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Pest categorisation of *Dendroctonus micans*

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Abstract

The Panel on Plant Health performed a pest categorisation of the great spruce bark beetle, *Dendroctonus micans* (Kugelann), (Coleoptera: Curculionidae, Scolytinae), for the EU. *D. micans* is a well-defined and distinguishable species, recognised mainly as a pest of spruce (*Picea* spp.) and pine (*Pinus* spp.) in Eurasia. Attacks on other conifers (*Abies* spp., *Larix decidua*, *Pseudotsuga menziesii*) are also reported. Supposedly originating from north-eastern Eurasia, *D. micans* has spread westward and is now distributed throughout the EU (22 Member States). It is a quarantine pest listed in Annex IIB of Council Directive 2000/29/EC for Greece, Ireland and the United Kingdom (Northern Ireland, Isle of Man and Jersey) as protected zones. Wood, wood products, bark and wood packaging material of the conifers genera listed as hosts are considered as the main pathways for the pest, which is also able to disperse several kilometres by flight. The sib-mating habits of the species allow each single female to start a new colony on her own. The pest's wide current geographic range suggests that it is able to establish anywhere in the EU where its hosts are present. The beetles attack living trees and usually complete their life cycle without killing their host, except under epidemic conditions at the limits of their distribution range, where hundreds of thousands of trees can be killed. Sitka spruce (*Picea sitchensis*) is particularly susceptible. Biological control using the very specific predatory beetle, *Rhizophagus grandis,* is a widespread and efficient option that has been implemented in all areas suffering from outbreaks. It is complemented by sanitary thinning or clear-felling. All criteria assessed by EFSA for consideration as potential protected zone quarantine pest were met. The criteria for considering *D. micans* as a potential regulated non-quarantine pest are not met since plants for planting are not the main pathway.

Keywords: Curculionidae, European Union, pest risk, plant health, plant pest, quarantine, great Eurasian spruce bark beetle

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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 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

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.
Sternochetus mangiferae Fabricius
Ips amitinus Eichhof
Ips cembrae Heer
Ips duplicatus Sahlberg
Ips sexdentatus Börner
Ips typographus Heer

(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

Dendroctonus micans 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 EU 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 *D. micans* is regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone (Greece, Ireland and the United Kingdom: Northern Ireland, Isle of Man and Jersey), thus the criteria refer 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 *D. micans* 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, 2017).

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 EU legislation, as well as notifications of plant pests detected in the territory of the Member States (MSs) and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *D. micans*, 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 regard to the principle of separation between risk assessment and risk management [EFSA founding regulation (EC) 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, 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?

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

D. micans is an insect of the family Curculionidae, subfamily Scolytinae.[4]

3.1.2. Biology of the pest

D. micans colonises the phloem of living, apparently healthy conifers, mainly spruces and pines (Grégoire, 1988). As it is extremely resistant to the defensive monoterpenes of conifers (Everaerts et al., 1988), it does not need to mass attack and kill the trees in order to establish successfully. The sex ratio is biased (one male for 5–40 females; Francke-Grosmann, 1950) and the females are usually fertilised by a brother before they leave their natal tree (Vouland et al., 1984). The majority of the emerging insects are thus females that are immediately ready to start a new colony on their own. Each female solitarily attacks a new host, and creates a short 5–20 cm egg gallery on the side of which her eggs are laid in batches. Most of the time, there is only one or a few attacks per tree, and the tree survives. In many cases, the females have to try repeatedly to enter the trees, which resist by producing resin and eventually expelling the insects. In the field, an egg batch may include only a few or up to 200 eggs. The males also emerge and fly, and can occasionally visit a new egg gallery and fertilise a female that has already mated with a brother (Fraser et al., 2014). Quite unusually among bark beetles, the larvae feed in groups in the living phloem, pushing their frass behind them. After metamorphosis, the young adults spend several weeks to several months together, according to the season, and it is during this period that they mate. The life cycle can be completed in 1 year under mild climates (e.g. Brittany, France) or is protracted to one and a half or two years or even longer when the growing season is very short. Except for the monovoltine populations, the phenology of the species varies each year, and most of the developmental stages may be found throughout the year. When metamorphosis occurs in the summer or autumn, the young adults undergo an obligatory reproductive diapause and need to overwinter. When metamorphosis occurs in the spring, the adults can oviposit on the same year. Hosts are randomly selected but, once a tree has been successfully attacked, it is often re-attacked the following years (Gilbert et al., 2001). An important feature in *D. micans*' biology is its association with an extremely specific predator, the Monotomid beetle *Rhizophagus grandis* Gyll. (Weber, 1900; Bergmiller, 1903; Grégoire, 1988). This insect is following *D. micans* in its geographical spread and, in many instances, has also been mass-produced and released for the biological control of *D. micans* (Kobakhidze et al., 1968; Evans et al., 1984; Grégoire et al., 1984; Yüksel, 1996).

