (Section 3.1)	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?
Absence/ presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest widely distributed within the EU? Describe the pest distribution briefly!	Is the pest present in the EU territory? If not, it cannot be a protected zone quarantine organism	Is the pest present in the EU territory? If not, it cannot be a regulated non-quarantine pest. (A regulated non-quarantine pest must be present in the risk assessment area)

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Regulatory status (Section 3.3)	If the pest is present in the EU but not widely distributed in the risk assessment area, it should be under official control or expected to be under official control in the near future	The protected zone system aligns with the pest free area system under the International Plant Protection Convention (IPPC). The pest satisfies the IPPC definition of a quarantine pest that is not present in the risk assessment area (i.e. protected zone)	Is the pest regulated as a quarantine pest? If currently regulated as a quarantine pest, are there grounds to consider its status could be revoked?
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways!	Is the pest able to enter into, become established in, and spread within, the protected zone areas? Is entry by natural spread from EU areas where the pest is present possible?	Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects? Clearly state if plants for planting is the main pathway!
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?	Would the pests' introduction have an economic or environmental impact on the protected zone areas?	Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?
Available measures (Section 3.6)	Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?	Are there measures available to prevent the entry into, establishment within or spread of the pest within the protected zone areas such that the risk becomes mitigated? Is it possible to eradicate the pest in a restricted area within 24 months (or a period longer than 24 months where the biology of the organism so justifies) after the presence of the pest was confirmed in the protected zone?	Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met	A statement as to whether (1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and (2) if not, which one(s) were not met	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential regulated non-quarantine pest were met, and (2) if not, which one(s) were not met

The Panel will not indicate in its conclusions of the pest categorisation whether to continue the risk assessment process, but following the agreed two-step approach, will continue only if requested by the risk managers. However, during the categorisation process, experts may identify key elements and knowledge gaps that could contribute significant uncertainty to a future assessment of risk. It would be useful to identify and highlight such gaps so that potential future requests can specifically target the major elements of uncertainty, perhaps suggesting specific scenarios to examine.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible? **Yes**

Coniferiporia sulphurascens (Pilát) L.W. Zhou & Y.C. Dai and *Coniferiporia weirii* (Murrill) L.W. Zhou & Y.C. Dai are fungi of the family Hymenochaetaceae.

The two species had previously been described as two different forms (a Douglas-fir form and a cedar form; Larsen and Lombard, 1989) of the species *Inonotus weirii* which is listed in Annex IAI in Council Directive 2000/29/EC. However, the suggestion that these two forms are distinct species was already made in the 1990s using enzyme-linked immunosorbent assay (ELISA) (Banik et al., 1993).

Both species have previously been accommodated under the genera *Inonotus*, *Phellinus* and *Phellinidium.* Following a recent phylogenetic analysis of the latter genus, the two species were moved to the genus *Coniferiporia* (Zhou et al., 2016).

Species synonyms listed for *C. sulphurascens* are: *Inonotus sulphurascens*, *Phellinidium sulphurascens*, *Phellinus sulphurascens* (Index Fungorum, http://www.indexfungorum.org/names/names.asp).

Species synonyms listed for *C. weirii* are: *Fomitiporia weirii*, *Fuscoporia weirii*, *Inonotus weirii Phellinidium weirii*, *Phellinus weirii* and *Poria weirii* (Index Fungorum, http://www.indexfungorum.org/names/names.asp).

3.1.2. Biology of the pest

The host range of the two fungi differs and while the biology of *C. sulphurascens* is rather well known, there is limited information regarding *C. weirii* (Hagle, 2009).

C. sulphurascens is known in North America to cause laminated root rot primarily in Douglas fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) (Hagle, 2009). Basidiocarps of *C. sulphurascens* are generally produced on the moist underside of fallen logs (Hagle, 2009). The fruit bodies are mostly annual, crust-like and mature in late summer or autumn (Hagle, 2009). Single-celled basidiospores are wind- or water-dispersed and require moisture to germinate (Hagle, 2009). Fruit body formation is uncommon in many areas and years, especially in dry conditions (Thies and Sturrock, 1995).

Spread of the fungus by root contacts is by far the dominant means of spread for *P. sulphurascens* (Lewis, 2013). New infection centres, e.g. from spores or through vegetative dispersal, appear to occur rarely (Bae et al., 1994). Instead the population structure appears to be mainly clonal with large and old genets slowly spreading in expanding disease centres (Hansen and Goheen, 2000). The genetic variation within established clones is very small and vegetative incompatibility among clones prevents new clones from establishing (Bae et al., 1994). Established clones generally stay in the site for a very long time spreading through root to root contact in living trees or via the contact of roots with infected wood (Hagle, 2009). *C. sulphurascens* can persist as a saprotroph in decaying roots and stumps up to 50 years (Hansen, 1979). By doing so the fungus can infect the regeneration following harvest (Hagle, 2009). Spread is assumed to be very limited in natural soil (EPPO, 1997).

The mycelium grows along the root surfaces and infects through both injured and healthy root bark (Lim et al., 2005). After infection of the root, the mycelium expands, kills the cambium and phloem and starts to decay the xylem (Lim et al., 2005). The mycelium may grow further up to colonise the root collar and may girdle the tree (Hagle, 2009). The optimal temperature for mycelial growth is 25°C, but growth occurs between 5°C and 30°C (Sinclair and Lyon, 2005).

