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Pest categorisation of *Ips typographus*

EFSA Panel on Plant Health (PLH),

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Abstract

The Panel on Plant Health performed a pest categorisation of the eight-toothed spruce bark beetle, *Ips typographus* L. (Coleoptera: Curculionidae, Scolytinae), for the EU. *I. typographus* is a well-defined and distinguishable species, recognised mainly as a pest of spruce (*Picea* spp.) in Eurasia. It also attacks other conifers such as *Abies* spp., *Larix* spp., *Pinus* spp. and *Pseudotsuga menziesii*. Native to Eurasia, *I. typographus* has spread from the native range of spruce to new areas in Eurasia where spruce has been planted, and is now widely distributed throughout the EU (22 Member states). It is a quarantine pest listed in Annex IIB of Council Directive 2000/29/EC for Ireland and United Kingdom as protected zones. Coniferous wood, bark and wood packaging material are considered as pathways for the pest, which is also able to disperse by flight over tens of kilometres. The insects normally establish on fallen trees but can also mass-attack healthy trees, killing millions of spruces. The males produce pheromones that attract conspecifics of both sexes. Each male attracts one to four females; each female produces 2–80 offspring. The insects also inoculate pathogenic fungi to their hosts. There are one to three generations per year. The wide current geographic range of *I. typographus* suggests that it is able to establish anywhere in the EU where its hosts are present. Sanitary thinning or clear-felling are the major control methods. Pheromone mass trapping is presently judged unreliable because of the large dispersal capacity of the pest. Quarantine measures are implemented to prevent entry in yet uncolonised areas. All criteria assessed by EFSA for consideration as potential protected zone quarantine pest are met. The criteria for considering *I. typographus* as a potential regulated non-quarantine pest are not met since plants for planting are not a pathway.

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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/EC¹ 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) 2016/2031² 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 178/2002³, 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 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 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

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

(b) Bacteria

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

(c) Fungi

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

(d) Virus and virus-like organisms

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

Annex IIB

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

<i>Anthonomus grandis</i> (Boh.)	<i>Ips amitinus</i> Eichhof
<i>Cephalcia lariciphila</i> (Klug)	<i>Ips cembrae</i> Heer
<i>Dendroctonus micans</i> Kugelán	<i>Ips duplicatus</i> Sahlberg
<i>Gilpinia hercyniae</i> (Hartig)	<i>Ips sexdentatus</i> Börner
<i>Gonipterus scutellatus</i> Gyll.	<i>Ips typographus</i> Heer
<i>Sternochetus mangiferae</i> Fabricius	

(b) Bacteria

Curtobacterium flaccumfaciens pv. *flaccumfaciens* (Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton
Gremmeniella abietina (Lag.) Morelet

Hypoxyton 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) <i>Carneocephala fulgida</i> Nottingham | 3) <i>Graphocephala atropunctata</i> (Signoret) |
| 2) <i>Draeculacephala minerva</i> Ball | |

Group of Tephritidae (non-EU) such as:

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

(c) Viruses and virus-like organisms

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

- | | |
|----------------------------------|--|
| 1) Andean potato latent virus | 4) Potato black ringspot virus |
| 2) Andean potato mottle virus | 5) Potato virus T |
| 3) Arracacha virus B, oca strain | 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 | 8) Peach yellows mycoplasma |
| 2) Cherry rasp leaf virus (American) | 9) Plum line pattern virus (American) |
| 3) Peach mosaic virus (American) | 10) Raspberry leaf curl virus (American) |
| 4) Peach phony rickettsia | 11) Strawberry witches' broom mycoplasma |
| 5) Peach rosette mosaic virus | 12) Non-EU viruses and virus-like organisms of <i>Cydonia</i> Mill., <i>Fragaria</i> L., <i>Malus</i> Mill., <i>Prunus</i> L., <i>Pyrus</i> L., <i>Ribes</i> L., <i>Rubus</i> L. and <i>Vitis</i> L. |
| 6) Peach rosette mycoplasma | |
| 7) Peach X-disease mycoplasma | |

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

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

- | | |
|--|--|
| 1) <i>Margarodes vitis</i> (Phillipi) | 3) <i>Margarodes prieskaensis</i> Jakubski |
| 2) <i>Margarodes vredendalensis</i> de Klerk | |

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

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

(b) Fungi

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

(c) Viruses and virus-like organisms

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

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAI

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

<i>Meloidogyne fallax</i> Karssen	<i>Rhizoecus hibisci</i> Kawai and Takagi
<i>Popillia japonica</i> Newman	

(b) Bacteria

<i>Clavibacter michiganensis</i> (Smith) Davis et al. ssp.	<i>Ralstonia solanacearum</i> (Smith) Yabuuchi et al.
<i>sepedonicus</i> (Spieckermann and Kotthoff) Davis et al.	