3.1.3. Intraspecific diversity

Intraspecific diversity appears extremely low over most of the geographical range. Mayer et al. (2015) sequenced three polymorphic molecular markers in samples from 110 localities in Europe, Siberia, Caucasus and the Russian Far East, and found very little differences between the local populations in Europe, Siberia and the Caucasus (1–4 mutation between different locations for the mitochondrial marker COI, none for two nuclear markers). The populations from the Russian Far East

[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.

showed a slightly higher distance from the former group (one mutation for the two nuclear markers, 9–14 mutational steps for the COI sequences).

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).

Because there are only one or a few attacks per tree and the attacked trees generally do not die under endemic conditions, symptoms must be searched very carefully. When expelling their frass and the resin secreted by the tree from their egg gallery, the females build a tube around the entry hole with this material. The colour of this 'resin tube' ranges from amber to purple or dark brown, turning greyish with time. The proportion of frass in the tube is an indicator of the female's success (the more resin and less frass, the less successful the egg gallery). In addition, resin pellets (whitish to purplish) are also expelled from the galleries, and liquid resin can also flow on the surface of the bark. There are often more resin tubes than actual successful brood systems, because of many abortive attempts. The attacks often occur at the base of the trees, or even on the roots, below the surface. They are then often betrayed by resin pellets at the surface of the litter. Woodpecker damage (holes in the bark, bark flakes detached) is also a symptom of attack. Under epidemic conditions, there are more attacks per tree and, depending on the tree species, there can be significant mortality in the stands.

On a wider scale, when trees are killed, the insects can be detected by helicopter surveys followed by ground inspections of any dead trees, as done in Scotland (Nick Fielding, Forest Research UK, personal communication, 6 March 2017, see Appendix A)

The adults are the largest bark beetles in Eurasia. They are black and measure ca 8 mm in length. The larvae feed side by side; the pupae are distributed among the frass in the brood chambers.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

D. micans is present in two continents, Europe and Asia, and is thought to have originated in Eastern Siberia or in the Russian Far East (Mayer et al., 2015). In non-EU Europe, the insect has been reported from Bosnia and Herzegovina, Georgia, Norway, Russia, Serbia, Switzerland, Turkey and Ukraine (Figure 1).

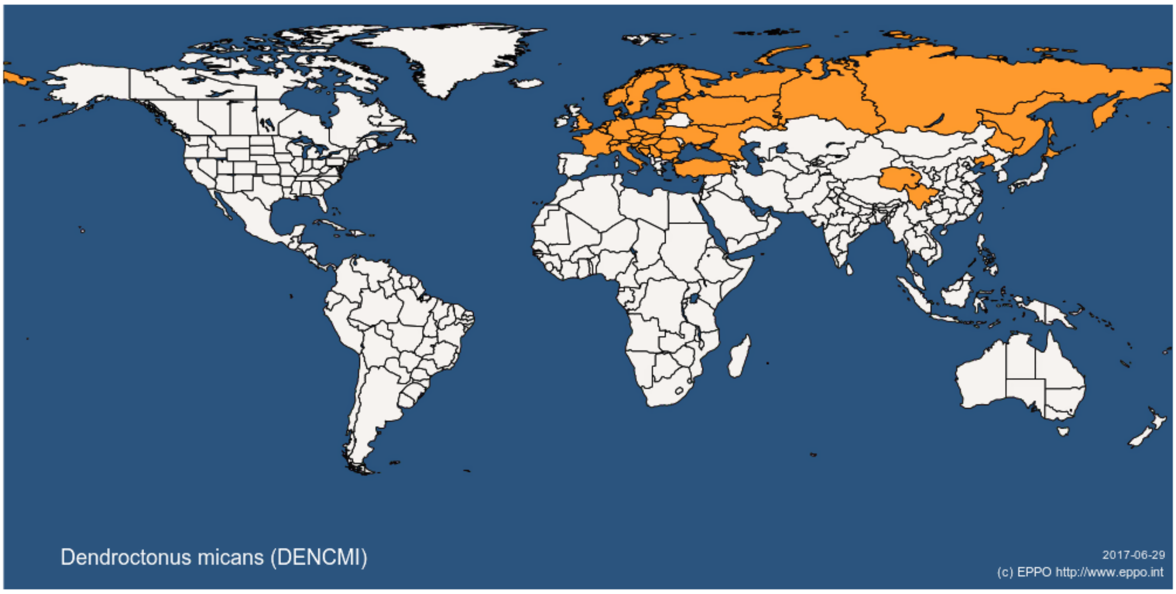


Figure 1: Global distribution map for *Dendroctonus micans* (extracted from EPPO global database accessed on 24 May 2017)

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, *D. micans* is present and widely distributed in the EU, it has been reported from 22 MSs (Table 2). The pest is absent in the protected zone.