The trees are killed when the roots are destroyed, due to girdling or as a result of wind-throw or secondary attack by, e.g. bark beetles (Hansen and Goheen, 2000; Hagle, 2009). This can be a very slow process and trees may be considerably infected before crown symptoms become apparent (Hagle, 2009).

C. sulphurascens can infect trees of any age, but the disease is most severe in stands 25–125 years old (Sinclair and Lyon, 2005). Most infested sites are moist, both cool and warm (Hagle, 2009).

There are no reports of the fungus producing conidia (EPPO, 1997).

C. weirii is known in North America to cause cedar laminated root and butt rot mainly in cedars (*Thuja plicata* and *Cupressus nootkatensis*) but there is limited information on the epidemiology of this pathogen (Hagle, 2009). Basidiocarps of *C. weirii* are often produced at the base of infected trees between buttress roots but can occasionally be found up to six feet high (Hagle, 2009). The fruit bodies are thin, resupinate and perennial (2–3 years; Hagle, 2009) and only found on *T. plicata* (EPPO, 1997). Sporulation occurs in spring and summer (Larsen et al., 1994).

Wounds that expose the wood by removing the bark may provide entry points for spores of *C. weirii* and may also increase the decay in already infected trees due to increased aeration (Hagle, 2009).

3.1.3. Intraspecific diversity

The fungus was first described as *Fomitiporia weirii* in 1914 on *T. plicata* (Murrill, 1914) and later found on several other hosts. Since around the 1940s two forms of the same fungal species have been recognised, the 'western red cedar form' and the 'Douglas fir form' (Larsen et al., 1994 and references therein). Differences in the cultural characteristics, length of setal hyphae, basidiospore germinating characteristics, host specificity, ELISA (serological) tests as well as compatibility tests and phylogenetic analysis between the two forms have confirmed that they are two separate species, i.e. *C. sulphurascens* and *C. weirii* (Angwin and Hansen, 1989; Larsen and Lombard, 1989; Banik et al., 1993; Larsen et al., 1994; Zhou et al., 2016).

Serological tests and monocaryon matings suggest that North American *P. sulphurascens* isolates are more closely related to Russian isolates of *P. sulphurascens* than to cedar form isolates of *C. weirii* (Banik et al., 1993; Larsen et al., 1994). However, isozyme patterns and pairing tests indicate that the Asian and North American populations of *C. sulphurascens* are not freely compatible (Hansen et al., 1998).

Phylogenetic studies of the genus have also indicated that an isolate identified as *C. weirii* from Turkmenistan isolated from *Juniperus* spp. is another closely related species (Zhou et al., 2016).

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pests?

Yes

Morphological descriptions of the species and supporting literature are given at www.mycobank.org. Further information on methods to differentiate the two species can be found in Larsen et al. (1994) and references therein.

There is a multiplex polymerase chain reaction (PCR) assay based on the internal transcribed spacer (ITS) region available to detect directly from wood and identify the *C. sulphurascens/weirii* complex making it possible to distinguish the complex from other decay fungi commonly found in conifers (Gonthier et al., 2015). In addition, a PCR assay is available to distinguish the two species from each other (Lim et al., 2005).

3.2. Pest distribution

C. weirii is reported to be present in North America and Asia (Figure 1; EPPO, 2018). It is, however, likely that these observations consist of observations of both *C. weirii* and *C. sulphurascens*. No distribution data are given specifically for *C. sulphurascens* in the EPPO global database (EPPO, 2018).