(c) Fungi

<i>Melampsora medusae</i> Thümen	<i>Synchytrium endobioticum</i> (Schilbersky) Percival
----------------------------------	--

Annex IB

(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

Ips typographus 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 excluding Ceuta, Melilla and the outermost regions of Member States referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores.

Since *I. typographus* is regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone (Ireland and the United Kingdom), thus the criteria refers to the protected zone instead of the EU territory.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *I. typographus* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the pest as search term. Relevant papers were reviewed, and further references and information were obtained from experts, from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the EPPO Global Database (EPPO, online).

Data about the area of hosts grown in the EU and about the import of commodity types that could provide a pathway for the pest to enter the EU from non-EU European countries were obtained from EUROSTAT.

The Europhyt database was consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network launched by the Directorate General for Health and Consumers (DG SANCO), 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 the EU legislation, as well as notifications of plant pests detected in the territory of the MSs and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *I. typographus*, 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 initiated following an evaluation of the EU's 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 as per 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. If one of the criteria is not met, the pest will not qualify. In such a case, the working group should consider the possibility to terminate the assessment early and to be concise in the sections preceding the question for which the negative answer is reached. Note that a pest that does not qualify as a quarantine pest may still qualify as a regulated non-quarantine pest which 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 regards to the principle of separation between risk assessment and risk management (EFSA founding regulation (EC) 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, while addressing social impacts is outside the remit of the Panel, in agreement with 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)
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?

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
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, the identity of the pest is established. It can be identified to species using conventional entomological keys.

Ips typographus is an insect of the family Curculionidae, subfamily Scolytinae.⁴

⁴ Although the leading taxonomists in the 2000s (Wood, 1982; Bright and Skidmore, 2002) still considered the Scolytidae to be a family distinct from the Curculionidae according to morphological criteria, modern phylogenetics supports the position of scolytine beetles (Scolytinae) within the family Curculionidae (Knížek and Beaver, 2004; Hulcr et al., 2015). This is reflected by the growing number of citations in Scopus (online) referring to Scolytinae (18 in 1990 vs 177 in 2016), as opposed to citations referring to Scolytidae (50 in 1990 vs 15 in 2016). The Scolytinae includes two subcategories, the 'bark beetles' which live in the phloem, and the 'ambrosia beetles' which live in the sapwood.

3.1.2. Biology of the pest

Comprehensive accounts of the biology and ecology of *I. typographus* are given by Chararas (1962), Christiansen and Bakke (1997), Wermelinger (2004) and Kausrud et al. (2011). The adults overwinter in the litter or in the bark of the trees where they developed, and disperse widely in the spring, flying in search for new hosts. Dispersal can be very wide, sometimes over tens of kilometres (Forsse and Solbreck, 1985) or even longer distances (> 100 km according to Montano et al., 2016). Upon emergence, the males constitute 30–50% of the population (Lobinger, 1996). They start colonising either weakened (e.g. fallen) or healthy trees and attract conspecifics of both sexes with aggregation pheromones (Bakke, 1970, 1976; Birgersson et al., 1984). Each male that has excavated a nuptial chamber in the phloem is joined by one to four females, which bore each a maternal gallery in the phloem, parallel to the phloem fibres and lay one egg at a time at regular intervals (Anderbrant, 1990), each in a small niche created in the lateral wall of the maternal gallery. Up to 80 eggs can be laid by one female but, at usual densities (1–5 females/dm²), 2–10 offspring/female are produced. After egg-laying, the parent adults often re-emerge, fly away and establish sister broods on new hosts. Each larva excavates an individual gallery perpendicular to the maternal gallery. Pupation occurs in a small niche in the phloem, at the end of each larval gallery. After metamorphosis, the young adults remain under the bark for maturation feeding before they disperse. An adult diapause is sometimes observed in upper latitudes or elevations (Schopf, 1989). There are one to possibly three generations per year. At low, endemic population levels, the beetles mostly establish on weakened hosts. When populations increase, for example after a storm has provided a large amount of undefended material, the beetles start attacking healthy trees, which they mass-attack, thus overwhelming their defences. During this process, pathogenic ophiostomatoid fungi are inoculated to the host (Solheim, 1986; Kirisits, 2004; Linnakoski et al., 2016) and contribute to tree death. These massively attacked trees also attract competitors (Schlyter and Anderbrant, 1993) and natural enemies (Mills, 1983, 1985; Kenis et al., 2004). The major triggers for *I. typographus* outbreaks are the availability of storm-felled timber, summer rainfall deficits and warm temperatures (Grégoire et al., 2015 and refs. therein; Marini et al., 2016). Climate change is predicted to alter the beetles' voltinism and the trees' vulnerability, leading to increased damage in the future (Jönsson et al., 2009, 2011; Bentz and Jönsson, 2015 and references therein; Seidl and Rammer, 2016).