As the insect is very inconspicuous at the endemic stage, it is probably more widespread in the areas where it is known as established than usually reported. However, its presence in Protected Zones would be obvious as, before biological control is established in a newly colonised area, destructive outbreaks usually occur (see Section 3.5.2.1).

Table 2: Current distribution of *Dendroctonus micans* in the 28 EU MSs based on information from the EPPO Global Database

Country	EPPO GD Last update: 24/5/16 Date Accessed: 24/5/17
Austria	Present, no details
Belgium	Present, no details
Bulgaria	Present, widespread
Croatia	Present, restricted distribution
Cyprus	No information
Czech Republic	Present, widespread
Denmark	Present, restricted distribution
Estonia	Present, restricted distribution
Finland	Present, restricted distribution
France	Present, restricted distribution
Germany	Present, few occurrences
Greece	Absent, confirmed by survey
Hungary	Present, restricted distribution
Ireland	Absent, confirmed by survey
Italy	Present, restricted distribution

Country	**EPPO GD** **Last update: 24/5/16** **Date Accessed: 24/5/17**
Latvia	Present, no details
Lithuania	Present, few occurrences
Luxembourg	Present, no details
Malta	No information
Poland	Present, restricted distribution
Portugal	Absent, confirmed by survey
Romania	Present, restricted distribution
Slovak Republic	Present, restricted distribution
Slovenia	Present, no details
Spain	Absent, confirmed by survey
Sweden	Present, Widespread
Netherlands	Present, restricted distribution
United Kingdom	Present, restricted distribution

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

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

Table 3: *Dendroctonus micans* 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
3.	Dendroctonus micans	Plants of *Abies* Mill., *Larix* Mill., *Picea* A.Dietr., *Pinus* L. and *Pseudotsuga* Carr., over 3 m in height, other than fruit and seeds, wood of conifers (Coniferales) with bark, isolated bark of conifers	EL, IRL, UK (Northern Ireland, Isle of Man and Jersey)

3.3.2. Legislation addressing plants and plant parts on which *Dendroctonus micans* is regulated

Table 4: Regulated hosts and commodities that may involve *Dendroctonus micans* 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., [. . .], *Larix* Mill., *Picea* A. Dietr., *Pinus* L., *Pseudotsuga* 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)
1.	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), (7), where appropriate: (a) the wood shall be stripped of its bark; or (b) official statement that the wood originates in areas known to be free from *Dendroctonus micans* Kugelan; or (c) there shall be evidence by a mark .Kilndried., .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	EL, IRL, UK (Northern Ireland, Isle of Man and Jersey)
7.	Plants of *Abies* Mill., *Larix* Mill., *Picea* A. Dietr., *Pinus* L. and *Pseudotsuga* 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) and Annex IV(A)(II)(4), (5), where appropriate, official statement that the place of production is free from *Dendroctonus micans* Kugelan	EL, IRL, UK (Northern Ireland, Isle of Man and Jersey)
14.1	Isolated bark of conifers (Coniferales)	Without prejudice to the prohibitions applicable to the bark listed in Annex III(A)(4), 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 *Dendroctonus micans* Kugelan.	EL, IRL, UK (Northern Ireland, Isle of Man and Jersey)

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 Abies Mill., [...] Larix Mill., [...], Picea A. Dietr., Pinus L., [...], Pseudotsuga Carr., [...]

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

No specific legislation is known. For further information on the organisms vectored by *D. micans*, see Section 3.5.2.2.

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

D. micans attacks various indigenous or introduced conifers. Spruce is the main host, in particular *Picea abies, Picea obovata, Picea orientalis* and *Picea sitchensis,* but other *Picea* species can also be attacked, such as *Picea ajanensis, Picea breweriana, Picea engelmannii, Picea glauca, Picea jezoensis, Picea mariana, Picea obovata, Picea omorika, Picea pungens. Pinus sylvestris* is regularly attacked in the Baltic area and in Siberia. Other pines (*Pinus contorta, Pinus nigra* var. *austriaca, Pinus sosnowskyi, Pinus strobus, Pinus uncinata*) have also been observed to be sporadically attacked, as well as firs (*Abies alba, Abies holophylla, Abies nordmannania, Abies pectinata, Abies sibirica*), larch (*Larix decidua*) and Douglas-fir (*Pseudotsuga menziesii*) (Grégoire, 1988; Mayer et al., 2015).