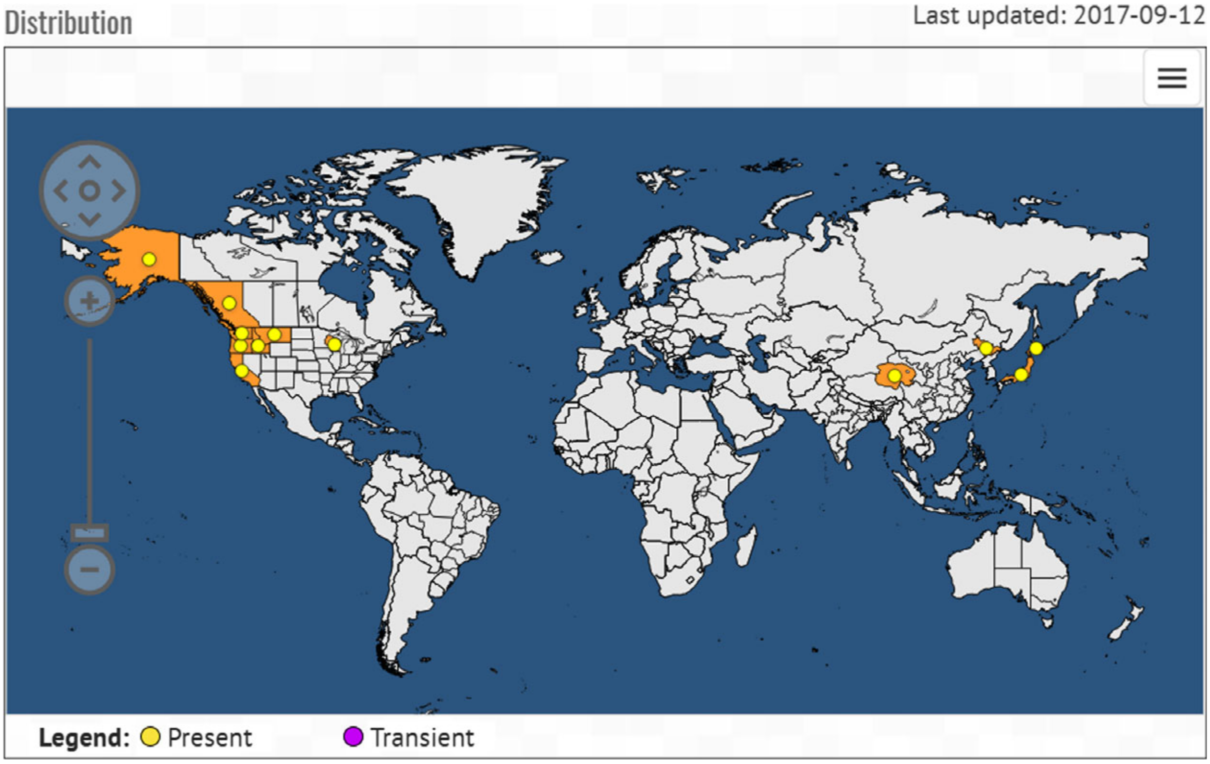

Figure 1: Global distribution map for *Coniferiporia weirii* (some observations may refer to *Coniferiporia sulphurascens.* Extracted from EPPO (2018), accessed January 2018). There are no reports of transient populations

3.2.1. Pest distribution outside the EU

C. weirii (most likely including observations of *C. sulphurascens*, see for example Banik et al., 1993; Larsen et al., 1994) is reported as present in Canada in southern British Columbia and in the USA (Alaska, California, Idaho, Montana, Oregon, Washington, Wisconsin) (EPPO, 2018).

The fungus is also present in China and Japan (EPPO, 2018). The reference given for Japan in EPPO GD refers to *C. weirii* (Aoshima, 1950). Both species appear to be present in China (Dai, 2004; Zhou et al., 2016).

C. sulphurascens has also been reported from Siberia (Banik et al., 1993) and the Primorsk Territory, Russia (Larsen et al., 1994), as well as from Turkey (Doğan and Karadelev, 2009).

3.2.2. Pest distribution in the EU

Are the pests present in the EU territory? If present, is the pest widely distributed within the EU?
No, the two pests are not reported to be present in the EU.

There are no reports of *C. sulphurascens* and of *C. weirii* from the EU (EPPO, 2018). Slovenia has reported one pathogen (*C. weirii*) as absent in July 2017 (EPPO, 2018). Also the UK, as of January 2018, reports that pathogen (as *Phellinus weirii*) as absent in the UK Plant Health Risk Register (https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?cslref=12383). There are no reports of absence available to the Panel that have been confirmed by survey.

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

C. sulphurascens/weirii is listed in Council Directive 2000/29/EC as *Inonotus weirii*. Details are presented in Tables 3 and 4.

Table 2: *Coniferiporia sulphurascens/weirii* in Council Directive 2000/29/EC

Annex I, Part A	**Harmful organisms whose introduction into, andSpread within, all Member States shall be banned**
Section I	**Harmful organisms not known to occur in any part of the Community and relevant for the entire Community**
(c)	Fungi
	Species
7.	*Inonotus weirii* (Murril) Kotlaba and Pouzar

3.3.2. Legislation addressing the hosts of *C. weirii* and *C. sulphurascens*

Table 3: Regulated hosts and commodities that may involve *Coniferiporia sulphurascens* and *Coniferiporia weirii* in Annexes III, IV and V of Council Directive 2000/29/EC

Annex III, Part A	**Plants, plant products and other objects the introduction of which shall be prohibited in all Member States**	
	Description	Country of origin
1.	Plants of *Abies* Mill., *Cedrus* Trew, *Chamaecyparis* Spach, *Juniperus* L., *Larix* Mill., *Picea* A. Dietr., *Pinus* L., *Pseudotsuga* Carr. and *Tsuga* Carr., other than fruit and seeds	Non-European countries
Annex V	**Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community**	
Part A	Plants, plant products and other objects originating in the Community	
Section II	Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones, and which must be accompanied by a plant passport valid for the appropriate zone when introduced into or moved within that zone	
1.1.	Plants of *Abies* Mill., *Larix* Mill., *Picea* A. Dietr., *Pinus* L. and *Pseudotsuga* Carr.	

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

C. sulphurascens primarily causes damage in *P. menziesii* (Douglas fir), *Tsuga mertensiana* (mountain hemlock), *A. grandis* (grand fir), *Abies concolor* (white fir). These hosts are particularly susceptible, but the pathogen may infect all conifers (Hansen and Goheen, 2000; Hagle, 2009). *Abies amabilis* (Pacific white fir) is also considered highly susceptible (Thies and Sturrock, 1995).

Other hosts in North America reported as intermediately susceptible are: *Abies lasiocarpa*, *Abies magnifica, Abies procera, Larix occidentalis*, *Picea engelmannii*, *Picea sitchensis, Sequoiadendron giganteum, Taxus brevifolia* and *Tsuga heterophylla* (Thies and Sturrock, 1995).

Low susceptibility or tolerance has been reported for *Pinus contorta*, *Pinus lambertiana, Pinus monticola and Pinus ponderosa* (Thies and Sturrock, 1995; Hagle, 2009). *Thuja* spp. and *Cupressus* spp. are resistant and hardwoods are considered immune (Thies and Sturrock, 1995).

C. sulphurascens has also been isolated from *Larix sibirica* in Siberia (Banik et al., 1993) and from *Juniperus* spp. in Turkey (Doğan and Karadelev, 2009).