3.1.3. Intraspecific diversity

One subspecies, *I. typographus japonicus* is known in China and Japan (Stauffer et al., 1999). In Europe, a phylogeographic analysis has revealed the existence of a northern and a southern group of haplotypes within the species *I. typographus* (Mayer et al., 2015).

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, the organism can be detected by visual searching, often after damage symptoms are seen. The species can be identified by examining morphological features, for which keys exist, e.g. Balachowsky (1949); Grüne (1979); Schedl (1981); Wood (1982).

The standing trees attacked by *I. typographus* die during the colonisation process. During the attacks, brown sawdust is expelled from the entry holes and, when the broods have metamorphosed and the young adults start feeding on the phloem around the galleries, the bark can flake off, and this phenomenon can be amplified by the action of wood peckers. Within and behind the phloem, vertical maternal galleries and horizontal larval galleries can be seen. The sapwood shows bluestaining due to the fungi introduced by the beetles. The adult insects are dark brown or black in colour, cylindrical, 4.5–5.5 mm long. The larvae are apodous, with a dark amber cephalic capsule.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

I. typographus is present in two continents, continental Europe and Asia. The insect is absent from the other continents. It has been repeatedly intercepted at ports in the United States (period 1985–2000;

286 interceptions out of 6,825 records: Haack, 2001) and in New Zealand (period 1952–2000; 43 interception out of 722 records: Brockerhoff et al., 2003). In non-EU Europe, the insect has been reported from Bosnia and Herzegovina, Georgia, Norway, Russia, Serbia, Switzerland, Turkey and Ukraine (Figure 1).

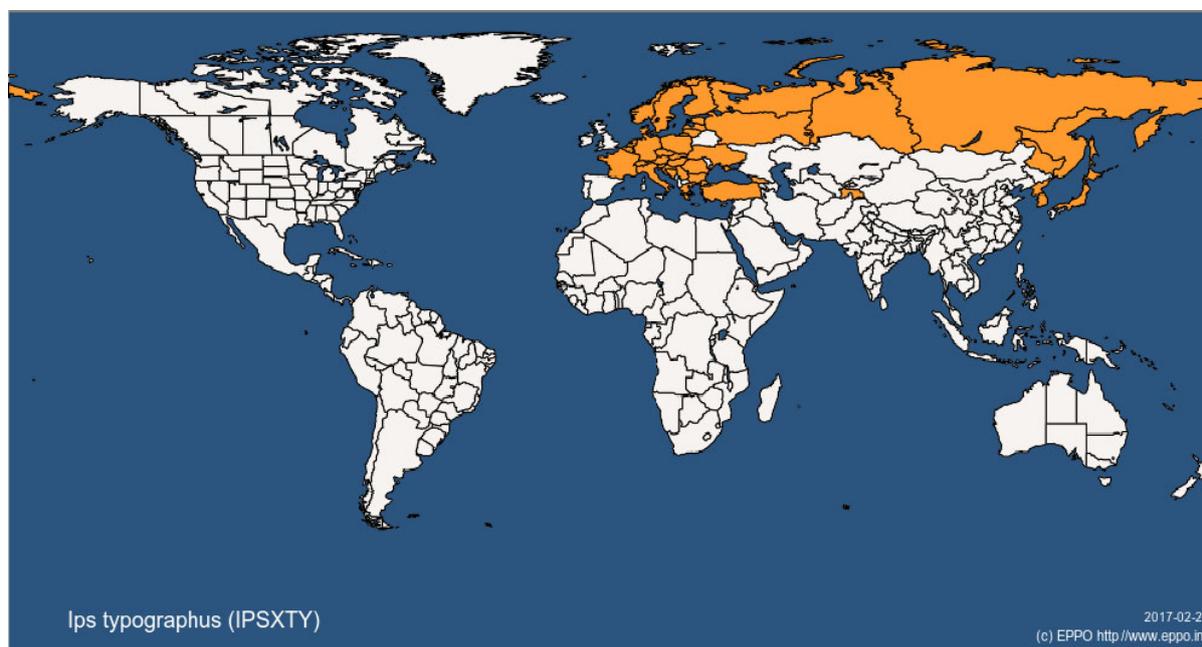


Figure 1: Global distribution map for *Ips typographus* (extracted from the EPPO Global Database accessed on 28 February 2017)

3.2.2. Pest distribution in the EU

Is the pest present in the EU territory? If present, is the pest widely distributed within the EU?