The hosts for which *D. micans* 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 EU areas where the pest is present is possible, only isolated areas (e.g. islands) can be protected zones. So, Greece is very likely to be invaded sooner or later by natural dispersal.

The pest was first recorded in Europe by the end of the 18th century (Grégoire, 1988).

The main pathways 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 of *Abies*, *Larix*, *Pinus*, *Picea* and *Pseudotsuga* from countries where the pest occurs are regarded as a very minor pathway for these bark beetles, because it is very unlikely that they will attack young trees in a tree nursery. The smallest attacked trees under intense outbreak conditions had a diameter at breast height of 7 cm (Grégoire, 1988).

As shown in Table 2, *D. micans* is present in most of the EU, except in Ireland, Greece, Portugal and Spain, while there is no information from Cyprus and Malta in the EPPO Global Database (EPPO, 2017). An important potential pathway is the trade in infested logs (Kobakhidze, 1967; Bevan and King, 1983; Pauly and Meurisse, 2007), but specific requirements are in place for the trade in wood to protected zones (see Section 3.3.2). 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 49,000 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). It should be noted that these data are overestimated because data for the whole UK were used, whereas only Northern Ireland, the Isle of Man and Jersey are protected zones.

Entry into protected zones, such as Greece, can occur by natural dispersal from adjacent infested areas. The pest is widespread in Bulgaria (Table 2) and there is a continuity of spruce coverage between this latter country and Greece (Figure 2). The beetles are able to fly 10 km or more in laboratory flightmills (Forsse, 1989; Gilbert et al., 2003). It has also to be remembered that one single female, usually fertilised by a brother, is able to found a new colony (Grégoire, 1988).

3.4.3. Establishment

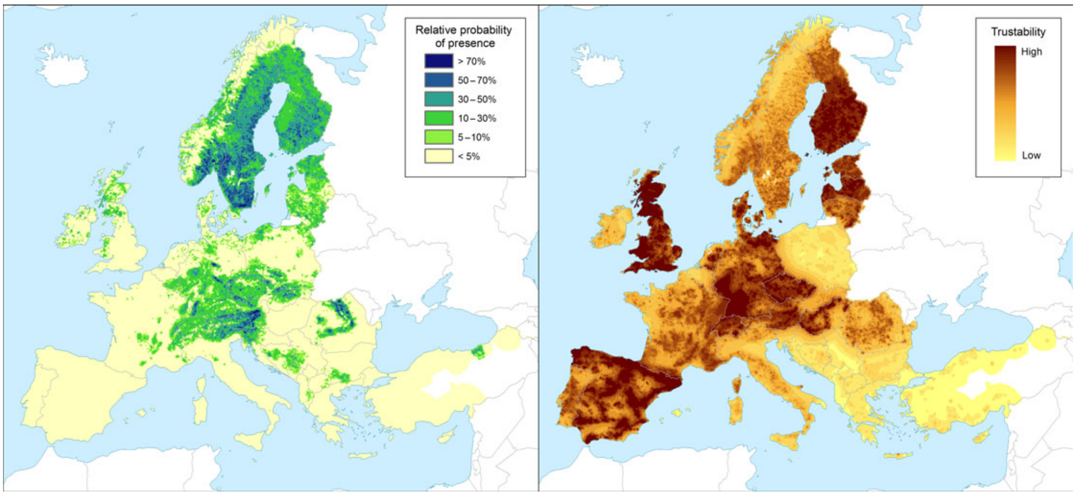
Is the pest able to become established in the protected zone areas of the EU territory?

Yes, the pest is already established in 22 MSs. The climate of the EU Protected Zones is similar to that of the MSs where *D. micans* is established, and the pest's main host plants are present (Figures 2–4)

3.4.3.1. EU distribution of main host plants

The wide distribution of host trees in the EU territory allowed *D. micans* to establish in most MSs (see Table 2). Norway spruce (*Picea excelsa*) and Scots pine (*Pinus sylvestris*) are native to Europe (Figure 2), and are widely planted outside their original range throughout the EU. The very susceptible Sitka spruce (*Picea sitchensis*, from Western North America) is also very commonly planted, particularly in Ireland and the UK which are protected zones (Figure 2B). Many other hosts are widely distributed in the EU territory (Figure 2A,C).