In Japan, other species are reported as hosts; *Abies mariesii*, *A. sachalinensis*, *Chamaecyparis* spp., *Picea jezoensis* and *Tsuga diversifolia* (EPPO, 1997).

C. weirii is reported to only cause disease in tree species of *Thuja* spp. and *Cupressus* spp. (Hagle, 2009), where *T. plicata* (western red cedar) and *Cupressus nootkatensis* (Alaskan yellow cedar) are reported as major hosts in North America (Hagle, 2009). Other species, such as *Abies* spp. are however also listed as hosts in Banik et al. (1993) and in China the pathogen has been reported from *Juniperus* spp. (Dai, 2004).

In Council Directive 2000/29/EC, the pest is not regulated on a particular host or commodity (Annex IAI).

3.4.2. Entry

Are the pests able to enter into the EU territory?

Yes, the two pests could enter the EU via movement of wood with bark, isolated bark and plants for planting of Cupressaceae and Pinaceae.

The main host commodities providing a pathway for entry of the two pathogens (EPPO, 1997, 2018) are:

- non-squared wood of Cupressaceae and Pinaceae
- isolated bark
- host plants for planting (including artificially dwarfed plants).

C. sulphurascens can persist as a saprotroph in the stem of cut trees for a very long time (Hansen, 1979), but the moisture requirements of the fungus are not known.

C. weirii has been isolated from bark tissue in cedar up to 5 m from ground level (Larsen et al., 1994).

Inoculation of young Douglas-fir (*P. menziesii*) seedlings with slabs of *C. sulphurascens* mycelia has been obtained in Petri dishes (Sturrock et al., 2007). In addition, the roots of potted and outplanted seedlings of nine coniferous species known to be susceptible to *C. weirii* (Douglas fir, grand fir, lodgepole pine, noble fir, Sitka spruce, western hemlock, western red cedar, western white pine and yellow cedar) were inoculated successfully (Sturrock and Reynolds, 1998). This suggests that also host plants for planting can be a potential pathway of entry. The Panel could not find information about whether seed can be a pathway of entry.

As of January 2018, there were no records of interception of *C. weirii* (code INONWE) in the Europhyt database. *C. sulphurascens* is not listed in the Europhyt database.

3.4.3. Establishment

Are the pests able to become established in the EU territory?

Yes, the two pests could establish in the EU, as hosts are present and favourable climatic conditions are common.

3.4.3.1. EU distribution of main host plants

Pseudotsuga menziesii, which is reported as highly susceptible to *C. sulphurascens,* was introduced to Europe at the beginning of the early 1800s and is an economically important species in central European forests (Da Ronch et al., 2016) (Figure 2).

Abies species are reported as hosts of both *C. sulphurascens* and *C. weirii* in North America. Some of these tree species are highly susceptible to infection by *C. sulphurascens* (EPPO, 1997; Hagle, 2009). Several *Abies* species are native to Europe (Figure 3), but the susceptibility of these species is not known.

In North America, the main hosts of *C. weirii* are cedars (*T. plicata* and *Cupressus nootkatensis*). These species are mainly present in Europe as ornamental trees. Moreover, *T. plicata* has been used in forest plantations in NW Europe, e.g. in the British Isles (Farjon, 2013), where it is reported as a neophyte regenerating from seed and increasing in distribution (Anon, 2018). The Mediterranean cypress (*Cupressus sempervirens*), widely used as an ornamental tree, is mainly found in some of the Mediterranean countries (Caudullo and de Rigo, 2016), but the susceptibility of this species to *C. weirii* is not known.

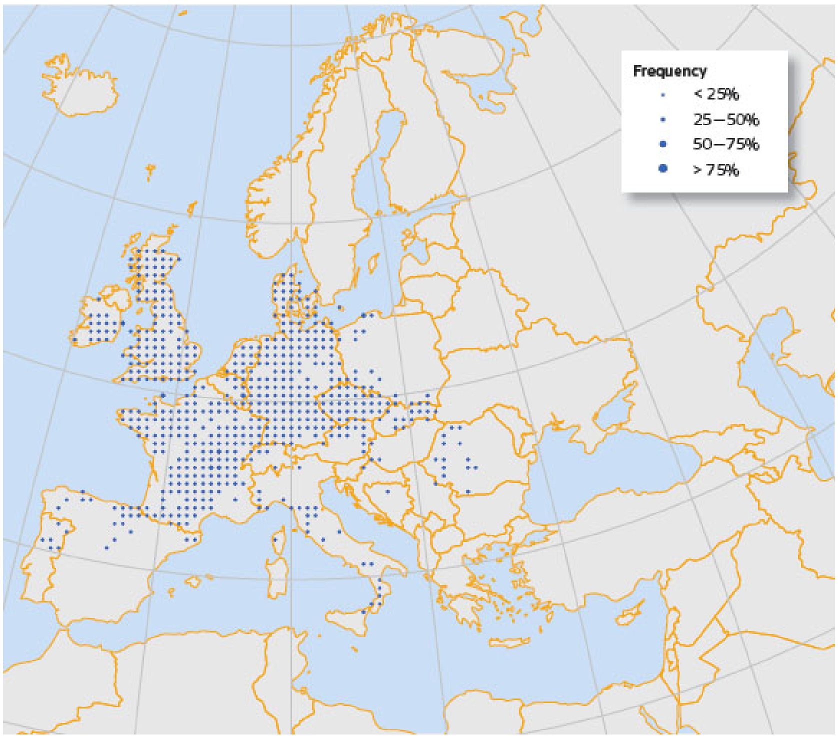

Figure 2: Plot distribution and simplified chorology map for *Pseudotsuga menziesii*. Frequency of *P. menziesii* occurrences within the field observations as reported by National Forest Inventories (Da Ronch et al., 2016)