Yes, *I. typographus* is present and widely distributed in the EU; it has been reported from 22 Member States (MSs). The protected zones, Ireland and the United Kingdom, are free from the pest.

Table 2: Current distribution of *Ips typographus* in the 28 EU MS based on information from the EPPO Global Database and other sources if relevant

Country	EPPO GD Last update: 10/3/2016 Date Accessed: 22/2/17
Austria	Present, no details
Belgium	Present, no details
Bulgaria	Present, widespread
Croatia	Present, restricted distribution
Cyprus	No information
Czech Republic	Present, widespread
Denmark	Present, widespread
Estonia	Present, no details
Finland	Present, widespread
France	Present, restricted distribution
Germany	Present, widespread
Greece	Present, no details

Country	EPPO GD Last update: 10/3/2016 Date Accessed: 22/2/17
Hungary	Present, restricted distribution
Ireland	Absent, confirmed by survey
Italy	Present, restricted distribution Sardegna: Absent, pest no longer present
Latvia	Present, no details
Lithuania	Present, widespread
Luxembourg	Present, no details
Malta	No information
Poland	Present, restricted distribution
Portugal	Absent, confirmed by survey
Romania	Present, no details
Slovak Republic	Present, widespread
Slovenia	Present, no details
Spain	Absent, confirmed by survey
Sweden	Present, widespread
The Netherlands	Present, restricted distribution
United Kingdom	Absent, confirmed by survey

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

Ips typographus is listed in Council Directive 2000/29/EC. Details are presented in Tables 3 and 4.

Table 3: *Ips typographus* in Council Directive 2000/29/EC

Annex II, Part B	Harmful organisms whose introduction into, and whose spread within, certain protected zones shall be banned if they are present on certain plants or plant products		
(a)	Insects, mites and nematodes, at all stages of their development		
	Species	Subject of contamination	Protected zones
6 (e)	<i>Ips typographus</i>	Plants of <i>Abies</i> Mill., <i>Larix</i> Mill., <i>Picea</i> A. Dietr., <i>Pinus</i> L. and <i>Pseudotsuga</i> Carr., over 3 m in height, other than fruit and seeds, wood of conifers (<i>Coniferales</i>) with bark, isolated bark of conifers	IRL, UK

3.3.2. Legislation addressing plants and plant parts on which *Ips typographus* is regulated

Table 4: Regulated hosts and commodities that may involve *Ips typographus* 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 <i>Abies</i> Mill., [...], <i>Larix</i> Mill., <i>Picea</i> A. Dietr., <i>Pinus</i> L., <i>Pseudotsuga</i> Carr. [...], other than fruit and seeds	Non-European Countries

Annex IV, Part B	Special requirements which shall be laid down by all member states for the introduction and movement of plants, plant products and other objects into and within certain protected zones		
	Plants, plant products and other objects	Special requirements	Protected zone(s)
3.	Wood of conifers (Coniferales)	Without prejudice to the requirements applicable to the wood listed in Annex IV(A)(I)(1.1), (1.2), (1.3), (1.4), (1.5), (1.6), (1.7), where appropriate, and Annex IV(B)(1) and (2): (a) the wood shall be stripped of its bark; or (b) official statement that the wood originates in areas known to be free from <i>Ips typographus</i> Heer; or (c) there shall be evidence by a mark 'Kiln-dried', 'KD' or another internationally recognised mark, put on the wood or on its packaging in accordance with current commercial usage, that it has undergone kiln-drying to below 20% moisture content, expressed as a percentage of dry matter, at time of manufacture, achieved through an appropriate time/temperature schedule	IRL, UK
9.	Plants of <i>Abies</i> Mill., <i>Larix</i> Mill., <i>Picea</i> A. Dietr., <i>Pinus</i> L. and <i>Pseudotsuga</i> Carr., over 3 m in height, other than fruit and seeds	Without prejudice to the provisions applicable to the plants listed in Annex III(A)(1), Annex IV(A)(I)(8.1), (8.2), (9), (10), Annex IV(A)(II)(4), (5) and Annex IV(B)(7), (8), where appropriate, official statement that the place of production is free from <i>Ips typographus</i>	IRL, UK
14.6	Isolated bark of conifers (Coniferales)	Without prejudice to the provisions applicable to the bark listed in Annex IV(B)(14.1), (14.2), (14.3), (14.4), (14.5), official statement that the consignment: (a) has been subjected to fumigation or other appropriate treatments against bark beetles; or (b) originates in areas known to be free from <i>Ips typographus</i>	IRL, UK
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 produced by producers whose production and sale is authorised to persons professionally engaged in plant production, other than those plants, plant products and other objects which are prepared and ready for sale to the final consumer, and for which it is ensured by the responsible official bodies of the Member States, that the production thereof is clearly separate from that of other products		
2.1	Plants intended for planting other than seeds of the genera <i>Abies</i> Mill., [...] <i>Larix</i> Mill., [...], <i>Picea</i> A. Dietr., <i>Pinus</i> L., [...], <i>Pseudotsuga</i> Carr., [...]		