(A)



(A) Relative probability of presence (RPP) and the trustability of RPP 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*)

(B) Relative probability of presence and the trustability of RPP of *Picea sitchensis* in the European Union territory

(C) Relative probability of presence and the trustability of RPP of the genus *Pinus* in the European Union territory (based on data from the species: *P. sylvestris, P. pinaster, P. halepensis, P. nigra, P. pinea, P. contorta, P. cembra, P. mugo, P. radiata, P. canariensis, P. strobus, P. brutia, P. banksiana, P. ponderosa, P. heldreichii, P. leucodermis, P. wallichiana*)

Figures 2 (A–C) **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 km^2 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 needn't 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).

Figure 2: Relative probability of presence of species/genera from the European Atlas of Forest Tree Species and the related trustability of RPP

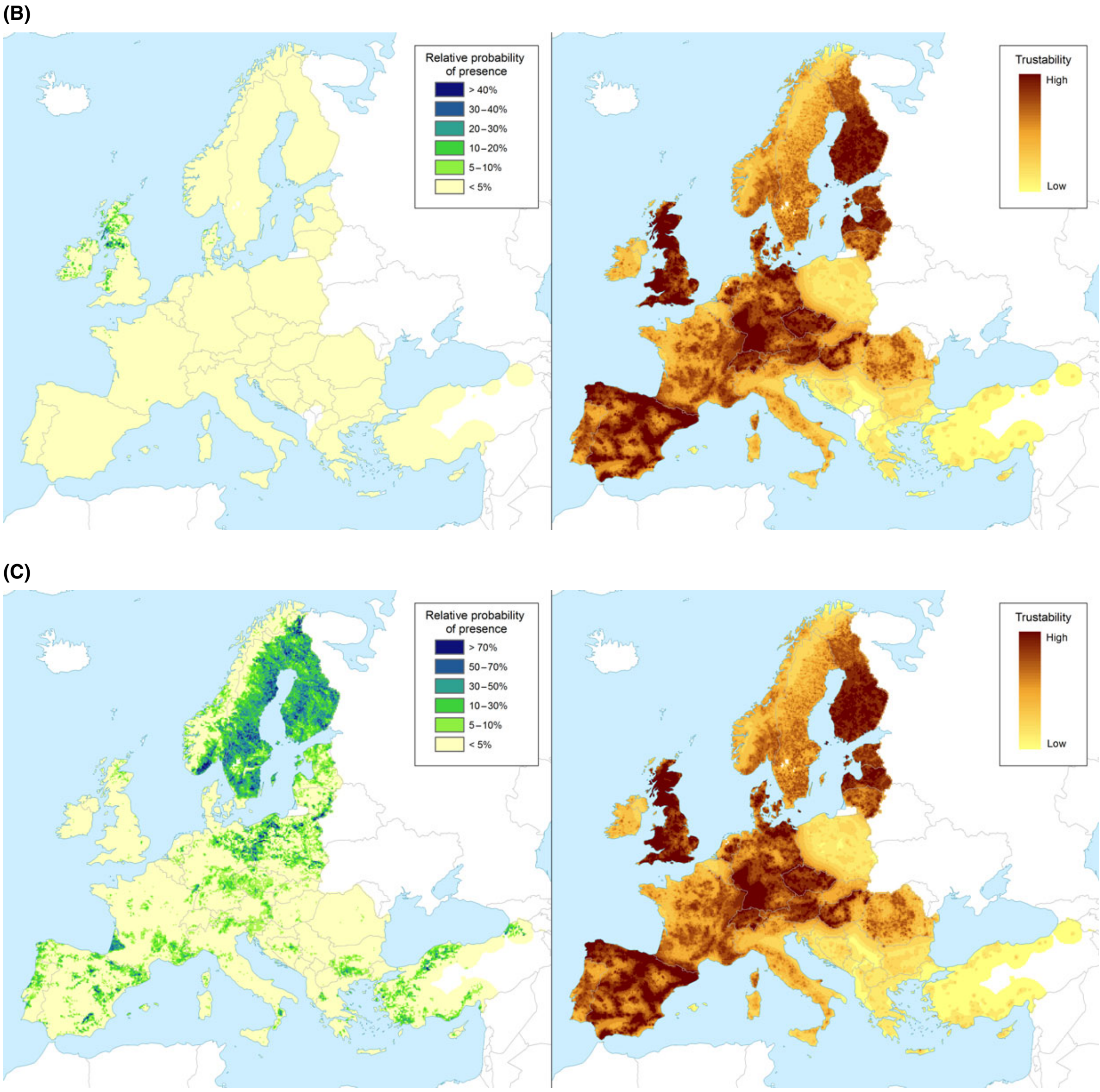


Figure 2: continued

3.4.3.2. Climatic conditions affecting establishment

Given the current distribution of *D. micans*, 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 10 km 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 from infested areas.