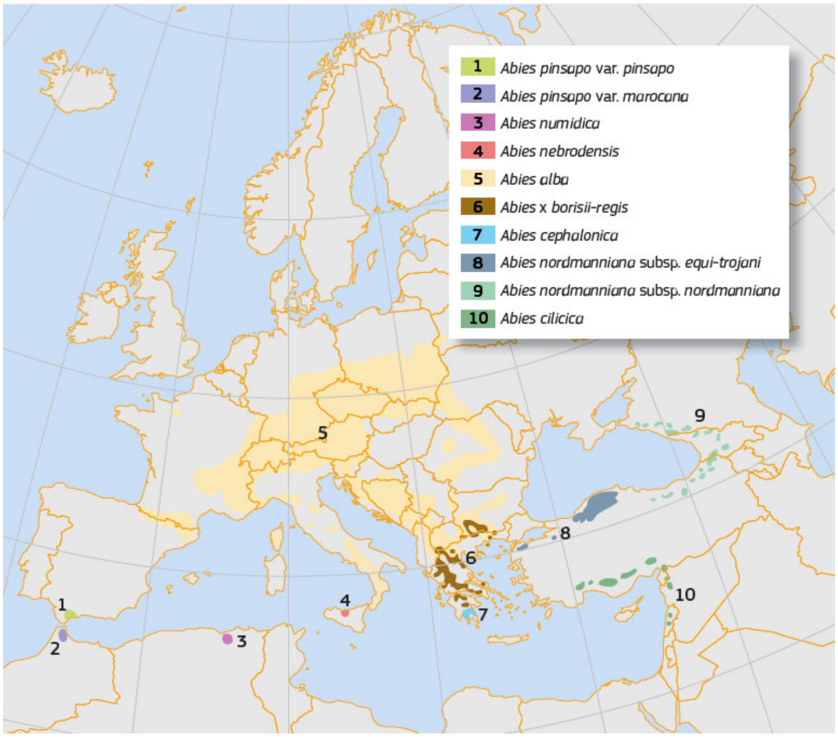

Figure 3: Plot distribution and simplified chorology map for *Abies* spp. Chorology of the native spatial range for the Circum-Mediterranean firs (Caudullo and Tinner, 2016)

3.4.3.2. Climatic conditions affecting establishment

The distribution of *C. sulphurascens and C. weirii* in North America and Japan (Figure 1; section 3.2) covers areas with temperate and cold Köppen-Geiger climate types, which are found in large parts of the EU (Peel et al., 2007) and to a large extent overlap with the distribution of *Pseudotsuga menziesii* and *Abies* spp.

3.4.4. Spread

Is the pest able to spread within the EU territory following establishment? How?
Yes, by movement of wood and isolated bark, wind- and water-dissemination of basidiospores, and root contact with infected root/wood.
RNQPs: Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects?
No, plants for planting are a potential pathway of spread, but not the main one.

The fungus may spread through the dissemination of wind- and water-dispersed basidiospores (Hagle, 2009). However, spores are generally not considered important for the dispersal of the disease (Bae et al., 1994; EPPO, 1997). Instead, the fungus mostly spreads through root to root contact in living trees or via the contact of roots with infected wood within the stand (Sinclair and Lyon, 2005; Hagle, 2009; Lewis, 2013). An annual spread rate of 20–40 cm has been observed corresponding to the growth rate of the mycelia along the roots (Sinclair and Lyon, 2005).

Longer distance spread may be due to transport of infected wood, isolated bark and plants for planning, given that the fungus could be associated with these commodities as described in Section 3.4.2.

3.5. Impacts

Would the pests' introduction have an economic or environmental impact on the EU territory?
Yes, the introduction of the two pests could have an impact in coniferous woodland, plantations and ornamental trees.
RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?[4]
Yes, the introduction of the two pests could have an impact on the intended use of plants for planting.

Both fungi cause a white rot type of decay in which both cellulose and lignin are degraded (Hagle, 2009). Laminated root rot has been described as 'the most serious forest disease in western North America' (Thies, 1984). Given the wide range of coniferous hosts, the introduction of the pest into the EU could lead to substantial economic losses (EPPO, 1997).

Infections of *C. sulphurascens* may be found both dispersed and aggregated in stands, but high mortality generally occurs in infection centres (Hagle, 2009) (Figure 4). The highest level of damage in North America is found in coastal Douglas-fir forests of Oregon, Washington and British Columbia (Hagle, 2009). In Oregon, surveys indicate that about 9% of the Douglas-fir forest consists of infection centres of *C. sulphurascens* with an estimated mortality of 50% (Hansen and Goheen, 2000). In Vancouver Island, the disease is found in 80% of second-growth Douglas-fir stands (Bloomberg and Reynolds 1985). In Idaho and Montana, 739,000 acres have been estimated to be infested and 156,000 acres of these have at least a 25% mortality rate of the basal area over 15 years. In these two states, large canopy gaps in the most productive forest stands are found on 15,400 acres (Hagle, 2009).