3.3.3. Legislation addressing the organisms vectored by *Ips typographus* (Directive 2000/29/EC)

Although several phytopathogenic ophiostomatoid fungi are regularly associated with *I. typographus*, (Solheim, 1986; Kirisits, 2004; Linnakoski et al., 2016), there is currently no legislation addressing this issue.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

I. typographus attacks mainly spruce (*Picea* spp.) but has also been observed attacking firs (*Abies* spp.), larch (*Larix* spp.), Douglas fir (*Pseudotsuga menziesii*) and pines (*Pinus* spp.) (EPPO, online; CABI, online).

The hosts for which *I. typographus* is regulated are comprehensive of the host range: the pest is regulated on five genera: *Abies*, *Larix*, *Picea*, *Pinus* and *Pseudotsuga*.

3.4.2. Entry

Is the pest able to enter into the protected zone areas of the EU territory? If yes, identify and list the pathways!

Yes, the pest is already established in 22 MSs. Since entry by natural dispersal from the EU areas where the pest is present is possible, only isolated areas (e.g. islands) can be long-term protected zones.

The pest is widely present in 22 MSs of the EU. In addition, it is regularly intercepted in MSs where it is still absent. Between 1994 and 2015, there have been 34 records of interception of *I. typographus* and 26 interceptions of '*Ips* sp.' in the Europhyt database, among which 30 *I. typographus* in the UK and three in Ireland.

The main pathways of entry are:

- wood of *Abies*, *Larix*, *Pinus*, *Picea* and *Pseudotsuga* from countries where the pest occurs;
- wood chips of conifers from countries where the pest occurs;
- bark of conifers from countries where the pest occurs;
- wood packaging material and dunnage from countries where the pest occurs.

Plants for planting should not be considered as a pathway for *I. typographus* because small trees are usually not attacked and if attacked, would be killed. Haack (2001) reports that in the US during the period 1985–2000, *I. typographus* was exclusively intercepted with wood packaging material containing tiles and machinery: crating (230 cases), dunnage (166) and pallets (34). The Europhyt database reports (1994–2015) 29 interceptions on wood and bark, 15 on wood packaging material (pallets, crates and dunnage) and 16 on unclassified plant material.

According to the EUROSTAT database, there are movements of material pertaining to the above pathways from Third countries and EU countries where the pest is present, into the protected zones. For example, concerning the wood pathway, around 41,000 tonnes of coniferous wood including the genera *Picea*, *Pinus* and *Abies* (Eurostat codes 44032011, 44032019, 44022031, 44032039, 44022091, 44032099), has been imported in the period 2011–2015 from EU countries into protected zones. In the same period, around 9,000 tonnes of coniferous wood were imported into the protected zones from third countries where the pest is present (Bosnia and Herzegovina, Norway, Russia, Serbia, Switzerland, Turkey and Ukraine).

3.4.3. Establishment

Is the pest able to become established in the protected zone areas of the EU territory?

Yes, the pest is already established in 22 MSs. The climate of the EU protected zones is similar to that of the MSs where *I. typographus* is established, and the pest's main host plants are present (Figure 2).

3.4.3.1. EU distribution of main host plants

The wide distribution of host trees in the EU territory allowed *I. typographus* to establish in most MSs (see Table 2). *Picea excelsa*, *Picea omorika* and *Picea orientalis* are native to Europe and are widely planted outside their original range throughout the EU. Other *Picea* species are widely distributed in the EU territory (Figure 2).