Regulated non-quarantine pests: 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 the main pathway for bark beetles, because natural spread and the transport of infested wood is the main pathway and it is unlikely, although not completely impossible, that beetles will attack young trees in a tree nursery (see Section 3.4.2).

As shown in Table 2, *D. micans* is present in most of the EU, except in Ireland, Greece, Portugal and Spain, while there is no information from Cyprus and Malta in the EPPO Global Database. The main pathway for spread is the transportation of infested logs (Kobakhidze, 1967; Bevan and King, 1983; Pauly and Meurisse, 2007). Autonomous dispersal by flight is also possible, the beetles being able to fly 10 km or more in laboratory flightmills (Forsse, 1989; Gilbert et al., 2003). It has to be remembered that one single female, usually fertilised by a brother, is able to found a new colony (Grégoire, 1988).

Therefore, natural spread from infested areas to protected zones as for example Greece can occur, because the pest is present in neighbouring countries such as Bulgaria and Turkey.

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 kill trees, sometimes in high numbers. In newly colonised areas, it could cause economic and environmental impact during a few years after its entry.

Outbreaks usually occur when the pest reaches new territories. Important tree mortality can be observed, particularly in the more susceptible Sitka spruce. Once the specific predator *Rhizophagus grandis* is established, either naturally or through inoculative releases, damage subside within 6–8 years. During and after particularly dry years, small, limited outbreaks can occur in spite of the presence of the natural enemies.

3.5.1. Potential pest impacts

3.5.1.1. Direct impacts of the pest

Outbreaks of *D. micans* have been reported from Siberia (Kolomiets and Bogdanova, 1976), as well as from the Baltic areas of Russia and from Belarus (Krivosheina and Aksentev, 1984). The pest invaded Georgia in 1956, probably travelling with timber imported from Russia, and attacked tens of thousands hectares of *Picea orientalis* (Kobakhidze, 1967). It then invaded Turkey, leading to the clearfelling of ca 7 million m^3 over 120,000 ha (Akinci et al., 2009). Because *D. micans* does not vector pathogenic fungi (see Section 3.5.2.2), the quality of the attacked timber is not affected.

3.5.1.2. Indirect pest impacts (e.g. by bacteria or viruses transmitted by the pest)

Some fungi can be occasionally vectored by *D. micans* (see Section 3.5.2.2).

3.5.2. Observed pest impacts in the EU

3.5.2.1. Direct impact of the pest

Under outbreak conditions at the limits of the extension range where biological control is not yet established, attacked trees can die, especially *Picea sitchensis*, sometimes in large numbers. In the French Massif Central, several thousand hectares of *Picea excelsa* were affected in the years 1970–1980 (Vouland and Schvester, 1994); in Great-Britain, surveys in 1982–1984 revealed that tens of thousands of trees have been attacked during this period (Fielding and Evans, 1997). However, contrary to damage exerted by mass-attacking, tree-killing bark beetles such as *Ips typographus*, the trees attacked by *D. micans* do not show any discolouration lowering the value of the wood.

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

Very little fungi are reported to be associated to *D. micans*. Lieutier et al. (1992) found *Ophiostoma canum* in variable proportions (32–92% of 155 flying beetles; 0.5–90% of 140 induced attacks), and only one observation of *Ophiostoma penicillatum* and seven observation of *Ophiostoma* sp. From artificial inoculations on *Pinus sylvestris*, Solheim et al. (2001) concluded that *O. canum* had a low virulence, inducing lesions similar to those provoked by sterile control inoculations. Under endemic conditions, the trees survive the attacks and bear no symptoms of fungal activity (blue staining) (Grégoire, 1988).

3.6. Availability and limits of mitigation measures

Are there feasible and effective measures available to prevent the entry into, establishment within, or spread of the pest within the protected zone areas 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 and bark. Debarking wood and heat treatment of wood, bark and chips is effective as specified in annex IVB of 2000/29/EC.

There are no effective measures to prevent establishment and spread.

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, the pest is very cryptic during the first years after its entry and establishment. The attacks are inconspicuous, and the attacked trees do not die before a sufficient number of broods have been established. Therefore, when the first symptoms appear, the established populations are already large and widespread.

However, there are no effective measures to prevent natural spread, because the removal of all host plants surrounding an area where the pest occurs is not feasible, and controlling the movements of infested material appears limited. After the entry of *D. micans* in Britain (Bevan and King, 1983), despite thorough control measures (surveys, sanitation, proscription of the movement of material from infested areas), *D. micans* has been able to spread into new areas in most of the country, except the North of Scotland (O'neill and Evans, 1999; Gilbert et al., 2003; Appendix A).

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

- *D. micans* is a cryptic species, with solitary, fertilised females colonising alone healthy trees. The attacked trees often only show very little external symptoms;
- Because one single female is able to found a colony, and because sib-mating in the brood is the rule, the Allee threshold for *D. micans* is very low;
- *D. micans* attacks living trees, which greatly increases its range of suitable hosts as compared to species less resistant to conifer defences, and which need to find weakened hosts.

3.6.2. Control methods

- Sanitary thinning and clearfelling. However, these measures are not sufficient without biological control.
- Biological control using *Rhizophagus grandis*. This practice is already implemented in all areas presently affected by *D. micans*. (currently Georgia, Turkey, Great Britain and France; see Section 3.1.2).
- Attempts at eradication have been unsuccessful so far (see Section 3.6).

3.7. Uncertainty

D. micans has been exhaustively studied since it entered Europe. Its biology, ecology, relationships to its hosts and to natural enemies are well understood. There is some uncertainty regarding the possibility that the pest could occasionally use plants for planting as a pathway.

4. Conclusions

D. micans meets the criteria assessed by EFSA for consideration as a potential protected zone quarantine pest for the territory of the protected zones: Greece, Ireland and the United Kingdom (Northern Ireland, Isle of Man and Jersey) (Table 5).

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 (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 (3.2)	*D. micans* is present and widely distributed in the EU, it has been reported from 22 MSs. The pest is absent in the protected zone.	*D. micans* is present and widely distributed in the EU, it has been reported from 22 MSs. The pest is absent in the protected zone.	**None**
Regulatory status (3.3)	*D. micans* is regulated as a quarantine pest in protected zones (Annex IIB): Ireland, Greece, United Kingdom (Northern Ireland, Isle of Man and Jersey). The pest is currently officially regulated by 2000/29/EC on plants of *Abies, Larix, Picea, Pinus* and *Pseudotsuga*, over 3 m in height, other than fruit and seeds, wood of conifers (Coniferales) with bark, isolated bark of conifers.	*D. micans* is regulated as a quarantine pest in protected zones (Annex IIB): Ireland, Greece, United Kingdom (Northern Ireland, Isle of Man and Jersey). The pest is currently officially regulated by 2000/29/EC on plants of *Abies, Larix, Picea, Pinus* and *Pseudotsuga*, over 3 m in height, other than fruit and seeds, wood of conifers (Coniferales) with bark, isolated bark of conifers.	**None**
Pest potential for entry, establishment and spread in the EU territory (3.4)	Entry: the pest is already established in 22 MSs. Since entry by natural dispersal from EU areas where the pest is present is possible, only isolated areas (e.g. islands) can be protected zones. Establishment: the climate of the EU Protected Zones is similar to that of MSs where *D. micans* is established, and the pest's main host plants are present. Spread: adults can disperse naturally. They can fly 10 km 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 from infested areas.	Plants for planting are not the main pathway for bark beetles, because natural spread and the transport of infested wood is the main pathway and it is unlikely, although not completely impossible that beetles will attack young trees in a tree nursery. Therefore, other criteria for consideration as regulated non-quarantine pest do not need to be assessed.	There are reports of exceptional attacks of trees with a minimal diameter of 7 cm. Therefore, it cannot be excluded that large nursery trees could be a pathway.
Potential for consequences in the EU territory (3.5)	The pest is known to kill trees, sometimes in high numbers. In newly colonised areas, it could cause economic and environmental impact during a few years after its entry.	Plants for planting are not the main 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 (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 and bark. Debarking wood and heat treatment of wood, bark and chips is effective. There are no effective measures to prevent establishment and spread. Eradication does not appear feasible, because the pest is very cryptic during the first years after its entry and establishment. The attacks are unconspicuous, and the attacked trees do not die before a sufficient number of broods have been established. Therefore, when the first symptoms appear, the established populations are already large and widespread.	Plants for planting are not the main pathway, therefore, other criteria for consideration as regulated non-quarantine pest do not need to be assessed.	**Entry:** inspections are difficult, due to the cryptic nature of the pest.
Conclusion on pest categorisation	All criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met.	The criteria for considering *D. micans* as a potential regulated non-quarantine pest are not met, since plants for planting are not the main pathway.	Listed above
Aspects of assessment to focus on / scenarios to address in future if appropriate	There is no important knowledge gap to consider other than the flight capacity of the pest, which could be analysed further, in order to quantify the risks of entry from adjacent areas.		

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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
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

Appendix A – Personal communication

Personal communication by Nick Fielding, Forest Research UK, 6 March 2017:

Dendroctonus micans is now found everywhere in Wales, more or less everywhere in England (more commonly in the west of the country reflecting where spruce is mainly grown); but is now getting a foothold in Scotland. The attached map shows the current distribution. I continue to rear *Rhizophagus grandis* and to treat any new finds of *D. micans*, but the rearing is on a much reduced scale. Most spruce woodland in Scotland is flown by helicopter and inspected from the air so the distribution is very accurate; this is followed by ground inspections of any dead or dying trees.

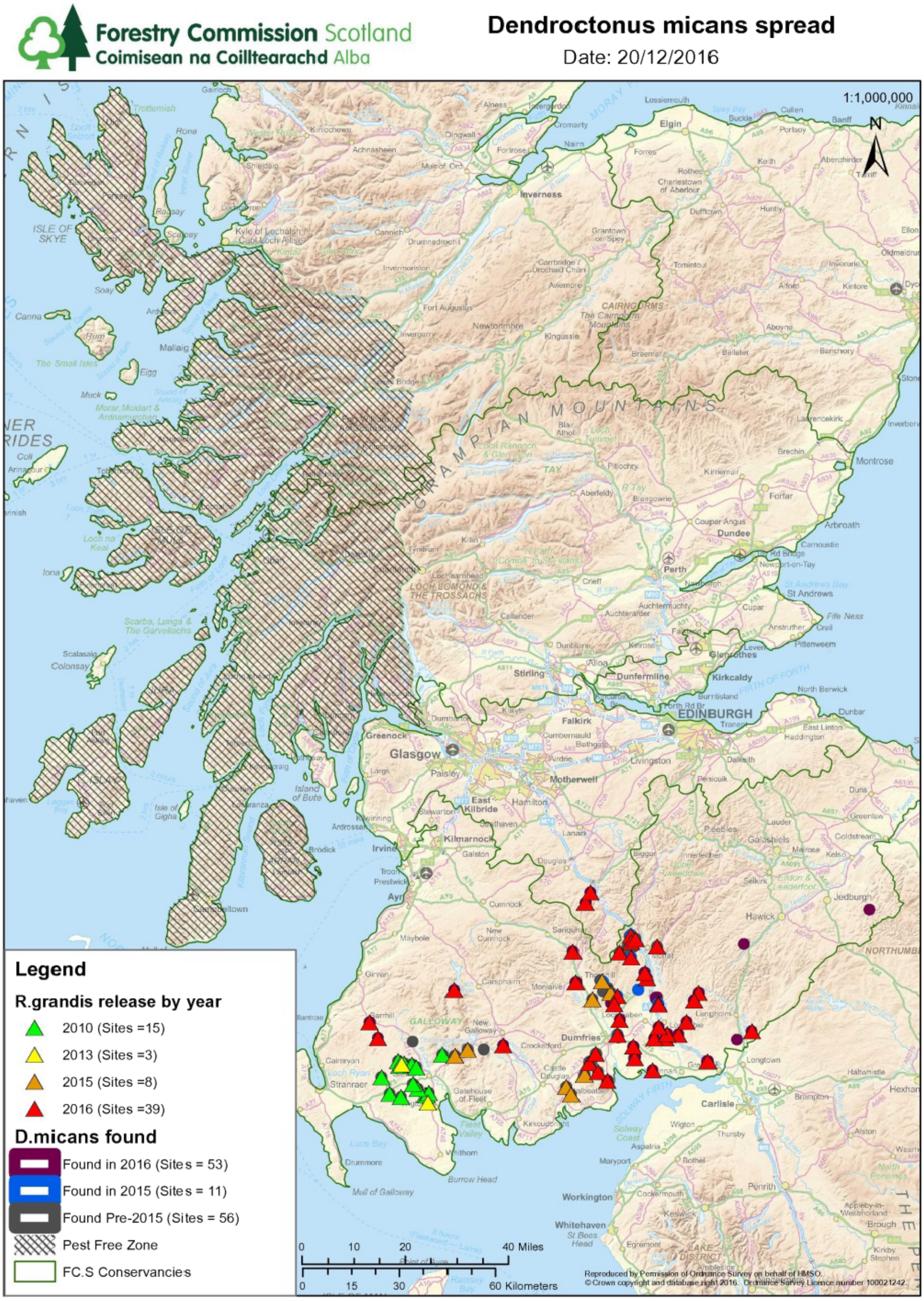

Figure: © Crown copyright