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Pest categorisation of the *Gonipterus scutellatus* species complex

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Abstract

The Panel on Plant health performed a pest categorisation of the Australian Eucalyptus snout-beetle *Gonipterus scutellatus* (Coleoptera: Curculionidae), for the EU. *G. scutellatus* should be referred as the *G. scutellatus* species complex because it includes several cryptic species. A complete nomenclature of the species present in the EU is still pending. It is a quarantine pest listed in Annex IIB of Council Directive 2000/29/EC. Protected zones are in place in Greece and Portugal (Azores). In the EU, it has been found in Italy, France, Spain and Portugal. It only consumes Eucalyptus species leaves. The main pathways of spread are the trade of Eucalyptus timber, hitchhiking in various commodities, trade of apple fruit as well as of plants for planting or plant parts. Spread by flight is also possible. The climate of the EU protected zones is similar to that of the Member States (MS) where the *G. scutellatus* complex is established, and the pest's main host plants are present. The damaged trees suffer die-back and the development of epicormics shoots. Severe attacks may provoke massive amounts of tree death. Biological control by using the egg parasitoid wasp *Anaphes nitens* is the most effective control measure. Some species within the *G. scutellatus* complex are not yet present in the EU (including *G. scutellatus* sensu stricto) and might therefore be considered as potential union quarantine pests for the EU territory. At least two species within the *G. scutellatus* complex (most likely *G. platensis* and *Gonipterus* species no. 2) meet the criteria assessed by EFSA for consideration as potential protected zone quarantine pests for the territory of the protected zones: Greece and Portugal (Azores). The criteria for considering the *G. scutellatus* complex as a potential regulated non-quarantine pest for the EU are not met since plants for planting are not the main pathway.

Keywords: Curculionidae, Eucalyptus weevil, European Union, pest risk, plant health, plant pest, quarantine

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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.

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

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

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

1.1.2.1. Terms of Reference: Appendix 1

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

Annex IIAI

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

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

(b) Bacteria

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

(c) Fungi

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

(d) Virus and virus-like organisms

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

Annex IIB

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

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

(b) Bacteria

Curtobacterium flaccumfaciens pv. flaccumfaciens (Hedges) Collins and Jones

(c) Fungi

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

1.1.2.2. Terms of Reference: Appendix 2

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

Annex IAI

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

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

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

Group of Tephritidae (non-EU) such as:

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

(c) Viruses and virus-like organisms

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

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

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

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

Annex IIAI

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

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

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

1.1.2.3. Terms of Reference: Appendix 3

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

Annex IAI

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

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

(b) Fungi

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

(c) Viruses and virus-like organisms

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

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAII

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

Meloidogyne fallax Karssen
Popillia japonica Newman
Rhizoecus hibisci Kawai and Takagi

(b) Bacteria

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

(c) Fungi

Melampsora medusae Thümen
Synchytrium endobioticum (Schilbersky) Percival

Annex I B

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

Leptinotarsa decemlineata Say
Liriomyza bryoniae (Kaltenbac

(b) Viruses and virus-like organisms

Beet necrotic yellow vein virus

1.2. Interpretation of the Terms of Reference

Gonipterus scutellatus 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 (MSs) referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores.

Since *G. scutellatus* is regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone (Greece and Portugal: Azores), thus the criteria refer to the protected zone instead of the EU territory. *G. scutellatus* comprises a complex of at least eight mostly cryptic species, consequently it should be referred as the *Gonipterus scutellatus* species complex (Mapondera et al., 2012).

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *G. scutellatus* 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, as well as from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the EPPO Global Database (EPPO, 2017).

Data about the import of host plants into the EU were obtained from the ISEFOR database.

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 MSs and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *G. scutellatus* 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 plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union quarantine pest and for a Union regulated non-quarantine pest in accordance with Regulation (EU) 2016/2031 on protective measures against pests of plants, and includes additional information required in accordance with the specific terms of reference received by the European Commission. In addition, for each conclusion, the Panel provides a short description of its associated uncertainty.

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

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

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

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

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

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

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?
Yes, the identity of the pest is established. For the identification to species level, morphological description of the male genitalia and molecular studies are necessary because of the existence of several cryptic species.

The Eucalyptus weevil, or Eucalyptus snout-beetle *G. scutellatus* Gyllenhal, 1833 (Coleoptera: Curculionidae, Gonipterinae) was once treated as a single species. However, on the basis of morphological and molecular data, it is now recognised as a cryptic species complex consisting of 8–10 different species native to Australia (Mapondera et al., 2012). Three of them are invasive: *G. platensis* Gyllenhal, *G. pulverulentus* Lea and *Gonipterus* species no. 2 with varying distributions (Mapondera et al., 2012). However, a comparative morphological study of *Gonipterus* specimens collected in Australia, Tasmania, South Africa, Spain and Portugal further supported by a genetic analysis based on a region of the cytochrome oxidase (COI), demonstrated that *G. scutellatus* comprises a complex of at least eight cryptic species (Mapondera et al., 2012). *G. scutellatus*, actually never left its native range in Tasmania and has not been introduced into new countries.

It has been proposed that the species present in Spain and Portugal should be *G. platensis*, whereas *Gonipterus* species no. 2 (still unnamed) should be the species present in Italy and France. Definitive nomenclature changes for the species present in the EU territory are pending.

Based on the uncertainty described above, the Panel proposes to address the species as 'the *Gonipterus scutellatus* species complex' as described by Mapondera et al. (2012).

3.1.2. Biology of the pest

Also known as the Eucalyptus snout-beetles, the species belonging to the genus *Gonipterus* have little economic significance in the Australian continent, whereas outside of their native range, they are some of the most harmful defoliators of several Eucalyptus species (Marelli, 1927; Frappa, 1950; Tooke, 1955; Cadahia, 1986a,b; Richardson and Meakins, 1986; Rosado-Neto, 1993; Cordero Rivera et al., 1999; Lanfranco and Dungey, 2001; Reis et al., 2012). Despite their torpid and slow movements, the members of the *G. scutellatus* complex are strong flyers and may live up to 12 months in the field (Mally, 1924; Tooke, 1955). The females can lay approximately 800 eggs, in clusters of 8–10 eggs, covered by a dark, 2.5–3.5 mm long, hard capsule, mainly composed of excrement, glued to the leaf. Incubation takes one week. There are four larval stages. The larvae are covered by a sticky slime that keeps them attached to the leaves. At maturity, the larvae drop to the ground and form a pupal cell. Pupation occurs in the soil for 30–40 days (Tooke, 1955). The life cycle can be completed in 2–3 months under mild climate (Santolamazza-Carbone et al., 2006). Adults take 30 days to achieve sexual maturity. After mating, the females need a few days to complete egg maturation (Tooke, 1955). The sex ratio is close to 1:1 and each female can mate with several males (Santolamazza-Carbone and Cordero Rivera, 1998). Adults overwinter clinging to twigs at the base of Eucalyptus leaves or in sheltered areas such as apple orchards or under the bark (Mally, 1924; Tooke, 1955). During the first and second instars, the larvae dig furrows in growing leaves; during the third and fourth instars they completely devour the leaf blades, shoots and buds. The adults feed on the margins of the leaves, making them scalloped, but also on the newly expanded leaves which are the most preferred for oviposition. The phenology varies from one to four generations per year depending on the altitude, climate, and control exerted by the natural enemies (Moutia and Vinson, 1945; Tooke, 1955; Arzone and Meotto, 1978; Cordero Rivera et al., 1999; Hanks et al., 2000; Loch, 2006; Santolamazza-Carbone et al., 2006). In the EU, *G. scutellatus* has a first generation in spring and a second one in autumn (Cordero Rivera et al., 1999). In the EU, the most susceptible Eucalyptus species are *E. globulus* and *E. viminalis*, and *E. camaldulensis* (Cerasoli et al., 2016). The *G. scutellatus* species complex does not contribute to the spread of any plant disease.

3.1.3. Intraspecific diversity

While one single species, *G. scutellatus*, was initially considered in the EU, Mapondera et al. (2012) identified a complex of at least eight, mostly cryptic species, distributed from south-eastern Australia to Tasmania. Hence, the differences described here relate to the *G. scutellatus* species complex and are thus, strictly speaking, interspecific differences. According to Mapondera et al. (2012), *G. platensis*, confused for decades with *G. scutellatus*, colonised New Zealand, Argentina, Chile, Brazil, California, Hawaii and western Europe (Portugal, Spain, the Canary Islands). *G. pulverulentus* was introduced into Brazil, Argentina and Uruguay. *Gonipterus* species no. 2 spread to South Africa, Madagascar, Mauritius, Italy and France. Intraspecific diversity should be assessed by dissection and examination of the male genitalia. The diagnostic differences mostly rely on the shape of aedeagal sclerites. In addition, molecular characterisation is needed to confirm the taxonomic identity and phylogeny (Echeverri et al., 2007 Garnas et al., 2011; Mapondera et al., 2012). Although different *Gonipterus* species may share the same life cycle and biology, it has been observed that the Eucalyptus species they attack may vary (Tooke, 1935; Richardson and Meakins, 1986; Clarke et al., 1998; Cordero Rivera and Santolamazza Carbone, 2000) with, probably, a correlation between the distribution range of the Eucalyptus hosts and the native range of the weevils (Newete et al., 2011).

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, detection is possible by visual searching of the leaf damages. Identification to genus level is possible by using entomological keys. For the identification to species level, morphological description of the male genitalia and molecular studies are needed because of the existence of cryptic species (Echeverri et al., 2007; Garnas et al., 2011; Mapondera et al., 2012).

The first symptom of infested trees is the brownish scorched appearance of young foliage. As the infestation increases, the young twigs and buds are destroyed. Severe defoliations give the trees a stunted and stag-headed appearance. The damaged trees show symptomatic scalloped leaf edges, with a resultant die-back of shoot tips and the development of epicormic shoots. The adults prefer to feed on the adult leaf margins and on young shoots, buds and tips. The larvae eat the young shoots and feed over the whole leaf surface leaving only the hard fibres (Tooke, 1955). The infestation can be detected by field survey. A Eucalyptus health monitoring system, based on satellite remote sensing imagery and forest stand parameters integrated in a GIS (Geographic Information System), has been tested in Spain in order to locate the areas where pest outbreaks affect health status and predict future hot spots (Álvarez Taboada et al., 2005). The presence of the adults in the foliage can be difficult to assess due to their cryptic colouration. When disturbed, the adults may drop to the ground and cling to anything they land on or may remain motionless (thanatosis) which makes visual detection difficult. Larvae are more easily detected due to their bright yellow colouration.

The adults are ochraceous brown and often reddish, and measure between 7.5 and 8.5 mm in length (the female between 7.5 and 9.4 mm and the male between 5.7 and 8.9 mm). There is a dark X-shaped mark over the elytra, not always detectable due to the variability in body colour. The larvae are 2–9 mm in length depending on the instars, apodous, with black head, and yellow-greenish body colour with small black spots on their back and lateral black strips. They are covered by a sticky slime. Larvae excrements, which are discharged like a black string, coil up on its back, which can be used as a diagnostic feature (Tooke, 1955; Arzone, 1985).

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

According to the EPPO Global Database, *G. scutellatus* is native to Australia and has spread to every continent with the exception of Asia (Figure 1 and Table 2). However, according to Mapondera et al. (2012), '*G. scutellatus*' should be considered as a species complex and actually *G. scutellatus* sensu stricto is restricted to Tasmania.

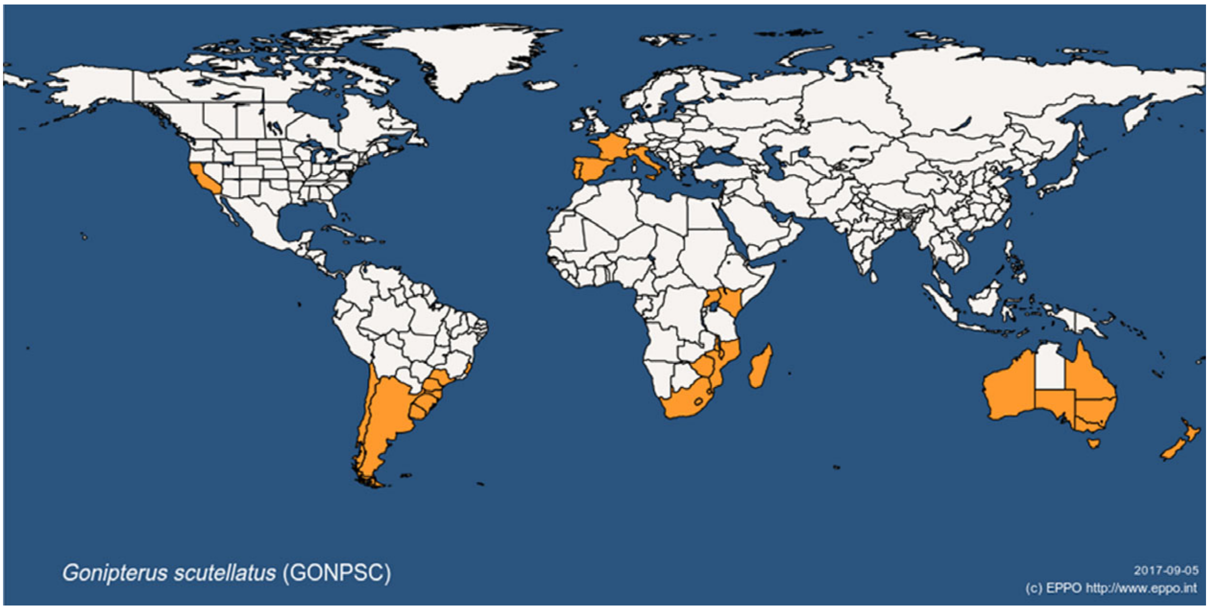

Figure 1: Global distribution map for *Gonipterus scutellatus* (extracted from the EPPO Global Database accessed on 5 September 2017)

Table 2: Global distribution of *Gonipterus scutellatus* (extracted from the EPPO Global Database accessed on 5 September 2017)

Continent	Country (including sub-national provinces/states)	Status (EPPO GD)
Africa	Kenya	Present, no details
	Lesotho	Present, no details
	Madagascar	Present, no details
	Malawi	Present, no details
	Mauritius	Present, no details
	Mozambique	Present, no details
	Saint Helena	Present, no details
	South Africa	Present, widespread
	Swaziland	Present, no details
	Uganda	Present, no details
	Zimbabwe	Present, no details
America	Argentina	Present no details
	Brazil (Espirito Santo, Parana, Rio Grande do Sul, Santa Catarina, Sao Paulo)	Present, no details
	Chile	Present, restricted distribution
	United States of America	Present, restricted distribution
	United States of America (California)	Present, no details
	Uruguay	Present, widespread
Asia	China	Absent, invalid record
Oceania	Australia	Present, widespread
	Australia (New South Wales, Queensland, South Australia, Tasmania, Western Australia)	Present, no details
	Australia (Victoria)	Present, few occurrences
	New Zealand	Present, widespread

G. scutellatus has been detected in Colombia in 2016 (ICA, 2016; Rodas, 2016).

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, at least two species of the *G. scutellatus* species complex are present in four MS (Table 3, Appendix A). The pest is absent in the protected zones, although there is one (unconfirmed) record of a finding of the pest in the Azores (Oromí et al., 2010; Borges et al., 2013).

Table 3: Current distribution of *Gonipterus scutellatus* in the 28 EU MS based on information from the EPPO Global Database and other sources

Country	EPPO Global database Last update: 17 March 2016 Date accessed: 5 September 2017	Other sources
Austria	No information	
Belgium	No information	
Bulgaria	No information	
Croatia	Absent, confirmed by survey	
Cyprus	No information	
Czech Republic	No information	
Denmark	No information	
Estonia	No information	
Finland	No information	
France	Present, restricted distribution Corse: Present, no details	According to Mapondera et al. (2012), the species present in France is *Gonipterus* species no. 2
Germany	No information	
Greece	Absent, confirmed by survey	
Hungary	No information	
Ireland	No information	
Italy	Present, restricted distribution Sicily: restricted distribution	According to Mapondera et al. (2012), the species present in Italy is *Gonipterus* species no. 2
Latvia	No information	
Lithuania	No information	
Luxembourg	No information	
Malta	No information	
Netherlands	No information	
Poland	No information	
Portugal	Present, restricted distribution	According to Mapondera et al. (2012), the species present in Portugal is *Gonipterus platensis*. It is widespread in mainland Portugal (Mansilla Vázquez and Pérez Otero, 1996; Reis et al., 2012; Valente et al., 2017) Two specimens of the species complex were found in the Azores, one in a Malaise trap, the other on *Erica azorica* in a native forest area (Oromí et al., 2010; Borges et al., 2013)
Romania	No information	
Slovak Republic	No information	
Slovenia	No information	
Spain	Present, restricted distribution	According to Mapondera et al. (2012), the species present in Spain is *Gonipterus platensis*. It is considered widespread (Mansilla Vázquez, 1992; Mansilla Vázquez and Pérez Otero, 1996; Cordero Rivera et al., 1999; Machado Carrillo, 1999; Alzugaray et al., 2004; Romanyk and Cadahia, 2001)

Country	EPPO Global database Last update: 17 March 2016 Date accessed: 5 September 2017	Other sources
Sweden	No information	
United Kingdom	No information	

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

Gonipterus scutellatus is listed in Council Directive 2000/29/EC. Details are presented in Tables 4 and 5.

Table 4: *Gonipterus scutellatus* 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
5.	*Gonipterus scutellatus*	Plants of *Eucalyptus* l'Herit., other than fruit and seeds	EL, P (Azores)

3.3.2. Legislation addressing the hosts of *Gonipterus scutellatus*

Table 5: Regulated hosts and commodities that may involve *Gonipterus scutellatus* in Annexes IV and V of Council Directive 2000/29/EC

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)
19.1	Plants of *Eucalyptus* L'Herit, other than fruit and seeds	Official statement that: (a) the plants are free from soil, and have been subjected to a treatment against *Gonipterus scutellatus* Gyll.; or (b) the plants originate in areas known to be free from *Gonipterus scutellatus* Gyll.	EL, P (Azores)
Annex V	**Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community**		
Part A	Plants, plant products and other objects originating in the Community		
Section II	Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for certain protected zones, and which must be accompanied by a plant passport valid for the appropriate zone when introduced into or moved within that zone.		
1.3	Plants, other than fruit and seeds, of [...], *Eucalyptus* L'Herit., [...]		

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

Gonipterus scutellatus is a defoliator and feeds exclusively on Eucalyptus (Tooke, 1935). Richardson and Meakins (1986) demonstrated a wide variation in susceptibility between and within eucalypt species. Clarke et al. (1998) pointed out that *E. globulus and E. viminalis* are generally considered as the most susceptible species in newly invaded areas, however in part of its native range (Tasmania), the most susceptible species are *E. pulchella*, *E. tenuiramis* and *E. amigdalina.* Field populations of *G. scutellatus* in Spain showed a marked preference for *E. globulus, E. longifolia, E. grandis* and *E. propinqua* (Cordero Rivera and Santolamazza Carbone, 2000).

Other reported vulnerable hosts are *E. camaldulensis*, *E. maideni*, *E. punctata*, *E. robusta* and *E. smithii* (EPPO, 2005)

Considering the existence of a complex of *G. scutellatus* cryptic species, the existence of a correlation between the distribution range of the preferred *Eucalyptus* spp. hosts and the native range of the weevils has been proposed (Newete et al., 2011).

3.4.2. Entry

Is the pest able to enter into the protected zones? If yes, identify and list the pathways!
Yes, there are pathways of introduction into the protected zones by human assisted spread or by natural spread from EU areas where the pest is present.

The main pathways of entry are:

- Trade of Eucalyptus timber
- Hitchhiking (e.g. trade of apple fruit)
- Natural spread by flight
- Trade of plants for planting and cut branches for floral arrangements

Timber trade

It has been reported that Eucalyptus logs with bark may provide shelter for the weevils on long journeys (Mally, 1924). The import of eucalypt timber should be considered with attention, because despite the fact that the logs are usually debarked before the shipments, they could still provide shelter to hitchhiking weevils. Nearly 80% of the timber (including Eucalyptus) imported from South America into Europe originates from Brazil where the pest is present, and the rest is imported from Argentina (*G. scutellatus* present), Paraguay, Ecuador, Bolivia, and Uruguay (Forest Trends, 2013). Uruguay, which was colonised by the pest in 1943 (Kober, 1955; Richardson and Meakins, 1986), is an important exporter of sawlogs of *E. globulus* to the Iberian Peninsula (ENCE, 2002).

Natural spread

The adults of *G. scutellatus* are strong flyers and natural dispersal occurs by this mean. The main dispersion is in the adult stage, because of its longevity and the capability to survive several weeks without food (Mally, 1924; Tooke, 1955). The adults may spread accidentally in various commodities and through vehicles as they may cling tenaciously to anything they land on and can be easily transported by man (Mally, 1924; Tooke, 1955).

Hitchhiking and apple trade

It has been reported that the introduction of *G. scutellatus* in South Africa, was probably due to frequent shipping of apples from Australia and Tasmania (Mally, 1924; Clark, 1931; Tooke, 1955). The weevils frequently visited the apple orchards, which were often surrounded by eucalypt plantations, seeking for shelter during autumn (Tooke, 1955). *G. scutellatus* legs have a multitude of tiny hooks which allow them to grip tenaciously to the pedicel of the apples, although they do not feed on the fruit or on the foliage (Tooke, 1955; Cordero Rivera and Santolamazza Carbone, 2000). At present, the export of Pink Lady apples from Australia is significantly affected by infestation of adult *G. scutellatus* and preshipment treatments with chemicals are needed (Agarwal et al., 2015). A similar problem occurs in New Zealand, where adult *G. scutellatus* are abundant in apple orchards, and severe controls are required to export the fruit to Australia (Australian Quarantine & Inspection Service, 1998).

There are uncertainties regarding other possible shelter places for hitchhiking beetles (Tooke, 1955) in trade from countries where the pest occurs.

Plants for planting

Afforestation programmes are likely one of the major justifications for the transportation of live Eucalyptus plants within and between countries (Hurley et al., 2016). Plants for planting are an obvious pathway within the EU, however, they should not be considered a common pathway of spread overseas, as seed propagation in tree nurseries is preferred and often the production and sale of Eucalyptus is limited to species already present in the country (Durand-Cresswell et al., 1982; Hurley et al., 2016). It cannot be excluded that adults or eggs may be carried on plant parts used for vegetative propagation or decorative purposes (Hurley et al., 2016). Last instar larvae and pupae could also be present in the accompanying soil (Mally, 1924; EPPO, 2005). Most species within the genus *Eucalyptus* exhibit heteroblastic leaf development. They develop strikingly different seedling, juvenile, transitional and adult leaf forms during successive life stages (James and Bell, 2001). It is known that *G. scutellatus* appreciate only adult leaves for food and oviposition (Tooke, 1955); however, younger seedlings could be used by hitchhiking beetles: depending on the provenance*, E. globulus* may produce adult leaves after 9–36 months.

Between 1994 and 2017, there were no records of interception of *G. scutellatus* in the Europhyt database. One outbreak in Italy in 2015, at Piedimonte Etneo (Catania) on *E. globulus* was reported (Mazza et al., 2015).

According to the ISEFOR database, there is trade of Eucalyptus plants for planting into the EU (France and the Netherlands) from countries where the pest is present, namely New Zealand, Australia, Kenya and the Canary Islands. There is no information on the possible EU-internal trade of Eucalyptus plants from EU countries to the protected zones.

3.4.3. Establishment

Is the pest able to become established in the protected zones?

Yes, the pest is already established in France, Italy, Spain and Portugal where its host plants are present. Eucalyptus is planted also in the protected zones in Greece and the Azores (Cerasoli et al., 2016). The climate of the EU protected zones is similar to that of the MS where the *G. scutellatus* complex is established, and the pest's main host plants are present (Figure 2).

3.4.3.1. EU distribution of main host plants

Cerasoli et al. (2016) provide a full review of the distribution of *Eucalyptus* spp. in the EU. *E. globulus* covers 1.3 million hectares of forested area, mainly (more than 80%) in the Iberian Peninsula, but also in France and Italy. *E. camaldulensis* is the second dominant species in the Mediterranean basin. It is planted in Spain, Portugal, Italy (Sardinia, Sicily, mainland coasts), France (French Riviera and Corsica), Greece (the Aegean islands), Malta, Cyprus and Turkey. *E. nitens*, which is well adapted to cold climates is planted in northern Portugal and Spain above 500 m, France, the United Kingdom and Ireland. In France and the United Kingdom, *E. viminalis* is planted for shelterbelt and for ornamental purposes.

In the protected zone Greece, *Eucalyptus* spp. were imported in 1872, and are widely found, especially *E. globulus* (in southern Greece and Crete) and *E. camaldulensis* (in the Aegean islands) (Panetsos, 1970). Eucalyptus is cultivated and used for various purposes; among others as aningredient in pharmaceutical products and for leather processing (Harvala et al., 2002).

In the protected zone Azores, *G. scutellatus* probably fed on *E. globulus*, which is commonly planted, as it occurs in Portugal (mainland).

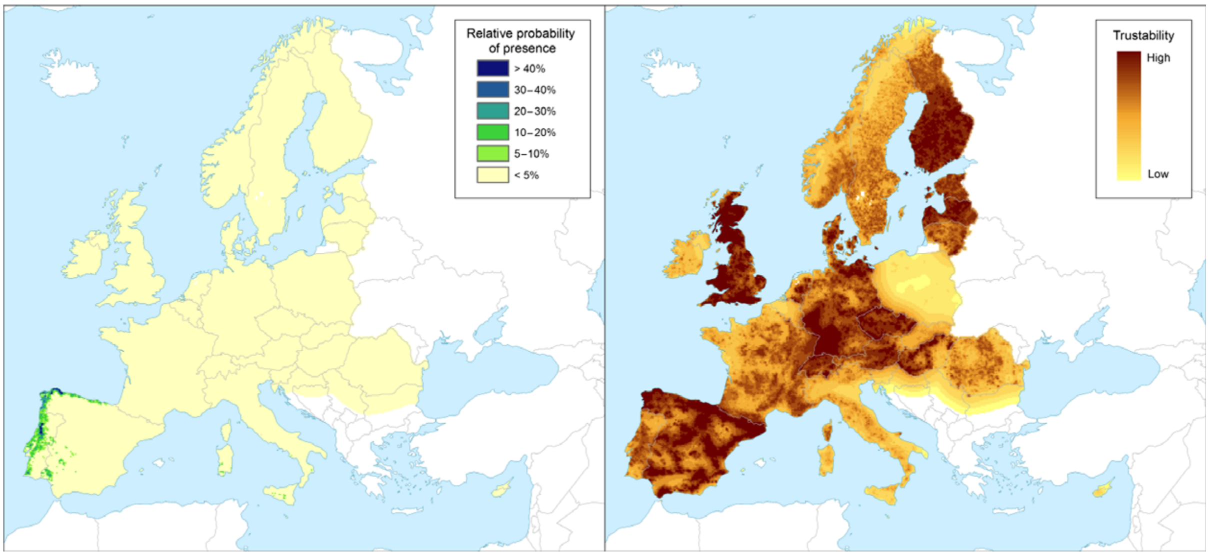

Figure 2: Distribution map of the genus *Eucalyptus* in the European Union territory from the European Atlas of Forest Tree Species (based on data from the species: *E. gomphocephalus*, *E. camaldulensis*, *E. globulus.* Left panel: Relative probability of presence (RPP) of the genus *Eucalyptus* in Europe, mapped at 100 km^2 resolution. The underlying data are from European-wide forest monitoring data sets and from national forestry inventories based on standard observation plots measuring in the order of hundreds m^2. RPP represents the probability of finding at least one individual of the taxon in a standard plot placed randomly within the grid cell. For details, see Appendix B (courtesy of JRC, 2017). Right panel: Trustability of RPP. This metric expresses the strength of the underlying information in each grid cell and varies according to the spatial variability in forestry inventories. The colour scale of the trustability map is obtained by plotting the cumulative probabilities (0–1) of the underlying index (for details see Appendix B).

3.4.3.2. Climatic conditions affecting establishment

The climate of the EU protected zones is similar to that of the MS where the *G. scutellatus* complex is established, and the pest's main host plants are present (Figure 3). The temperate, oceanic climate, with cool summers (below 22°C in the warmest month) and mild winters (above 0°C in the coldest month), frequent precipitations, is the predominant climate type across much of western Europe, the Pacific north-west region of the United States and Canada, parts of central Mexico, the south-western part of South America, south-eastern Australia, including Tasmania and New Zealand. It is the appropriate climate for growing several Eucalyptus species (Hughes et al., 1996) and consequently for the spread of *Gonipterus* populations (Santolamazza-Carbone et al., 2006). In Europe, *G. scutellatus* is distributed in north-western Spain (Galicia, Asturias, Cantabria, Basque Country) and northern Portugal, were *E. globulus* plantations are widespread because the climate is similar to that of the native range of the tree in Australia (Mansilla Vázquez and Pérez Otero, 1996; Cordero Rivera et al., 1999; Romanyk and Cadahia, 2001; Bahillo de la Puebla and Lopez-Colon, 2002; Alzugaray et al., 2004).

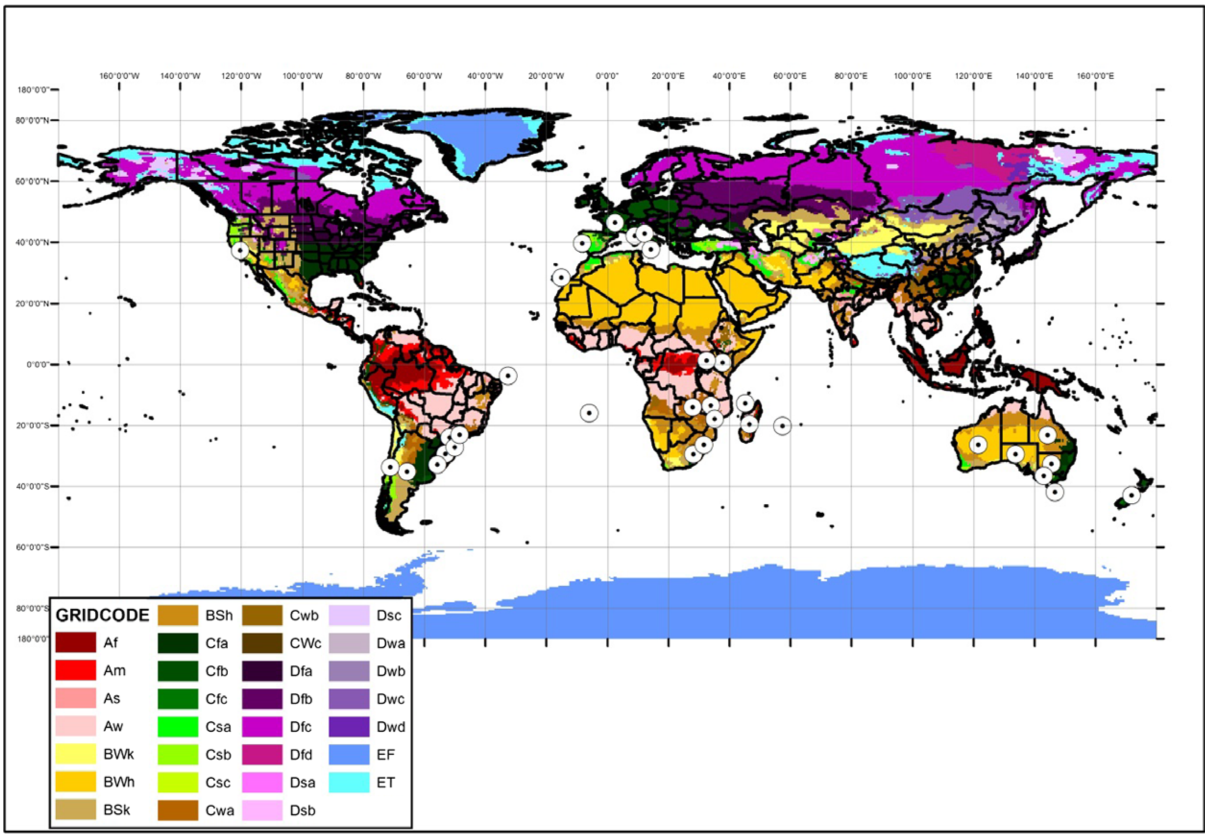

Figure 3: The current distribution of *Gonipterus scutellatus* presented by white dots on the Köppen-Geiger climate classification map (Kottek et al., 2006) of Eurasia

3.4.4. Spread

Is the pest able to spread within the protected zones following establishment?

Yes, the weevil is able to disperse naturally by flight. The pest can also disperse by human assistance, mainly with the transportation of timber. Exportation of apples has been also indicated as a possible pathway of introduction, because the weevil may use apple orchards for shelter (see Section 3.4.2).

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 the main pathway.

In the EU*, G. scutellatus* is present only in Spain, Portugal, Italy and France. The main pathway for spread appears to be the transportation of infested timber. Dispersal by flight from infested areas is highly possible. The pest is able to colonise islands, as it occurs in Tuscany (Isola del Giglio, Isola d'Elba) (Mazza et al., 2012) and Sicily (Mazza et al., 2015). Two specimens of the weevil have also been found in the Azores islands which is a protected zone of Portugal, one in a Malaise trap, and another one on *Erica azorica* in a native forest area (Oromí et al., 2010; Borges et al., 2013). The pest has also been detected in the Canary Islands (Machado Carrillo, 1999).

It has been reported that the weevil may spread 100 km/year (Rabasse and Perrin, 1979) but it is unknown whether this refers to natural or human assisted spread.

3.5. Impacts

Would the pest's introduction have an economic or environmental impact in the protected zones? **Yes,** the pest inflicts severe defoliation and eventually kills the trees. The defoliation causes the reduction of the stem growth which implies important economic losses in those countries were Eucalyptus is planted for timber or paper pulp production. *RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?*[4] **No**, the plants for planting are not considered as the main pathway.

In its native area of south-eastern Australia and Tasmania, the *G. scutellatus* species complex is not economically important, supposedly because of efficient control by local natural enemies (Loch, 2006).

In all the countries colonised by the pest, damage has been significantly reduced by means of biological control exerted by *Anaphes nitens* (Hymenoptera, Mymaridae) (Moutia and Vinson, 1945; Tooke, 1955; Arzone and Vidano, 1978; Cordero Rivera et al., 1999; Hanks et al., 2000).

In south-western Australia and in other countries, the weevil causes defoliation of the branches, die-back of shoots, loss of apical dominance and eventually the death of the tree. Severe defoliation implies loss of stem growth and important reduction of the volume of merchantable wood (Reis et al., 2012). *E. globulus*, *E. viminalis* and *E. camaldulensis* are indicated as the most vulnerable species (Cerasoli et al., 2016). Eucalyptus plantations are the most productive forest stands in Spain, with around 500,000 ha of cultivated area. *E. globulus* is the dominant species in northern and north-western Spain (Álvarez Taboada et al., 2005). Since 1991, the high productivity of this species has been threatened by the outbreaks of *G. scutellatus.* It has been estimated that tree growth is sometimes reduced by 30% in Galicia (Álvarez Taboada et al., 2005). Determination of the impact of different level of defoliation on wood production is difficult because it depends on tree age, tree health status, soil parameters and orientation of the stands (Reis et al., 2012). Mature and healthy trees could be more tolerant to defoliation: by using an empirical growth model, it has been predicted that for 10-year-old trees the 75% and 100% defoliation would produce wood volume losses of 43% and 86%, respectively (Reis et al., 2012). However, 20% defoliation of 3-year-old *E. globulus* results in significant reduction of stem growth within just one year after defoliation (Pinkard et al., 2006).

In Brazil, *G. scutellatus* was detected for the first time in 1955 (Barbiellini, 1955; Rosado-Neto, 1993). In 2012, a new outbreak of the pest in the region of Sâo Paulo endangered plantations (Medeiros de Souza et al., 2016). It was estimated that 2- to 5-year-old trees suffered loss of stem growth between 3.3 and 21.6% with important economic consequences (Medeiros de Souza et al., 2016).

It is yet to be determined whether the weakening of the vitality of trees attacked by *G. scutellatus* would favour the Eucalyptus borer *Phoracantha semipunctata* (Parra, 1999).

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 such that the risk becomes mitigated? **Yes,** there are measures in place to prevent entry, establishment and spread. *RNQPs: Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?* **Yes,** there are measures available for nurseries.

3.6.1. Phytosanitary measures

Currently, there are only phytosanitary measures in place for the trade of plants for planting towards the protected zones (see Section 3.3.2). Trade is only allowed for plants free from soil, and that have been subjected to a treatment against *G. scutellatus* or the plants originate from pest-free areas.

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

Other possible measures for the identified pathways include:

- debarking of timber;
- pest-free areas for the production of plants for planting;
- production of plants for planting in protected cultivation;
- trade for plants for planting restricted to seeds and *in vitro* culture;
- treatment of apple consignments originating from areas surrounded by Eucalyptus plantations;
- eradication is considered not feasible after introduction of the pest in a new area, without removing all host plants in the area. There are no records that the pest has ever been eradicated.

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

- *G. scutellatus* adults are cryptic and not easy to detect visually (Mally, 1924; Tooke, 1955).
- Although *G. scutellatus* females can mate with several males, they just need one mating to fertilise all their egg complement (Santolamazza-Carbone and Cordero Rivera, 1998). Consequently, the entry of a few mated females in a new area could be enough to found a new population.
- Protected cultivation is not common in forest nurseries.
- Treatment of apples is difficult, since methyl-bromide is phased out and there are not many alternatives available.
- Hitchhiking is difficult to control. *G. scutellatus* adults may survive several weeks without food (Mally, 1924; Tooke, 1955).
- Natural spread is difficult to control.

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

- The adults, larvae and eggs may be carried on plant material; furthermore, the adults can travel as hitchhikers with many commodities. Visual inspection of adults or egg capsules can be difficult because of their cryptic appearance and reduced size, respectively.
- The larvae and pupae may also be present in the accompanying soil and cannot be easily detected.

3.6.4. Control methods

- Biological control: the use of *A. nitens*.
- Chemical control: It has low efficacy, high cost and it is harmful for the non-target arthropods, the environment and risky for the human health.
- Resistant varieties: planting species less susceptible to the Eucalyptus snout-beetle.

Several natural enemies of *G. scutellatus* larvae and eggs have been described (Tooke, 1955). The most important egg parasitoids are *A. nitens*, *A. tasmaniae* and *A. inexpectatus* (Huber and Prinsloo, 1990). Because *A. nitens* does not achieve high parasitism rates in colder areas, below 10°C and above 500 m elevation, two other *Anaphes* species have been introduced: *A. inexpectatus* in Portugal (Reis et al., 2012; Valente et al., 2017) and *A. tasmaniae* in Chile (Mayorga et al., 2013; Gumovsky et al., 2015). Three larval parasitods, native to Australia, are known: *Entedon magnificus* (Hymenoptera: Eulophidae), *Oxyserpus* sp. (Hymenoptera: Proctotrupidae) and *Anagonia* sp. (Diptera: Tachinidae) (Loch, 2008). In all the countries colonised by the pest, damage has been significantly reduced by means of the biological control exerted by *A. nitens* (Moutia and Vinson, 1945; Tooke, 1955; Arzone and Vidano, 1978; Cordero Rivera et al., 1999; Hanks et al., 2000).

A. nitens is a quasi-gregarious egg parasitoid, native to south-eastern Australia (Tooke, 1955). The adult wasps feed on nectar and honeydew, but the larvae are carnivorous and feed on the eggs of *G. scutellatus*. The female wasp deposits her eggs into the egg capsules and the developing wasp larvae feed on the snout beetle eggs. *A. nitens* was introduced into South Africa in 1924 and after a massive rearing between 1928 and 1931 the parasitoid was released in the field, starting one of the most impressive example of successful biological control programme (Mossop, 1929; Tooke, 1942, 1955), which was replicated in other countries, achieving 80-100% of parasitism rate (Quintana, 1963; Arzone and Vidano, 1978; Arzone, 1985; Cadahia, 1986a,b; Cordero Rivera et al., 1999; Hanks et al., 2000).

Recorded fecundity is 20-100 eggs per female (Tooke, 1955; Santolamazza- Carbone and Cordero Rivera, 2003) and females are highly effective in locating freshly laid host eggs (Santolamazza-Carbone et al., 2004). The parasitoids may enter a state of quiescence/oligopause to overwinter, which allows them to be synchronised with the life cycle of their host (Santolamazza-Carbone et al., 2009).

Chemical applications, pruning, burning heavily infested areas or ploughing up the ground to expose pupal cells, did not lead to satisfactory pest control (Tooke, 1955; Atkinson and Govender, 1998; Atkinson, 1999). Also, chemical control is not recommended because of its high cost, low or irregular efficacy and risk for the human health, beneficial insects and environmental contamination (Santolamazza-Carbone and Fernández de Ana-Magan, 2004). Nonetheless, synthetic pyrethroids are currently used in Australia to control defoliating beetle pests (Loch, 2005). The entomopathogenic fungus *Beauveria bassiana* showed a good performance against the pest under laboratory conditions (Echeverri-Molina and Santolamazza-Carbone, 2010). The use of lure-trap to collect adults has been tested with poor results and cannot be considered a new control method (Paiva Sarmento, 2016).

Studies on the chemical signatures affecting host plant choice (Bouwer et al., 2014) and on the development of Eucalyptus hybrids with low susceptibility to *G. scutellatus* (Dungey and Potts, 2003; ENCE, 2016) have not yet provided significant results.

The use of less susceptible Eucalyptus species would be an interesting control measure to be included in the integrated pest management of the pest, as implemented in South Africa (Hurley et al., 2016).

3.7. Uncertainty

- Complete taxonomical identification of the species distributed in Europe, Africa, North America and South America is still ongoing (Mapondera et al., 2012).
- It is not clear whether the presence of *G. scutellatus* adults on the apples is due to the attraction by plant volatiles or merely because Eucalyptus shelterbelts are close to the orchards. The presence of the Eucalyptus snout-beetle has not been reported on other fruits or vegetables.

4. Conclusions

Definitive nomenclature changes for the species present in the EU territory are pending. Some species within the *Gonipterus scutellatus* complex are not yet present in the EU (including *G. scutellatus* sensu stricto) and might therefore be considered as potential union quarantine pests for the EU territory. At least two species within the *G. scutellatus* complex (most likely *G. platensis* and *Gonipterus* species no. 2; see Section 3.1.1) meet the criteria assessed by EFSA for consideration as potential protected zone quarantine pests for the territory of the protected zones: Greece and Portugal (Azores). The criteria for considering the *G. scutellatus* complex as a potential regulated non-quarantine pest for the EU are not met since plants for planting are not the main pathway (Table 6).

Table 6: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	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. For the identification to species level, morphological description of the male genitalia and molecular studies are necessary because of the existence of several cryptic species	The identity of the pest is established. For the identification to species level, morphological description of the male genitalia and molecular studies are necessary because of the existence of several cryptic species	The identity of the pest is established. For the identification to species level, morphological description of the male genitalia and molecular studies are necessary because of the existence of several cryptic species	A complete nomenclature of the species present in the EU is still pending
Absence/ presence of the pest in the EU territory (Section 3.2)	Some species within the *Gonipterus scutellatus* complex are not yet present in the EU (including *Gonipterus scutellatus* sensu stricto)	A part of the species complex (*G. platensis* and *Gonipterus* species no. 2) is present in the EU and has been reported from four MS (most likely, *G. platensis* in Spain and Portugal and *Gonipterus* species no. 2 in Italy and France). The pest is absent in the protected zones (Greece and the Azores)	A part of the species complex (*G. platensis* and *Gonipterus* species no. 2) is present in the EU and has been reported from four MS (most likely, *G. platensis* in Spain and Portugal and *Gonipterus* species no. 2 in Italy and France). The pest is absent in the protected zones (Greece and the Azores)	There are records of the presence of the pest in literature, but there is no official confirmation of the pest status in the protected zone of the Azores
Regulatory status (Section 3.3)	The pest is currently officially regulated by 2000/29/EC on plants of Eucalyptus, other than fruit and seeds It is regulated as a quarantine pest in protected zones (Annex IIB): Greece and Portugal (Azores) Currently there are no requirements for EU-internal trade outside protected zones	The pest is currently officially regulated by 2000/29/EC on plants of Eucalyptus, other than fruit and seeds It is regulated as a quarantine pest in protected zones (Annex IIB): Greece and Portugal (Azores) Currently there are no requirements for EU-internal trade outside protected zones	The pest is currently officially regulated by 2000/29/EC on plants of Eucalyptus, other than fruit and seeds It is regulated as a quarantine pest in protected zones (Annex IIB): Greece and Portugal (Azores) Currently there are no requirements for EU-internal trade outside protected zones	None

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	The pest can enter the EU by human assisted spread The climate of the EU is similar to that of the areas where a part of the *G. scutellatus* complex is established, and the pest's main host plants are present	The pest can enter the protected zones by human assisted spread or by natural spread from EU areas where the pest is present The climate of the EU protected zones is similar to that of the MS where a part of the *G. scutellatus* complex is established, and the pest's main host plants are present	Plants for planting are not the main pathway	The mechanism of association with apples is not known. Hitchhiking as a pathway is still poorly documented
Potential for consequences in the EU territory (Section 3.5)	The pest inflicts severe defoliation and eventually kills the trees. The defoliation causes the reduction of the stem growth which implies important economic losses in those countries were eucalypts are planted for timber or paper pulp production	The pest inflicts severe defoliation and eventually kills the trees. The defoliation causes the reduction of the stem growth which implies important economic losses in those countries were eucalypts are planted for timber or paper pulp production	Plants for planting are not the main pathway	None
Available measures (Section 3.6)	There are measures available to prevent entry, establishment and spread. These include pest-free area, debarking of timber, treatment of apple consignments originating from areas surrounded by Eucalyptus plantations, production of plants for planting in protected cultivation, and trade for plants for planting restricted to seeds and in vitro culture Eradication is considered not feasible after introduction of the pest in a new area, without removing all host plants in the area. There are no records that the pest has ever been eradicated Biological control is successfully implemented in all colonised areas	There are measures available to prevent entry, establishment and spread. These include pest-free area, debarking of timber, treatment of apple consignments originating from areas surrounded by Eucalyptus plantations, production of plants for planting in protected cultivation, and trade for plants for planting restricted to seeds and in vitro culture Eradication is considered not feasible after introduction of the pest in a new area, without removing all host plants in the area. There are no records that the pest has ever been eradicated Biological control is successfully implemented in all colonised areas	Plants for planting are not the main pathway	None

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Conclusion on pest categorisation (Section 4)	Some species within the *Gonipterus scutellatus* complex are not yet present in the EU (including *Gonipterus scutellatus* sensu stricto) and might therefore be considered as potential union quarantine pest for the EU territory	At least two species within the *G. scutellatus* complex (most likely *G. platensis* and *Gonipterus* species no. 2) meet the criteria assessed by EFSA for consideration as potential protected zone quarantine pests for the territory of the protected zones: Greece and Portugal (Azores)	The criteria for considering the *G. scutellatus* complex as a potential regulated non-quarantine pest for the EU are not met since plants for planting are not the main pathway	A complete nomenclature of the species present in the EU is still pending
Aspects of assessment to focus on/ scenarios to address in future if appropriate	The proper quarantine status of each species within the *Gonipterus scutellatus* complex will have to be re-evaluated after the taxonomic revision of this complex is completed			

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Abbreviations

CLC	Corine Land Cover
COI	cytochrome oxidase
C-SMFA	constrained spatial multi-scale frequency analysis
EPPO	European and Mediterranean Plant Protection Organization
EUFGIS	European Information System on Forest Genetic Resources
FAO	Food and Agriculture Organization
GD	Georeferenced Data on Genetic Diversity
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 – First reports of the *Gonipterus scutellatus* complex

First report	Country	Bibliography
1890	New Zealand	Tillyard (1931), Withers (2001)
1916	South Africa	Mally (1924), Mossop (1929), Clark (1931), Tooke (1935, 1942), Mossop (1955), Tooke (1955), Atkinson (1999)
1925	Argentina	Marelli (1927, 1928, 1939), Quintana (1963), Lanteri et al. (1998)
1938	Mozambique	Cadahia (1986a,b)
1938	Malawi	Cadahia (1986a,b)
1940	Rhodesia	Mossop (1955), Rabasse and Perrin (1979)
1940	Mauritius	Moutia and Vinson (1945) Williams et al. (1951)
1943	Uruguay	Richardson and Meakins, (1986), Kober (1955)
1944	Kenia	Kevan (1946), Rabasse and Perrin (1979)
1944	Uganda	Rabasse and Perrin (1979)
	Swaziland	Geertsema and Berg (1980)
1944	St. Helena	Cadahia (1986a,b), Decelle and Voss (1972)
1948	Zimbawe	Barret and Carter (1976)
1948	Madagascar	Frappa (1950)
1955	Brazil (Rio Grande do Sul)	Barbiellini (1955), Kober (1955), Rosado-Neto (1993)
1975	Italy (Liguria)	Arzone (1976), Sampo (1976), Arzone and Vidano (1978), Arzone and Meotto (1978), Vidano et al., (1978), Jacoboni (1982), Arzone (1985)
1978	France (Menton)	Rabasse and Perrin (1979), Pinet (1986), Jourdheuil (1986)
1979–1982	Brazil (Santa Catarina, Sao Paulo, Paraná)	Rosado-Neto (1993), Fenilli (1982)
1986	Lesotho	Richardson and Meakins (1986)
1991	Spain (Galicia)	Mansilla Vázquez (1992), Mansilla (1995), Mansilla Vázquez and Pérez Otero (1996), Cordero Rivera et al. (1999)
1992	Italy (Latium)	Maltzeff and Colonnelli (1994)
1994	Spain (Asturias)	Alzugaray et al. (2004)
1994	California	Cowles and Downer (1995), Hanks et al. (2000), Paine et al. (2000), Paine and Millar (2002)
1995	Portugal	Mansilla Vázquez and Pérez Otero (1996)
1998	Chile	Elgueta (1999), Parra (1999), Lanfranco and Dungey (2001)
1999	Spain (Cantabria)	Romanyk and Cadahia (2001)
1999	Spain (Canary Islands)	Machado Carrillo (1999)
2003	France (Corse)	Neid (2003)
2004	Hawaii	Haines and Samuelson (2006)
2008	Brazil (Espiritu Santo)	Wilcken et al. (2008)
2008	Spain (Andalucia)	Sanchez García et al. (2009)
2010	Portugal (Azores)	Oromí et al. (2010), Borges et al. (2013)
2011	Italy (Tuscany)	Mazza et al. (2012)
2015	Italy (Sicily)	Mazza et al. (2015)
2016	Colombia	ICA (2016), Rodas (2016)

Appendix B – Methodological notes on Figure 2

The relative probability of presence (RPP) reported here for *Eucalyptus* spp. in Figure 2 and in the European Atlas of Forest Tree Species (de Rigo et al., 2016; San-Miguel-Ayanz et al., 2016) is the probability of that genus to occur in a given spatial unit (de Rigo et al., 2017). In forestry, such a probability for a single taxon is called 'relative'. The maps of RPP are produced by means of the constrained spatial multi-scale frequency analysis (C-SMFA) (de Rigo et al., 2014, 2017) of species presence data reported in geolocated plots by different forest inventories.

B.1. Geolocated plot databases

The RPP models rely on five geodatabases that provide presence/absence data for tree species and genera: four European-wide forest monitoring data sets and a harmonised collection of records from national forest inventories (de Rigo et al., 2014, 2016, 2017). The databases report observations made inside geolocalised sample plots positioned in a forested area, but do not provide information about the plot size or consistent quantitative information about the recorded species beyond presence/absence.

The harmonisation of these data sets was performed within the research project at the origin of the European Atlas of Forest Tree Species (de Rigo et al., 2016; San-Miguel-Ayanz, 2016; San-Miguel-Ayanz et al., 2016). Given the heterogeneity of strategies of field sampling design and establishment of sampling plots in the various national forest inventories (Chirici et al., 2011a,b), and also given legal constraints, the information from the original data sources was harmonised to refer to an INSPIRE compliant geospatial grid, with a spatial resolution of 1 km^2 pixel size, using the ETRS89 Lambert Azimuthal Equal-Area as geospatial projection (EPSG: 3035, http://spatialreference.org/ref/epsg/etrs89-etrs-laea/).

B.1.1. European National Forestry Inventories database

This data set was derived from National Forest Inventory data and provides information on the presence/absence of forest tree species in approximately 375,000 sample points with a spatial resolution of 1 km^2/pixel, covering 21 European countries (de Rigo et al., 2014, 2016).

B.1.2. Forest Focus/Monitoring data set

This project is a Community scheme for harmonised long-term monitoring of air pollution effects in European forest ecosystems, normed by EC Regulation No 2152/2003[5]. Under this scheme, the monitoring is carried out by participating countries on the basis of a systematic network of observation points (Level I) and a network of observation plots for intensive and continuous monitoring (Level II). For managing the data, the JRC implemented a Forest Focus Monitoring Database System, from which the data used in this project were taken (Hiederer et al., 2007; Houston Durrant and Hiederer, 2009). The complete Forest Focus data set covers 30 European Countries with more than 8,600 sample points.

B.1.3. BioSoil data set

This data set was produced by one of a number of demonstration studies performed in response to the 'Forest Focus' Regulation (EC) No 2152/2003 mentioned above. The aim of the BioSoil project was to provide harmonised soil and forest biodiversity data. It comprised two modules: a Soil Module (Hiederer et al., 2011) and a Biodiversity Module (Houston Durrant et al., 2011). The data set used in the C-SMFA RPP model came from the Biodiversity module, in which plant species from both the tree layer and the ground vegetation layer were recorded for more than 3,300 sample points in 19 European Countries.

[5] Council of the European Union, 2003. Regulation (EC) No 2152/2003 of the European Parliament and of the Council of 17 November 2003 concerning monitoring of forests and environmental interactions in the Community (Forest Focus). Official Journal of the European Union 46 (L 324), p. 1–8.

B.1.4. European Information System on Forest Genetic Resources (EUFGIS)

EUFGIS (http://portal.eufgis.org) is a smaller geodatabase providing information on tree species composition in over 3,200 forest plots in 34 European countries. The plots are part of a network of forest stands managed for the genetic conservation of one or more target tree species. Hence, the plots represent the natural environment to which the target tree species are adapted.

B.1.5. Georeferenced Data on Genetic Diversity (GD^2)

GD^2 (http://gd2.pierroton.inra.fr) provides information about 63 species of interest for genetic conservation. The database covers 6,254 forest plots located in stands of natural populations that are traditionally analysed in genetic surveys. While this database covers fewer species than the others, it covers 66 countries in Europe, North Africa, and the Middle East, making it the data set with the largest geographic extent.

B.2. Modelling methodology

For modelling, the data were harmonised in order to have the same spatial resolution (1 km^2) and filtered to a study area comprising 36 countries in the European continent. The density of field observations varies greatly throughout the study area and large areas are poorly covered by the plot databases. A low density of field plots is particularly problematic in heterogeneous landscapes, such as mountainous regions and areas with many different land use and cover types, where a plot in one location is not representative of many nearby locations (de Rigo et al., 2014). To account for the spatial variation in plot density, the model used here (C-SMFA) considers multiple spatial scales when estimating RPP. Furthermore, statistical resampling is systematically applied to mitigate the cumulated data-driven uncertainty.

The presence or absence of a given forest tree species then refers to an idealised standard field sample of negligible size compared with the 1 km^2 pixel size of the harmonised grid. The modelling methodology considered these presence/absence measures as if they were random samples of a binary quantity (the punctual presence/absence, not the pixel one). This binary quantity is a random variable having its own probability distribution which is a function of the unknown average probability of finding the given tree species within a plot of negligible area belonging to the considered 1 km^2 pixel (de Rigo et al., 2014). This unknown statistic is denoted hereinafter with the name of 'probability of presence'.

C-SMFA preforms spatial frequency analysis of the geolocated plot data to create preliminary RPP maps (de Rigo et al., 2014). For each 1 km^2 grid cell, the model estimates kernel densities over a range of kernel sizes to estimate the probability that a given species is present in that cell. The entire array of multi-scale spatial kernels is aggregated with adaptive weights based on the local pattern of data density. Thus, in areas where plot data are scarce or inconsistent, the method tends to put weight on larger kernels. Wherever denser local data are available, they are privileged ensuring a more detailed local RPP estimation. Therefore, a smooth multi-scale aggregation of the entire arrays of kernels and data sets is applied instead of selecting a local 'best performing' one and discarding the remaining information. This array-based processing, and the entire data harmonisation procedure, are made possible thanks to the semantic modularisation which defines the Semantic Array Programming modelling paradigm (de Rigo, 2012).

The probability to find a single species (e.g. a particular coniferous tree species) in a 1 km^2 grid cell cannot be higher than the probability of presence of all the coniferous species combined. The same logical constraints applied to the case of single broadleaved species with respect to the probability of presence of all the broadleaved species combined. Thus, to improve the accuracy of the maps, the preliminary RPP values were constrained so as not to exceed the local forest-type cover fraction with an iterative refinement (de Rigo et al., 2014). The forest-type cover fraction was estimated from the classes of the Corine Land Cover (CLC) maps which contain a component of forest trees (Bossard et al., 2000; Büttner et al., 2012).

The resulting probability of presence is relative to the specific tree taxon, irrespective of the potential co-occurrence of other tree taxa with the measured plots, and should not be confused with the absolute abundance or proportion of each taxon in the plots. RPP represents the probability of finding at least one individual of the taxon in a plot placed randomly within the grid cell, assuming that the plot has negligible area compared with the cell. As a consequence, the sum of the RPP associated with different taxa in the same area is not constrained to be 100%. For example, in a forest with two co-dominant tree species which are homogeneously mixed, the RPP of both may be 100% (see e.g. the Glossary in San-Miguel-Ayanz et al. (2016), http://forest.jrc.ec.europa.eu/media/atlas/Glossary.pdf).

The robustness of RPP maps depends strongly on sample plot density, as areas with few field observations are mapped with greater uncertainty. This uncertainty is shown qualitatively in maps of 'RPP trustability'. RPP trustability is computed on the basis of the aggregated equivalent number of sample plots in each grid cell (equivalent local density of plot data). The trustability map scale is relative, ranging from 0 to 1, as it is based on the quantiles of the local plot density map obtained using all field observations for the species. Thus, trustability maps may vary among species based on the number of databases that report a particular species (de Rigo et al., 2014, 2016).

The RPP and relative trustability range from 0 to 1 and are mapped at a 1 km spatial resolution. To improve visualisation, these maps can be aggregated to coarser scales (i.e. 10 $\times$ 10 pixels or 25 $\times$ 25 pixels, respectively summarising the information for aggregated spatial cells of 100 and 625 km^2) by averaging the values in larger grid cells.