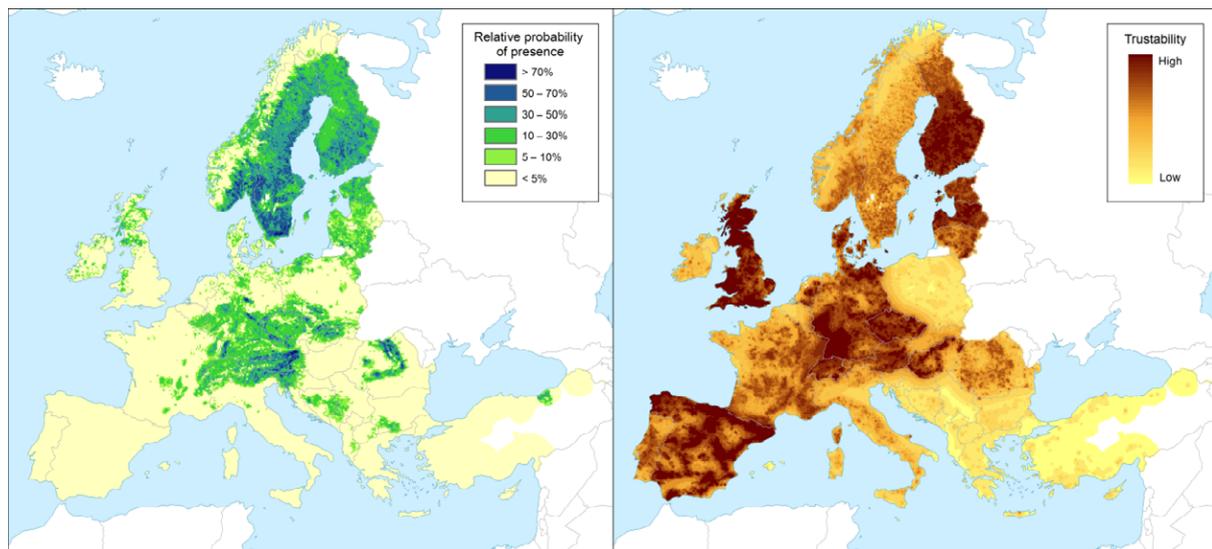


Figure 2: Relative probability of presence of the genus *Picea* in the European Union territory (based on data from the species: *P. abies*, *P. sitchensis*, *P. glauca*, *P. engelmannii*, *P. pungens*, *P. omorika*, *P. orientalis*). **Left panel:** Relative probability of presence (RPP) of species/genera from the European Atlas of Forest Tree Species (de Rigo et al., 2016; San-Miguel-Ayanz et al., 2016), aggregated at 100 km² pixel resolution. RPP is defined as the probability of finding species/taxon in a given area, irrespective of the probability of finding other taxa (de Rigo et al., 2017). As a consequence, the sum of all RPPs for different taxa in the same area need not be 100%. The estimates are based on constrained spatial multi-scale frequency analysis (C-SMFA) (de Rigo et al., 2014, 2016, 2017): this is a spatial multi-scale frequency analysis of field observations (de Rigo et al., 2014, 2016), constrained to enhance the estimates' consistency with the frequency of broadleaved and coniferous taxa derived from Corine Land Cover (Bossard et al., 2000; Büttner et al., 2012). **Right panel:** Trustability of RPP. This qualitative measure is based on the multi-scale aggregation of the number of field observations (i.e. the local density of data) for each pixel and taxon. The colour scale of the trustability map is based on the quantiles of this data density (de Rigo et al., 2014, 2016)

3.4.3.2. Climatic conditions affecting establishment

Given the current distribution of *I. typographus*, the whole EU area (including protected zones) is suitable for establishment.

3.4.4. Spread

Is the pest able to spread within protected zones areas of the EU territory following establishment? How?

Yes, adults can disperse naturally. They can fly over tens of kilometres or even more. The pest can also spread by human assistance, e.g. with the transportation of wood, wood chips, bark, wood packaging material and dunnage of conifers.

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 not a pathway.

As shown in Table 2, *I. typographus* is present in most of the EU, except in Ireland, Portugal, Spain and the United Kingdom, while there is no information from Cyprus and Malta in the EPPO Global Database. The main pathway for spread is the transportation of infested material, but natural spread by flight regularly occurs over large distances (see Section 3.1.2).

3.5. Potential or observed impacts in the EU

Would the pests' introduction have an economic or environmental impact on the protected zones of the EU?

Yes, the pest is known to have killed millions of trees, after triggering events such as storms or dry summers.

3.5.1. Potential pest impacts

The species is native to Europe, and hence, it is irrelevant to consider impact outside the EU territory.