In a study where different tree species were planted in infested sites, mortality rates after 17–20 years were nearly 30% for grand fir, 26% for Douglas fir, 12% for Western hemlock, 11% for ponderosa pine and 5% for western red cedar and other pine species (Nelson and Sturrock, 1993; Hagle, 2009).

[4] See section 2.1 on what falls outside EFSA's remit.

The fungus causes reduction in tree growth due to reduced nutrient and water uptake, and because of the allocation of resources to defence rather than to growth (Lewis, 2013). Thies (1983) estimated growth rates in trees killed by *C. sulphurascens* as 32% less than those of healthy counterparts in their last 10 years of growth. Goheen and Hansen (1993) estimated a combined growth reduction and mortality loss of 40–70% in infested areas (reviewed by Lewis, 2013).

Figure 4: Mortality centre due to *Coniferiporia sulphurascens/weirii* in the USA (photo by Robert L. James, USDA Forest Service, Bugwood.org, available online at: https://www.invasive.org/browse/detail.cfm?imgnum=2250031)

C. weirii causes decay of the heartwood mainly in butt logs and roots, often leaving them hollow (Hagle, 2009). The decay develops and increases with tree age and is especially found in mature trees at least a 100 years old (Hagle, 2009). Extensive decay does not always lead to external symptoms and the fungus rarely kills the trees (Hagle, 2009). *C. weirii* is mainly known to cause disease in *Thuja* spp. and *Cupressus* spp. (Hagle, 2009).

There seems to be no record of *C. sulphurascens* and *C. weirii* associated with plants for planting, but root to root transmission may occur in large trees if these are grown in nurseries. Once established in a site *C. sulphurascens* may persist for a very long time as the fungus is both a saprophyte and a pathogen (Hagle, 2009). Moreover, in an EPPO list of recommended phytosanitary measures for coniferous species, for 'plants for planting (except seeds) of conifers originating in countries where *Phellinus weirii* occurs', 'pest-free area for *Phellinus weirii*' is recommended (EPPO, 2014).

3.6. Availability and limits of mitigation measures

Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?

Yes, please see Section 3.6.2.

RNQPs: Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?

Yes, production of plants for planting in pest free areas can prevent pest presence on plants for planting.

3.6.1. Phytosanitary measures

Phytosanitary requirements are in place for coniferous wood originating from Canada, China, Japan and the USA (Annex IVAI, points 1.1 and 1.3), as well as for isolated bark of coniferous wood from non-European countries (Annex IVAI, point 7.3).

Phytosanitary measures are currently applied to plants of various conifer genera, but not all the host genera are covered (see Section 3.3.2). As mentioned in Section 3.5, in an EPPO list of recommended phytosanitary measures for coniferous species, for 'plants for planting (except seeds) of conifers originating in countries where *Phellinus weirii* occurs', 'pest-free area for *Phellinus weirii*' is recommended (EPPO, 2014).

3.6.1.1. Biological or technical factors limiting the feasibility and effectiveness of measures to prevent the entry, establishment and spread of the pest

- Once established in a site *C. sulphurascens* may persist for a very long time as the fungus is both a saprophyte and a pathogen (Hagle, 2009).

3.6.1.2. Biological or technical factors limiting the ability to prevent the presence of the pest on plants for planting

- There is little knowledge on the presence of the pest on plants for planting (but see Sturrock and Reynolds, 1998; Sturrock et al., 2007), and of biological or technical factors limiting the ability to prevent the presence of the pest on this pathway.

3.6.2. Pest control methods

Control methods against *P. sulphurascens* have been previously reviewed (Lewis, 2013) and include the following:

- Planting of resistant tree species in diseased sites can reduce impacts (Hagle, 2009).
- Removal of stumps may reduce the mortality in infected centres (Thies and Sturrock, 1995; Hagle, 2009; Cleary et al., 2013).
- Treatment of stumps with fumigants has been reported to reduce inoculum, but long term effect may be limited (Thies and Sturrock, 1995; Hagle, 2009) and use of such fumigants may not be permitted (e.g. Commission Regulation (EU) No 73/2013).

3.7. Uncertainty

There is limited information regarding the biology of *C. weirii*.

There is uncertainty on the current geographic distribution in Asia of both *C. sulphurascens* and *C. weirii*.

A knowledge gap is the level of susceptibility of conifers native to Europe.

There is little knowledge on the presence of the pest on plants for planting, and of biological or technical factors limiting the ability to prevent the presence of the pest on this pathway.

4. Conclusions

Both *C. sulphurascens* and *C. weirii* meet the criteria assessed by EFSA for consideration as potential quarantine pests (Table 4).

Table 4: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the two species (*C. sulphurascens* and *C. weirii*) is clear	The identity of the two species (*C. sulphurascens* and *C. weirii*) is clear	None
Absence/presence of the pest in the EU territory (Section 3.2)	The two pests are not reported to be present in the EU	The two pests are not reported to be present in the EU	None
Regulatory status (Section 3.3)	The two pests are regulated by Council Directive 2000/29/EC (Annex IAI) (as *Inonotus weirii*) as a harmful organism whose introduction into, and spread within, all Member States shall be banned	The two pests are regulated by Council Directive 2000/29/EC (Annex IAI) (as *Inonotus weirii*) as a harmful organism whose introduction into, and spread within, all Member States shall be banned	None
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Entry: the two pests could enter the EU via wood with bark, isolated bark and plants for planting of Cupressaceae and Pinaceae Establishment: hosts and favourable climatic conditions are widespread in the risk assessment area Spread: the two pests would be able to spread following establishment by movement of wood with bark, isolated bark and plants for planting of Cupressaceae and Pinaceae, as well as natural spread	Plants for planting are not the main pathway of entry and spread, given that the pathogen can disperse also by movement of wood with bark and isolated bark	There is uncertainty on the current geographic distribution in Asia of both *C. weirii* and *C. sulphurascens* There is little knowledge on the presence of the pest on plants for planting
Potential for consequences in the EU territory (Section 3.5)	The introduction of the two pests would have economic and environmental impacts in coniferous woodlands, plantations and ornamental trees	The introduction of the two pests could have an impact on the intended use of plants for planting	A knowledge gap is the level of susceptibility of conifers native to Europe
Available measures (Section 3.6)	Planting of resistant tree species in diseased sites and removal of stumps in infected centres may reduce the impacts	Production of plants for planting in pest free areas can prevent pest presence on plants for planting	There is uncertainty about the biological or technical factors limiting the ability to prevent the presence of the two pests on the plants for planting pathway
Conclusion on pest categorisation (Section 4)	For both pathogens, the criteria assessed by the Panel for consideration as a potential quarantine pest are met	For both pathogens, the criterion on the pest presence in the EU is not met	

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Aspects of assessment to focus on/scenarios to address in future if appropriate	The main knowledge gaps concern: (i) the distribution of the two pest species in Asia, (ii) the level of susceptibility of conifers native to Europe, and (iii) the role of plants for planting as a pathway of entry and spread		

References

Angwin PA and Hansen EM, 1989. Population structure of *Phellinus weirii*. In: Morrison DJ (ed.). Proceedings of the seventh international conference on root and butt rots, 9-16 August 1988, Pacific Forestry Centre, Victoria, BC, Canada. pp. 371–380.

Anon, 2018. *Thuja plicata*. Online Atlas of the British and Irish Flora. Available online: http://www.brc.ac.uk/plantatlas/plant/thuja-plicata

Aoshima K, 1950. Wood-rotting *Poria* from Japan. I. Report of the Forest Experiment Station, Meguro, Tokyo, 46, 155–168.

Bae HH, Hansen EM and Strauss SH, 1994. Restriction fragment length polymorphisms demonstrate single origin of infection centers in *Phellinus weirii*. Canadian Journal of Botany, 72, 440–447.

Banik MT, Paul JA, Burdsall Jr HH and Cook ME, 1993. Serological differentiation of two forms of *Phellinus weirii*. Mycologia, 85, 605–611.

Bloomberg WJ and Reynolds G, 1985. Growth loss and mortality in laminated root rot infection centers in second-growth Douglas-fir on Vancouver Island. Forest Science, 31, 497–508.

Caudullo G and de Rigo D, 2016. *Cupressus sempervirens* in Europe: distribution, habitat, usage and threats. In: San-Miguel-Ayanz J, de Rigo D, Caudullo G and Houston Durrant T, Mauri A. (eds.). European Atlas of Forest Tree Species. Publications Office of the European Union, Luxembourg. pp. e015be7.

Caudullo G and Tinner W, 2016. *Abies* – circum-mediterranean firs in Europe: distribution, habitat, usage and threats. In: San-Miguel-Ayanz J, de Rigo D, Caudullo G, Houston Durrant T, Mauri A. (eds.). European Atlas of Forest Tree Species. Publications Office of the European Union, Luxembourg. pp. e01afb4.

Cleary MR, Arhipova N, Morrison DJ, Thomsen IM, Sturrock RN, Vasaitis R, Gaitnieks T and Stenlid J, 2013. Stump removal to control root disease in Canada and Scandinavia: a synthesis of results from long-term trials. Forest Ecology and Management, 290, 5–14.

Da Ronch F, Caudullo G and de Rigo D, 2016. *Pseudotsuga menziesii* in Europe: distribution, habitat, usage and threats. In: San-Miguel-Ayanz J, de Rigo D, Caudullo G, Houston Durrant T and Mauri A. (eds.). European Atlas of Forest Tree Species. Publications Office of the European Union, Luxembourg. pp. e01a4f5.

Dai YC, 2004. First report of laminated root rot on *Sabina przewalskii* caused by *Phellinus weirii* sensu stricto in China. Plant Disease, 88, 573.

Doğan HH and Karadelev M, 2009. *Phellinus sulphurascens* (Hymenochaetaceae, Basidiomycota): a very rare wood-decay fungus in Europe collected in Turkey. Turkish Journal of Botany, 33, 239–242.

EFSA PLH Panel (EFSA Panel on Plant Health), 2010. PLH Guidance on a harmonised framework for pest risk assessment and the identification and evaluation of pest risk management options by EFSA. EFSA Journal 2010;8(2):1495, 66 pp. https://doi.org/10.2903/j.efsa.2010.1495

EPPO (European and Mediterranean Plant Protection Organization), 1997. Data sheets on quarantine pests: *Phellinus weirii*. In: Smith IM, McNamara DG, Scott PR and Holderness M (eds.). Quarantine Pests for Europe, 2nd Edition. CABI/EPPO, Wallingford. 1425 pp.

EPPO (European and Mediterranean Plant Protection Organization), 2014. PM 8/2 (2) Coniferae. EPPO Bulletin, 44, 403–440. https://doi.org/10.1111/epp.12163

EPPO (European and Mediterranean Plant Protection Organization), 2018. EPPO Global Database. Available online: https://gd.eppo.int

FAO (Food and Agriculture Organization of the United Nations), 2004. ISPM (International Standards for Phytosanitary Measures) 21—Pest risk analysis of regulated non-quarantine pests. FAO, Rome, 30 pp. Available online: https://www.ippc.int/sites/default/files/documents//1323945746_ISPM_21_2004_En_2011-11-29_Refor.pdf

FAO (Food and Agriculture Organization of the United Nations), 2013. ISPM (International Standards for Phytosanitary Measures) 11—Pest risk analysis for quarantine pests. FAO, Rome, 36 pp. Available online: https://www.ippc.int/sites/default/files/documents/20140512/ispm_11_2013_en_2014-04-30_201405121523-494.65%20KB.pdf

Farjon A, 2013. *Thuja plicata*. The IUCN Red List of Threatened Species, 2013, e.T42263A2968155. https://doi.org/10.2305/iucn.uk.2013-1.rlts.t42263a2968155.en

Goheen DJ and Hansen EM, 1993. Effects of pathogens and bark beetles on forests. In: Schowalter T and Filip G (eds.). *Beetle-Pathogen Interactions in Conifer Forests*. Academic Press, London. pp. 175–196.
Gonthier P, Guglielmo F, Sillo F and Garbelotto M, 2015. A molecular diagnostic assay for the detection and identification of wood decay fungi of conifers. Forest Pathology, 45, 89–101.
Hagle SK, 2009. Management guide for laminated root rot. Forest Health Protection and State Forestry Organisations. USDA, Forest Service, 20 pp. Available online: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5187461.pdf
Hansen EM, 1979. Survival of *Phellinus weirii* in Douglas-fir stumps after logging. Canadian Journal of Forest Research, 9, 484–488.
Hansen EM and Goheen EM, 2000. *Phellinus weirii* and other native root pathogens as determinants of forest structure and process in western North America. Annual Review of Phytopathology, 38, 515–539.
Hansen EM, Angwin PA, Dreisbach TA, Gernandt D and McWilliams MG, 1998. Species limits for *Phellinus weirii*. In: Root and butt rots of forest trees: 9th International Conference on Root and Butt Rots, Carcans-Maubuisson, France, 1–7 September, 1997. Institut National de la Recherche Agronomique (INRA), France. pp. 119–127.
Larsen MJ and Lombard FF, 1989. Taxonomy and nomenclature of *Phellinus weiri* in North America. In: Morrison DJ (ed). Proceedings of the 7th international conference on root and butt rots, 9-16 August 1988. Pacific Forestry Centre, Victoria, BC, Canada. pp. 573–578.
Larsen MJ, Lombard FF and Clark JW, 1994. *Phellinus sulphurascens* and the closely related *P. weirii* in North America. Mycologia, 86, 121–130.
Lewis KJ, 2013. Laminated and tomentosus root rots. In: Gonthier P and Nicolotti G (eds.). Infectious Forest Diseases. Cabi International, Wallingford. pp. 178–196.
Lim YW, Yeung YC, Sturrock R, Leal I and Breuil C, 2005. Differentiating the two closely related species, *Phellinus weirii* and *P. sulphurascens*. Forest Pathology, 35, 305–314.
Murrill WA, 1914. An enemy of the western red cedar. Mycologia, 6, 93–94.
Nelson EE and Sturrock RN, 1993. Susceptibility of western conifers to laminated root rot (*Phellinus weirii*) in Oregon and British Columbia field tests. Western Journal of Applied Forestry, 8, 67–70.
Peel MC, Finlayson BL and McMahon TA, 2007. Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences Discussions, 4, 439–473.
Sinclair WA and Lyon HH, 2005. Diseases of Trees and Shrubs, 2nd Edition. Comstock Publishing Associates, a division of Cornell University Press, Ithaca, NY. 660 pp.
Sturrock RN and Reynolds G, 1998. A new technique for inoculation of conifer seedling roots with the laminated root rot pathogen, *Phellinus weirii*. Canadian Journal of Plant Pathology, 20, 324–330.
Sturrock RN, Islam MA and Ekramoddoullah AK, 2007. Host–pathogen interactions in Douglas-fir seedlings infected by *Phellinus sulphurascens*. Phytopathology, 97, 1406–1414.
Thies WG, 1983. Determination of growth reduction in Douglas-fir infected by *Phellinus weirii*. Forest Science, 29, 305–315.
Thies WG, 1984. Laminated root rot – the quest for control. Journal of Forestry, 84, 345–356.
Thies WG and Sturrock RN, 1995. Laminated root rot in western North America. PNW-GTR-349. USDA, Forest Service, Portland, Oregon, USA, 32 pp. Available online: http://forestry.wsu.edu/wp-content/uploads/PNW_GTR_349.pdf
Zhou LW, Vlasák J and Dai YC, 2016. Taxonomy and phylogeny of *Phellinidium* (Hymenochaetales, Basidiomycota): a redefinition and the segregation of *Coniferiporia* gen. nov. for forest pathogens. Fungal Biology, 120, 988–1001.

Abbreviations

DG SANTÉ	Directorate General for Health and Food Safety
ELISA	enzyme-linked immunosorbent assay
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
ITS	internal transcribed spacer
MS	Member State
PCR	polymerase chain reaction
PLH	Plant Health
RNQP	regulated non-quarantine pest
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference
USDA	United States Department of Agriculture