3.5.2. Observed pest impacts in the EU

3.5.2.1. Direct impact of the pest

I. typographus mass attacks standing, healthy host trees, which are killed by the combined effect of the beetles and associated pathogenic ophiostomatoid fungi (see Section 3.1.2). The species is considered as the most damaging forest pest in Europe (Grégoire and Evans, 2004; Grégoire et al., 2015). Schelhaas et al. (2003) calculated that 8% of all tree mortality in Europe during the period 1850–2000 was due to bark beetles, and mainly to *I. typographus*. In Switzerland between 2000 and 2009, the beetles have killed 8 million m³ of spruce (Meier et al., 2013); in Austria, 18 million m³ were killed between 2002 and 2012 (Steyrer and Krehan, 2009; Krehan et al., 2012).

In addition to these silvicultural damage, large outbreaks of *I. typographus* also have an ecosystemic impact, as tree mortality at this scale negatively influences the ecosystemic services of the forest, as well as the global carbon balance (Kurz et al., 2008; Kautz et al., 2016; Seidl and Rammer, 2016).

3.5.2.2. Indirect pest impact (e.g. by bacteria or viruses transmitted by the pest)

The impact of fungi associated to *I. typographus* has been analysed by many authors (e.g. Solheim, 1986; Yamaoka et al., 1997; Viiri and Lieutier, 2004; Sallé et al., 2005; Linnakoski et al., 2016). Kirisits (2004) provides a review of the ophiostomatoid fungi associated to *I. typographus*: At least 23 species were isolated from the galleries of the beetles: *Ceratocystiopsis alba*; *Ceratocystiopsis minuta*; *Ceratocystis polonica*; *Graphium fimbriisporum*; *Graphium pseudormiticum* (= *G. fimbriisporum*?) *Graphium* (*Pesotum*?) *pycnocephalum*; *Leptographium euphyes*; *Leptographium lundbergii*; *Leptographium* spp.; *Ophiostoma ainoae*; *Ophiostoma araucariae*; *Ophiostoma bicolor*; *Ophiostoma cainii*; *Ophiostoma cucullatum*; *Ophiostoma flexuosum*; *Ophiostoma floccosum*; *Ophiostoma japonicum*; *Ophiostoma penicillatum*; [*Ophiostoma penicillatum* f. *chalcographi*]; *Ophiostoma piceae*; *Ophiostoma* cf. *piceae*; *Ophiostoma piceaperdum*; (*Ophiostoma pluriannulatum*); *Ophiostoma serpens*; *Ophiostoma stenoceras*; *Ophiostoma tetropii*; *Ophiostoma* spp.; *Pesotum fragrans*; *Pesotum* sp.; *Pesotum* (*Graphium*?) spp.

Some of these species (e.g. *Ceratocystis polonica*) are virulent tree pathogens (Christiansen, 1985), others (e.g. *Ophiostoma bicolor*, *O. penicillatum*, *O. piceaperdum*, *O. piceae*, *Pesotum* sp.) are more innocuous (Solheim et al., 2001).

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 protected zones of the EU such that the risk becomes mitigated?

Yes, in isolated areas (e.g. islands) that cannot be reached by natural spread, measures can be put in place to prevent the introduction with wood, wood products, wood chips, bark and plants for planting. Debarking wood, heat treatment of wood, bark and chips, and inspection of plants for planting are specified in Annex IVBII of 2000/29/EC. When such geographical barriers do not exist, there is no possibility to prevent the entry, establishment and spread of *I. typographus* in new areas. This is illustrated by the gradual and sometimes very recent colonisation on continental EU of areas recently planted with spruce, far from the trees' area of origin (Belgium, Brittany or Normandy in France, etc.).

Is it possible to eradicate the pest in a restricted area within 24 months after the presence of the pest was confirmed in the PZ?

No, when the pest starts killing trees, it has already widely established, inconspicuously living on fallen or broken trees.

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

- In spite of quarantine regulations bearing on round wood, wood packaging material and wood products other than paper, the pest is regularly intercepted at ports.
- It is very difficult, if not impossible, to successfully eradicate the pest from forest areas after an introduction. All infected trees and tree parts (including pieces of fallen or broken material) have to be detected and removed and as a prevention for the possible spread from the affected area all suitable host plants should be removed in a zone of several km.
- Despite silvicultural control, in areas where it is established, the pest continues to develop outbreaks whenever climatic conditions are favourable.

3.6.2. Control methods

- Silvicultural methods: sanitation thinning and clearfelling with rapid removal of the infested material (Stadelmann et al., 2013; Fettig and Hilszczanski, 2015; Grégoire et al., 2015);
- Pheromone mass-trapping was largely used at the end of the 20th century (Bakke, 1989, 1991; Raty et al., 1995), but is presently judged unreliable because of the large dispersal capacity of the pest (Duelli et al., 1997);
- Log storage under water sprinkling after windstorms, in order to protect them from bark-beetle attack and reduce bark-beetle population growth (Björkhem et al., 1977; Flot and Vautherin, 2002). This could involve millions of m³ (Lindelöw and Schroeder, 2008).

3.7. Uncertainty

Ips typographus has been exhaustively studied. Its biology, ecology, relationships to its hosts and to natural enemies are well understood. Uncertainty does not affect most of the categorisation conclusions. However, the apparently very low capacity of the pest to invade new areas across a geographic barrier needs to be investigated further.

4. Conclusions

Ips typographus meets the criteria assessed by EFSA for consideration as a potential protected zone quarantine pest, for the territory of the protected zones: Ireland and the United Kingdom.

Table 5: 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 Protected Zone 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 pest is established. It can be identified to species using conventional entomological keys	The identity of the pest is established. It can be identified to species using conventional entomological keys	None
Absence/ presence of the pest in the EU territory (Section 3.2)	<i>I. typographus</i> is present and widely distributed in 22 EU MSs. The protected zones, Ireland and the United Kingdom, are free from the pest	<i>I. typographus</i> is present and widely distributed in the EU, it has been reported from 22 EU MSs. The protected zones, Ireland and the United Kingdom, are free from the pest	None
Regulatory status (Section 3.3)	The pest is currently officially regulated by 2000/29/EC on plants of <i>Abies</i> , <i>Larix</i> , <i>Picea</i> , <i>Pinus</i> and <i>Pseudotsuga</i> , over 3 m in height, other than fruit and seeds, wood of conifers (Coniferales) with bark, isolated bark of conifers <i>I. typographus</i> is regulated as a quarantine pest in protected zones (Annex IIB): Ireland, United Kingdom	The pest is currently officially regulated by 2000/29/EC on plants of <i>Abies</i> , <i>Larix</i> , <i>Picea</i> , <i>Pinus</i> and <i>Pseudotsuga</i> , over 3 m in height, other than fruit and seeds, wood of conifers (Coniferales) with bark, isolated bark of conifers <i>I. typographus</i> is regulated as a quarantine pest in protected zones (Annex IIB): Ireland, United Kingdom	None
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	<u>Entry</u> : The pest is already established in 22 MSs. Since entry by natural spread from EU areas where the pest is present is possible, only isolated areas (e.g. islands) can be long-term protected zones <u>Establishment</u> : The climate of the EU Protected Zones is similar to that of MSs where <i>I. typographus</i> is established, and the pest's main host plants are present <u>Spread</u> : Adults can disperse naturally. They can fly over tens of kilometres or even more. The pest can also spread by human assistance, e.g. with the transportation of wood, wood chips, bark, wood packaging material and dunnage of conifers	Plants for planting are not a pathway; therefore, other criteria for consideration as regulated non-quarantine pest do not need to be assessed	There are 16 records of interceptions on 'unclassified plant material' in the Europhyt database
Potential for consequences in the EU territory (Section 3.5)	The pest is known to have killed millions of trees, after triggering events such as storms or dry summers	Plants for planting are not a pathway; therefore, other criteria for consideration as regulated non-quarantine pest do not need to be assessed	None This is illustrated by the pest's past history in the EU

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Protected Zone quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Available measures (Section 3.6)	In isolated areas (e.g. islands) that cannot be reached by natural spread, measures can be put in place to prevent the introduction with wood, wood products, wood chips, bark and plants for planting. Debarking wood and heat treatment of wood, bark and chips, and inspection of plants for planting are effective. If limited entry occurs nevertheless, spread and establishment are unlikely to occur. When such geographical barriers do not exist, there is no possibility to prevent the entry, establishment and spread of <i>I. typographus</i> .	Plants for planting are not a pathway; therefore, other criteria for consideration as regulated non-quarantine pest do not need to be assessed.	Geographic barrier Entry: inspections are difficult Establishment and spread: wide dispersal upon emergence and very high Allee threshold of this mass-attacking beetle No geographic barrier none
Conclusion on pest categorisation	All criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met.	The criteria for considering <i>I. typographus</i> as a potential regulated non-quarantine pest are not met since plants for planting are not a pathway.	Listed above
Aspects of assessment to focus on/ scenarios to address in future if appropriate	Further analysis of the effects of wide dispersal upon emergence and high Allee thresholds could lower the uncertainties regarding the risks of establishment and spread.		

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Abbreviations

C-SMFA	constrained spatial multi-scale frequency analysis
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization of the United Nations
IPPC	International Plant Protection Convention
MS	Member State
PLH	EFSA Panel on Plant Health
RPP	Relative probability of presence
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference