SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 28 March 2019

doi: 10.2903/j.efsa.2019.5667

Commodity risk assessment of black pine (*Pinus thunbergii* Parl.) bonsai from Japan

EFSA Panel on Plant Health (EFSA PLH Panel),
Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Paolo Gonthier, Marie-Agnès Jacques, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Philippe Lucien Reignault, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen, Lucia Zappalà, Andrea Battisti, Anna Maria Vettraino, Renata Leuschner, Olaf Mosbach-Schulz, Maria Chiara Rosace and Roel Potting

Abstract

The EFSA Panel on Plant health was requested to deliver a scientific opinion on how far the existing requirements for the bonsai pine species subject to derogation in Commission Decision 2002/887/EC would cover all plant health risks from black pine (*Pinus thunbergii* Parl.) bonsai (the commodity defined in the EU legislation as naturally or artificially dwarfed plants) imported from Japan, taking into account the available scientific information, including the technical information provided by Japan. The relevance of an EU-regulated pest for this opinion was based on: (a) evidence of the presence of the pest in Japan; (b) evidence that *P. thunbergii* is a host of the pest and (c) evidence that the pest can be associated with the commodity. Sixteen pests that fulfilled all three criteria were selected for further evaluation. The relevance of other pests present in Japan (not regulated in the EU) for this opinion was based on (i) evidence of the absence of the pest in the EU; (ii) evidence that *P. thunbergii* is a host of the pest; (iii) evidence that the pest can be associated with the commodity and (iv) evidence that the pest may have an impact in the EU. Three pests fulfilled all four criteria and were selected for further evaluation (*Crisicoccus pini, Sirex nitobei* and *Urocerus japonicus*). For the selected 19 pests, the risk mitigation measures proposed in the technical dossier were evaluated. Limiting factors on the effectiveness of the measures were documented. For each of the 19 pests, an expert judgement is given on the likelihood of pest freedom taking into consideration the risk mitigation measures acting on the pest, including any uncertainties. For all evaluated pests, the median likelihood of the pest freedom is 99.5% or higher and within the 90% uncertainty range it is 99% or higher.

Keywords: *Pinus thunbergii*, black pine, bonsai, Japan, European Union, commodity risk assessment, plant health

Requestor: European Commission

Question number: EFSA-Q-2017-00715

Correspondence: alpha@efsa.europa.eu

Panel members: Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Paolo Gonthier, Marie-Agnès Jacques, Josep Anton Jaques Miret, Anne Marie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe L Reignault, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent, Jonathan Yuen, Lucia Zappalà.

Acknowledgements: The EFSA Panel on Plant Health wishes to thank Eugen Christoph for the support provided during the expert knowledge elicitation, Svetla Kozelska for the support during the whole process of the opinion development and Emanuela Tacci for the administrative and technical support provided to this opinion.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Reignault PL, Thulke H-H, Van der Werf W, Civera AV, Yuen J, Zappalà L, Battisti A, Vettraino AM, Leuschner R, Mosbach-Schulz O, Rosace MC and Potting R, 2019. Scientific Opinion on the commodity risk assessment of black pine (*Pinus thunbergii* Parl.) bonsai from Japan. EFSA Journal 2019;17(5):5667, 184 pp. https://doi.org/10.2903/j.efsa.2019.5667

ISSN: 1831-4732

The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.

Table of contents

Abstract 1
Summary 4
1. Introduction 5
1.1. Background as provided by the European Commission 5
1.2. Terms of reference as provided by the European Commission 5
1.3. Interpretation of the terms of reference 5
2. Data and methodologies 5
2.1. Data 5
2.2. Methodologies 8
2.2.1. Commodity data 9
2.2.2. Identification of pests potentially associated with the commodity 9
2.2.3. Listing and evaluation of risk mitigation measures 9
3. Commodity data 10
3.1. Description of the commodity 10
3.2. Description of the production areas 10
3.3. Production and handling processes 11
3.3.1. Growing conditions 11
3.3.2. Source of planting material 11
3.3.3. Production cycle 12
3.3.4. Export procedure 12
3.3.5. Post-entry quarantine procedure in the EU 12
3.4. Surveillance system in Japan 12
4. Identification of pests potentially associated with the commodity 12
4.1. Selection of relevant EU-regulated pests associated with the commodity 12
4.2. Selection of other relevant pests (not regulated in the EU) associated with the commodity 15
4.3. Overview of interceptions 15
4.4. List of potential pests not further assessed 15
4.5. Summary of pests selected for further evaluation 16
5. Risk mitigation measures 17
5.1. Requirements of the current derogation 17
5.2. Possibility of pest presence in the export nurseries 17
5.3. Risk mitigation measures applied in Japan 17
5.4. Evaluation of the current measures for the selected relevant pests including uncertainties 18
5.4.1. *Coleosporium asterum* 18
5.4.2. *Coleosporium phellodendri* 19
5.4.3. *Cronartium orientale* 20
5.4.4. *Dothistroma septosporum* 20
5.4.5. *Fusarium circinatum* 21
5.4.6. *Lecanosticta acicola* 21
5.4.7. *Pseudocercospora pini-densiflorae* 22
5.4.8. *Crisicoccus pini* 23
5.4.9. *Dendrolimus sibiricus* 23
5.4.10. *Dendrolimus spectabilis* 24
5.4.11. *Monochamus alternatus* 24
5.4.12. *Pissodes nitidus* 24
5.4.13. *Pissodes obscurus* 24
5.4.14. *Popillia japonica* 24
5.4.15. *Sirex nitobei* 25
5.4.16. *Thecodiplosis japonensis* 25
5.4.17. *Urocerus japonicus* 25
5.4.18. *Bursaphelenchus xylophilus* 26
5.4.19. *Xiphinema americanum* Cobb. *sensu lato* 26
6. Conclusions 30
Documentation provided to EFSA 30
References 30
Glossary 35
Abbreviations 35
Appendix A – Specific conditions applying to plants, originating in Japan, benefiting from the derogation provided for in Article 1 of Commission Decision 2002/887/EC 36
Appendix B – Pest sheets of relevant actionable pests 39
Appendix C – Tables 170

Summary

At the request of the European Commission, the EFSA Panel on Plant Health (hereafter referred to as 'the Panel') was asked to deliver its scientific opinion on a technical file submitted to the European Commission by the Japanese authorities in support of a request to lift the export ban on *Pinus thunbergii* to the European Union (EU).

In particular, the European Food Safety Authority (EFSA) was requested to determine whether the proposed measures for bonsai of *P. thunbergii* (the commodity defined in the EU legislation as naturally or artificially dwarfed plants) included in the Japanese derogation request provide a level of protection comparable to those stipulated in Commission Decision 2002/887/EC[1] for bonsai of *Pinus parviflora* from Japan.

The Panel examined the technical file following the EFSA Guidance on commodity risk assessment for the evaluation of high risk plant dossiers (EFSA PLH Panel, 2019).

The relevance of an EU-regulated pest for the purposes of this opinion was based on: (a) evidence of the presence of the pest in Japan; (b) evidence that *P. thunbergii* is a host of the pest and (c) evidence for the likelihood that one or more life stages of the pest can be associated with the commodity. Pests that fulfilled all three criteria were selected for further evaluation. Of the 43 EU-regulated species evaluated, 28 species are present in Japan and of these 16 pest species were considered to be relevant for further assessment.

The relevance of other pests present in Japan (not regulated in the EU) for the purposes of this opinion was based on (i) evidence of the absence of the pest in the EU; (ii) evidence that *P. thunbergii* is a host of the pest; (iii) evidence for the likelihood that one or more life stages of the pest can be associated with the specified commodity and (iv) evidence for the likelihood that the pest may have an impact in the EU. Pests that fulfilled all four criteria were selected for further evaluation. Of the 169 species (not regulated in the EU), three non-regulated pests (*Crisicoccus pini*, *Sirex nitobei* and *Urocerus japonicus*) were thus selected.

For the 19 relevant pests identified, the risk mitigation measures proposed in the technical dossier were evaluated. For each pest, the Panel evaluated the possibility that the pest could be present in a bonsai nursery by evaluating the possibility that bonsai in the export nursery are infested either by: (a) introduction of the pest (e.g. insects, spores) from the environment of the nursery; (b) introduction of infested d plants from other nurseries; or (c) introduction of the pest through cultural practices in the nursery (e.g. infested growing media or water). With the information provided by Ministry of Agriculture, Forestry and Fisheries of the Government of Japan (hereafter referred to as 'MAFF'), the Panel made an overview of all the risk mitigation measures that are proposed to be applied in export nurseries. For each pest, the relevant risk mitigation measures acting on the pest were identified. Limiting factors on the effectiveness of the measure were documented.

For each of the 19 relevant pests identified, an expert judgement is given for the likelihood of pest freedom, taking into consideration the risk mitigation measures acting on the pest. For all evaluated pests, the median likelihood of the pest freedom is 99.5% or higher and within the 90% uncertainty range it is 99% or higher.

Apart from the 19 evaluated pests, there are 16 species listed for which the current available evidence provides no reason to select them for further evaluation in this opinion. However, there is limited information available for these 16 species that belong to a genus with pests with reported impact. Therefore, a literature monitoring for these pests is suggested and if more information becomes available this could trigger a re-evaluation of this opinion.

[1] 2002/887/EC: Commission Decision of 8 November 2002 authorising derogations from certain provisions of Council Directive 2000/29/EC in respect of naturally or artificially dwarfed plants of *Chamaecyparis* Spach, *Juniperus* L. and *Pinus* L., originating in Japan (notified under document number C(2002) 4348). OJ L 309, 12.11.2002, p. 8–12.

1. Introduction

1.1. Background as provided by the European Commission

Council Directive 2000/29/EC[2] lays down the phytosanitary provisions and control checks to be carried out at the place of origin on plant products destined for the Union or to be moved within the Union. Annex III A prohibits the introduction of *Pinus* plants, originating in non-EU countries.

In 2002, Japan was granted a derogation from Art. 4(1) of Council Directive 2000/29/EC with regards to prohibitions for artificially dwarfed plants of *Chamaecyparis* Spach, *Juniperus* L., *Pinus* L., other than fruits and seeds (Commission Decision 2002/887/EC[3]).

Japan has made a request for lifting the export ban of artificially dwarfed Japanese black pine (*Pinus thunbergii* Parl.), for which Japan claims similar import requirements into the EU, as those in Commission Decision 2002/887/EC. Recently, Japan provided supplementary technical information to support this request.

1.2. Terms of reference as provided by the European Commission

EFSA is requested, pursuant to Article 29 of Regulation (EC) No 178/2002[4], to provide a scientific opinion.

Taking into account the available scientific information, including the technical information provided by Japan, EFSA is requested to consider how far the existing requirements for the bonsai pine species subject to derogation in Commission Decision 2002/887/EC would cover all plant health risks from black pine bonsai *Pinus thunbergii* Parl. imported from Japan.

1.3. Interpretation of the terms of reference

The EFSA Panel on Plant Health (hereafter referred to as 'the Panel') will conduct a commodity risk assessment of bonsai of *P. thunbergii* from Japan based on the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019). The Panel will evaluate whether the measures that are in place for bonsai of *Pinus parviflora* (see Appendix A) give the same level of protection for harmful organisms that can be present on bonsai of *P. thunbergii* and assess the potential additional risks associated with the import of bonsai of *P. thunbergii*.

In its evaluation, the Panel will:

- Check whether the provided information in the technical dossier is sufficient to conduct a commodity risk assessment. If necessary, additional information may be requested from the Japanese authorities (Ministry of Agriculture, Forestry and Fisheries of the Government of Japan (MAFF)).
- Select the relevant EU-regulated pests and other pests present in Japan and associated with bonsai of *P. thunbergii.*
- Evaluate the effectiveness of the proposed measures (as specified by MAFF) for the relevant organisms on bonsai of *P. thunbergii.*

Risk management decisions are not within EFSA's remit. Therefore, the Panel will provide a rating for the likelihood of pest freedom for each relevant pest given the risk mitigation measures proposed by MAFF.

2. Data and methodologies

2.1. Data

For a thorough evaluation of how far the existing requirements for the bonsai pine species subject to derogation in Commission Decision 2002/887/EC would cover all plant health risks from black pine

[2] 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, 10.7.2000, p. 1–112.

[3] 2002/887/EC: Commission Decision of 8 November 2002 authorising derogations from certain provisions of Council Directive 2000/29/EC in respect of naturally or artificially dwarfed plants of *Chamaecyparis* Spach, *Juniperus* L. and *Pinus* L., originating in Japan. OJ L 309, 12.11.2002, p. 8–12.

[4] 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, 1.2.2002, p. 1–24.

(*P. thunbergii* Parl.) bonsai imported from Japan, the Panel considered all the data and information provided by MAFF to support a request for derogation from the EU import requirements for black pine bonsai (hereafter called 'the Dossier'). The Dossier is managed by EFSA.

The structure and overview of the Dossier is shown in Table 1. The number of the relevant section will be indicated in the opinion when referring to a specific part of the Dossier.

Table 1: Structure and overview of the Dossier

Dossier section	Overview of contents	Filename
1.0	Initial request by Japan	COM-17-09-xx-ARES xxxx Annex1-2016 Letter+Annex.pdf
1.1	Initial Letter to the European Commission	COM-17-09-xx-ARES xxxx Annex1-2016 Letter+Annex.pdf
1.2	Annex 1 – Results of survey for needle rust	COM-17-09-xx-ARES xxxx Annex1-2016 Letter+Annex.pdf
1.3	Cultivation history of Kagawa Prefecture	COM-17-09-xx-ARES xxxx Annex1-2016 Letter+Annex.pdf
1.4	Bonsai cultivation and treatment scheme	COM-17-09-xx-ARES xxxx Annex1-2016 Letter+Annex.pdf
2.0	Annex with table with detailed organism information	COM-17-09-xx-ARES xxxx Annex2-17-08-03 Letter+Annex.pdf
3.0	Additional information provided by Japan	
3.1	Letter providing additional information	Letter_No.30/shouan/2434_Additiional info on *P. thunbergii*.pdf
3.2	Answers to specific questions posed by EFSA, 65 pp.	Additional information *Pinus thunbergii*.pdf
3.3	Evaluation table of 32 EU-regulated pests, 3 pp.	Attachment 2 (for A.2).pdf
3.4	Evaluation table of 189 non-regulated pests, 12 pp.	Attachment 3 (for A.3).pdf
3.5	Pests (60) associated with *Pinus thunbergii*, 9 pp.	Attachment 4 (for A.4).pdf
3.6	Additional information on six pests present in the EU, 4 pp.	Attachment 5.1 (for B.6).pdf
3.7	Pictures of symptoms, 12 pp.	Attachment 5.2(for B.6).pdf
3.8	Climate information, 2 pp.	Attachment 6 (for B.6).pdf
3.9	Information on soil treatment and packing procedures, 3 pp.	Attachment 7 (for C.12).pdf
3.10	Pesticide registration information, 14 × 8 pp.	Attachment 8 (for C.15).pdf
3.11	Overview table of pesticide treatment and relevant organisms	Attachment 9 (for C.16).pdf
4.0	Documents related to hearing on 9 November 2018	
4.1	Additional questions by EFSA	2018.10.25_EFSA_request_for_further_information.pdf
4.2	Response from Japan to questions by EFSA	Additional information regarding request.pdf
4.3	Vegetation maps of area surrounding bonsai nurseries	Attachments to Additional information_9NOV2018.pdf
4.4	Additional information requested during hearing, 7 pp.	Letter from MAFF_14 Dec 2018_.pdf
4.5.	Information on efficacy tests for soil nematodes, 13 + 11 pp.	Attachment1-1_Whole translation of efficacy test.pdf Attachment1-2_original document of efficacy test.pdf
4.6.	Table for corrected pest density index, 2 pp.	Attachment2_Table for corrected pest density index.xlsx
4.7	Paper Takeda et al. (2015), 7 pp.	Attachment3_Ai takeda 2015.pdf
4.8.	Observation report by Kagawa Prefecture, 2 pp.	Attachment4_Observation report by Kagawa prefecture.pdf
4.9.	Approved minutes of the hearing with Japanese experts, 11 pp.	Attachment5_10 wg_DRAFT_minutes_MAFF amended 1212.docx

The data and supporting information provided by MAFF formed the basis of the commodity risk assessment. The following are the main data sources used by MAFF to compile the requested information:

1) Agricultural Insect Pests in Japan (Book, in Japanese)

Umeya and Okada (2003)

Regarding pests occurring in Japan, this widely covers not only insects (Insecta), but also mites (Arachnida), nematodes (Nematoda), and snails and slugs (Gastropoda).

2) Database 'Pests and weeds' (in Japanese)

Rural Culture Association Japan (online)

This is a database managed by the Rural Culture Association of Japan to supplement the book *Agricultural Insect Pests in Japan* with new knowledge acquired after 2003. This database also provides pest occurrence forecasting information and warnings released by pest control stations in each prefecture.

3) Forest Insects (Book, in Japanese)

Kobayashi and Taketani (1994)

Regarding insects in forests, this exhaustively covers pests living in Japan including secondary insects. The ecology of each pest is described based on domestic and foreign research and literature. It was written by the 60 authors from the Forestry and Forest Products Research Institute of MAFF (currently the Forest Research and Management Organization) and professors of domestic universities. This made it possible to check the information about insects in forests in addition to *Agricultural Insect Pests in Japan*.

4) Colour atlas of nursery stock pests in Japan (Book, in Japanese)

Rural Culture Association Japan (2008)

This is an encyclopaedia, edited by the Rural Culture Association Japan, of pests of nursery stock and the method for management and diagnosis for these pests. The authors are researchers at plant protection stations or agricultural research and development institutes in the prefectures who are experienced in the production field and researchers of forestry and forest research and management organisation. This encyclopaedia has more information about pest management and diagnosis and colour pictures of pests while it has less information regarding taxonomic data and covers fewer pests than sources 1–3.

5) Database 'New occurrence notification of the area-wide pest surveillance' (in Japanese)

MAFF (online)

Surveillance information from Japan, based on the 'pest occurrence forecasting system' in all prefectures. In this programme, information is provided as a 'new occurrence notification' when a pest which has not occurred before is detected in fields.

6) Database of Plant Diseases in Japan. NARO Genebank

NARO (online)

This is a database in which information on domestic plant pathogens is exhaustively collected. The Phytopathological Society of Japan deliberates on and determines Japanese disease names, pathogen names, etc., based on the literature, mainly for plant diseases whose occurrence has been reported. Diseases confirmed only by artificial inoculation may also be described after appropriate deliberation.

7) Plant Diseases in Japan (Book, in Japanese)

Kishi (1998)

This was written by 328 authors who are mainly researchers in universities and national or prefectural public research and development institutes. With respect to plant diseases present or occurring in Japan, viroid, phytoplasma, bacteria and fungi are exhaustively recorded with an explanation on ecology and symptoms.

To verify and complement which pests are potentially associated with *Pinus* spp. and *P. thunbergii* in Japan other resources were consulted by the Panel as indicated below.

1) USDA Fungal database

USDA (online)

The United States National Fungus Collections Laboratory maintains several fungal databases that are continuously updated.

2) CABI Crop Protection Compendium

CABI (online_a)

The Crop Protection Compendium is an encyclopaedic resource that brings together a wide range of different types of science-based information on all aspects of crop protection. It comprises detailed datasheets on pests, diseases, weeds, host crops and natural enemies that have been sourced from experts, edited by an independent scientific organisation, and enhanced with data from specialist organisations, images, maps, a bibliographic database and full-text articles. New datasheets and datasets continue to be added, datasheets are reviewed and updated, and search and analysis tools are being built.

3) European and Mediterranean Plant Protection Organization Global Database

EPPO (online_a)

The EPPO Global Database is maintained by the EPPO Secretariat. The aim of the database is to provide all pest-specific information that has been produced or collected by EPPO. It includes host range data, distribution ranges and pest status information.

4) The European Union Notification System for Plant Health Interceptions – EUROPHYT database

EUROPHYT (online)

The EUROPHYT database, which collates notifications of interceptions of plants or plant products, that do not comply with EU legislation, was consulted, searching for pest-specific notifications.

5) Other sources

When developing the opinion the available scientific information, including previous EFSA opinions on the relevant pests and diseases (see pest sheets in Appendix B), the European Commission's Food and Veterinary Office report on its Mission to Japan (European Commission, 2008), and the relevant literature and legislation (Council Directive 2000/29/EC, Commission Decision 2002/499/EC[5], Commission Decision 2002/887/EC and Commission Decision 2007/433/EC[6]) was taken into account.

2.2. Methodologies

When developing the opinion, the Panel followed the EFSA Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019).

In the first step, pests associated with the commodity in the country of origin (EU-regulated pests and other pests) that may require risk mitigation measures are identified. For the group of non-EU-regulated pests, a decision has to be made as to whether a pest categorisation is needed to evaluate whether the pest fulfils the criteria for Union quarantine status. In this opinion, relevant pests not regulated in the EU were selected on the basis of evidence for their potential impact for the EU.

After step 1, all the relevant pests that may need risk mitigation measures are identified.

In the second step, the overall efficacy of the proposed risk mitigation measures for each pest is evaluated. A conclusion on the pest-freedom status of the commodity for each of the relevant pests is achieved and uncertainties are identified.

[5] 2002/499/EC: Commission Decision of 26 June 2002 authorising derogations from certain provisions of Council Directive 2000/29/EC in respect of naturally or artificially dwarfed plants of *Chamaecyparis* Spach, *Juniperus* L. and *Pinus* L., originating in the Republic of Korea. OJ L 168, 27.6.2002, p. 53–57.

[6] 2007/433/EC: Commission Decision of 18 June 2007 on provisional emergency measures to prevent the introduction into and the spread within the Community of *Gibberella circinata* Nirenberg & O'Donnell (notified under document number C(2007) 2496). OJ L 161, 22.6.2007, p. 66–69.

2.2.1. Commodity data

Based on the information provided by MAFF, the characteristics of the commodity were summarised.

2.2.2. Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of bonsai of *P. thunbergii* from Japan, a pest list was compiled. The pest list is a compilation of all plant pests with actionable regulatory status for the EU that are present in Japan and are associated with the commodity. The compilation is done in two steps. First, the relevance of EU-regulated pests is evaluated (Section 4.1). Second, the relevance of any other plant pests is evaluated (Section 4.2). The pest list is based on information provided in Dossier section 2.0 and Dossier sections 3.2–3.6.

2.2.3. Listing and evaluation of risk mitigation measures

All currently used risk mitigation measures were listed and evaluated. When evaluating the potential pest freedom of the commodity, the following types of potential infection sources for bonsai plants in export nurseries and relevant risk mitigation measures (i.e. risk reduction options) were taken into account (see also Figure 1):

- pest entry from surrounding areas,
- pest entry with new plants,
- pest entry or infection by growing practices.

The risk reduction options (RROs) proposed by MAFF were evaluated.

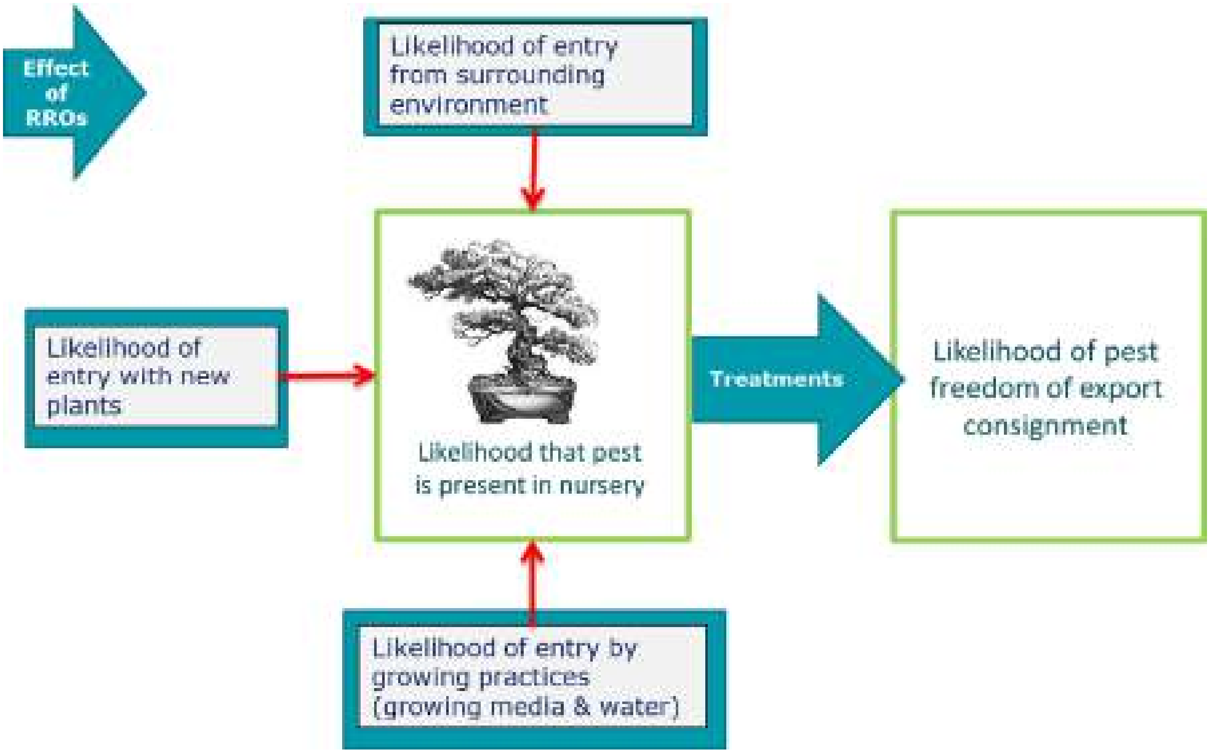


Figure 1: General factors taken into account for the estimation of pest freedom

All information on the biology, likelihood of entry of the pest to the export nursery and the effect of the measures on the specific pest were summarised in pest sheets for each actionable pest (see Appendix B).

To estimate the pest freedom of the commodity a semi-formal expert knowledge elicitation (EKE) was performed following Annex B.8 on semi-formal EKE of the EFSA opinion on the principles and methods behind EFSA's Guidance on Uncertainty Analysis in Scientific Assessment (EFSA Scientific Committee, 2018). The specific question for the semi-formal EKE was defined as follows: 'Taking into account (i) the risk RROs in place in the export nurseries, and (ii) other relevant information, how many of 10,000 bonsai plants will be infested with the relevant pest/pathogen when arriving in the EU (after post-entry quarantine)?'. The EKE question was common to all pests for which the pest freedom of the commodity was estimated. The uncertainties associated to the EKE (expert judgements) on the pest freedom of the commodity for each pest were taken into account and quantified in the probability distribution applying the semi-formal method described in Section 3.5.2 of the EFSA Guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018a). Finally, the results were transformed into the likelihood of pest freedom and the corresponding 90% uncertainty interval was reported. The lower limit of this interval is the lower limit for the one-sided 95% certainty interval of pest freedom: The likelihood of pest freedom is with 95% certainty above this limit.

It should be noted that the number of infested consignments potentially entering the EU may be lower than the estimated number of infested plants due to potential clustering of infected plants. The consignment size could vary from a few to several hundred plants.

Table 2 shows the likelihood classes and corresponding subjective probability ranges for the evaluation of the probability of pest freedom given the RROs acting on the pest under consideration.

Table 2: Likelihood classes and corresponding subjective probability ranges for the evaluation of probability of pest freedom given the risk reduction options acting on the pest under consideration (Adapted from EFSA PLH Panel, 2019)

Probability term	Probability of pest freedom	Explanation of plants that are pest free	Explanation of plants that are infested
Almost certain	*99.95–100%*	*More than 9,995 of 10,000 plants are on average pest free*	*From 0 to 5 of 10,000 plants are on average infested*
Extremely likely	*99.90–99.95%*	*Between 9,990 and 9,995 of 10,000 plants are on average pest free*	*At least 5 (maximum 10) of 10,000 plants are on average infested*
Very likely	*99.5–99.9%*	*Between 995 and 999 of 1,000 plants are on average pest free*	*At least 1 (maximum 5) of 1,000 plants are on average infested*
Likely	*99.0–99.5%*	*Between 990 and 995 of 1,000 plants are on average pest free*	*At least 5 (maximum 10) of 1,000 plants are on average infested*
Moderate likely	*95–99%*	*Between 95 and 99 of 100 plants are on average pest free*	*At least 1 (maximum 5) of 100 plants are on average infested*
Unlikely	*90–95%*	*Between 90 and 95 of 100 plants are on average pest free*	*At least 5 (maximum 10) of 100 plants are on average infested*
Very unlikely	*50–90%*	*Between 5 and 9 of 10 plants are on average pest free*	*At least 1 (maximum 5) of 10 plants are on average infested*
Extremely unlikely	*0–50%*	*Between 0 and 5 of 10 plants are on average pest free*	*At least 5 (maximum 10) of 10 plants are on average infested*

3. Commodity data

3.1. Description of the commodity

The commodity to be imported is artificially dwarfed plants (bonsai) of *P. thunbergii* Parl. (Pinaceae). Plants for import are rooted bonsai plants 3–30 years old and potted in disinfected growing media. According to ISPM 36 (FAO, 2016), the commodity can be classified as 'plants for planting – rooted plants in pots'.

3.2. Description of the production areas

In 2018, there were 107 export nurseries producing bonsai of *P. parviflora* for the EU and 18 nurseries producing bonsai of *P. thunbergii* designated for export to Turkey (see Figure 2 taken from Dossier section 4.2).

The major place of production in Japan is the Kagawa Prefecture where 60–80% of the *P. thunbergii* dwarfed plants for the potential export to the EU are expected to be produced (Dossier section 4.0).

MAFF provided maps of the natural vegetation of three areas: Kinashi in the Kagawa Prefecture, Sousa in the Chiba Prefecture and Saitama in the Saitama Prefecture, which are the main production areas with many registered export bonsai nurseries (Dossier section 4.2). Several potential export nurseries are located near areas with *Pinus* trees.

Based on the global Köppen–Geiger climate zone classification (Kottek et al., 2006), the climate of the production areas of bonsai in Japan is similar to that found in the EU (Humid subtropical climate, Cfa).

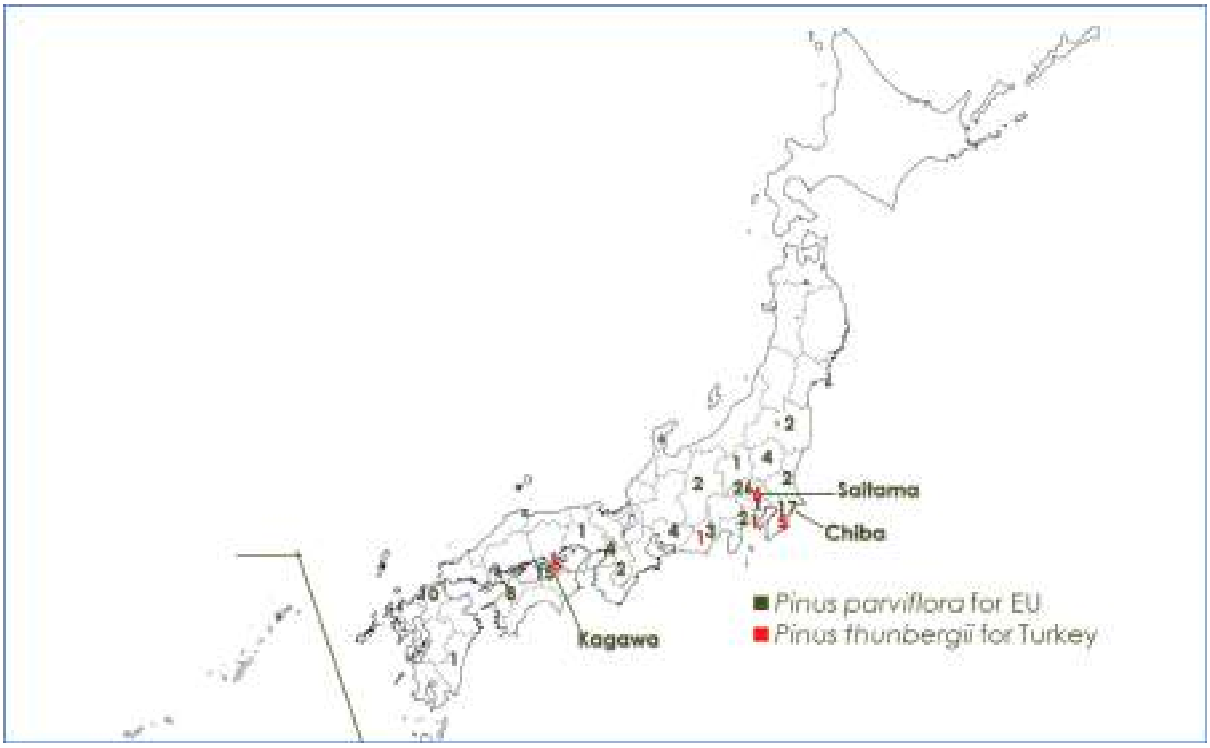


Figure 2: Overview of export nurseries producing bonsai of *Pinus parviflora* for the EU and nurseries producing bonsai of *Pinus thunbergii* designated for export to Turkey in 2018 (taken from Dossier section 4.2)

3.3. Production and handling processes

3.3.1. Growing conditions

Bonsai for export are cultivated in the open air in pots on shelves 50 cm above the soil. Bonsai plants are planted in new certified or disinfected growing medium. The steam soil disinfection is carried out at 90°C or more for at least 30 min. Water used to water plants is obtained by pumping up the ground water.

3.3.2. Source of planting material

Bonsai cultivation, from the beginning (sowing or planting) to export can take 10–30 years. The source of the planting material is either:

- seeds harvested in Japan and planted in a seedling-raising tray;
- grafting – cuttings taken from nursery plants and grafted to the seedlings produced by the above-mentioned method;
- cuttings taken from nursery plants and put into a disinfected or unused growing medium to allow them to root.

Bonsai produced by unregistered nurseries may be used by registered export nurseries, provided these bonsai from unregistered nurseries stay for 2 years in the export nurseries and follow the requirements as specified in Commission Decision 2002/887/EC (see Appendix A). There were no data available on the number of bonsai received from unregistered nurseries.

3.3.3. Production cycle

Currently, bonsai of *P. parviflora* destined for export to the EU have to be produced according the requirements as specified in Commission Decision 2002/887/EC (see Appendix A). This requires that bonsai plants destined for export to the EU have to be labelled individually and must remain for 2 years in the registered nursery. Decandling is applied to remove new spring shoots to induce dwarfing of the bonsai plant. The production cycle for *P. thunbergii* is similar to the production cycle described above.

3.3.4. Export procedure

According to Dossier section 3.2, bonsai plants are shipped in winter (from late October) after passing the final on-site inspection of that year carried out during cultivation in registered nurseries and the export inspection by the National Plant Protection Organisation. Monthly records on export inspections of genus *Pinus* bonsai (*P. parviflora* bonsai) for Europe (EU and Switzerland) for the past 10 years show that 98.5% were exported from November to February. *Pinus thunbergii* is expected to be exported in a similar season by similar measures to those for *P. parviflora*.

3.3.5. Post-entry quarantine procedure in the EU

Exported plants stay for at least 3 months in a post-quarantine station in the EU and are inspected at least twice. Plants with symptoms are tested. For more details see point 11 in Appendix A.

3.4. Surveillance system in Japan

MAFF conducts inspections of the registered nurseries six times a year. Therefore, MAFF has checked all the inspection records of the registered nurseries of *P. parviflora* for the EU and *P. thunbergii* for Turkey for the past 3 years (Dossier section 4.2). There has been no detection of EU-regulated pests at the registered nurseries for 3 years. There is no pest-specific surveillance in the vicinity of the export nurseries.

4. Identification of pests potentially associated with the commodity

4.1. Selection of relevant EU-regulated pests associated with the commodity

In the EU, the quarantine pest list (Annexes I and II of Council Directive 2000/29/EC) is based on assessments concluding that the pest can enter, establish, spread and have potential impact in the EU. The European Commission requested that MAFF provide information on 32 EU-regulated pests relevant for bonsai of *Pinus* spp. (Dossier section 3.2). Several of these listed pests are regulated as a group of species (all non-European species of *Cronartium*, *Monochamus*, *Pissodes*, Scolytidae and *Xiphinema*). Based on the information provided by Japan (Dossier section 3.2), the relevant species were selected for these groups of organisms. In total, 43 EU-regulated species were evaluated (Table 3) for their relevance of being included in this opinion. For some EU-regulated species, the name as specified in the Annexes of Council Directive 2000/29/EC has to be updated. For these species, the current scientific name is indicated in Table 3.

The relevance of an EU-regulated pest for this opinion was based on:

a) evidence of the presence of the pest in Japan;
b) evidence for the fact that the pest uses *P. thunbergii* as a host;
c) evidence for the likelihood that one or more life stages of the pest can be associated with the specified commodity.

Pests that fulfilled all three criteria were selected for further evaluation.

In Table 3, an overview is given of the evaluation of the 43 EU-regulated pest species. The remarks for individual species can be found in Table 4. For more information, see also Table C.1 in Appendix C.

Of the 43 EU-regulated species evaluated, 28 species are present in Japan, and of these, 16 species were considered to be relevant for further assessment.

Table 3: Overview of the evaluation of the 43 EU-regulated pest species

Pest name according to EU legislation*	Current scientific name if different from EU legislation	Group**	Pest of *Pinus* spp. present in Japan	*P. thunbergii* confirmed as a host	Pest can be associated with the commodity	Pest relevant for the opinion	Remarks
Atropellis spp.		FUN	✓			**N**	
Cercoseptoria pini-densiflorae	*Pseudocercospora pini-densiflorae*	FUN	✓	✓	✓	**Y**	See Note 1
Coleosporium asterum		FUN	✓	✓	✓	**Y**	
Coleosporium eupatorii		FUN	✓			**N**	
Coleosporium paederiae		FUN	✓			**N**	
Coleosporium phellodendri		FUN	✓	✓	✓	**Y**	
Cronartium spp.(non-European)	*Cronartium orientale*	FUN	✓	✓	✓	**Y**	
Endocronartium spp. (non-European)	*Cronartium orientale*	FUN	✓	✓	✓	**N**	
Gibberella circinata	*Fusarium circinatum*	FUN	✓	✓	✓	**Y**	
Gremmeniella abietina		FUN	✓			**N**	
Inonotus weirii		FUN	✓			**N**	
Melampsora medusae		FUN	✓			**N**	
Peridermium kurilense	*Cronartium kurilense* (Index Fungorum, online)/*C. kamtschaticum* (EPPO, online_b)	FUN	✓			**N**	
Scirrhia acicola	*Lecanosticta acicola*	FUN	✓	✓	✓	**Y**	
Scirrhia pini	*Dothistroma septosporum*	FUN	✓	✓	✓	**Y**	
Acleris spp. (non-European)		INS				**N**	
Choristoneura spp. (non-European)		INS				**N**	
Dendroctonus micans		INS	✓			**N**	See Note 2
Dendrolimus sibiricus		INS	✓	✓	✓	**Y**	See Note 3
Dendrolimus spectabilis		INS	✓	✓	✓	**Y**	
Ips amitinus		INS				**N**	
Ips cembrae		INS				**N**	
Ips duplicatus		INS	✓			**N**	
Ips sexdentatus		INS				**N**	
Ips typographus		INS	✓			**N**	
Monochamus spp. (non-European)	*Monochamus alternatus*	INS	✓	✓	✓	**Y**	
Pissodes spp. (non-European)	*Pissodes nitidus*	INS	✓	✓	✓	**Y**	
Pissodes spp. (non-European)	*Pissodes obscurus*	INS	✓	✓	✓	**Y**	
Popillia japonica		INS	✓		✓	**Y**	See Note 4

Pest name according to EU legislation*	Current scientific name if different from EU legislation	Group**	Pest of *Pinus* spp. present in Japan	*P. thunbergii* confirmed as a host	Pest can be associated with the commodity	Pest relevant for the opinion	Remarks
Scolytidae spp. (non-European)	*Cryphalus fulvus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Cryphalus laricis*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Ips acuminatus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Orthotomicus angulatus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Orthotomicus tosaensis*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Pityophthorus jucundus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Polygraphus proximus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Tomicus brevipilosus*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Tomicus minor*	INS	✓	✓	✓	**N**	See Note 5
Scolytidae spp. (non-European)	*Tomicus piniperda*	INS	✓	✓	✓	**N**	See Note 5
Thecodiplosis japonensis		INS	✓	✓	✓	**Y**	
Bursaphelenchus xylophilus		NEM	✓	✓	✓	**Y**	
Xiphinema americanum sensu lato non-European populations		NEM	✓	✓	✓	**Y**	See Note 6
Arceuthobium spp. (non-European)		PLN				**N**	

*Council Directive 2000/29/EC, Commission Decision EC/2002/778, Commission Decision 2007/433/EC, Commission Decision 2002/499/EC.
**: FUN: fungi; INS: insect; NEM: nematode; PLN: plant.

Table 4: The species-specific notes as indicated in Table 3

Note number in Table 3	Remark
Note 1	According to the EFSA pest categorisation (EFSA PLH Panel, 2017), the current scientific name for *Cercoseptoria pini-densiflorae* is *Pseudocercospora pini-densiflorae*
Note 2	*Dendroctonus micans* is mainly associated with spruce (*Picea*) and the Panel considered it very unlikely that *D. micans* could be associated with bonsais of *Pinus thunbergii*
Note 3	*Dendrolimus sibiricus* is taxonomically very closely related and similar to *Dendrolimus superans* (EFSA PLH Panel, 2018c) and is sometimes described as *D. superans sibiricus*. *D. superans* is present in Japan. According to MAFF, *D. sibiricus* does not occur in Japan. Given the taxonomic uncertainty, the Panel decided to include *D. superans* in the group of *D. sibiricus* and consider it as a regulated species
Note 4	Although *P. thunbergii* is not a host for *Pinus japonica*, the pest may be present in soil attached to bonsai plants. Therefore, the pest was selected for further evaluation
Note 5	Non-European Scolytidae. There are several Scolytidae species present in Japan that could use *P. thunbergii* as a host in dying or dead bonsais that are not traded and therefore these species of non-European Scolytidae were not selected for further evaluation
Note 6	*Pinus thunbergii* is reported as a host for *Xiphinema incognitum* which is a member of the species group *Xiphinema americanum sensu lato*. It may also be present in soil attached to bonsai plants as evidenced by interceptions in the EU (see section 4.3). Therefore, the pest was selected for further evaluation

4.2. Selection of other relevant pests (not regulated in the EU) associated with the commodity

The information provided by MAFF was evaluated in order to assess whether there are other relevant potential quarantine pests of *Pinus* present in the country of export. For these potential pests that are not regulated in the EU, pest risk assessment information on the probability of introduction, establishment, spread and impact is usually lacking. Therefore, these non-regulated pests that are present on *Pinus* in Japan were also evaluated to determine whether they were absent from the EU and whether there was evidence for potential impact in the EU.

Thus, the relevance of other pests (not regulated in the EU) for this opinion was based on:

a) evidence of the absence of the pest in the EU;
b) evidence for the fact that the pest uses *P. thunbergii* as a host;
c) evidence for the likelihood that one or more life stages of the pest can be associated with the specified commodity;
d) evidence for the likelihood that the pest may have an impact in the EU.

Pests that fulfilled all four criteria were selected for further evaluation.

Based on the information provided by MAFF (Dossier section 3.2), 169 species known to be associated with *Pinus* spp. in Japan were evaluated (see Table C.2 in Appendix C) for their relevance to this opinion. Of the 169 non-EU-regulated species evaluated, 92 species are absent from the EU. Three non-regulated pests (*Crisicoccus pini, Sirex nitobei* and *Urocerus japonicus*) were selected for further evaluation because they met all the selection criteria. More information on these three species can be found in the pest datasheets (Appendix B).

4.3. Overview of interceptions

Currently, bonsai of *Pinus parviflora* from Japan are authorised for import into the EU under derogation, pursuant to Commission Decision 2002/887/EC. Table 5 shows the number of *P. parviflora* bonsai plants exported from Japan to the EU in the years 2002–2008.

Table 5: Overview of the number of *Pinus parviflora* bonsai plants exported from Japan to the EU in the years 2002–2008 (European Commission, 2008)

Year	2002	2003	2004	2005	2006	2007	2008
Number of *P. parviflora* bonsai plants exported from Japan to the EU	18,151	17,731	18,431	16,589	17,093	18,241	21,289

Data on the interception of harmful organisms on bonsai of *Pinus* spp. can provide information on some of the organisms that can be present on bonsai of *P. thunbergii* despite the current measures taken. Table 6 gives an overview of all notifications of interception of EU-regulated pests of bonsai of *Pinus* spp. from Japan. It should be noted that some interception records are not reported at the species level. Hence, in the indicated time period, there were an additional eight interceptions of *Xiphinema* spp.

Table 6: Overview of EU-regulated pests intercepted on bonsai of *Pinus* spp. from Japan (1999–2018), based on notifications of interceptions by EU Member States (based on EUROPHYT (online), accessed on 14 January 2019)

Name of harmful organism	Group	Total
Xiphinema americanum	Nematode	3
Dendrolimus spectabilis	Insect	1

4.4. List of potential pests not further assessed

From the list of pests not selected for further evaluation, the Panel highlighted 16 species (indicated in Tables C.2 and C.3 in Appendix C) for which the currently available evidence provides no reason to select these species for further evaluation in this opinion. However, these 16 species belong to a genus with pests that have a reported impact. The Panel suggests that the literature for these 16 pests is monitored (see Table C.3 in Appendix C). If more information becomes available (e.g. a report of an outbreak) for one of these species, this could trigger a re-evaluation of this opinion.

4.5. Summary of pests selected for further evaluation

The 19 pests identified to be present in Japan and considered to be reasonably likely to be associated with bonsai of *P. thunbergii* are listed in Table 7. Of the 19 relevant species selected for further evaluation, there are eight species that also use *Pinus parviflora* as a host plant (indicated in Table 7). These eight species are currently controlled by the phytosanitary measures in place for bonsai of *P. parviflora* from Japan as specified in Commission Decision 2002/887/EC (see Appendix A). For these selected pests, the currently applied risk mitigation measures applied for the commodity were evaluated.

Table 7: List of relevant pests selected for further evaluation

Number	Current scientific name	Name used in the EU legislation	Taxonomic information	Group*	Regulatory status	*P. parviflora* used as host
1	*Coleosporium asterum*	*Coleosporium asterum*	Basidiomycota, Pucciniales, Coleosporiaceae	FUN	EU-regulated	
2	*Coleosporium phellodendri*	*Coleosporium phellodendri*	Basidiomycota, Pucciniales, Coleosporiaceae	FUN	EU-regulated	
3	*Cronartium orientale*	*Cronartium* spp. (non-European)	Basidiomycota, Pucciniales, Cronartiaceae	FUN	EU-regulated	
4	*Dothistroma septosporum*	*Scirrhia pini*	Ascomycota, Capnodiales, Mycosphaerellaceae	FUN	EU-regulated	
5	*Fusarium circinatum*	*Gibberella circinata*	Ascomycota, Hypocreales, Nectriaceae	FUN	EU-regulated	
6	*Lecanosticta acicola*	*Scirrhia acicola*	Ascomycota, Capnodiales, Mycosphaerellaceae	FUN	EU-regulated	
7	*Pseudocercospora pini-densiflorae*	*Cercoseptoria pini-densiflorae*	Ascomycota, Capnodiales, Mycosphaerellaceae	FUN	EU-regulated	✓
8	*Crisicoccus pini*	*Crisicoccus pini*	Homoptera, Pseudococcidae	INS	Not regulated in the EU	✓
9	*Dendrolimus sibiricus*	*Dendrolimus sibiricus*	Lepidoptera, Lasiocampidae	INS	EU-regulated	✓
10	*Dendrolimus spectabilis*	*Dendrolimus spectabilis*	Lepidoptera, Lasiocampidae	INS	EU-regulated	✓
11	*Monochamus alternatus*	*Monochamus* spp. (non-European)	Coleoptera, Cerambycidae	INS	EU-regulated	✓
12	*Pissodes nitidus*	*Pissodes* spp. (non-European)	Coleoptera, Curculionidae	INS	EU-regulated	✓
13	*Pissodes obscurus*	*Pissodes* spp. (non- European)	Coleoptera, Curculionidae	INS	EU-regulated	✓
14	*Popillia japonica*	*Popillia japonica*	Coleoptera, Rutelidae	INS	EU-regulated	
15	*Sirex nitobei*	*Sirex nitobei*	Hymenoptera, Siricidae	INS	Not regulated in the EU	
16	*Thecodiplosis japonensis*	*Thecodiplosis japonensis*	Diptera, Cecidomyiidae	INS	EU-regulated	

Number	Current scientific name	Name used in the EU legislation	Taxonomic information	Group*	Regulatory status	*P. parviflora* used as host
17	*Urocerus japonicus*	*Urocerus japonicus*	Hymenoptera, Siricidae	INS	Not regulated in the EU	
18	*Bursaphelenchus xylophilus*	*Bursaphelenchus xylophilus*	Nematode	NEM	EU-regulated	✓
19	*Xiphinema americanum sensu lato* non-European populations	*Xiphinema americanum sensu lato* non-European populations	Nematode	NEM	EU-regulated	

*: FUN: fungi; INS: insect; NEM: nematode.

5. Risk mitigation measures

For each pest, the Panel assessed the possibility that it could be present in a bonsai export nursery and assessed the probability that pest freedom of a consignment is achieved by the proposed risk mitigation measures (i.e. RROs) acting on the pest under consideration.

All the information used in the evaluation of the pest presence and risk mitigation measures for each pest is summarised in a pest data sheet (see Appendix B).

5.1. Requirements of the current derogation

Specified requirements for the export of bonsai of *P. parviflora* to the EU, taken from the Annex to Commission Decision 2002/887/EC are provided in Appendix A.

5.2. Possibility of pest presence in the export nurseries

For each pest, the Panel evaluated the possibility that the pest could be present in a bonsai nursery by evaluating the possibility that bonsai in the export nursery are infected either by:

a) introduction of the pest (e.g. insects, spores) from the environment surrounding the nursery;
b) introduction of infected plants from other nurseries;
c) introduction of the pest through cultural practices in the nursery (e.g. infected growing media or water).

5.3. Risk mitigation measures applied in Japan

With the information provided by MAFF, the Panel made an overview of all the RROs (i.e. risk mitigation measures) that are proposed to be applied at export nurseries. Table 8 gives a summary of the proposed RROs.

Table 8: Overview of the currently proposed risk reduction options for bonsai of *P. thunbergii* designated for export to EU

Number of the risk reduction option	Risk reduction options	Current measures in Japan
RRO1	Insecticide treatment of crop	Ten registered insecticides are applied. Label information on the registered insecticide is provided in Dossier section 3.10. Treatment schemes are provided in Dossier section 3.11
RRO2	Fungicide treatment of crop	Three registered fungicides are applied. Label information on the registered fungicides is provided in Dossier section 3.10. Treatment schemes are provided in Dossier section 3.11
RRO3	Soil treatment	Plants are repotted every year with disinfected growing media (heat treatment of soil for at least 30 min at 90°C) (Dossier section 3.9)

Number of the risk reduction option	Risk reduction options	Current measures in Japan
RRO4	Root treatment (repotting)	Prior to export, roots are washed to remove all soil and plants are repotted with disinfected growing media (Dossier section 3.9)
RRO5	Root treatment (MEP*)	Prior to export washed roots are immersed in MEP for 30 min (Dossier sections 3.9 and 4.5)
RRO6	Protected cultivation	Potted plants are cultivated 50 cm above ground on concrete tables
RRO7	Pruning	Decandling, removal of new shoots (in May)
RRO8	Surveillance	No pest-specific surveillance is carried out in the surrounding environment of the nurseries (Dossier section 4.2)
RRO9	Visual inspection	All plants destined for export from the nursery are inspected six times per year (April to September) for the presence of harmful organisms (a total of 12 inspections). Infected plants are removed Prior to export the consignment is inspected. Branches are beaten over a white plastic bowl to check for the presence of insects
RRO10	Registration	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery
RRO 11	Sampling and testing	Prior to export, plants are tested for *Gibberella circinata.* A soil test may be taken for the analysis of the presence of nematodes to verify pest freedom after a finding in an export consignment (Dossier section 3.2; European Commission, 2008)

*: Fenitrothion (the name 'MEP' is approved by the Japanese Ministry of Agriculture, Forestry and Fisheries – see Alan Wood's Website, online).

The Panel assumes that the same measures will be applied for bonsai of *P. thunbergii* as currently applied for bonsai of *P. parviflora* as specified in Commission Decision 2002/887/EC. Therefore, an additional RROs applied in the EU is included.

RRO12	Post-entry quarantine	Exported plants stay for at least 3 months in a post-quarantine station in the EU and are inspected at least twice. Plants with symptoms are tested

5.4. Evaluation of the current measures for the selected relevant pests including uncertainties

For each pest, the relevant risk mitigation measures acting on the pest were identified. Any limiting factors on the effectiveness of the measures (RROs) were documented. The pesticides used in Japan are officially registered for application in bonsai production (Dossier sections 3.10 and 3.11). Therefore, the Panel assumes that applications are effective in removing the pest to an acceptable level. If there are serious uncertainties or evidence of pest presence despite application of the pesticide (e.g. reports of interception at import), this will be taken into account in the EKE on the effectiveness of the measures.

Based on this information, for each identified pest, an expert judgement is given for the likelihood of pest freedom taking into consideration the RROs and their combination acting on the pest. All the relevant information including the related uncertainties deriving from the limiting factors used in the evaluation are summarised in a pest data sheet provided in Appendix B.

An overview of the evaluation of each relevant pest is given in the sections below (Sections 5.4.1–5.4.19). The likelihood of pest freedom is given by the median with a 90% uncertainty interval.

5.4.1. *Coleosporium asterum*

Rating of the likelihood of pest freedom	Extremely likely
Distribution of the likelihood of pest freedom	5%: 99.83%; Q1: 99.88%; M: 99.90%; Q3: 99.92%; 95%: 99.94%

5%	Q1	M	Q3	95%
99.83%	99.88%	99.90%	99.92%	99.94%

Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Coleosporium asterum* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternate hosts or (2) wind-borne introduction of spores from the surrounding environment. The probability of an introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *C. asterum* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** There were no interceptions reported on alternate hosts or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *C. asterum* **Main uncertainties** – Location of export nurseries in relation to the distance from areas where alternate hosts are present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

5.4.2. *Coleosporium phellodendri*

Rating of the likelihood of pest freedom	Extremely likely
Distribution of the likelihood of pest freedom	5%: 99.83%; Q1: 99.88%; M: 99.90%; Q3: 99.92%; 95%: 99.94%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Coleosporium phellodendri* is present in Japan. It cannot be excluded that bonsai plants in the nursery are infested by *C. phellodendri* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternative hosts; or (2) wind-borne introduction of spores from the surrounding environment. The probability of introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures are supposed to greatly reduce the probability that *C. phellodendri* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen. Surveys conducted in Kagawa Prefecture showed the absence of *C. phellodendri*. If the absence of the pathogen is confirmed by repeated surveys, the Kagawa area could be considered as to be a pest-free area **Interception records** No interceptions (1999–2018) **Shortcomings of present methods** Available surveillance data refer only to surveys conducted in the Kagawa Prefecture. Bonsai plants are not tested for the asymptomatic presence of *C. phellodendri* **Main uncertainties** – Location of export nurseries in relation to the distance from areas where *Phellodendron* is present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

5.4.3. *Cronartium orientale*

Rating of the likelihood of pest freedom	Very likely
Distribution of the likelihood of pest freedom	5%: 99.56% ; Q1: 99.71% ; M: 99.79% ; Q3: 99.86% ; 95%: 99.92%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Cronartium orientale* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternative hosts; or (2) wind-borne introduction of spores from the surrounding environment The probability of introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *C. orientale* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen. Surveys conducted in Kagawa Prefecture showed the absence of *C. orientale.* If the absence of the pathogen is confirmed by repeated surveys, the Kagawa area could be considered to be a pest-free area **Interception records** There were no interceptions reported on alternative host species or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host **Shortcomings of present methods** Available surveillance data refers only to surveys conducted in the Kagawa Prefecture. Bonsai plants are not tested for the asymptomatic presence of *C. orientale* **Main uncertainties** – Location of export nurseries in relation to the distance from areas where alternate hosts are present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

5.4.4. *Dothistroma septosporum*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.95% ; Q1: 99.96% ; M: 99.97% ; Q3: 99.97% ; 95%: 99.98%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested with *Dothistroma septosporum* either by: (1) introduction of new infested plants from (unregistered) nurseries; (2) natural introduction of spores from the surrounding environment; or (3) human activity **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *D. septosporum* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** There are no records of interceptions of *D. septosporum* on *P. parviflora*. However, *P. parviflora* is not a host for *D. septosporum*

	Shortcomings of present methods Bonsai plants are not tested for the asymptomatic presence of *D. septosporum* **Main uncertainties** – It is uncertain whether the fungicide treatments may contribute to the eradication of the pathogen or not

5.4.5. *Fusarium circinatum*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.93%; Q1: 99.96%; M: 99.97%; Q3: 99.98%; 95%: 99.99%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Fusarium circinatum* either by: (1) introduction of new infested plants from (unregistered) nurseries; (b) vectors; (c) growing media; (d) human activity; or (e) wind-borne introduction of spores from the surrounding environment. Plants are regularly inspected, by visual assessment, for the presence of symptoms of the infection and laboratory tests are performed. However, *F. circinatum* is present in Japan, and its introduction by vectors or other means could not be excluded **Measures taken against the pest and their efficacy** The applied measures are: (a) insecticides, fungicides and soil treatments; (b) removal of symptomatic plants; and (c) pruning. These measures are supposed to greatly reduce the probability of the presence of *F. circinatum* in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood that the pathogen is present. The fungicide treatment and pruning of young leaves are very effective. The symptoms are easily detected. The pathogen has never been found through laboratory testing at the exporting nurseries **Interception records** Among imports of bonsai plants of *P. parviflora* to the EU between 1999 and 2018, *F. circinatum* has never been found **Shortcomings of present methods** The measures applied are supposed to be effective. The pathogen has never been detected in the exporting nurseries or on bonsai plants imported to the EU **Main uncertainties** – There is uncertainty about the surveillance for this pest and its possible vectors in the neighbourhood of the nurseries – It is uncertain whether the fungicide treatments may contribute to the eradication of the pathogen or not – It is uncertain whether the insecticide treatments fully prevent the spread of the pathogen by vectors or not

5%	Q1	M	Q3	95%
99.93%	99.96%	99.97%	99.98%	99.99%

5.4.6. *Lecanosticta acicola*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.95%; Q1: 99.96%; M: 99.97%; Q3: 99.97%; 95%: 99.98%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Lecanosticta acicola* is present in Japan. It cannot be excluded that bonsai plants in the nursery are infected by *L. acicola* either by: (1) introduction of new infected plants from (unregistered) nurseries; (2) introduction of spores from the surrounding environment by natural means; or (3) insects

5%	Q1	M	Q3	95%
99.95%	99.96%	99.97%	99.97%	99.98%

	Measures taken against the pest and their efficacy The applied measures are: (a) insecticide and fungicide treatments and soil treatment; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *L. acicola* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** No interceptions (1999–2018) **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *L. acicola*. **Main uncertainties** – It is uncertain whether the fungicide treatments contribute to the eradication of the pathogen or not

5.4.7. *Pseudocercospora pini-densiflorae*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.95%; Q1: 99.96%; M: 99.97%; Q3: 99.97%; 95%: 99.98%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Pseudocercospora pini-densiflorae* is present in Japan and can be associated with at least 36 *Pinus* species (Quintero, 2015). It cannot be excluded that bonsai plants in the nursery are infested by *P. pini-densiflorae* either by: (1) introduction of new infested plants from (unregistered) nurseries; (2) splash dispersal from the surrounding environment; or (3) growing media. The probability of an introduction from the surrounding area is considered to be low **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicides and soil treatments; (b) removal of symptomatic plants. These measures will greatly reduce the probability that *P. pini-densiflorae* is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** In imports of *Pinus* spp. bonsai plants from Japan to the EU over the period 1999–2018, *P. pini-densiflorae* has never been reported. *P. pini-densiflorae* use *Pinus parviflora* as a host **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *P. pini-densiflorae* **Main uncertainties** – There is uncertainty regarding surveillance for this pest in the neighbourhood of the nurseries – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments
Summary of the information used for the evaluation	*Pseudocercospora pini-densiflorae* is very similar to other foliar pathogens (*Dothistroma septosporum*, *Lecanosticta acicola*). *P. pini-densiflorae* is associated with *P. parviflora*. The period during which symptoms develop is well before the delivery time. The lack of interception data confirms that the probability of entry is low. Overall, the Panel considers that the likelihood for pest freedom in the case of *P. pini-densiflorae* is comparable to the other foliar pathogens cited above

5.4.8. *Crisicoccus pini*

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Very likely</td></tr>
<tr><td>Distribution of the likelihood of pest freedom</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>99.22%</td><td>99.40%</td><td>99.50%</td><td>99.60%</td><td>99.71%</td></tr></table></td></tr>
<tr><td>Summary of the information used for the evaluation</td><td>Possibility that the pest could enter exporting nurseries
It is not possible to exclude the possibility that bonsai plants in the nursery could be colonised by Crisicoccus pini either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating mealybugs from nearby forests

Measures taken against the pest and their efficacy
The applied measures are: (a) removal of mealybugs; (b) regular insecticide treatments. These measures are supposed to greatly reduce the probability that C. pini-attacked plants are present in consignments destined for export

Shortcomings of present methods
Crisicoccus pini can be difficult to detect due to their small size and concealed condition

Main uncertainties
– Effectiveness of insecticide treatments
– Location of export nurseries in relation to distance from pine forests
– Occurrence of local outbreaks in forests close to the nurseries</td></tr>
</table>

5.4.9. *Dendrolimus sibiricus*

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Extremely likely</td></tr>
<tr><td>Distribution of the likelihood of pest freedom</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>99.86%</td><td>99.91%</td><td>99.93%</td><td>99.95%</td><td>99.97%</td></tr></table></td></tr>
<tr><td>Summary of the information used for the evaluation</td><td>Possibility that the pest could enter exporting nurseries
It cannot be excluded that bonsai plants in the nursery are colonised by Dendrolimus spp. either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) oviposition by female moths immigrating from nearby forests

Measures taken against the pest and their efficacy
The applied measures are: (a) removal of larvae; (b) regular insecticide treatments. These measures will greatly reduce the probability that Dendrolimus-attacked plants are present in consignments destined for export

Interception records
There was one reported interception of D. spectabilis larvae on bonsai of P. thunbergii from Japan in 2018

Shortcomings of present methods
Dendrolimus spp. larvae are difficult to detect or to suppress with insecticides when they are dormant (winter period) on the lower part of the trunk and branches or in the upper soil layer

Main uncertainties:
– Effectiveness of insecticide treatment on dormant larvae
– Location of export nurseries in relation to the distance from pine forests
– Occurrence of local outbreaks in forests close to the nurseries</td></tr>
</table>

5.4.10. *Dendrolimus spectabilis*

The biology of *Dendrolimus spectabilis* was considered to be similar to that of *D. sibiricus.* The results of the evaluation can be found in Section 5.4.9.

5.4.11. *Monochamus alternatus*

For the evaluation of *Monochamus alternatus*, see Section 5.4.18.

5.4.12. *Pissodes nitidus*

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Almost certain</td></tr>
<tr><td>Distribution of the likelihood of pest freedom</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>99.985%</td><td>99.989%</td><td>99.991%</td><td>99.993%</td><td>99.995%</td></tr></table></td></tr>
<tr><td>Summary of the information used for the evaluation</td><td>Possibility that the pest could enter exporting nurseries
It cannot be excluded that bonsai plants in the nursery are colonised by Pissodes either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating beetles from nearby forests

Measures taken against the pest and their efficacy
The applied measures are: (a) removal of symptomatic plants; (b) regular application of insecticide treatments
These measures will greatly reduce the probability that Pissodes-attacked plants are present in consignments destined for export

Shortcomings of present methods
Pissodes attack can be difficult to detect in the early phase

Main uncertainties
– Effectiveness of insecticide treatments
– Location of export nurseries in relation to distance from pine forests
– Occurrence of local outbreaks in forests close to the nurseries</td></tr>
</table>

5.4.13. *Pissodes obscurus*

The biology of *Pissodes obscurus* was considered to be similar to that of *P. nitidus.* The results of the evaluation can be found in Section 5.4.12.

5.4.14. *Popillia japonica*

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Almost certain</td></tr>
<tr><td>Distribution of the likelihood of pest freedom</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>100.00%</td><td>100.00%</td><td>100.00%</td><td>100.00%</td><td>100.00%</td></tr></table></td></tr>
<tr><td>Summary of the information used for the evaluation</td><td>In theory, it is possible that Popillia japonica larvae and pupae are present in the soil or growing media used for potting bonsai plants. However, the treatments carried out at the nurseries are very effective: bonsai plants are repotted every year with pest-free growing media and roots are washed and immersed in MEP before export. These measures guarantee that potted plants are free from P. japonica</td></tr>
</table>

5.4.15. *Sirex nitobei*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.990%; Q1: 99.993%; M: 99.995%; Q3: 99.997%; 95%: 99.999%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by woodwasps either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating wasps from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of symptomatic plants; (b) regular application of insecticide treatments. These measures will greatly reduce the probability that woodwasp-attacked plants are present in consignments destined for export **Shortcomings of present methods** Woodwasp attack can be difficult to detect in the early phase **Main uncertainties** – Effectiveness of insecticide treatments – Location of export nurseries in relation to the distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

5.4.16. *Thecodiplosis japonensis*

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.973%; Q1: 99.983%; M: 99.987%; Q3: 99.991%; 95%: 99.994%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by *Thecodiplosis japonensis* either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating *T. japonensis* from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of galls; (b) regular application of insecticide treatments. These measures will greatly reduce the probability that *T. japonensis*-attacked plants are present in consignments destined for export **Shortcomings of present methods** *Thecodiplosis japonensis* galls can be difficult to detect due to their small size **Main uncertainties** – Effectiveness of the insecticide treatments – Location of export nurseries in relation to the distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

5.4.17. *Urocerus japonicus*

The biology of *Urocerus japonicus* was considered to be similar to that of *Sirex nitobei.* The results of the evaluation can be found in Section 5.4.15.

5.4.18. *Bursaphelenchus xylophilus*

Rating of the likelihood of pest freedom	*Bursaphelenchus xylophilus* (PWN): Very likely *Monochamus alternatus*: Almost certain
Distribution of the likelihood of pest freedom of PWN	5%: 99.06% · Q1: 99.42% · M: 99.60% · Q3: 99.74% · 95%: 99.88%
Distribution of the likelihood of pest freedom of *M. alternatus*	5%: 100.00% · Q1: 100.00% · M: 100.00% · Q3: 100.00% · 95%: 100.00% No uncertainties The possibility that *M. alternatus* is carried with bonsai plants destined for export to the EU is excluded. If larvae are present in the wood, plants would be immediately destroyed as their presence is an obvious symptom. Adults are not expected to be present on exported plants
Summary of the information used for the evaluation of PWN	**Probability that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infected by PWN either by: (1) introduction of new PWN-infected plants from (unregistered) nurseries; or (2) maturating feeding of PWN-infected *M. alternatus* beetles immigrating from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of symptomatic plants; (b) removal of plants with feeding scars; and (c) regular insecticide treatments. These measures will greatly reduce the probability that PWN-infected plants are present among bonsai destined for export **Interception records** So far (1999–2018), the nematode has never been intercepted on bonsai plants of *P. parviflora*. However, it should be noted that *P. parviflora* is a poor host for PWN, while *P. thunbergii* is a highly susceptible host. In exports to Turkey, around 10% of the plants were discarded, including wilting plants (i.e. potentially PWN-infected). It is unknown how many of these discarded plants were really PWN-infected and therefore the percentage of asymptomatic PWN-infected plants is unknown **Shortcomings of present methods** Asymptomatic plants are not tested so PWN-infected plants may remain undetected. Such infections can potentially originate from infected plants introduced into the export nursery. It is uncertain whether the insecticide treatments can fully prevent the maturation feeding activity of PWN-infected *M. alternatus* beetles immigrating from the environment The possibility that *M. alternatus* is carried with bonsai plants destined for export to the EU is excluded: the presence of larvae in the wood would be immediately detected as an obvious symptom and the plants would be destroyed **Main uncertainties** – The frequency of nematode infections of *M. alternatus* in the area surrounding the export nurseries is not known – The location of export nurseries in relation to the distance from forests hosting PWN and *M. alternatus* is not known – The effectiveness of insecticide applications in preventing maturation feeding and transmission of PWN is not known – Inspections that focus on feeding scars of *M. alternatus* may fail to detect these symptoms – The percentage of asymptomatic PWN-infected plants is not known

5.4.19. *Xiphinema americanum* Cobb. *sensu lato*

Rating of the likelihood of pest freedom	Very likely
Distribution of the likelihood of pest freedom	5%: 99.36% · Q1: 99.57% · M: 99.71% · Q3: 99.82% · 95%: 99.93%

Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Xiphinema americanum sensu lato* is present in Japan. Another species, which belongs to the same species complex, *X. incognitum*, has been described in Japan. There are no regular surveys for *Xiphinema* spp. in Japan. Species belonging to this genus have broad host ranges, especially trees, so members of the *X. americanum s.l.* species complex may be present on *P. thunbergii* bonsai plants imported to the exporting nurseries **Measures taken against the pest and their efficacy** Repotting plants imported to the exporting nursery in heat-treated soil may not remove nematodes feeding inside the root ball. Washing with water jets may not be a very effective measure either in removing nematodes strongly attached to roots. Immersion of washed roots in nematicide only immobilise the pest temporarily. Symptoms of root damage from these nematodes develop slowly and may go unnoticed at the time of export and during post-export quarantine **Interception records** During the imports of bonsai plants of *P. parviflora* to the EU between 1999 and 2018, *X. americanum s.l.* was intercepted on three occasions (0.002%) and *Xiphinema* spp. on eight occasions (0.006%) out of 127,525 plants (EUROPHYT, online) **Shortcomings of present methods** *Xiphinema* spp. are not visible to the naked eye and will go unnoticed during inspections. They are difficult to get rid of because they are strongly attached to the roots and are only temporarily immobilised by the nematicides applied. Damage can take many years to develop **Main uncertainties** – The frequency of the pest on plants imported to the nursery is unknown – Washing the roots is of unclear efficacy – Treatment with MEP may only have a temporary effect Development of symptoms is slow and unspecific

The results of the evaluation of the currently proposed risk mitigation measures for bonsai of *P. thunbergii* designated for export to the EU are summarised in Table 9. Some of the pests can currently theoretically enter the EU with bonsai of *P. parviflora.* The association of the selected pest with *P. parviflora* is reported in Table 7.

Table 9 and Figure 3 show a comparison of the likelihood of the pest freedom after the evaluation of the currently proposed risk mitigation measures for bonsai of *P. thunbergii* designated for export to the EU for all evaluated pests.

Table 9: Conclusion on the likelihood of the pest freedom after the evaluation of the currently proposed risk mitigation measures for bonsai of *Pinus thunbergii* designated for export to the EU. The median value is indicated by'M' and the 90% uncertainty range is indicated by'x'. For more information on pest freedom categories see Table 2

Number	Group*	Pest species	Pest Freedom (PF) Category							
			Almost certain	Extremely likely	Very likely	Likely	Moderately likely	Unlikely	Very unlikely	Extremely unlikely
1	FUN	*Coleosporium asterum*		xM	x					
2	FUN	*Coleosporium phellodendri*		xM	x					
3	FUN	*Cronartium orientale*		x	Mx					
4	FUN	*Dothistroma septosporum*	xMx							
5	FUN	*Fusarium circinatum*	xM	x						
6	FUN	*Lecanosticta acicola*	xMx							
7	FUN	*Pseudocercospora pini-densiflorae*	xMx							
8	INS	*Crisicoccus pini*			xM	x				
9	INS	*Dendrolimus sibiricus*	x	M	x					
10	INS	*Dendrolimus spectabilis*	x	M	x					
11	INS	*Monochamus alternatus*	xMx							
12	INS	*Pissodes nitidus*	xMx							
13	INS	*Pissodes obscurus*	xMx							
14	INS	*Popillia japonica*	xMx							
15	INS	*Sirex nitobei*	xMx							
16	INS	*Thecodiplosis japonensis*	xMx							
17	INS	*Uroceros japonicus*	xMx							
18	NEM	*Bursaphelenchus xylophilus* (PWN)			xM	x				
19	NEM	*Xiphinema americanum sensu lato*		x	M	x				

Pest Freedom (PF) Category		Probability of pest freedom
1	Almost certain	99.95% - 100%
2	Extremely likely	99.90% - 99.95%
3	Very likely	99.5% - 99.9%
4	Likely	99.0% - 99.5%
5	Moderate likely	95% - 99%
6	Unlikely	90% - 95%
7	Very unlikely	50% - 90%
8	Extremely unlikely	0% - 50%

Legend for the elicited PF categories	
xMx	Elicited PF category includes Median (M) and both ranges (x)
Mx	Elicited PF category includes Median (M) and right range (x)
xM	Elicited PF category includes Median (M) and left range (x)
x	Elicited PF category for left or right range (x)

*: FUN: fungi; INS: insect; NEM: nematode.

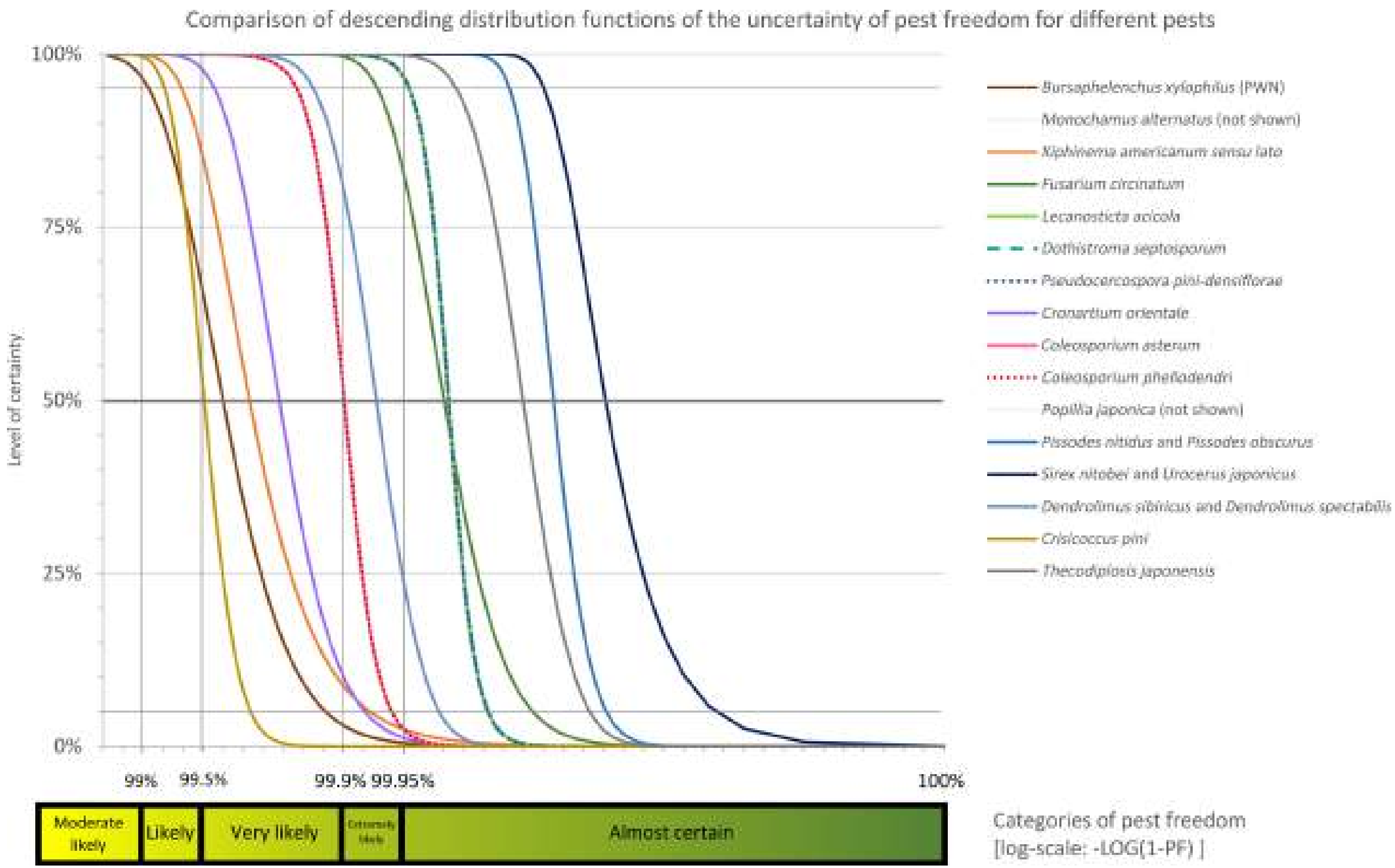


Figure 3: Comparison of the likelihood of pest freedom after the evaluation of the currently proposed risk mitigation measures for bonsai of *Pinus thunbergii* designated for export to the EU for all evaluated pests visualised as descending distribution function

6. Conclusions

There are 19 pests identified to be present in Japan and considered to be likely to be associated with bonsai of *P. thunbergii.* For these pests, the likelihood of the pest freedom after the evaluation of the currently proposed risk mitigation measures for bonsai of *P. thunbergii* designated for export to the EU was estimated. The associated uncertainty was expressed using the 90% uncertainty range.

There are four pests for which the likelihood of the pest freedom was estimated as 'Very likely' with the 90% uncertainty range reaching from 'Very likely' to 'Likely' (*Crisicoccus pini* and *Bursaphelenchus xylophilus*), from 'Extremely likely' to 'Likely' (*Xiphinema americanum sensu lato* non-European populations) and from 'Extremely likely' to 'Very likely' (*Cronartium orientale*).

There are four pests for which the likelihood of the pest freedom was estimated as 'Extremely likely' with the 90% uncertainty range reaching from 'Extremely likely' to 'Very likely' (*Coleosporium asterum* and *Coleosporium phellodendri*) and from 'Almost certain' to 'Very likely' (*Dendrolimus sibiricus* and *Dendrolimus spectabilis*).

There is one pest (*Fusarium circinatum*) for which the likelihood of the pest freedom was estimated as 'Almost certain' with the 90% uncertainty range reaching from 'Almost certain' to 'Extremely likely'.

For the remaining 10 pests (*Dothistroma septosporum, Lecanosticta acicola, Pseudocercospora pini-densiflorae, Monochamus alternatus, Pissodes nitidus, Pissodes obscurus, Popillia japonica, Sirex nitobei, Thecodiplosis japonensis* and *Urocerus japonicus*), the likelihood of the pest freedom was estimated within the 90% uncertainty range as 'Almost certain'.

For all 19 evaluated pests, the median likelihood of the pest freedom is 99.5% or higher and within the 90% uncertainty range it is 99% or higher.

Apart from the 19 evaluated pests, there are 16 species (*Endocronartium sahoanum* var. *hokkaidoense, Ganoderma neo-japonicum, Onnia orientalis, Acantholyda nipponica, Aspidiotus cryptomeriae, Basilepta pallidula, Cephalcia variegata, Contarinia matsusintome, Diprion nipponica, Eulachnus thunbergii, Glaucias subpunctatus, Hemiberlesia pitysophila, Matsucoccus matsumurae, Nesodiprion japonicus, Rhyacionia dativa* and *Rhyacionia duplana*) for which the current available evidence provides no reason to select them for further evaluation in this opinion. However, there is limited information available for these 16 species that belong to a genus with pests with reported impact. Therefore, a literature monitoring for these pests is suggested and if more information becomes available this could trigger a re-evaluation of this opinion.

Documentation provided to EFSA

1) Request to provide a scientific opinion on the request from Japan regarding the export of black pine bonsai to the EU. SANTE.GI/MM/as (2017) 4927364. 22/09/2017. Submitted by the European Commission, Directorate-General for Health and Food Safety.
2) Letter from the Japanese Authority on additional information on the request for lifting a ban on export of *P. thunbergii* bonsai plants for the EU addressed to the Directorate-General for Health and Food Safety. Dated 21 April 2017 (Annex 1).
3) Letter from the Japanese Authority on the provision of additional information regarding the request for lifting a ban on export of *Pinus thunbergii* bonsai for the EU addressed to the Directorate-General for Health and Food Safety. Dated 30 June 2017 (Annex 2).
4) Letter from the Japanese Authority on the provision of additional information regarding the request for lifting a ban on the export of Japanese *Pinus thunbergii* bonsai plants to the EU addressed to EFSA. Dated 31 July 2018.
5) Additional information regarding the request for lifting a ban on the export of Japanese *Pinus thunbergii* bonsai plants to the EU provided by the Japanese Authority addressed to EFSA. Dated 9 November 2018.
6) Letter from the Japanese Authority on technical information on Japanese *Pinus thunbergii* bonsai plants addressed to EFSA. Dated 14 December 2018.

References

Alan Wood's Website, online. Compendium of pesticide common names. Available online: http://www.alanwood.net/pesticides/index_cn_frame.html

Bezos D, Martínez-Álvarez P, Sanz-Ros AV, Martín-García J, Fernandez MM and Diez JJ, 2018. Fungal communities associated with bark beetles in *Pinus radiata* plantations in Northern Spain affected by pine pitch canker, with special focus on *Fusarium* species. Forests, 9, 698. https://doi.org/10.3390/f9110698

Boselli M and Pellizzari G, 2016. First record of the Kuwana pine mealybug *Crisicoccus pini* (Kuwana) in Italy: a new threat to Italian pine forests? Zootaxa, 4083, 293–296. https://doi.org/10.11646/zootaxa.4083.2.8

Brown AV and Webber JF, 2008. Red band needle blight of Conifers in Britain. Forestry Commission Research Note 002. Forestry Commission, Edinburgh. Available online: https://www.forestry.gov.uk/PDF/fcrn002.pdf/$FILE/fcrn002.pdf

CABI (Centre for Agriculture and Bioscience International), online_a. CABI Crop Protection Compendium. Available online: https://www.cabi.org/cpc/ [Accessed: 26 November 2018]

CABI (Centre for Agriculture and Bioscience International), online_b. *Mycosphaerella pini*. CABI Invasive Species Compendium, 41 pp. Available online: https://www.cabi.org/ISC/datasheet/49059 [Accessed: 4 February 2019]

CABI (Centre for Agriculture and Bioscience International), online_c. *Gibberella circinata* (pitch canker), CABI Invasive Species Compendium, 36 pp. Available online: https://www.cabi.org/isc/datasheet/25153 [Accessed: 4 February 2019]

Cho WD and Shin HD (eds)., 2004. List of plant diseases in Korea. Korean Society of Plant Pathology, Suwon. p. 779.

Cohn E, 1970. Observations on the Feeding and Symptomatology of *Xiphinema* and *Longidorus* on Selected Host Roots. Journal of Nematology, 2, 167–173.

DEFRA (Department for Environment, Food and Rural Affairs), online. UK Plant Health Risk Register. Details for *Crisicoccus pini* – Updated 2018. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?cslref=27689

Department of Agriculture and Water Resources, 2018. Draft group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports. Canberra, Department of Agriculture and Water Resources, 211 pp. Available online: http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk-analysis/group-pest/draft-mealybugs-report.pdf

Dwinell LD, 1978. Susceptibility of southern pines to infection by *Fusarium moniliforme* var. *subglutinans*. Plant Disease Reporter, 62, 108–111.

Dwinell LD, Barrows-Braddus JB and Kuhlman EG, 1985. Pitch canker: a disease complex of southern pines. Plant Disease, 69, 270–276.

EFSA PLH Panel (EFSA Panel on Plant Health), 2010. Risk assessment of *Gibberella circinata* for the EU territory and identification and evaluation of risk management options. EFSA Journal 2010;8(6):1620, 93 pp. https://doi.org/10.2903/j.efsa.2010.1620

EFSA PLH Panel (EFSA Panel on Plant Health), 2013. Scientific Opinion on the risk to plant health posed by Dothistroma septosporum (Dorog.) M. Morelet (Mycosphaerella pini E. Rostrup, syn. Scirrhia pini) and Dothistroma pini Hulbary to the EU territory with the identification and evaluation of risk reduction options. EFSA Journal 2013;11(1):3026, 173 pp. https://doi.org/10.2903/j.efsa.2013.3026

EFSA PLH Panel (EFSA Panel on Plant Health), 2017. Scientific opinion on the pest categorisation of *Pseudocercospora pini-densiflorae*. EFSA Journal 2017;15(10):5029, 27 pp. https://doi.org/10.2903/j.efsa.2017.5029

EFSA PLH Panel (EFSA Panel on Plant Health), 2018a. Guidance on quantitative pest risk assessment. EFSA Journal 2018;16(8):5350, 86 pp. doi:10.2903/j.efsa.2018.5350

EFSA PLH Panel (EFSA Panel on Plant Health), 2018b. Scientific Opinion on the pest categorisation of *Cronartium* spp. (non-EU). EFSA Journal 2018;16(12):5511, 30 pp. https://doi.org/10.2903/j.efsa.2018.5511

EFSA PLH Panel (EFSA Panel on Plant Health), 2018c. Scientific opinion on pest categorisation of *Dendrolimus sibiricus*. EFSA Journal 2018;16(6):5301, 29 pp. https://doi.org/10.2903/j.efsa.2018.5301

EFSA PLH Panel (EFSA Panel on Plant Health), 2018d. Scientific Opinion on the pest categorisation of non-EU *Pissodes* spp. EFSA Journal 2018;16(6):5300, 29 pp. https://doi.org/10.2903/j.efsa.2018.5300

EFSA PLH Panel (EFSA Panel on Plant Health), 2018e. Scientific Opinion on the pest categorisation of *Popillia japonica*. EFSA Journal 2018;16(11):5438, 30 pp. https://doi.org/10.2903/j.efsa.2018.5438issn:1831-4732

EFSA PLH Panel (EFSA Panel on Plant Health), 2018f. Scientific Opinion on the pest categorisation of non-EU *Monochamus* spp. EFSA Journal 2018;16(11):5435, 35 pp. https://doi.org/10.2903/j.efsa.2018.5435

EFSA PLH Panel (EFSA Panel on Plant Health), 2019. Guidance on commodity risk assessment for the evaluation of high risk plants dossiers. EFSA Journal 2019;17(4):5668, 20 pp. https://doi.org/10.2903/j.efsa.2019.5668

EFSA Scientific Committee, 2018. Scientific Opinion on the principles and methods behind EFSA's Guidance on Uncertainty Analysis in Scientific Assessment. EFSA Journal 2018;16(1):5122, 235 pp. https://doi.org/10.2903/j.efsa.2018.5122

EPPO, 2004. Mini data sheet on *Dendrolimus spectabilis*. 1 p. Available online: https://gd.eppo.int/download/doc/1062_minids_DENDSC.pdf

EPPO (European and Mediterranean Plant Protection Organization), 2009. Report of a Pest Risk Analysis for *Bursaphelenchus xylophilus*, 09/15449. 63 pp. Available online: https://pra.eppo.int/getfile/e575b4b0-3f6c-4195-9245-0b630d57dc58

EPPO (European and Mediterranean Plant Protection Organization), 2016. PM 9/21(1) *Popillia japonica*: procedures for official control. EPPO Bulletin, 46, 543–555. https://doi.org/10.1111/epp.12345

EPPO (European and Mediterranean Plant Protection Organization), 2017. PM 7/95(2). *Xiphinema americanum sensu lato*. EPPO Bulletin, 47, 198–210. https://doi.org/10.1111/epp.12382

EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO Global Database. Available online: https://www.eppo.int/[Accessed: 26 November 2018]

EPPO (European and Mediterranean Plant Protection Organization), online_b. *Cronartium kamtschaticum* (CRONKA), EPPO Global Database. Available online: https://gd.eppo.int/taxon/CRONKA [Accessed: 20 March 2019]

EPPO (European and Mediterranean Plant Protection Organization), online_c. *Cronartium quercuum* - Data Sheets on Quarantine Pests. 5 pp. Available online: https://gd.eppo.int/download/doc/73_datasheet_CRONQU.pdf [Accessed: 26 November 2018]

EPPO (European and Mediterranean Plant Protection Organization), online_d. *Lecanosticta acicola* (SCIRAC), EPPO Global Database. Available online: https://gd.eppo.int/taxon/SCIRAC/hosts [Accessed: 12 March 2019]

EPPO (European and Mediterranean Plant Protection Organization), online_e. *Monochamus alternatus* (MONCAL), EPPO Global Database. Available online: https://gd.eppo.int/taxon/MONCAL [Accessed 21 March 2019]

EPPO (European and Mediterranean Plant Protection Organization), online_f. *Bursaphelenchus xylophilus* (BURSXY), EPPO Global Database. Available online: https://gd.eppo.int/taxon/BURSXY/distribution [Accessed: 12 March 2019]

Eschen R, Douma JC, Grégoire JC, Mayer F, Rigaux L and Potting RPJ, 2017. A risk categorisation and analysis of the geographic and temporal dynamics of the European import of plants for planting. Biological Invasions, 19, 3243–3257. https://doi.org/10.1007/s10530-017-1465-6

European Commission, 2008. Final report of a mission carried out in Japan from 4 November to 13 November 2008 in order to evaluate the system of official controls and the certification of bonsai type plants for export to the European Union. 28 pp. Available online: http://ec.europa.eu/food/fvo/act_getPDF.cfm?PDF_ID=7274

EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT. Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 14 January 2019]

Evans HC, 1984. The genus *Mycosphaerella* and its anamorphs *Cercoseptoria*, *Dothistroma* and *Lecanosticta* on pines. Mycological Paper, 153, 1–102.

Evans HF, McNamara DG, Braasch H, Chadoeuf J and Magnusson C, 1996. Pest Risk Analysis (PRA) for the territories of the European Union (as PRA area) *on Bursaphelenchus xylophilus* and its vectors in the genus *Monochamus*. EPPO Bulletin, 26, 199–249.

FABI (Forestry and Agricultural Biotechnology Institute), online. Sirex literature. University of Pretoria. Available online: https://fabinet.up.ac.za/index.php/sirex-literature

FAO (Food and Agriculture Organization of the United Nations), 2016. ISPM (International standards for phytosanitary measures) No. 36. Integrated measures for plants for planting. FAO, Rome, 22 pp. Available online: https://www.ippc.int/en/publications/636/

FAO (Food and Agriculture Organization of the United Nations), 2017. ISPM (International standards for phytosanitary measures) No. 5. Glossary of phytosanitary terms. FAO, Rome. Available online: https://www.ippc.int/en/publications/622/

Farr DF and Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: https://nt.ars-grin.gov/fungaldatabases/ [Accessed: 9 November 2018]

Futai K, 2008. Pine Wilt in Japan: From First Incident to the Present. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T (eds). Pine Wilt Disease. Springer, Tokyo. pp. 5–12.

Gadgil PD, 1970. Survival of *Dothistroma pini* on fallen needles of *Pinus radiata*. New Zealand Journal of Botany, 8, 303–309.

Gordon TR, Storer AJ and Wood DL, 2001. The pitch canker epidemic in California. Plant Disease, 85, 1128–1139.

Halbrendt JM and Brown DJF, 1993. Aspects on biology and development of *Xiphinema americanum* and related species. Journal of Nematology, 25, 355–360.

Halik S and Bergdahl DR, 1992. Survival and infectivity of *Bursaphelenchus xylophilus* in wood chip-soil mixtures. Journal of Nematology, 24, 495–503.

Hama T, 1987. Studies on the important rust diseases of some conifers in the central mountainous region of Japan. Bulletin of the Forestry and Forest Products Research Institute, 343, 1–118.

Hansen EM and Lewis KJ, 1997. Compendium of Conifer diseases. American Phytopathological Society. APS Press, St Paul, USA. 101 pp.

Haydock PPJ, Woods SR, Grove IG and Hare MC, 2013. Chemical Control of Nematodes. In: Perry NR and Moens M (eds). Plant Nematology, 2nd edition. CAB International Gutenberg Press Ltd., Malta. pp. 459–479.

Henk DA, Farr DF and Aime MC, 2011. *Mycodiplosis* (Diptera) infestation of rust fungi is frequent, wide spread and possibly host specific. Fungal Ecology, 4, 284–289. https://doi.org/10.1016/j.funeco.2011.03.006

Hernandez-Escribano L, Iturritxa E, Aragonés A, Mesanza N, Berbegal M, Raposo R and Elvira-Recuenco M, 2018. Root infection of canker pathogens, *Fusarium circinatum* and *Diplodia sapinea*, in asymptomatic trees in *Pinus radiata* and *Pinus pinaster*. Forests, 9, 128. https://doi.org/10.3390/f9030128

Hiratsuka N, 1944. Melampsoracearum Nipponicarum (contributions to the rust-flora of eastern Asia). Memoirs of the Tottori Agricultural College, 7, 91–273.

Hiratsuka N, Sato S, Katsuya K, Kakishima M, Hiratsuka Y, Kaneko S, Ono Y, Sato T, Harada Y, Hiratsuka T and Nakayama K, 1992. The rust flora of Japan. Tsukuba Shuppankai Takezono, Ibaraki Japan, 1,205 pp.

Hirt RR, 1936. The progress of blister rust in planted Northern white pine. Journal of Forestry, 34, 506–511.

Hodge GR and Dvorak WS, 2000. Differential responses of Central American and Mexican pine species and *Pinus radiata* to infection by the pitch canker fungus. New Forests, 19, 241–258.

Hulbary RL, 1941. A needle blight of Austrian pines. Illinois Natural History Survey Bulletin, 21, 231–236.

Hunt R, 1997. Stem rusts. In: Hansen EM and Lewis KJ (eds.). Compendium of conifer diseases. American Phytopathological Society, St. Paul, Minnesota, USA. p. 26.
Index Fungorum, online. Index fungorum. Available online: www.indexfungorum.org [Accessed: 20 March 2019]
Ito S and Homma Y, 1938. Notae mycologicae Asiae orientalis. III. Transactions of the Sapporo Natural History Society, 15, 113–128.
Ivory MH, 1977. Preliminary investigations of the pests of exotic forest trees in Zambia. Commonwealth Forestry Review, 56, 47–56.
Ivory MH, 1987. Diseases and disorders of pines in the tropics: a field and laboratory manual. Overseas Research Publication No. 31, Overseas Development Administration, Oxford Forestry Institute, Oxford, UK. 92 pp.
Jankovský LM, Bednářová M and Palovčiková D, 2004. *Dothistroma* needle blight *Mycosphaerella pini* E. Rostrop, a new quarantine pathogen of pines in the Czech Republic. Journal of Forest Science, 50, 319–326.
Jankovský L, Palovčíková D and Tomšovský M, 2009. Records of brown spot needle blight related to *Lecanosticta acicola* in the Czech Republic. Plant Protection Science, 45, 16–18.
Jin L, 1989. *Pissodes nitidus* Roelofs, the yellow-spotted pine weevil (*Coleoptera: Curculionidae*): a serious pest of Korean pine plantations in northeast China. In: Alfaro RI and Glover SG (eds.). Insects affecting reforestation: biology and damage. Forestry Canada, Pacific Forestry Centre, Victoria, British Columbia. pp. 186–193.
Kamata N, 2002. Outbreaks of forest defoliating insects in Japan 1950-2000. Bulletin of Entomological Research, 92, 109–117.
Kaneko S, 1981. The species of *Coleosporium*, the causes of pine needle rusts, in the Japanese Archipelago. Reports of the Tottori Mycological institute, 19 pp.
Kaneko S, 2000. *Cronartium orientale*, sp. nov., segregation of the pine gall rust in eastern Asia from *Cronartium quercuum*. Mycoscience, 41, 115–122. https://doi.org/10.1007/BF02464319
Kaneko S, Pham TQ and Hiratsuka Y, 2007. Notes on some rust fungi in Vietnam. Mycoscience, 48, 263–265.
Karadžić D and Milijašević T, 2008. The most important parasitic and saprophytic fungi in Austrian pine and scots pine plantations in Serbia. Bulletin of the Faculty of Forestry, 97, 147–170.
Kishi Y, 1995. The pine wood nematode and the Japanese pine sawyer. Thomas Company Ltd., Futaba Prints, Tokyo. p. 302.
Kishi K, 1998. Plant Diseases in Japan. Zenkoku Noson Kyoiku Kyokai, Tokyo. 1,276 pp.
Kobayashi T, 2007. Index of fungi inhabiting woody plants in Japan. Host, Distribution and Literature. Zenkoku-Noson-Kyoiku Kyokai Publishing Co., Tokyo, Japan. 1,227 pp.
Kobayashi F and Taketani A, 1994. Forest insects. Tokyo, Youkendo, 567 pp.
Kobayashi F, Yamane A and Ikeda T, 1984. The Japanese Pine Sawyer Beetle as the Vector of Pine Wilt Disease. Annual Review of Entomology, 29, 115–135.
Kondo H, 1975. Studies on eastern gall rust of pines (*Cronartium quercuum* (Berk.) Miyabe ex Shirai), with special references to the life cycle, the infection period to pines, and pathogenic variability to alternate hosts of the causal fungus. Ibaraki Prefectural Forest Experiment Station Bulletin, 8, 1–107.
Kononov A, Ustyantsev K, Wang B, Mastro VC, Fet V, Blinov A and Baranchikov Y, 2016. Genetic diversity among eight *Dendrolimus* species in Eurasia (Lepidoptera: Lasiocampidae) inferred from mitochondrial COI and COII, and nuclear ITS2 markers. BMC Genetics, 17,157, 173–191. https://doi.org/10.1186/s12863-016-0463-5
Kottek M, Grieser J, Beck C, Rudolf B and Rubel F, 2006. World map of Köppen- Geiger climate classification updated. Meteorologische Zeitschrift, 15, 259–263.
Kusunoki M, Kanegae Y, Fujita K, Ri I, Kitahama I, Muraguchi H, Sano Y, Fujimura T and Kozai T, 2017. Survey of needle rust and Asian pine gall rust occurrence risk on Japanese black pine (*Pinus thunbergii*) at bonsai production areas in Kagawa Prefecture. Tree and Forest Health, 21, 8–12. https://doi.org/10.18938/treeforesthealth.21.1_8
Lamberti F and Bleve-Zacheo T, 1979. Studies on *Xiphinema americanum sensu lato* with descriptions of fifteen new species (Nematoda: Longidoridae). Nematologia Mediterranea, 7, 51–106.
Lowe DP, 1972. Needle rust of lodgepole pine. Forest Insect and Disease Survey pest Leaflet no. 41. May 1972. Pacific Forest Research Centre, Canadian Forestry Service, Victoria British Columbia. 7 pp.
MAFF (Ministry of Agriculture, Forestry and Fisheries of Japan), online. New occurrence notification of the area-wide pest surveillance. [Database]. Available online: http://www.maff.go.jp/j/syouan/syokubo/boujyo/120104_yoho.html
Malek RB, 1969. Population fluctuations and observations of the life cycle of *Xiphinema americanum* associated with cottonwood (*Populus deltoides*) in South Dakota. Proceedings of the Helminthological Society of Washington, 36, 270–274.
Malek RB and Appleby JE, 1984. Epidemiology of pine wilt in Illinois. Plant Disease, 68, 180–186.
Mamiya Y, 1983. Pathology of the pine wilt disease caused by *Bursaphelenchus xylophilus*. Annual Review of Phytopathology, 21, 201–220.
Mamiya Y, 1984. The pine wood nematode. In: Nickle WR (ed). Plant and Insect Nematodes. Marcel Dekker, New York, USA. pp. 589–626.
Mamiya Y, 1988. History of pine wilt disease in Japan. The Journal of Nematology, 20, 219–226.

Nakamura-Matori K, 2008. Vector-Host Tree Relationships and the Abiotic Environment. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T (eds.). Pine Wilt Disease. Springer Japan, Tokyo. pp. 144–161. https://doi.org/10.1007/978-4-431-75655-2

NARO (National Agriculture and Food Research Organization), online. Database of Plant Diseases in Japan. NARO Genebank Project. Available online: http://www.gene.affrc.go.jp/databases-micro_pl_diseases.php

Pehl L, 1995. *Lecanosticta*-needle blight - a new disease on pine in the Federal Republic of Germany. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes, 47, 305–309.

Pehl L and Wulf A, 2001. Mycosphaerella-needle fungi on pines—symptoms, biology and differential diagnosis. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes, 53, 217–222.

Quintero TG, 2015. New pest response guidelines. Pseudocercospora pini-densiflorae (Hori & N. Nambu) Deighton. Brown Needle Fungus. USDA, Forest Service. p. 91.

Rural Culture Association Japan, 2008. Colour atlas of nursery stock pests in Japan. Tokyo. 585 pp. [in Japanese].

Rural Culture Association Japan, online. Pests and weeds [Database, in Japanese]. Available online: http://www.boujo.net/

Sansford C, 2015. Pest Risk Analysis for *Coleosporium asterum*. Forestry Commission. Version 5 from 23 April 2015, 46 pp. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4047

Shishida Y, 1983. Studies of Nematodes Parasitic on Woody Plants 2. Genus *Xiphinema* Cobb, 1913. Japanese Journal of Nematology, 12, 1–14.

Siddiqi MR, 1973. *Xiphinema americanum*. C. I. H. Descriptions of plant-parasitic nematodes. Set 2, no. 29, Wallingford, CAB international, 4 pp.

Siggers PV, 1944. The brown spot needle blight of pine seedlings. USDA Technical Bulletin, 870, 1–36.

Sinclair WA, Lyon HH and Johnson WT, 1987. Diseases of trees and shrubs. Cornell University Press, Ithaca, New York, USA. p. 574.

Singh S, Khan SN and Misra BM, 1988. Cercoseptoria needle blight of pines in nurseries: disease spread and control strategies. Forest Pathology, 18, 397–400.

Skilling DD and Nicholls TH, 1974. Brown spot needle disease - biology and control in Scotch pine plantations. USDA Forest Service Research Paper, No. NC-109, 19 pp.

Smith IM, McNamara DG, Scott PR and Holderness M, 1997. Quarantine pests for Europe. 2nd Edition. Data sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization. CABI, Wallingford, GB, 1425 pp.

Sousa E, Naves P, Bonifacio L, Henriques J, Inacio ML and Evans H, 2011. Assessing risks of pine wood nematode *Bursaphelenchus xylophilus* transfer between wood packaging by simulating assembled pallets in service. EPPO Bulletin, 41, 423–431.

Spaulding P, 1961. Foreign diseases of forest trees of the world. US Agricultural Research Service, Agriculture Handbook, 197, 1–361.

Storer AJ, Gordon TR, Wood DL and Bonello P, 1997. Pitch canker disease of pines: current and future impacts. Journal of Forestry, 95, 21–26.

Sullivan M, 2016. CPHST (Center for Plant Health Science and Technology) Pest Datasheet for *Pseudocercospora pini-densiflorae*. USDA-APHISPPQ-CPHST, Raleigh, North Carolina, USA. 10 pp.

Sundheim L, Økland B, Magnusson C, Solberg B and Rafoss T, 2010. Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway – Part 2. Opinion of the Plant Health Panel of the Scientific Committee for Food Safety, 08/906-6_final, ISBN 978-82-8259-002-0 (Electronic edition). 21 pp.

Swett CL and Gordon TR, 2012. First report of grass species (Poaceae) as naturally occurring hosts of the pine pathogen *Gibberella circinata*. Plant Disease, 96, 908 pp.

Swett CL and Gordon TR, 2017. Exposure to a pine pathogen enhances growth and disease resistance in *Pinus radiata* seedlings. Forest Pathology, 47, 1–10.

Takeda A, Shito T, Kato M, Hisaka H and Shibata T, 2015. Control of the dagger nematode *Xiphinema brevicolle* (Dorylaimida: Longidoridae) in wrapped root balls of the Japanese holly *Ilex crenata* (Celastrales: Aquifoliaceae) by drenching in a fenitrothion or benomyl solution. Nematological Research, 14, 27–33. https://doi.org/10.3725/jjn.45.27

Takeuchi Y, 2008. Host Fate Following Infection by the Pine Wood Nematode. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T (eds.). Pine Wilt Disease. Springer, Tokyo, Japan. pp. 235–249.

Thomas PR, 1970. Host status of some plants for *Xiphinema diversicaudatum* (Micol.) and their susceptibility to viruses transmitted by this species. Annals of Applied Biology, 65, 169–178.

Umeya K and Okada T, 2003. Agricultural Insect Pests in Japan. Zenkoku Noson Kyoiku Kyokai, Tokyo, Japan. 1203 pp. [in Japanese].

USDA (United States Department of Agriculture), online. US National Fungus Collections Databases. Available online: https://nt.ars-grin.gov/sbmlweb/fungi/databases.cfm [Accessed: 26 November 2018]

Venette RC (ed.)., 2008. Exotic Pine Pests: Survey Reference. Cooperative Agriculture Pest Survey (CAPS). USDA Forest Service, St. Paul, Minnesota, USA.

VKM (Norwegian Scientific Committee for Food Safety), 2008. Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway - Part 1. Opinion of the Panel on Plant Health of the Norwegian Committee of Food Safety, 08/906-4 Final, ISBN 978-82-8082-271-0. VKM, Oslo, Norway, 48 pp.

VKM (Norwegian Scientific Committee for Food and Environment), 2018.Pest risk assessment of *Dendrolimus sibiricus* and *Dendrolimus superans*. Opinion of the Panel on Plant Health of the Norwegian Scientific Committee for Food and Environment. VKM report 2018:08, Norwegian Scientific Committee for Food and Environment (VKM), Oslo, Norway, 69 pp.

Working Group on the Annexes of Council Directive 2000/29/EC, 2016. Recommendation of the Working Group on the Annexes of Council Directive 2000/29/EC – Section II – Listing of Harmful Organisms as regards the future listing of *Scirrhia acicola*. 2 pp. Available online: https://planthealthportal.defra.gov.uk/assets/uploads/2.1-Mycosphaerella-dearnessii-Scirrhia-acicola.pdf

Zambino PJ, 2010. Biology and pathology of *Ribes* and their implications for management of white pine blister rust. Forest Pathology, 40, 264–291.

Zhuang WY (ed.)., 2001. Higher Fungi of Tropical China. Mycotaxon Ltd, Ithaca, New York, USA. p. 485.

Zhuang WY (ed.)., 2005. Fungi of northwestern China. Mycotaxon Ltd, Ithaca, New York, USA. p. 430.

Glossary

Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2017).
MEP	Fenitrothion (the name 'MEP' is approved by the Japanese Ministry of Agriculture, Forestry and Fisheries – see Alan Wood's Website, online).
Pathway	Any means that allows the entry or spread of a pest (FAO, 2017).
Protected zone	A protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union.
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017).
Risk mitigation measure	See definition of risk reduction option.
Risk reduction option (RRO)	A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager

Abbreviations

CABI	Centre for Agriculture and Bioscience International
EKE	expert knowledge elicitation
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
FUN	fungi
INS	insect
ISPM	International Standards for Phytosanitary Measures
ISEFOR Database	Database developed within the FP7 Project 'Increasing Sustainability of European Forests: Modelling for Security Against Invasive Pests and Pathogens under Climate Change'
MAFF	Ministry of Agriculture, Forestry and Fisheries of the Government of Japan
NEM	nematode
PLH	Plant Health
PLN	plant
RRO	risk reduction option

Appendix A – Specific conditions applying to plants, originating in Japan, benefiting from the derogation provided for in Article 1 of Commission Decision 2002/887/EC

1) The plants shall be naturally or artificially dwarfed plants of the genus *Chamaecyparis* Spach, genus *Juniperus* L., or in the case of the genus *Pinus* L. either entirely of the species *Pinus parviflora* Sieb. & Zucc. (*Pinus pentaphylla* Mayr), or that species grafted on a rootstock of a *Pinus* species other than *Pinus parviflora* Sieb. & Zucc. In the latter case, the rootstock shall not bear any shoots.
2) The total number of plants shall not exceed quantities which have been determined by the importing Member State, having regard to available quarantine facilities.
3) Prior to export to the European Community, the plants shall have been grown, held and trained for at least two consecutive years in officially registered nurseries, which are subject to an officially supervised control regime. The annual lists of the registered nurseries shall be made available to the Commission, at the latest by 31 October of each year. These lists shall be immediately transmitted to the Member States. They shall include the number of plants grown in each of these nurseries, as far as they are deemed suitable for dispatch to the Community, under the conditions laid down in this Decision.
4) For *Juniperus* plants, the plants of the genera *Chaenomeles* Lindl., *Crataegus* L., *Cydonia* Mill., *Juniperus* L., *Malus* Mill., *Photinia* Ldl. and *Pyrus* L., which have been grown in the two last years prior to dispatch in the abovementioned naturally or artificially dwarfed plants nurseries and their immediate vicinity shall have been officially inspected at least six times a year at appropriate intervals for the presence of harmful organisms of concern. For *Chamaecyparis* and *Pinus* plants, the plants of the genus *Chamaecyparis* Spach and of the genus *Pinus* L. which have been grown in the abovementioned naturally or artificially dwarfed plants nurseries and their immediate vicinity shall have been officially inspected at least six times a year at appropriate intervals, for the presence of harmful organisms of concern.

   The harmful organisms of concern are:

   a) for *Juniperus* plants,

      i) *Aschistonyx eppoi* Inouye,
      ii) *Gymnosporangium asiaticum* Miyabe ex Yamada and *G*. *yamadae* Miyabe ex Yamada,
      iii) *Oligonychus perditus* Pritchard et Baker,
      iv) *Popillia japonica* Newman,
      v) any other harmful organism which is not known to occur in the Community;

   b) for *Chamaecyparis* plants,

      i) *Popillia japonica* Newman,
      ii) any other harmful organism which is not known to occur in the Community;

   c) for *Pinus* plants,

      i) *Bursaphelenchus xylophilus* (Steiner & Buehrer) Nickle et al.,
      ii) *Cercoseptoria pini-densiflorae* (Hori & Nambu) Deighton,
      iii) *Coleosporium paederiae*,
      iv) *Coleosporium phellodendri* Komr,
      v) *Cronartium quercuum* (Berk.) Miyabe ex Shirai,
      vi) *Dendrolimus spectabilis* Butler,
      vii) *Monochamus* spp. (non-European),
      viii) *Peridermium kurilense* Dietel,
      ix) *Popillia japonica* Newman,
      x) *Thecodiplosis japonensis* Uchida & Inouye,
      xi) any other harmful organism which is not known to occur in the Community.

   The plants shall have been found free, in these inspections, from the harmful organisms abovementioned. Infested plants shall be removed. The remaining plants shall be effectively treated.

5) Any detection of harmful organisms of concern specified in point 4 in the inspections carried out pursuant to point 4 shall be officially recorded, and the records shall be kept available to the

Commission, upon its request. Any detection of any of the harmful organisms, which are specified in point 4, shall disqualify the nursery from its status under point 3. The Commission shall be informed immediately thereof. In such case, the registration can be renewed only in the following year.

6) The plants intended for the Community shall at least during the period referred to in point 3:

   a) be potted, at least during the same period, in pots which are placed either on shelves at least 50 cm above ground or onto concrete flooring, impenetrable for nematodes, which is well maintained and free from debris,
   b) be found free, in the inspections referred to in point 4, from the harmful organisms of concern specified in point 4 and not be affected by the measures referred to in point 5,
   c) if they belong to the genus *Pinus* L. and in the case of grafting on a rootstock of a *Pinus* species other than *Pinus parviflora* Sieb. & Zucc., have a rootstock derived from sources officially approved as healthy material,
   d) be made recognisable with a marking, exclusive for each individual plant and notified to the official plant protection organisation of Japan, enabling the identification of the registered nursery and the year of potting.

7) The official plant protection organisation of Japan shall ensure the identifiability of the plants from the time of their removal from the nursery until the time of loading for export, through sealing of transport vehicles or appropriate alternatives.
8) The plants and the adhering or associated growing medium (hereinafter referred to as the material) shall be accompanied by a phytosanitary certificate issued in Japan in accordance with Article 7 of Directive 2000/29/EC, on the basis of the examination laid down in Article 6 of that Directive relating to the conditions laid down therein, in particular freedom from harmful organisms of concern, as well as to the requirements specified in points 1 to 7.

   The certificate shall indicate:

   a) the name or the names of the registered nursery or nurseries,
   b) the markings referred to in point 6, as far as they enable identification of the registered nursery and the year of potting,
   c) the specification of the last treatment applied, prior to dispatch,
   d) under 'Additional Declaration', the statement 'This consignment meets the conditions laid down in Decision 2002/887/EC'.

9) Prior to introduction into a Member State, the importer shall notify each introduction sufficiently in advance to the responsible official bodies referred to in Directive 2000/29/EC, in the Member State concerned, indicating:

   a) the type of material,
   b) the quantity,
   c) the declared date of import,
   d) the officially approved site where the plants will be held under the post- entry quarantine referred to in point 10.

   The importers shall be officially informed, prior to the introduction, of the conditions laid down in points 1 to 12.

10) The material shall be subject, before it is released, to official post-entry quarantine for a period of not less than 3 months of active growth in the case of *Pinus* and *Chamaecyparis* plants and for a period including the active growth season from 1 April until 30 June in the case of *Juniperus* plants and must be found free, during this quarantine period, from any harmful organisms of concern. Particular attention shall be given to preserve for each plant the marking referred to in point 6(d).

11) The post-entry quarantine referred to in point 10 shall:

    a) be supervised by the responsible official bodies of the Member State concerned and executed by officially approved and trained staff, with the possible assistance of the experts referred to in Article 21 of Directive 2000/29/EC under the procedure laid down therein;

b) be performed at an officially approved site provided with appropriate facilities sufficient to contain harmful organisms and maintain the material in such a way as to eliminate any risk of spreading harmful organisms;

c) be performed for each item of material:

  i) by visual examination upon arrival and at regular intervals thereafter, having regard to the type of material and its state of development during the quarantine period, for harmful organisms or symptoms caused by any harmful organism,

  ii) by appropriate testing of any symptom observed in the visual examination in order to identify the harmful organisms having caused such symptoms.

12) Any lot in which material which has not been found free, during the post- entry quarantine referred to in point 10, from harmful organisms of concern shall be immediately destroyed under official supervision.

13) Member States shall notify, to the Commission and to the other Member States, any contamination by harmful organisms in question which has been confirmed during the post-entry quarantine referred to in point 10. In such case, the relevant Japanese nursery shall be disqualified from its status under point 3. The Commission shall inform immediately Japan thereof.

14) Any material which has been subjected to the post-entry quarantine referred to in point 10 in the importing Member State and has been found free, during that quarantine period, from harmful organisms of concern and which has been maintained under appropriate conditions may be moved within the Community only when a plant passport referred to in Article 10 of Directive 2000/29/EC has been issued in accordance with the relevant provisions of that Directive and has been attached to the material, to its packaging or to the vehicles transporting the material.

The plant passport referred to in the first subparagraph shall indicate the name of the country of origin.

Appendix B – Pest sheets of relevant actionable pests

B.1. *Coleosporium asterum*

B.1.1. Organism information

Taxonomic information	Current valid name: *Coleosporium asterum* (Dietel) Sydow & P. Sydow.	
Group	FUN	
EPPO code	COLSAS	
Regulated status in the EU	EPPO Alert list (formerly) This pest is not listed in Council Directive 2000/29/EC but mentioned in the derogation (Commission Decision EC/2002/499)	
Pest status in Japan	Present, no details (Farr and Rossman, online)	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*Pinus parviflora* is not a host for *C. asterum*	
PRA information	PRA by Sansford (2015) No EFSA pest categorisation is available	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Yellow or pale yellow tiny filmy substances appear in parallel on a needle leaf in spring. Diseased leaves are discoloured and fall off Symptoms are clearly detectable
	Presence of asymptomatic plants	In late summer or early autumn, pine species are infected by basidiospores produced on alternate hosts. Symptoms on pine trees do not appear until the spring following the infection Clear disease symptoms are visually evident within 2 years (data refers to C. *phellodendri* – Dossier 1.2–2.0). Therefore, it can be inadvertently introduced from the surrounding areas
	Confusion with other pathogens/pests	It may be difficult to distinguish *C. asterum* from closely related *Coleosporium* spp. They can be distinguished by DNA analysis
Host plant range	The fungus is known to infect several *Pinus* species, including *P. thunbergii,* and several members of the Compositae family (Farr and Rossman, online)	
Pathways	Basidiospores formed on alternate hosts are the source of infection for pines; they are spread by the wind and water-splash (Lowe, 1972). The dispersal distance of the basidiospores of *Coleosporium* spp. is about 300 metres (Kusunoki et al., 2017) The fungus can also be introduced through the movement of infested host plants or parts of the plant (e.g. cut flowers and foliage of *Pinus* spp.). Vectors are not needed to disperse the spores. However, various invertebrates, especially flies belonging to the genus *Mycodiplosis* have the potential to disperse spores of *C. asterum* (Henk et al., 2011)	
Surveillance information	There is no regular surveillance for this fungus; therefore, it cannot be excluded that the pest is present in areas where the export nurseries are located	

B.1.2. Possibility of pathogen entry into the nursery

B.1.2.1. Possibility of entry from surrounding environment

Coleosporium asterum is present in Japan on several *Pinus* species and alternate hosts. There are no officially controlled pest-free areas. Alternate hosts are essential for the pathogen to complete its life cycle. The disease cycle begins on pine trees when they are infested by basidiospores produced on the alternate host. The approximate maximum scattering distance of basidiospores (referring to

C. phellodendri – Dossier section 1.3) is 300 m. If *Pinus* and alternate host trees are present in the area surrounding the export nurseries, it is possible that spores disperse from the environment to the export nursery.

Symptoms (i.e. the disease presence) are easy to detect. Spores could be transported by the wind from the surrounding environment to the nursery. The dispersal distance provided in the dossier (Dossier section 1.3) is short (300 m). However, the paper by Sansford (2015) proposes a dispersal distance up to 800 m for *C. asterum*.

Uncertainties:

- There are uncertainties about the presence of the pathogen in the areas surrounding the nursery.
- There are no confirmations of pest freedom based on sampling and testing.
- There is uncertainty regarding the dispersal distance for this fungus; the paper by Sansford (2015) proposes a dispersal distance of up to 800 m.

Taking into consideration the above evidence and uncertainties, the Panel considers that the presence of the pathogen in the area surrounding the nursery is possible and spores can be carried by the wind into the nursery.

B.1.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9). The pathogen may be present in the area where unregistered nurseries are located. Therefore, it is possible that spores could be present on the plants that are transferred to the export nursery. These spores could start the infection cycle.

Uncertainties:

- New plants entering the nurseries can be taken/collected from areas in Japan where *C. asterum* is present – no specific information regarding the native location of the new plants entering the nursery is available.
- The level of inspections and, therefore, the probability of detection of the fungus, are not known for the unregistered nurseries that might deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *C. asterum* to enter the nursery with new plants.

B.1.2.3. Possibility of entry by growing practices

Soil and water are not known to be pathways for *C. asterum*. There are no uncertainties.

Coleosporium asterum can be present on *Pinus* species and/or on alternate hosts in the area. The transfer is dependent on the distance between the alternate host plants and *P. thunbergii* bonsai destined for export.

Uncertainties:

- The presence of alternate host species in the nursery is not certain.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of *C. asterum* in the nursery through growing practices is possible.

B.1.2.4. Information from interceptions

There were no interceptions reported on alternate hosts or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host.

B.1.3. Evaluation of risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *C. asterum* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *C. asterum.* The active substances are reported to be effective against another *Coleosporium* species, *C. phellodendri* (Kondo, 1975; Ito and Homma, 1938; Dossier section 1.2–2.0). The experiments involved spraying fungicides when the infection took place (Dossier section 2.0) Uncertainties: In the event that the pathogen is present, it is uncertain whether the eradication would be successful
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The pathogen may be removed through the pruning activity
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	
RRO9	Visual inspection	X	All plants destined for export are inspected six times per year (from April to September over 2 years) for the presence of harmful organisms (a total of 12 inspections). Plants showing symptoms are removed	The frequency of inspection assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected. No laboratory testing of plants is applied Uncertainties: The incidence of asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants showing symptoms are tested	

B.1.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Extremely likely
Distribution of the likelihood of pest freedom	5%: 99.83%; Q1: 99.88%; M: 99.90%; Q3: 99.92%; 95%: 99.94%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Coleosporium asterum* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternate hosts; or (2) wind-borne introduction of spores from the surrounding environment. The probability of an introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *C. asterum* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** There were no interceptions reported on alternate hosts or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *C. asterum* **Main uncertainties** – Location of export nurseries in relation to the distance from areas where alternate hosts are present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

B.1.5. Elicitation outcomes of the assessment of the pest freedom for *Coleosporium asterum*

The ratings for *Coleosporium asterum* are very similar to those on *Cronartium orientale*. The only difference is the shorter asymptomatic period which enables visual detection during the 2-year production period.

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit).

- Based on a visual assessment, the Kagawa area could be considered to be pest-free within the 300 m zone surrounding the exporting nurseries.
- The fungicide treatment covers the pathogen.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit).

- No molecular detection has been carried out on non-symptomatic plants. Asymptomatic plants may be present and the asymptomatic period may last up to 2 years.
- Infested bonsai can enter from other areas.
- The reported dispersal distance of 300 m in the Dossier (Dossier section 1.3) is considered to be too low. The paper by Sansford (2015) reports a dispersal distance of up to 800 m for *C. asterum*.
- There is uncertainty regarding the efficacy of fungicide treatments on asymptomatic plants.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The fungicide treatment may reduce the risk assuming that asymptomatic infested plants are present in the exporting nurseries.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The estimated values express the uncertainty regarding the efficacy of fungicide treatments.

The elicited and fitted values for *Coleosporium asterum* agreed by the Panel are shown in Tables B.1 and B.2 (Figure B.1).

Table B.1: Elicited and fitted values of the uncertainty distribution of pest infestation by *Coleosporium asterum* per 10,000 bonsai plants

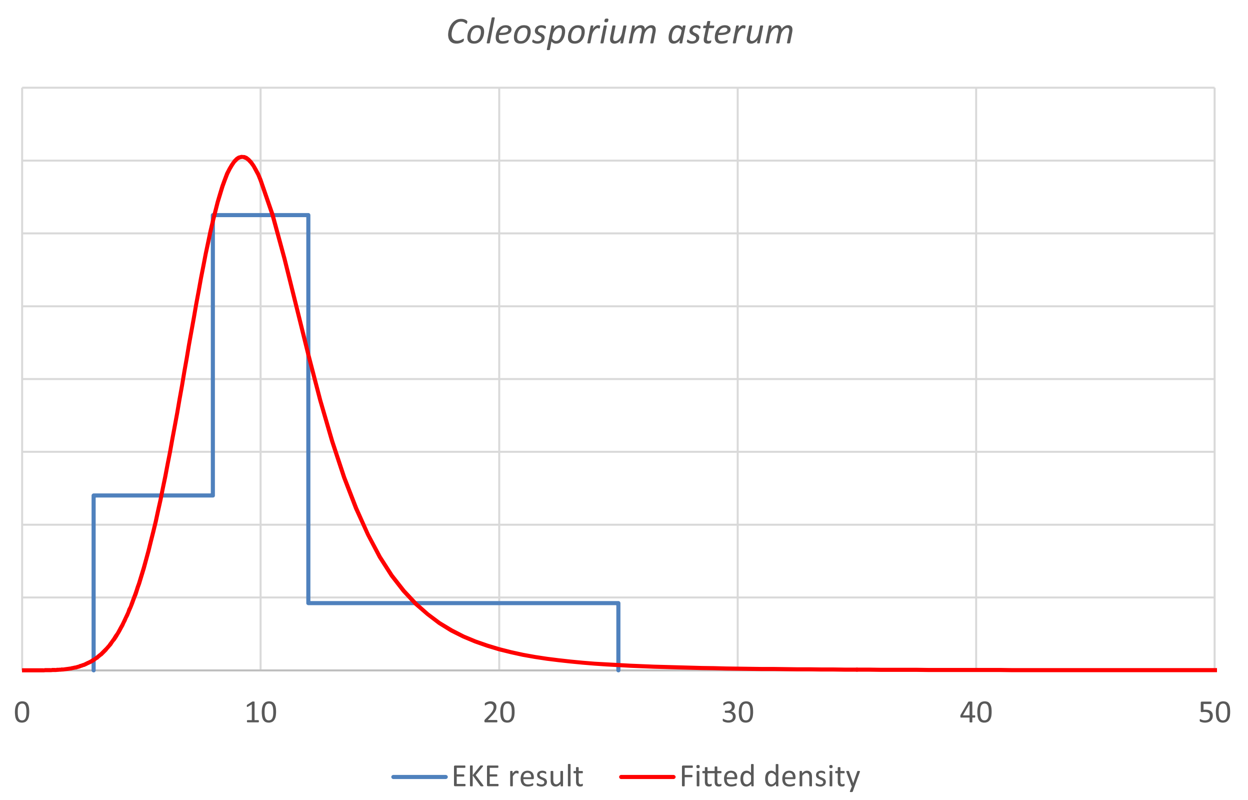
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	3					8		10		12					25
Fit-LL	4.2	5.0	5.7	6.6	7.3	8.1	8.7	9.9	11.3	12.1	13.3	14.9	17.1	19.5	23.2

Loglogistic(0,9.8922,5.3911) fitted with @Risk version 7.5.

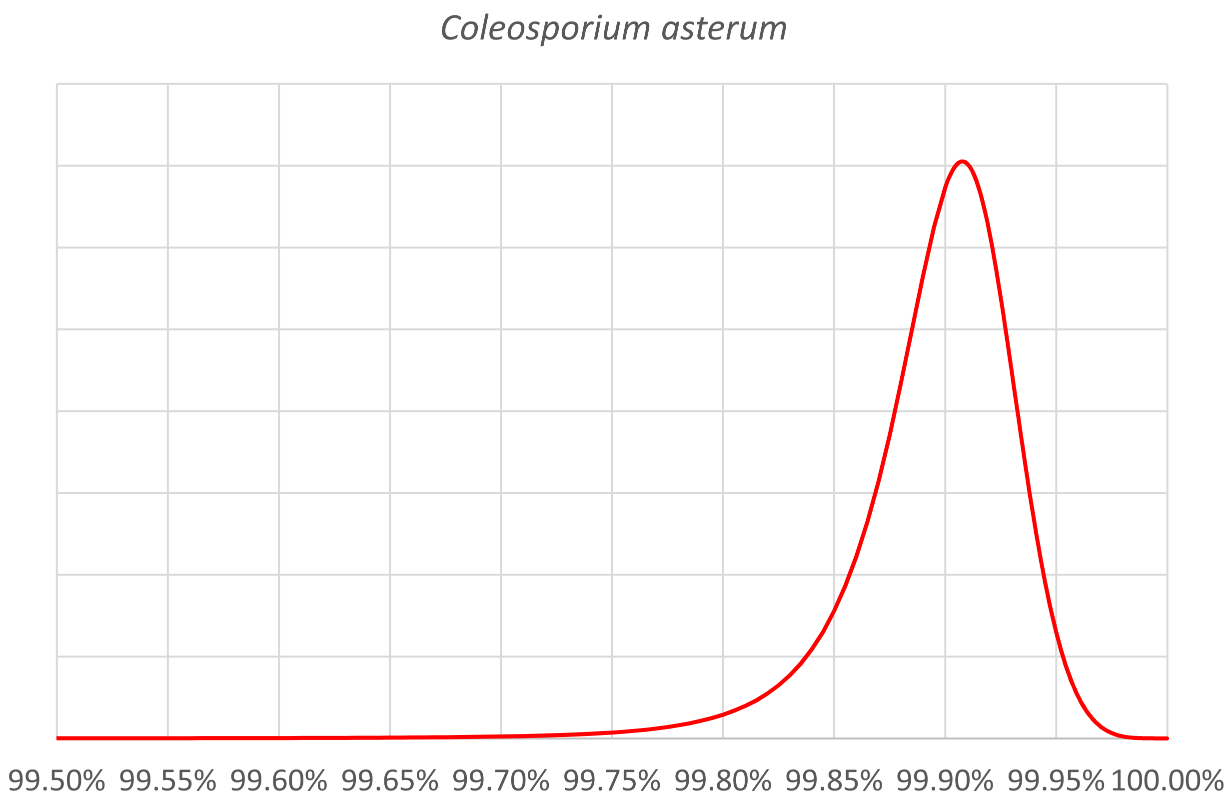
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.2.

Table B.2: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Coleosporium asterum*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.75%					99.88%		99.90%		99.92%					99.97%
Fit-LL	99.77%	99.80%	99.83%	99.85%	99.87%	99.88%	99.89%	99.90%	99.91%	99.92%	99.93%	99.93%	99.94%	99.95%	99.96%


Coleosporium asterum
0
10
20
30
40
50
EKE result
Fitted density

(a)


Coleosporium asterum
99.50%
99.55%
99.60%
99.65%
99.70%
99.75%
99.80%
99.85%
99.90%
99.95%
100.00%

(b)

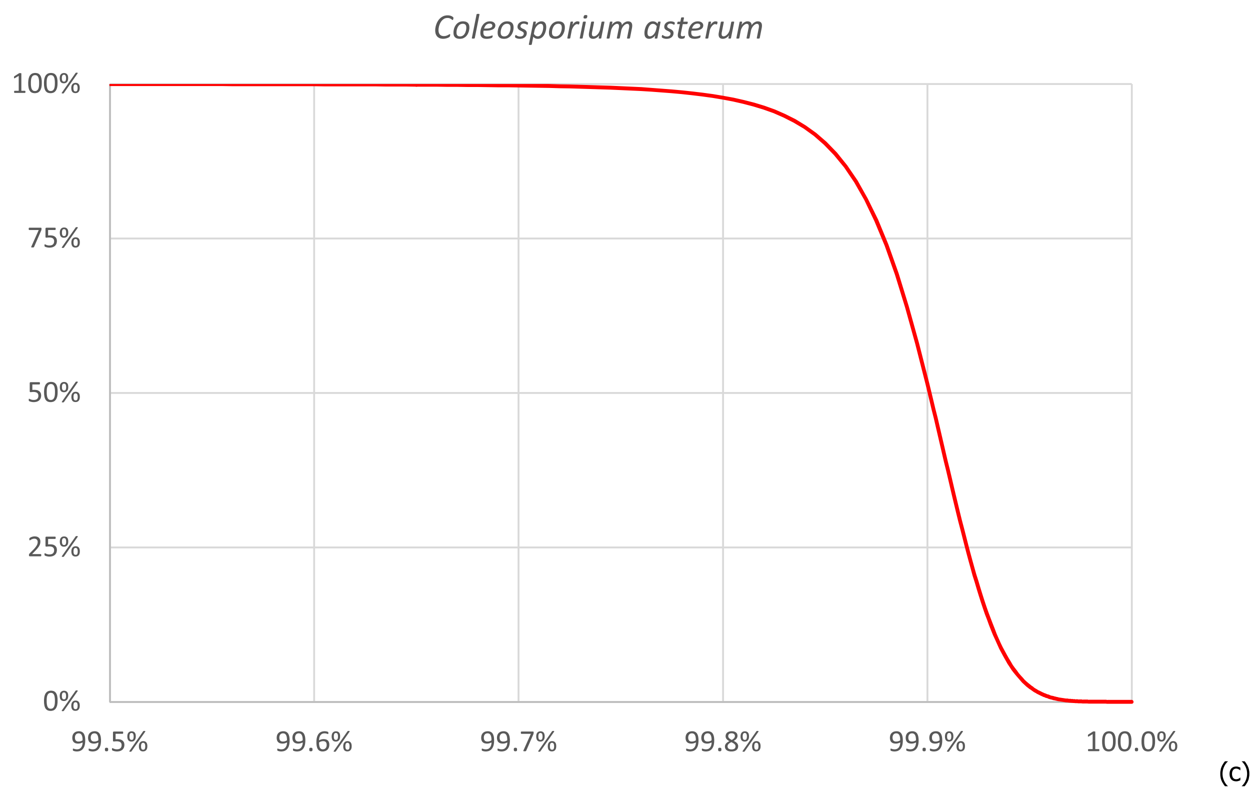


Figure B.1: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.1.6. Reference list

Sansford C, 2015. Pest Risk Analysis for *Coleosporium asterum*. Forestry Commission. Version 5 from 23 April 2015, 46 pp. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4047

Farr DF and Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: https://nt.ars-grin.gov/fungaldatabases/ [Accessed: 9 November 2018]

Henk DA, Farr DF and Aime MC, 2011. *Mycodiplosis* (Diptera) infestation of rust fungi is frequent, wide spread and possibly host specific. Fungal Ecology, 4, 284-289. https://doi.org/10.1016/j.funeco.2011.03.006

Ito S and Homma Y, 1938. Notae mycologicae Asiae orientalis. III. Transactions of the Sapporo Natural History Society, 15, 113-128.

Kondo H, 1975. Studies on eastern gall rust of pines (*Cronartium quercuum* (Berk.) Miyabe ex Shirai), with special references to the life cycle, the infection period to pines, and pathogenic variability to alternate hosts of the causal fungus. Ibaraki Prefectural Forest Experiment Station Bulletin 8, 1–107.

Kusunoki M, Kanegae Y, Fujita K, Inokuchi Ri, Kitahama I, Muraguchi H, Sano Y, Fujimura T, Kozai T, 2017. Survey of needle rust and Asian pine gall rust occurrence risk on Japanese black pine (*Pinus thunbergii*) at bonsai production areas in Kagawa Prefecture. Tree and Forest Health, 21, 8-12. https://doi.org/10.18938/treeforesthealth.21.1_8

Lowe DP, 1972. Needle rust of lodgepole pine. Forest Insect and Disease Survey pest Leaflet no. 41. May 1972. Pacific Forest Research Centre, Canadian Forestry Service, Victoria British Columbia. 7 pp.

B.2. *Coleosporium phellodendri*

B.2.1. Organism information

Taxonomic information	Current valid name: *Coleosporium phellodendri* Komarov	
Group	FUN	
EPPO code	COLSPH	
Regulated status in the EU	This pest is not listed in Council Directive 2000/29/EC but is mentioned in the derogation for bonsai of *Pinus parviflora* (Commission Decision 2002/778/EC) EPPO Alert list (formerly)	
Pest status in Japan	Present, no details	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*P. parviflora* is not a host for *C. phellodendri*	
PRA information	No EFSA pest categorisation is available	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Diseased leaves are discoloured, showing yellowing spots on the upper surface and pustules on the lower surface, wither before long and fall off. Seriously damaged young trees sometimes wither and die (Kishi, 1998)
	Presence of asymptomatic plants	Symptoms on pines are not detectable during the incubation period, from August to November, since needles are infested by basidiospores while spermogonia appears on the pine needles around November (Dossier section 4.4). Clear symptoms appear within 2 years of infection (Dossier section 1.2, 2.0) Data from other rust species indicate that plants may remain asymptomatic for many years (EPPO, online_c)
	Confusion with other pathogens/pests	It may be difficult to distinguish *C. phellodendri* from closely related *Coleosporium* spp. based only on visual inspection. They can be distinguished by DNA analysis

Host plant range	The fungus is known to infect several *Pinus* species, including *P. thunbergii.* The alternate hosts include *Phellodendron amurense*, *Phellodendron amurense* var. *japonicum*, and *Phellodendron amurense* var. *sachalinense* (Spaulding, 1961; Kaneko, 1981; Hiratsuka et al., 1992)
Pathways	Plants for planting and natural spread *Coleosporium phellodendri* is spread by infection on amur cork and pine. Pine infection is caused by basidiospores formed on amur cork (*Phellodendron amurense*) leaves and spread by the wind. Regarding the infection of amur cork, aecia formed on pine leaves are spread by the wind (Hama, 1987). The reported maximum dispersal distance of spores is 300 m (Hirt, 1936; Kusunoki et al., 2017) For other *Coleosporium* species, it has been proposed that Diptera may also have the potential to disperse spores (Henk et al., 2011)
Surveillance information	Surveillance data are presented for the Kagawa prefecture (Kusunoki et al., 2017 – Dossier section 1.3) where most of the export bonsai nurseries are located. No findings were reported for this area No regular surveillance is carried out for this fungus. Therefore, it cannot be excluded that the pest is present in other areas where the export nurseries are located

B.2.2. Possibility of pathogen entry into the nursery

B.2.2.1. Possibility of entry from surrounding environment

Coleosporium phellodendri is present in Japan on several *Pinus* and *Phellodendron* species. There are no officially controlled pest-free areas. If *Pinus* and *Phellodendron* trees are present in the area surrounding the export nurseries, it is possible that spores could disperse to the export nursery. Specific surveillance data related to 26,838 plants of *P. thunbergii* (1–100 years old) fully surveyed is available for the Kagawa Prefecture, where the fungus was not detected. *Phellodendron amurense*, an alternate host of *C. phellodendri*, was not present within a 300 m radius of the nursery. This is the maximum scattering distance of basidiospores (Dossier section 1.3). An alternate host is essential for the pathogen to complete its life cycle. The disease cycle begins on pine infested by basidiospores produced on the alternate host.

Symptoms (i.e. the disease presence) are easy to detect. Spores could be transported by the wind from the surrounding environment to the nursery. The dispersal distance provided in the dossier (Dossier section 1.3) is short (300 m). However, the paper by Sansford (2015) proposes a dispersal distance of up to 800 m for *C. asterum*.

The pathogen is also present on the island of Honshu where many nurseries are located (Dossier section 4.3).

Uncertainties:

- There are uncertainties about the presence of the pathogen in the areas surrounding the nursery.
- There are no confirmations of pest freedom based on sampling and testing.
- There is uncertainty regarding the dispersal distance for this fungus; the paper by Sansford (2015) proposes a dispersal distance of up to 800 m.

Taking into consideration the above evidence and uncertainties, the Panel considers that the presence of the pathogen in the area surrounding the nursery is possible and spores could be carried by the wind into the nursery. For the Kagawa Prefecture, surveys have been conducted and no records have been reported.

B.2.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9). The pathogen may be present in the area where unregistered nurseries are located. Therefore, it is possible that spores could be present on the plants that are transferred to the export nursery. These spores could start the infection cycle if the alternate host is present.

Uncertainties:

- New plants entering the nurseries can be taken/collected from areas in Japan where *C. phellodendri* is present – no specific information regarding the native location of the new plants entering the nursery is available.

– The level of inspections and, therefore, the probability of detection of the fungus is not known for the unregistered nurseries that might deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *C. phellodendri* to enter the nursery with new plants.

B.2.2.3. Possibility of entry by growing practices

Soil and water are not known to be pathways for *C. phellodendri*. There are no uncertainties.

Coleosporium phellodendri can be present on alternative species in the nursery. The transfer is dependent on the distance between the alternate host plants and *P. thunbergii* bonsai destined for export.

Uncertainties:

– The presence of alternate host species in the nursery is not certain.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of *C. phellodendri* within the nursery through growing practices is possible.

B.2.2.4. Information from interceptions

There were no interceptions reported on *Phellodendron* species or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host.

B.2.3. Evaluation of risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on C. *phellodendri* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *C. phellodendri*. The active substances are reported to be effective against this pathogen (Ito and Homma, 1938; Kondo, 1975). The experiments involved spraying fungicides when the infection took place (Dossier section 1.4) Uncertainties: In the event that the pathogen is present, it is uncertain whether the eradication is successful
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The pathogen may be removed through the pruning activity
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO9	Visual inspection	X	All plants destined for export are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Plants showing symptoms are removed	The frequency of inspection assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected. No laboratory testing of plants is applied Uncertainties: The incidence of asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		Not applied	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.2.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Extremely likely
Distribution of the likelihood of pest freedom	5%: 99.83% / Q1: 99.88% / M: 99.90% / Q3: 99.92% / 95%: 99.94%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Coleosporium phellodendri* is present in Japan. It cannot be excluded that bonsai plants in the nursery are infested by *C. phellodendri* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternative hosts; or (2) wind-borne introduction of spores from the surrounding environment. The probability of introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures are supposed to greatly reduce the probability that *C. phellodendri* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen. Surveys conducted in Kagawa Prefecture showed the absence of *C. phellodendri*. If the absence of the pathogen is confirmed by repeated surveys, the Kagawa area could be considered as to be a pest-free area **Interception records** No interceptions (1999–2018) **Shortcomings of present methods** Available surveillance data refer only to surveys conducted in the Kagawa Prefecture. Bonsai plants are not tested for the asymptomatic presence of *C. phellodendri*

	Main uncertainties – Location of export nurseries in relation to the distance from areas where *Phellodendron* is present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

B.2.5. Elicitation outcomes of the assessment of the pest freedom for *Coleosporium phellodendri*

The ratings for *Coleosporium phellodendri* are very similar to those for *Cronartium orientale*. The only difference is the shorter asymptomatic period which enables visual detection in the 2-year production period in the exporting nursery.

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Based on a visual assessment, the Kagawa area could be considered to be pest-free considering the 300 m zone surrounding the exporting nurseries.
- The fungicide treatment covers the pathogen.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- No molecular detection has been carried out on non-symptomatic plants. Asymptomatic plants may be present and the asymptomatic period may last for up to 2 years.
- Infested bonsai plants can enter from other areas.
- The reported dispersal distance of 300 m in the Dossier (Dossier section 1.3) is considered to be too low. The paper by Sansford (2015) reports a dispersal distance of up to 800 m for *C. asterum*.
- There is an uncertainty regarding the efficacy of fungicide treatments on asymptomatic plants.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The fungicide treatment may reduce the risk, assuming that asymptomatic infested plants are present in the exporting nurseries.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The estimated values express the uncertainty regarding the efficacy of fungicide treatments.

The elicited and fitted values for *Coleosporium phellodendri* agreed by the Panel are shown in Tables B.3 and B.4 (Figure B.2).

Table B.3: Elicited and fitted values of the uncertainty distribution of pest infestation by *Coleosporium phellodendri* per 10,000 bonsai plants

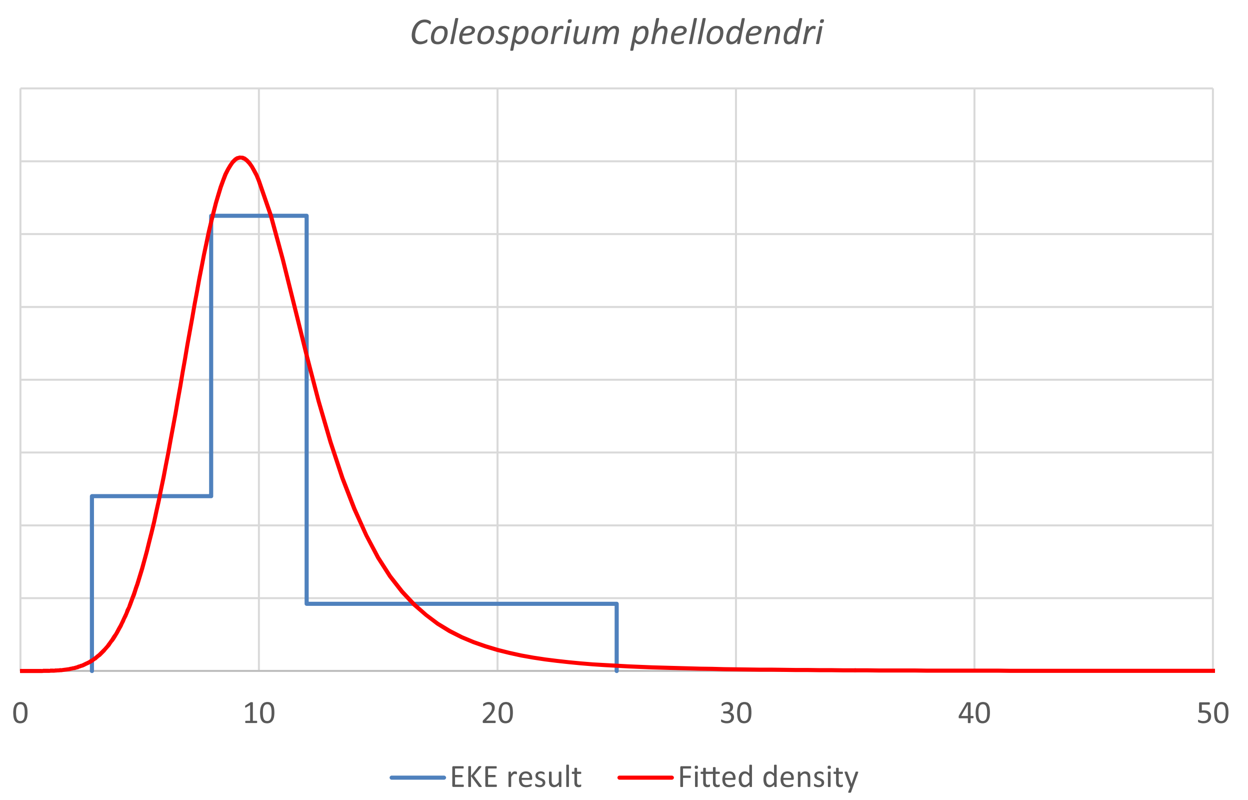
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	3					8		10		12					25
Fit-LL	4.2	5.0	5.7	6.6	7.3	8.1	8.7	9.9	11.3	12.1	13.3	14.9	17.1	19.5	23.2

Loglogistic(0,9.8922,5.3911) fitted with @Risk version 7.5.

Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.4.

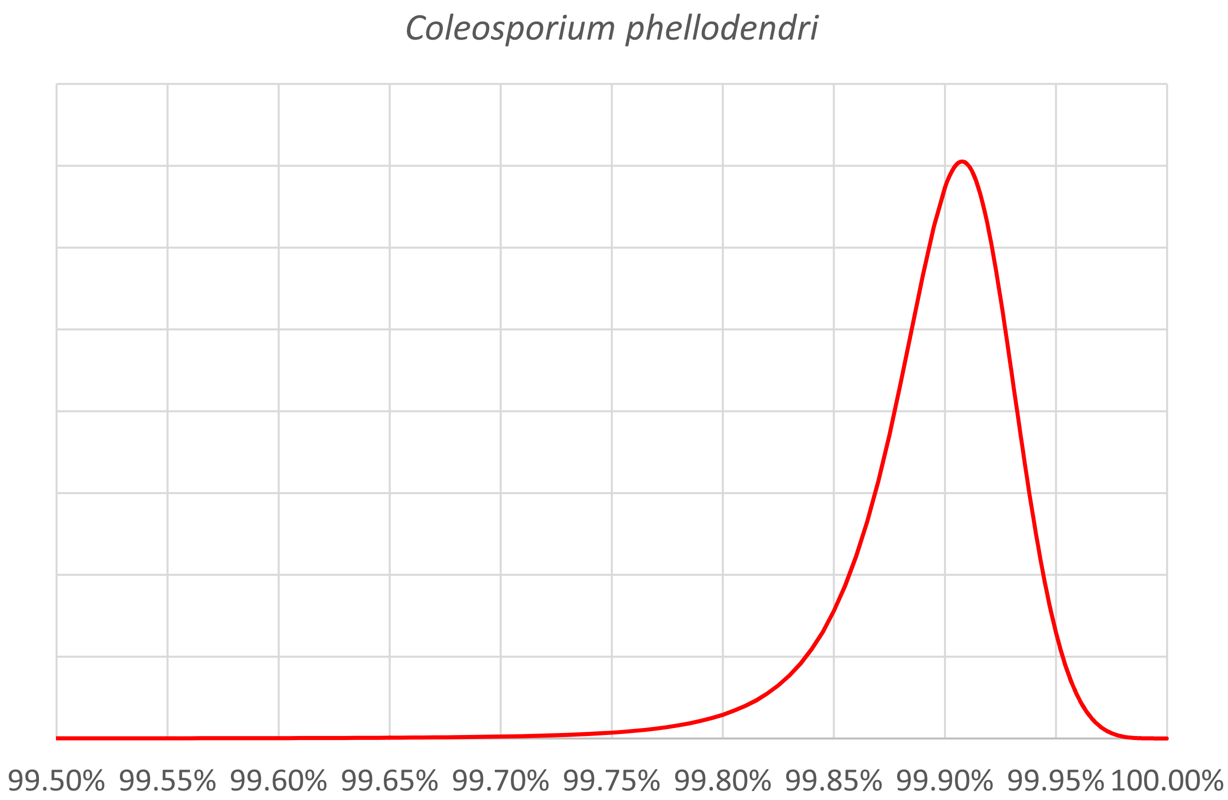
Table B.4: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Coleosporium phellodendri*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.75%					99.88%		99.90%		99.92%					99.97%
Fit-LL	99.77%	99.80%	99.83%	99.85%	99.87%	99.88%	99.89%	99.90%	99.91%	99.92%	99.93%	99.93%	99.94%	99.95%	99.96%

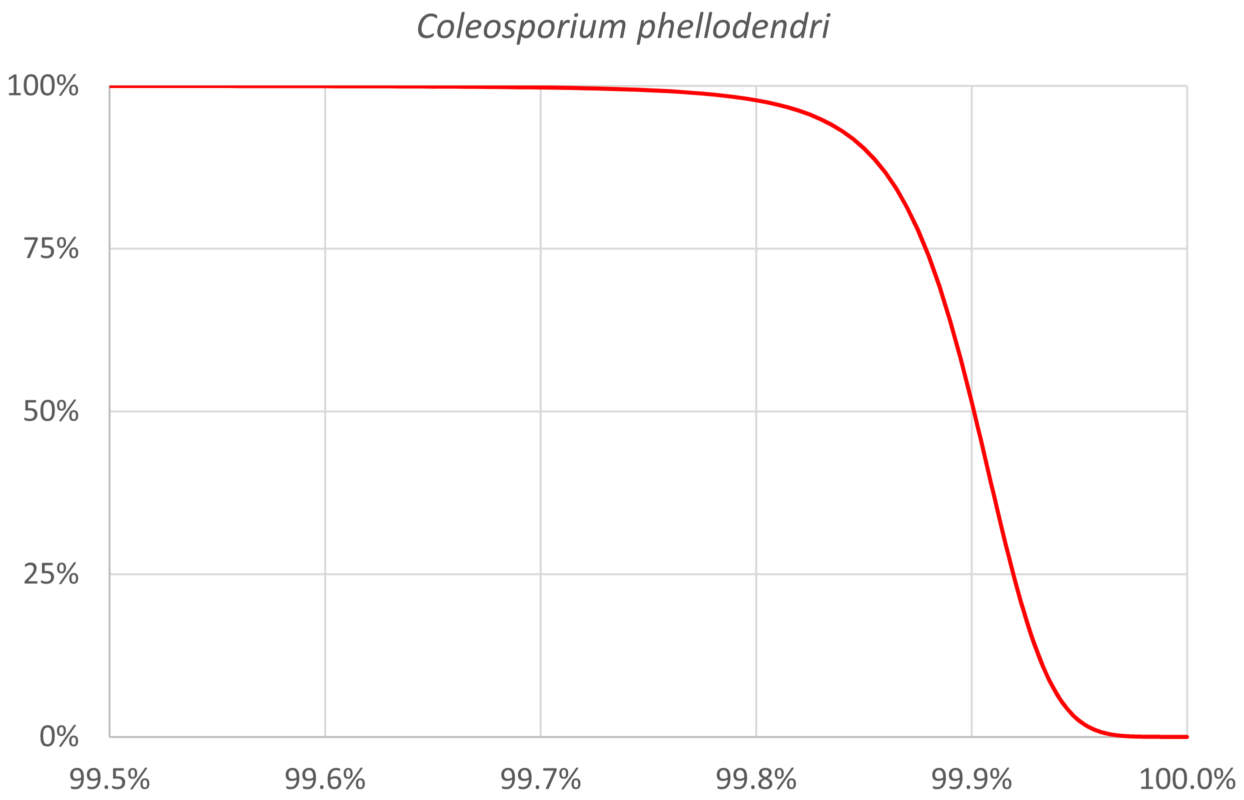


Coleosporium phellodendri
0
10
20
30
40
50
EKE result
Fitted density

(a)


Coleosporium phellodendri
99.50%
99.55%
99.60%
99.65%
99.70%
99.75%
99.80%
99.85%
99.90%
99.95%
100.00%

(b)



(c)

Figure B.2: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.2.6. Reference list

EPPO (European and Mediterranean Plant Protection Organization), online_c. *Cronartium quercuum* - Data Sheets on Quarantine Pests. 5 pp. Available online: https://gd.eppo.int/download/doc/73_datasheet_CRONQU.pdf [Accessed: 26 November 2018]

Hama T, 1987. Studies on the important rust diseases of some conifers in the central mountainous region of Japan. Bulletin of the Forestry and Forest Products Research Institute, 343, 1-118.

Henk DA, Farr DF and Aime MC, 2011. *Mycodiplosis* (Diptera) infestation of rust fungi is frequent, wide spread and possibly host specific. Fungal Ecology, 4, 284-289. https://doi.org/10.1016/j.funeco.2011.03.006

Hiratsuka N, Sato S, Katsuya K, Kakishima M, Hiratsuka Y, Kaneko S, Ono Y, Sato T, Harada Y, Hiratsuka T and Nakayama K, 1992. The rust flora of Japan. Tsukuba Shuppankai Takezono, Ibaraki Japan, 1, 205 pp.

Hirt RR, 1936. The progress of blister rust in planted Northern white pine. Journal of Forestry, 34, 506-511.

Ito S and Homma Y, 1938. Notae mycologicae Asiae orientalis. III. Transactions of the Sapporo Natural History Society, 15, 113-128.

Kaneko S, 1981. The species of *Coleosporium*, the causes of pine needle rusts, in the Japanese Archipelago. Reports of the Tottori Mycological institute, 19 pp.

Kishi K, 1998. Plant Diseases in Japan. Zenkoku Noson Kyoiku Kyokai, Tokyo. 1,276 pp.

Kondo H, 1975. Studies on eastern gall rust of pines (*Cronartium quercuum* (Berk.) Miyabe ex Shirai), with special references to the life cycle, the infection period to pines, and pathogenic variability to alternate hosts of the causal fungus. Ibaraki Prefectural Forest Experiment Station Bulletin 8, 1–107.

Kusunoki M, Kanegae Y, Fujita K, Inokuchi Ri, Kitahama I, Muraguchi H, Sano Y, Fujimura T, Kozai T, 2017. Survey of needle rust and Asian pine gall rust occurrence risk on Japanese black pine (*Pinus thunbergii*) at bonsai production areas in Kagawa Prefecture. Tree and Forest Health, 21, 8-12. https://doi.org/10.18938/treeforesthealth.21.1_8

Sansford C, 2015. Pest Risk Analysis for *Coleosporium asterum*. Forestry Commission. Version 5 from 23 April 2015, 46 pp. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4047

Spaulding P, 1961. Foreign diseases of forest trees of the world. US Agricultural Research Service, Agriculture Handbook 197, 1-361.

B.3. *Cronartium orientale*

B.3.1. Organism information

Taxonomic information	Current valid name: *Cronartium orientale* Notes: Kaneko (2000) considers Asian isolates to be a separate species from *Cronartium quercuum* found in North America
Group	FUN
EPPO code	****NOT FOUND**** *Cronartium quercuum* (CRONQU)
Regulated status in the EU	*Cronartium* spp. (non-European) in Annex IAI of Council Directive 2000/29/EC
Pest status in Japan	Present, no details (Kaneko, 2000; Kobayashi, 2007). *Cronartium orientale* has been described in Tottori Prefecture and subsequently found in Tsukuba and Ibaraki Prefectures (Kaneko, 2000) close to the exporting nurseries. The main export area for bonsai is Kagawa Prefecture. In 1944, *C. orientale* was reported from this area as *C. quercuum* (Hiratsuka, 1944)
Pest status in the EU	Absent
Host status on *P. parviflora*	*Pinus parviflora* is not a host for *C. orientale*
PRA information	Pest categorisation of *Cronartium* spp. (non-EU) (EFSA PLH Panel, 2018b)

Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Infestation on branches and stems. The infested portion grows into a gall. Symptoms are clearly detectable. The sperogonial and aecial stages occur on hard pines and the uredinial and telial states on other hosts
	Presence of asymptomatic plants	The infection period occurs between September and November (Dossier section 2.0). Noticeable disease symptoms develop within 2 years after the infection takes place (Dossier section 1.2, 2.0) Data from other rust species indicate that it is possible for plants to remain asymptomatic for many years (EPPO, online_c)
	Confusion with other pathogens/pests	No. It could be confused with *C. quercuum*, in the field. A detailed analysis shows that *C. orientale* has globose, almost hyaline basidiospores in contrast to the ellipsoid, yellow-orange ones of the North American *C. quercuum* (Kaneko, 2000)
Host plant range	The fungus is known to infect several *Pinus* species and other members of the Fagaceae family*:* • *Pinus*: *P. banksiana, P. densiflora, P. luchuensis, P. Montana, P. nigra, P. nigra* var. *austriaca, P. nigra* var. *nigra, P. nigra* var. *poiretiana, P. pinaster, P. ponderosa, P. sylvestris, P. tabuliformis, P. tabuliformis* var. *mukdensis, P. thunbergiana, P. thunbergii* • *Castanea*: *C. crenata, C. dentata, C. koreana, C. mollissima* • *Castanopsis: C. cuspidata, C. cuspidata* var. *sieboldii* • *Quercus: Q. acutissima, Q. aliena, Q. crispula, Q. dentata, Q. glauca, Q. macrocarpa, Q. mongolica* var. *grosseserrata, Q. myrsinaefolia, Q. palustris, Q. phellos, Q. rubra, Q. serrata, Q. sessiliflora, Q. suber* • *Fagus crenata* (Kaneko, 2000; Zhuang, 2001, 2005; Cho and Shin, 2004; Kaneko et al., 2007; Kobayashi, 2007; Farr and Rossman, online)	
Pathways	Basidiospores formed on alternate hosts are the source of infection for pines; they are spread by the wind There are no specific data on the dispersal distance of *C. orientale* basidiospores. In the dossier (Dossier section 1.3), information is provided on basidiospores of *C. ribicola*, concluding that the maximum dispersal distance is 300 m based on Hirt (1936). However, according to the EFSA pest categorisation on *Cronartium* spp. (EFSA PLH Panel, 2018b), the dispersal is usually limited to an area within 1.5 km of the telial host (EPPO, online_c; see Zambino (2010) for a review of dispersal distances for *C. ribicola*) Dispersal distance of the basidiospores of *Cronartium* spp. and *Coleosporium* spp. is about 300 m (Kusunoki et al., 2017). Aeciospores and urediniospores may be disseminated at greater distances than basidiospores, which may be limited to less than 500 m (Hunt, 1997) Notes: information on *C. quercuum* used for similarity	
Surveillance information	Surveillance data are presented for the Kagawa Prefecture (Kusunoki et al., 2017 – Dossier section 1.3), where most of the export bonsai nurseries are located. No findings were reported for this area There is no regular surveillance established for this fungus. Therefore, it cannot be excluded that the pest is present in areas where the export nurseries are located	

B.3.2. Possibility of pathogen entry into the nursery

B.3.2.1. Possibility of entry from surrounding environment

Cronartium orientale is present in Japan on several *Pinus* species and members of the Fagaceae family. No records have been reported from the Kawaga Prefecture, one of the three major areas where registered nurseries are located, on 26,838 plants of *P. thunbergii* (1–100 years old) surveyed (Dossier section 1.2). However, Hiratsuka (1944) reported the presence of *C. orientale* in this area. Kusunoki et al. (2017) stated that in this area, based on the fact that a roughly 100-year-old Japanese black pine showed no symptoms of Asian pine gall rust, it is likely that the disease had not occurred for the last 100 years or it has been properly eliminated. *Cronartium orientale* has been described in Tottori Prefecture and found later in Tsukuba and Ibaraki Prefectures (Kaneko, 2000) close to the exporting nurseries.

An alternate host is essential for the pathogen to complete its life cycle. The disease cycle begins on pines when they are infested by basidiospores produced on the alternate host. In the Kawaga Prefecture several intermediate hosts of *C. orientale* (25 *Q. acutissima* trees, 5 *Q. serrata* trees, 1,962 *Q. phylliraeoides* trees and 1,036 *Q. glauda* trees) were surveyed within a 300 m radius of nurseries growing bonsai. No records have been reported (Dossier section 1.2).

Symptoms (i.e. the disease presence) are easy to detect. Spores could be transported by the wind from the surrounding environment to the nursery. The dispersal distance provided in the dossier (Dossier section 1.3) is about 300 m. However, the paper by Sansford (2015) proposes a dispersal distance of up to 800 m for *C. asterum*.

Uncertainties:

- There are uncertainties regarding the presence of the pathogen in the area surrounding the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that the presence of the pathogen in the area surrounding the nursery is possible and spores could be carried inside the nursery by the wind. For the Kagawa Prefecture, surveys have been conducted in an area within 300 m radius of a nursery and no records have been reported.

B.3.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that areas with no pines in the vicinity may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan. These plants may be infected by *C. orientale* in an asymptomatic state.

Uncertainties:

- New plants entering the nurseries can be taken/collected from areas in Japan where *C. orientale* is present– no specific information regarding the native location of the new plants entering the nursery is available.
- The level of inspections and, therefore, the probability of detection of the fungus are not known for the unregistered nurseries that may deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *C. orientale* to enter the nursery with new plants.

B.3.2.3. Possibility of entry by growing practices

Soil and water are not known to be pathways for *C. orientale*. There are no uncertainties.

Cronartium orientale can be present on alternative species in the nursery. The transfer is dependent on the distance between the alternate host plants and *P. thunbergii* bonsai destined for export.

Uncertainties:

- The presence of alternate host species in the nursery is not certain.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of *C. orientale* within the nursery through growing practices is possible.

B.3.2.4. Information from interceptions

There were no interceptions reported on alternative host species or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host.

B.3.3. Evaluation of risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *C. orientale* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop	x	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *C. orientale*. The active substances are reported to be effective against this pathogen (Dossier section 2.0). The experiments involved spraying fungicides at the time of the infection. Fungicides were diluted 500–1,000 times (Dossier section 2.0) Uncertainties: In the event of the pathogen's presence, it is uncertain whether the eradication is successful or not using the present treatment
RRO3	Soil treatment		No effect	
RRO4	Washing		No effect	
RRO5	Immersion		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	x	Decandling, removal of new shoots (in May)	The pathogen can infect new leaves which are pruned in line with the traditional management in the nurseries
RRO8	Surveillance	x	No pest-specific surveillance is carried out in the environment surrounding the nurseries	
RRO9	Visual inspection	x	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	The frequency of inspection assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected. No laboratory testing of plants is applied Uncertainties: The incidence of asymptomatic plants in the nursery is unknown
RRO10	Registration	x	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		Not applied	
RRO12	Post-entry quarantine	x	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.3.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Very likely
Distribution of the likelihood of pest freedom	5%: 99.56%; Q1: 99.71%; M: 99.79%; Q3: 99.86%; 95%: 99.92%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Cronartium orientale* either by: (1) introduction of new infested plants from (unregistered) nurseries, including alternative hosts; or (2) wind-borne introduction of spores from the surrounding environment The probability of introduction from the surrounding area is considered to be low due to the short dispersal distance of the spores **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *C. orientale* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen. Surveys conducted in Kagawa Prefecture showed the absence of *C. orientale.* If the absence of the pathogen is confirmed by repeated surveys, the Kagawa area could be considered to be a pest-free area **Interception records** There were no interceptions reported on alternative hosts species or *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host **Shortcomings of present methods** Available surveillance data refers only to surveys conducted in the Kagawa Prefecture. Bonsai plants are not tested for the asymptomatic presence of *C. orientale* **Main uncertainties** – Location of export nurseries in relation to the distance from areas where alternate hosts are present – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments

B.3.5. Elicitation outcomes of the assessment of the pest freedom for *Cronartium orientale*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Based on a visual assessment, the Kagawa area could be considered to be pest-free considering the 300 m surrounding the exporting nurseries.
- The fungicide treatment is effective against the pathogen.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- No molecular detection has been carried out on non-symptomatic plants. Asymptomatic plants may be present and the asymptomatic period may last for several years.
- Infested bonsai plants can enter from other areas.
- The reported dispersal distance of 300 m in the Dossier (Dossier section 1.3) is considered to be too low. According to the EFSA pest categorisation on *Cronartium* spp. (EFSA PLH Panel, 2018b), the dispersal is usually limited to an area within 1.5 km of the telial host (EPPO, online_c; see Zambino (2010) for a review of dispersal distances for *C. ribicola*).
- There is uncertainty regarding the efficacy of fungicide treatments on asymptomatic plants.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The fungicide treatment may reduce the risk, assuming that asymptomatic infested plants are present in the exporting nurseries.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The estimated values express the uncertainty regarding both the efficacy of fungicide treatments and the long latency period of the fungal infection.

The elicited and fitted values for *Cronartium orientale* agreed by the Panel are shown in Tables B.5 and B.6 (Figure B.3).

Table B.5: Elicited and fitted values of the uncertainty distribution of pest infestation by *Cronartium orientale* per 10,000 bonsai plants

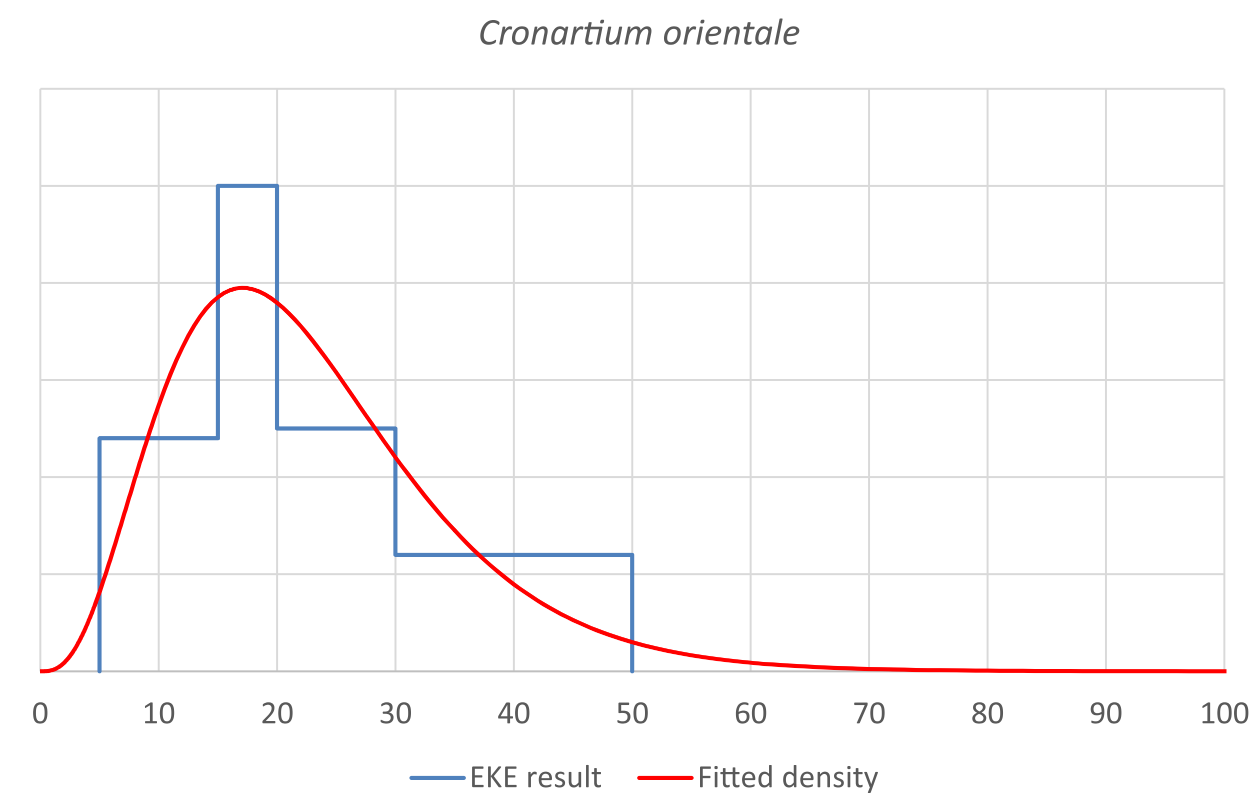
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	5					15		20		30					50
Fit-G	4.7	6.2	7.8	10	12	14	17	21	26	29	33	38	44	50	57

Gamma(4.0227,5.652) fitted with @Risk version 7.5.

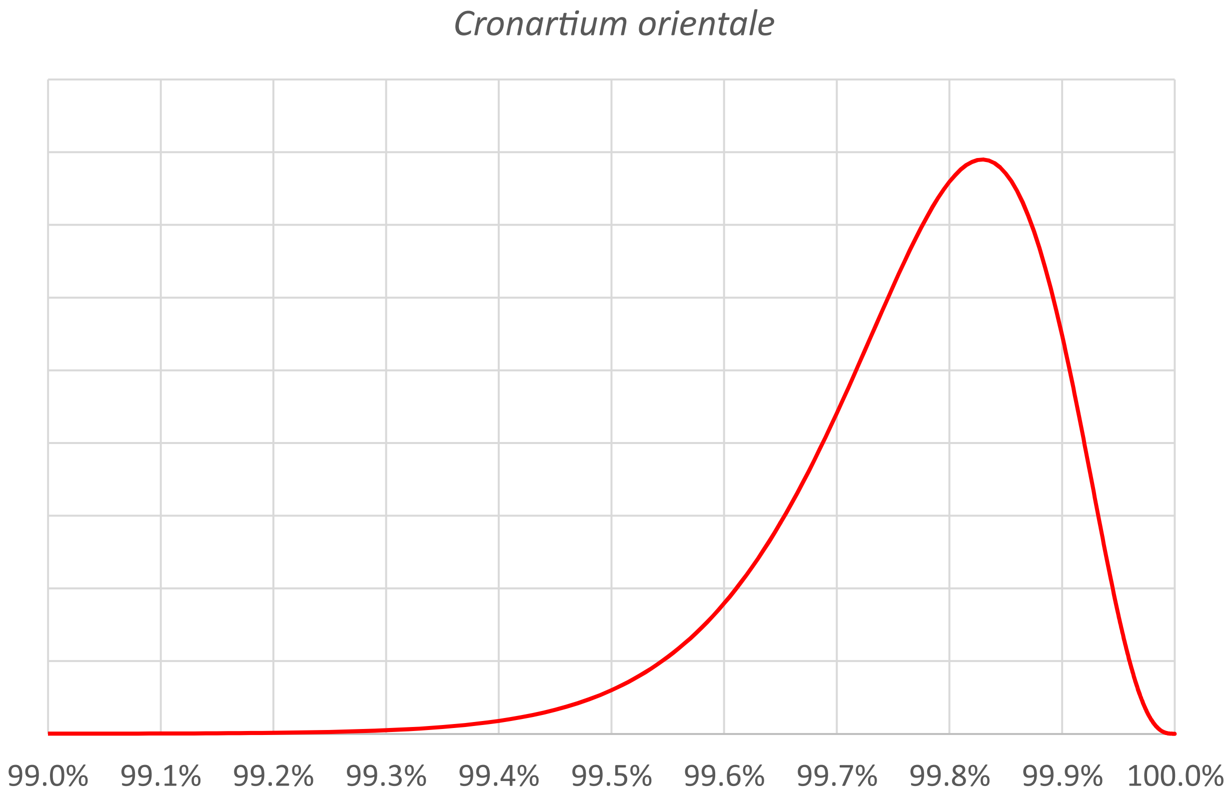
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.6.

Table B.6: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Cronartium orientale*

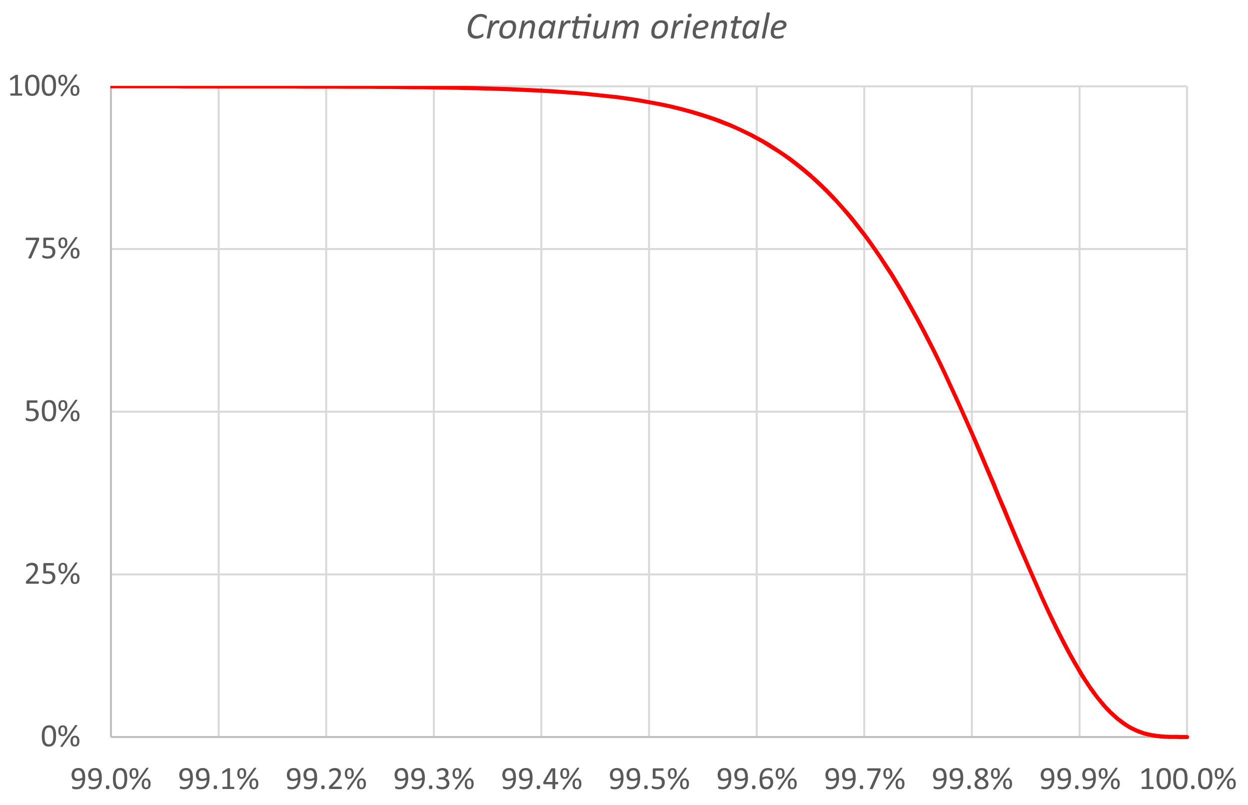
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.50%					99.70%		99.80%		99.85%					99.95%
Fit-G	99.43%	99.50%	99.56%	99.62%	99.67%	99.71%	99.74%	99.79%	99.83%	99.86%	99.88%	99.90%	99.92%	99.94%	99.95%


Cronartium orientale
0
10
20
30
40
50
60
70
80
90
100
EKE result
Fitted density

(a)


Cronartium orientale
99.0%
99.1%
99.2%
99.3%
99.4%
99.5%
99.6%
99.7%
99.8%
99.9%
100.0%

(b)



(c)

Figure B.3: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.3.6. Reference list

Cho WD and Shin HD (eds), 2004. List of plant diseases in Korea. Korean Society of Plant Pathology, Suwon, 779 pp.

Sansford C, 2015. Pest Risk Analysis for *Coleosporium asterum*. Forestry Commission. Version 5 from 23 April 2015, 46 pp. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4047

EFSA PLH Panel (EFSA Panel on Plant Health), 2018b. Scientific Opinion on the pest categorisation of *Cronartium* spp. (non-EU). EFSA Journal 2018; 16(12):5511, 30 pp. https://doi.org/10.2903/j.efsa.2018.5511issn:1831-4732

EPPO (European and Mediterranean Plant Protection Organization), online_c. *Cronartium quercuum* - Data Sheets on Quarantine Pests. 5 pp. Available online: https://gd.eppo.int/download/doc/73_datasheet_CRONQU.pdf [Accessed: 26 November 2018]

Farr DF and Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: https://nt.ars-grin.gov/fungaldatabases/ [Accessed: 9 November 2018]

Hiratsuka N, 1944. Melampsoracearum Nipponicarum (contributions to the rust-flora of eastern Asia). Memoirs of the Tottori Agricultural College, 7, 91–273.

Hirt RR, 1936. The progress of blister rust in planted Northern white pine. Journal of Forestry, 34, 506-511.

Hunt R, 1997. Stem rusts. In: Hansen E M and Lewis K J (eds.). Compendium of conifer diseases. American Phytopathological Society, St. Paul, Minnesota, USA, pp. 26.

Kaneko S, 2000. *Cronartium orientale*, sp. nov., segregation of the pine gall rust in eastern Asia from *Cronartium quercuum*. Mycoscience, 41, 115-122. https://doi.org/10.1007/bf02464319

Kaneko S, Pham TQ and Hiratsuka Y, 2007. Notes on some rust fungi in Vietnam. Mycoscience, 48, 263-265.

Kobayashi T, 2007. Index of fungi inhabiting woody plants in Japan. Host, Distribution and Literature. Zenkoku-Noson-Kyoiku Kyokai Publishing Co., Tokyo, Japan. 1,227 pp.

Kusunoki M, Kanegae Y, Fujita K, Inokuchi Ri, Kitahama I, Muraguchi H, Sano Y, Fujimura T, Kozai T, 2017. Survey of needle rust and Asian pine gall rust occurrence risk on Japanese black pine (*Pinus thunbergii*) at bonsai production areas in Kagawa Prefecture. Tree and Forest Health, 21, 8-12. https://doi.org/10.18938/treeforesthealth.21.1_8

Zambino PJ, 2010. Biology and pathology of *Ribes* and their implications for management of white pine blister rust. Forest Pathology, 40, 264–291.

Zhuang WY (ed.), 2001. Higher Fungi of Tropical China. Mycotaxon, Ltd., Ithaca, New York, USA. 485 pp.

Zhuang WY (ed.), 2005. Fungi of northwestern China. Mycotaxon, Ltd., Ithaca, New York, USA. 430 pp.

B.4. *Dothistroma septosporum*

B.4.1. Organism information

Taxonomic information	Current valid name: *Dothistroma septosporum* (Dorog.) M. Morelet (synonyms: *Mycosphaerella pini*, *Scirrhia pini*) and *Dothistroma pini* Hulbary In the technical dossier it is referred to as *Scirrhia pini*
Group	FUN
EPPO code	SCIRPI
Regulated status in the EU	Annex II/A2 (Council Directive EC/2000/29)
Pest status in Japan	Present
Pest status in the EU	Present
Host status on *P. parviflora*	*Pinus parviflora* is not a host for *D. septosporum*
PRA information	Pest risk assessment of *Scirrhia pini* (EFSA PLH Panel, 2013)

Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Early symptoms consist of deep-green bands or water-soaked lesions, with yellow and tan spots on the live needles. The infection generally develops from late summer to early autumn. In the following spring, a reddish brown spot appears on the needles (Dossier section 3.2; Hulbary, 1941; Brown and Webber, 2008)
	Presence of asymptomatic plants	Latently infested host plants may remain asymptomatic for 4–38 weeks (Ivory, 1977; Jankovský et al., 2004, 2009; Karadžić and Milijašević, 2008)
	Confusion with other pathogens/pests	Needle blight symptoms are similar to those caused by other pine needle pathogens (e.g. *Lecanosticta acicola*, *Cercoseptoria pini-densiflorae*, etc.), adverse environmental conditions or nutrient deficiencies (e.g. boron or sulfur deficiencies) (Pehl and Wulf, 2001). After careful observation, however, they can be distinguishable. The lesion colour and incidence time of symptoms of *D. septosporum* are different from those for *L. acicola*. A spindle-shaped fungus body is observed as a sign and a black zone line appears on a needle leaf in the case of needle cast (Dossier section 3.2)
Host plant range	*Pinus* spp., *Pseudotsuga menziesii*, *Picea abies*, *Larix decidua* (EFSA PLH Panel, 2013). *P. thunbergii* is considered by CABI (CABI, online_b), to be a main host of *Dothistroma septosporum*	
Pathways	Conidia are formed on diseased leaves after overwintering (Dossier section 3.2). Airborne conidia are released and dispersed by the wind or rain splash for short distances (up to 300 m). The spread over longer distances may occur by transportation via air currents of: (i) conidia, following the evaporation of the droplets in which they are enclosed; and (ii) ascospores, in areas where the teleomorph of *D. septosporum* is also present. Conidial dispersal over long distances may also occur through heavy mist or clouds. Conidia remain viable for 6 months on damp leaf litter (Gadgil, 1970) Pathways: • Host plants intended for planting or grafting (seedlings, scions, rooted Christmas trees, bonsai plants, etc.), excluding fruit and seeds • Natural means (wind, rain, wind-driven rain, heavy mist, clouds, etc.) • Human activity (forestry tools, vehicles, etc.)	
Surveillance information	No surveillance information for this pathogen is available	

B.4.2. Possibility of pest presence in the nursery

B.4.2.1. Possibility of entry from surrounding environment

Dothistroma septosporum is present in Japan. There are no specific surveillance data available for the production areas. Symptoms (i.e. the disease presence), at first glance, can be mistaken for those caused by abiotic diseases and other pathogens.

Uncertainties:

– There are uncertainties regarding the presence of the pathogen in the area surrounding the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery from the surrounding area. The pathogens could be present in the surrounding area but the transfer rate via spores could be very low.

B.4.2.2. Possibility of entry with new plants

Dothistroma septosporum is present in Japan. Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines in the vicinity may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan. These plants may be infested with *D. septosporum* but not showing any symptoms.

Supposing that the pathogen is present in the area, it is possible that spores/mycelium present on the plant are transferred to the nursery. The spores of the pathogen could be present on plants meant to be transferred to the export nursery and can, therefore, start the infection cycle.

Uncertainties:

- There are uncertainties about the presence of the pathogen in the area of origin.
- The level of inspections and, therefore, the probability of detection of the fungus are not known for the unregistered nurseries that may deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible for the pathogen to enter the nursery with new plants.

B.4.2.3. Possibility of entry by growing practices

Soil and irrigation water are not known to be pathways for *D. septosporum*.

There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pathogen through growing practices is possible, but this event is unlikely to occur.

B.4.2.4. Information from interceptions

There are no reported interceptions of *D. septosporum* on *P. parviflora* bonsai plants. However, the pathogen does not use *P. parviflora* as a host.

B.4.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *D. septosporum* is provided.

Risk reducing option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *D. septosporum*. The active substances are reported to be effective against this pathogen Uncertainties: In the event it is present, it is uncertain whether the pathogen eradication would be successful or not using the present treatment
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The pathogen may be removed by the pruning activity
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	

Risk reducing option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO9	Visual inspection	X	In the nursery, all plants destined for export are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	The frequency of the inspections assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected. No laboratory testing of plants is applied Uncertainties: The incidence of the asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are individually labelled. Plants are held and trained for at least two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		Not applied	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.4.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.95%; Q1: 99.96%; M: 99.97%; Q3: 99.97%; 95%: 99.98%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested with *Dothistroma septosporum* either by: (1) introduction of new infested plants from (unregistered) nurseries; (2) natural introduction of spores from the surrounding environment; or (3) human activity **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicide treatments; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that *D. septosporum* infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** There are no records of interceptions of *D. septosporum* on *P. parviflora*. However, *P. parviflora* is not a host for *D. septosporum* **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *D. septosporum* **Main uncertainties** – It is uncertain whether the fungicide treatments may contribute to the eradication of the pathogen or not

B.4.5. Elicitation outcomes of the assessment of the pest freedom for *Dothistroma septosporum*

Dothistroma septosporum is very similar to *Lecanosticta acicola*. Neither is associated with *P. parviflora*. *Dothistroma septosporum* is spread by the wind and rain splash. There is uncertainty on the pest pressure of the pathogen in Japan. There is no sampling and testing as there is for *L. acicola*. However, the asymptomatic period is longer than that of *L. acicola* (up to 9 months) and the frequency of visual inspections can, therefore, guarantee that infected plants are detected within the 2 years in the export nursery and the 3 months in post-entry quarantine. The main infection period is in spring and bonsai plants are exported mainly from November to February (Dossier section 3.2). Overall, the Panel considers that the likelihood of pest freedom in the case of *D. septosporum* is comparable to that for *L. acicola.*

The elicited and fitted values for *Dothistroma septosporum* agreed by the Panel are shown in Tables B.7 and B.8 (Figure B.4).

Table B.7: Elicited and fitted values of the uncertainty distribution of pest infestation by *Dothistroma septosporum* per 10,000 bonsai plants

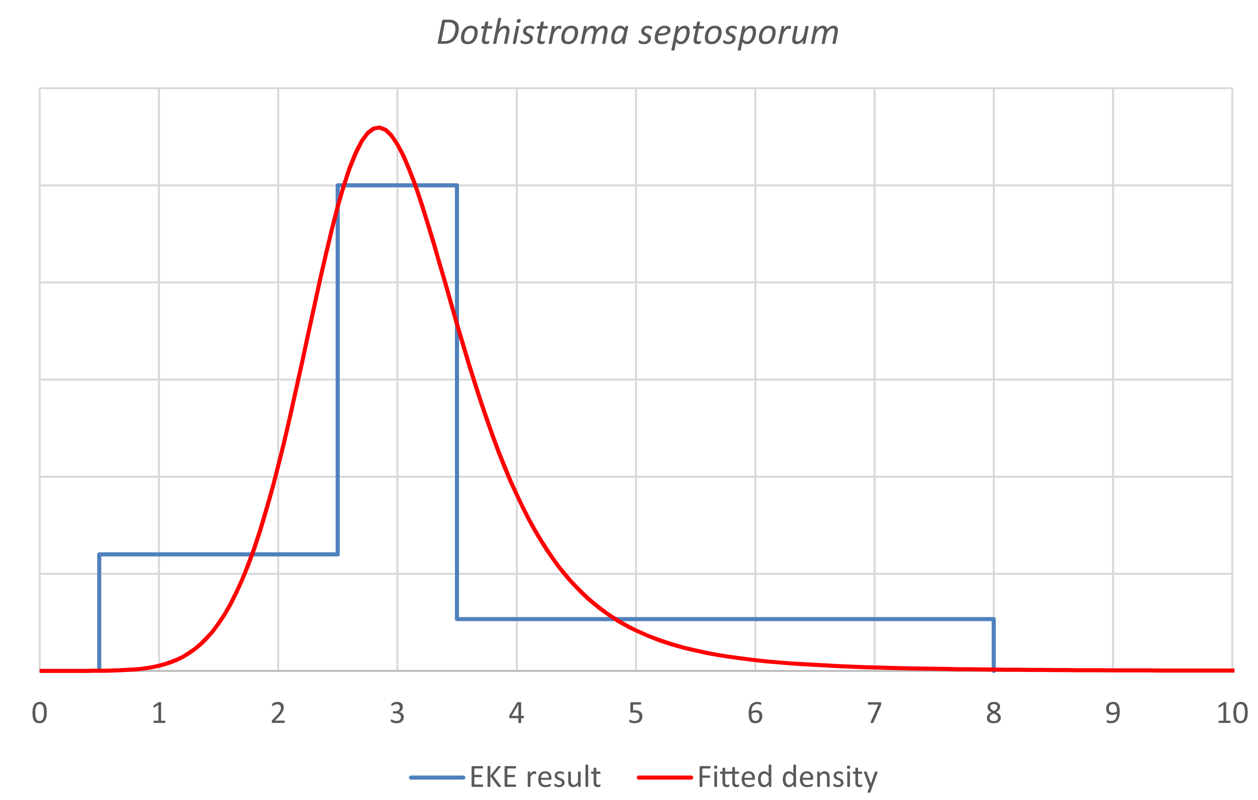
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.5					2.5		3		3.5					8
Fit-LL	1.5	1.7	1.9	2.1	2.3	2.5	2.7	3.0	3.3	3.5	3.8	4.2	4.7	5.2	6.0

Loglogistic(0,2.9777,6.5102) fitted with @Risk version 7.5.

Based on the numbers of estimated infested plants the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.8.

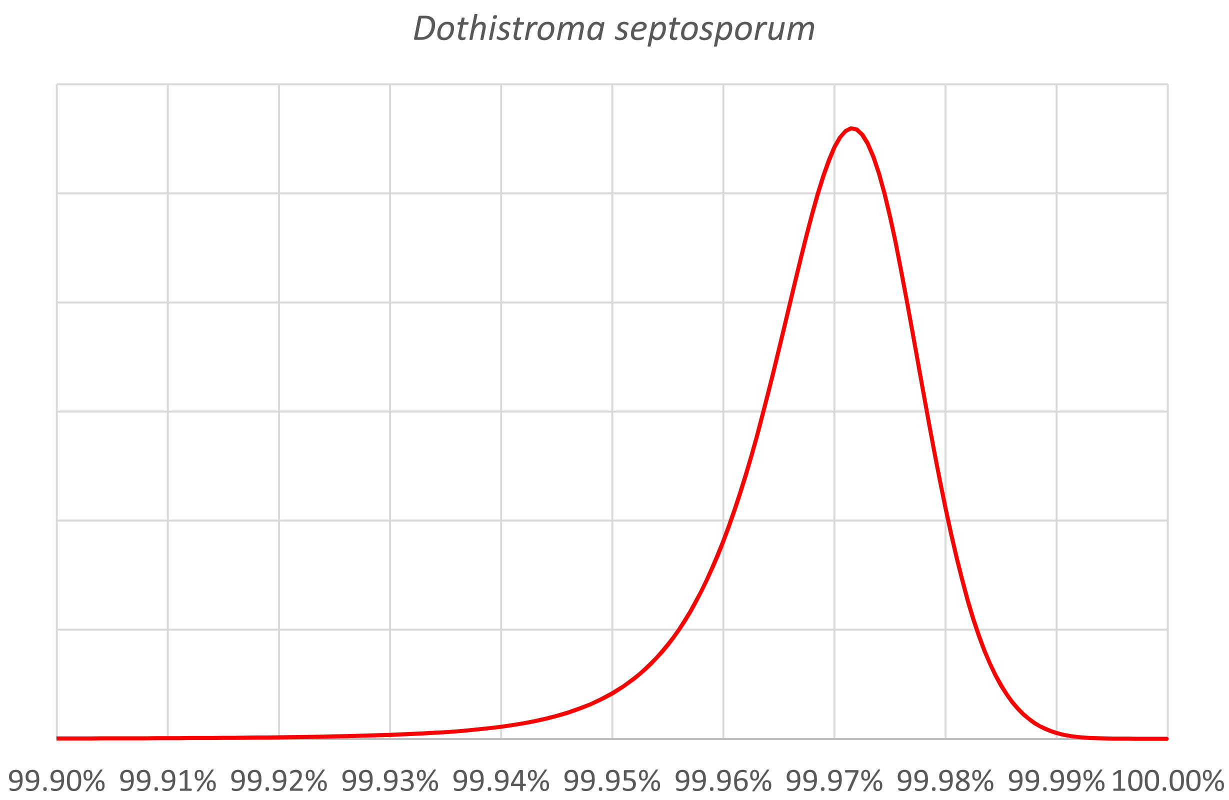
Table B.8: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Dothistroma septosporum*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.92%					99.97%		99.97%		99.98%					100.00%
Fit-LL	99.94%	99.95%	99.95%	99.96%	99.96%	99.96%	99.97%	99.97%	99.97%	99.97%	99.98%	99.98%	99.98%	99.98%	99.99%



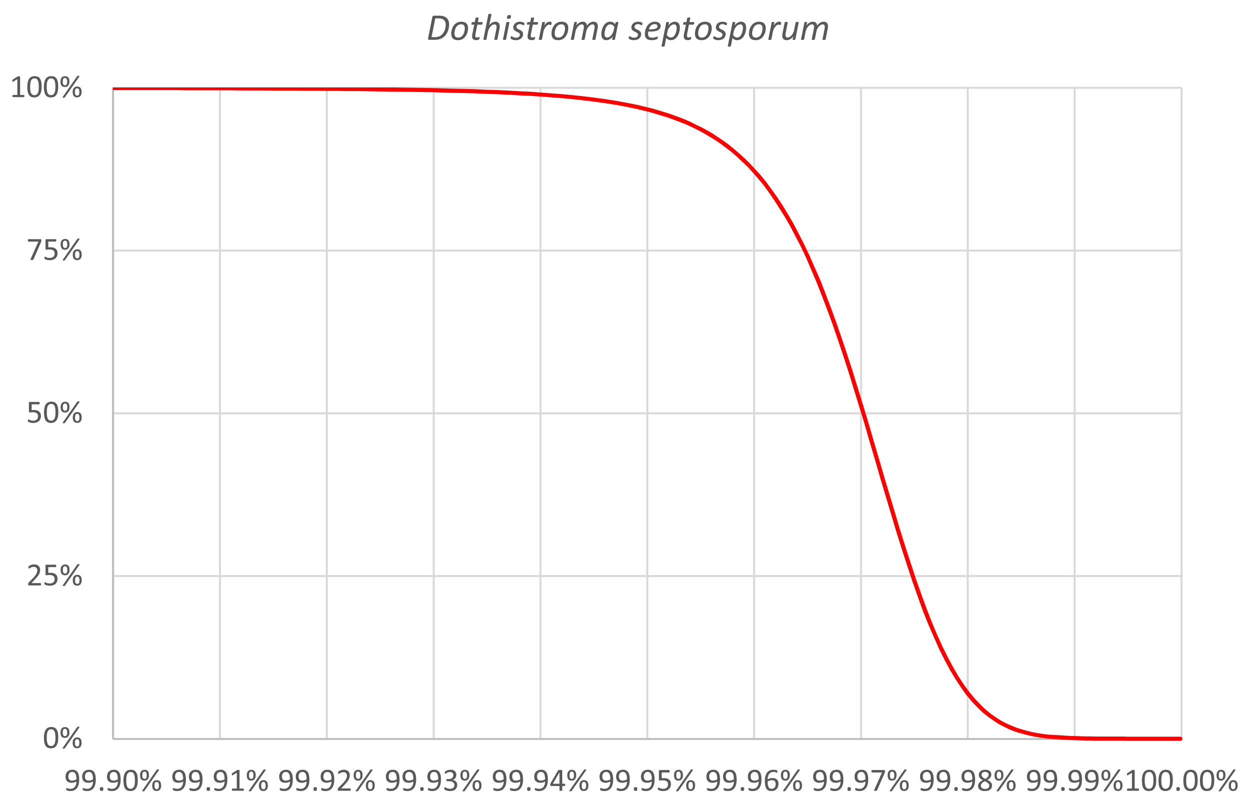
Dothistroma septosporum
0
1
2
3
4
5
6
7
8
9
10
EKE result
Fitted density

(a)



Dothistroma septosporum
99.90%
99.91%
99.92%
99.93%
99.94%
99.95%
99.96%
99.97%
99.98%
99.99%
100.00%

(b)



(c)

Figure B.4: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.4.6. Reference list

Brown AV and Webber JF, 2008. Red band needle blight of Conifers in Britain. Forestry Commission Research Note 002. Forestry Commission, Edinburgh. Available online: https://www.forestry.gov.uk/PDF/fcrn002.pdf/$FILE/fcrn002.pdf

CABI (Centre for Agriculture and Bioscience International), online_b. *Mycosphaerella pini*. CABI Invasive Species Compendium, 41 pp. Available online: https://www.cabi.org/ISC/datasheet/49059 [Accessed: 4 February 2019]

EFSA PLH Panel (EFSA Panel on Plant Health), 2013. Scientific Opinion on the risk to plant health posed by *Dothistroma septosporum* (Dorog.) M. Morelet (*Mycosphaerella pini* E. Rostrup, syn. *Scirrhia pini*) and *Dothistroma pini* Hulbary to the EU territory with the identification and evaluation of risk reduction options. EFSA Journal 2013; 11(1):3026, 173 pp. https://doi.org/10.2903/j.efsa.2013.3026

Gadgil PD, 1970. Survival of *Dothistroma pini* on fallen needles of *Pinus radiata*. New Zealand Journal of Botany, 8, 303–309.

Hulbary RL, 1941. A needle blight of Austrian pines. Illinois Natural History Survey Bulletin, 21, 231–236.

Ivory MH, 1977. Preliminary investigations of the pests of exotic forest trees in Zambia. Commonwealth Forestry Review, 56, 47-56.

Jankovský LM, Bednářová M and Palovčiková D, 2004. *Dothistroma* needle blight *Mycosphaerella pini* E. Rostrop, a new quarantine pathogen of pines in the Czech Republic. Journal of Forest Science, 50, 319–326.

Jankovský L, Palovčíková D and Tomšovský M, 2009. Records of brown spot needle blight related to *Lecanosticta acicola* in the Czech Republic. Plant Protection Science, 45, 16–18.

Karadžić D and Milijašević T, 2008. The most important parasitic and saprophytic fungi in Austrian pine and scots pine plantations in Serbia. Bulletin of the Faculty of Forestry, 97, 147–170.

Pehl L and Wulf A, 2001. Mycosphaerella-needle fungi on pines—symptoms, biology and differential diagnosis. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes, 53, 217–222.

B.5. *Fusarium circinatum*

B.5.1. Organism information

Taxonomic information	Current valid name: *Fusarium circinatum* Nirenberg and O'Donnell In the Japanese dossier, it is referred as *Gibberella circinata* Nirenberg and O'Donnel	
Group	FUN	
EPPO code	GIBBCI	
Regulated status in the EU	EU Emergency measures 2007: 2007/433/EC: Commission Decision of 18 June 2007 on provisional emergency measures to prevent the introduction into and the spread within the Community of *Fusarium circinatum* Nirenberg and O'Donnell. OJ L 161, 22.6.2007, pp. 66–69 EPPO A2 list 2002 (year addition) 2010 (year transfer)	
Pest status in Japan	Present, no details	
Pest status in the EU	Present in Spain and Portugal	
Host status on *P. parviflora*	*Pinus parviflora* is not a host for *F. circinatum*	
PRA information	Pest categorisation of *Gibberella circinata* (EFSA PLH Panel, 2010)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Cankers, sometimes together with extensive production of resin *F. circinatum* can infect seeds and cause damping-off and root rot. Aerial infection symptoms include yellowing of the needles, which turn to red, drop and dieback of the shoots
	Presence of asymptomatic plants	The pathogen can remain latent for up to 2 years within the host tissues, as reported for *Pinus radiata* (Swett and Gordon, 2017). Contaminated seeds may produce asymptomatic seedlings (Hernandez-Escribano et al., 2018)

	Confusion with other pathogens/pests	Symptoms can be mistaken for those caused by other pathogens (e.g. *Sphaeropsis sapinea* and root-rot pathogens, in the case of damping off of seedlings, as *Phytophthora* spp.). When the disease is at an advanced stage, resin flow and bark deformation are typical symptoms of the presence of *F. circinatum*
Host plant range	Several *Pinus* species and *Pseudotsuga menziesii*. The main hosts are *Pinus radiata*, *P. patula*, *P. elliotii* var. *elliotii*, *P. taeda* and *P. virginiana*. *Pinus thunbergii* is included among the other hosts (CABI, online_c) Other hosts are less damaged because they are either: inherently less susceptible to the pathogen; exposed to lower disease pressure due to location, climate or levels of insect vector activity; found in natural or less intensively managed systems (Dwinell, 1978; Dwinell et al., 1985; Hodge and Dvorak, 2000; Gordon et al., 2001) Present on grass hosts (Swett and Gordon, 2012)	
Pathways	Airborne spores. Many insects are known to carry the pitch canker pathogen in America, including pine-associated bark beetles (Coleoptera: Scolytidae) belonging to the genera *Pityophthorus*, *Ips*, *Conophthorus* and *Ernobius* (Coleoptera: Anobiidae) (Storer et al., 1997). Recently, observations have been made in Europe (*Pityophthorus* and *Tomicus*) (Bezos et al., 2018) The following entry pathways from infested areas have been identified: i) plant material for propagation purposes (seeds, seedlings and scions) ii) wood iii) plant material for decorative purposes (Christmas trees, branches, cones, etc.) iv) soil and growing substrates v) natural means (insects, wind, etc.) vi) human activity (travellers, machinery, silvicultural practices, vehicles etc.)	
Surveillance information	No surveillance is applied for this specific pathogen in the surrounding area. Plant protection officials confirmed the absence of the pathogen through surveys and laboratory tests at the exporting nurseries (Dossier 4.2)	

B.5.2. Possibility of pest presence in the nursery

B.5.2.1. Possibility of entry from surrounding environment

Fusarium circinatum is present in Japan. There are no specific surveillance data available for the areas surrounding the nurseries; however, it has been never recorded in export nurseries (Dossier section 4.2). Spores are dispersed by natural means, soil and human activity. Insect vectors (bark and wood borers) present in the area surrounding the nursery, can potentially carry the fungus but no specific information is available from Japan, even though these possible vectors are known to occur there (Kobayashi and Taketani, 1994).

Uncertainties:

– There are uncertainties about the presence of the pathogen and the vectors in the surrounding areas.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery from the surrounding area. The pathogens can be present in the surrounding areas and the transferring rate could be enhanced by vectors.

B.5.2.2. Possibility of entry with new plants

Fusarium circinatum is present in Japan. Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines may import trees from nurseries located near to pine forests, which are very common in Japan. These plants may be infested with *F. circinatum* but not show any symptoms.

There are no specific surveillance data available for the surrounding production areas. Symptoms (i.e. the disease presence) can be mistaken for those caused by other pathogens. Supposing that the pathogen is present in the area, it is possible for the spores/mycelium present on the plant to be transferred to the nursery.

Uncertainties:

- The level of inspections and, therefore, the probability of detection of the fungus are not known for the unregistered nurseries that may deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pathogen could enter the nursery with new plants or soil growing media.

B.5.2.3. Possibility of entry by growing practices

Fusarium circinatum could possibly be present in the soil used as growing media.

There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pathogen within the nursery is a possible event.

B.5.2.4. Information from interceptions

No interceptions on *Pinus parviflora* bonsai have been recorded. However, *P. parviflora* is not a host for *F. circinatum.*

B.5.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *F. circinatum* is provided.

Risk reducing Option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatments (acetamiprid mid-April; fenitrothion or acetamiprid in May, June, July, August; ethofenprox in June; permethrin in October)	The timing of the treatment is decided in accordance with the life cycle of the vectors of *F. circinatum*. The active substances are reported to be effective against these potential vectors Uncertainties: The efficacy of the insecticide treatment against internal feeders is uncertain
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *F. circinatum*. The active substances are reported to be effective against this pathogen
RRO3	Soil treatment	X	Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	*Fusarium circinatum* can survive in the soil. Soil treatments will eradicate the pathogen
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The pruning is effective in decreasing the pressure of the pathogen
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the surrounding environment of the nurseries. Visual inspection and laboratory testing are regularly carried out in the nurseries in order to detect the presence of *F. circinatum*	Because the nurseries are tested by samples the measure is reliable

Risk reducing Option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed Prior to export the consignment is inspected	The frequency of inspections assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected Uncertainties: The incidence of asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing	X	Laboratory tests are conducted in order to detect the presence of *F. circinatum* in the nursery From one lot, 4–10 samples are taken, depending on the lot size. One lot is composed of plants from the same nursery, the same year and the same species. The number of plants in a lot depends on the nursery and can vary from a few to hundreds of plants. Each lot is checked, all plants in the lot are checked and some are sampled for laboratory tests to confirm the absence of *F. circinatum* (Dossier section 4.9)	The laboratory test will detect the presence of asymptomatic plants. The pathogen has never been found through these tests
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.5.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.93%; Q1: 99.96%; M: 99.97%; Q3: 99.98%; 95%: 99.99%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infested by *Fusarium circinatum* either by: (1) introduction of new infested plants from (unregistered) nurseries; (b) vectors; (c) growing media; (d) human activity; or (e) wind-borne introduction of spores from the surrounding environment. Plants are regularly inspected, by visual assessment, for the presence of symptoms of the infection and laboratory tests are performed. However, *F. circinatum* is present in Japan, and its introduction by vectors or other means could not be excluded **Measures taken against the pest and their efficacy** The applied measures are: (a) insecticides, fungicides and soil treatments; (b) removal of symptomatic plants; and (c) pruning. These measures are supposed to greatly reduce the probability of the presence of *F. circinatum* in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood that the

	pathogen is present. The fungicide treatment and pruning of young leaves are very effective. The symptoms are easily detected. The pathogen has never been found through laboratory testing at the exporting nurseries **Interception records** Among imports of bonsai plants of *P. parviflora* to the EU between 1999 and 2018, *F. circinatum* has never been found **Shortcomings of present methods** The measures applied are supposed to be effective. The pathogen has never been detected in the exporting nurseries or on bonsai plants imported to the EU **Main uncertainties** – There is uncertainty about the surveillance for this pest and its possible vectors in the neighbourhood of the nurseries – It is uncertain whether the fungicide treatments may contribute to the eradication of the pathogen or not – It is uncertain whether the insecticide treatments fully prevent the spread of the pathogen by vectors or not

B.5.5. Elicitation outcomes of the assessment of the pest freedom for *Fusarium circinatum*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Plant protection officials confirmed the absence of the pathogen through surveys and laboratory tests at the exporting nurseries over the last 10 years.
- Insecticides and fungicides are regularly applied (six times per year) and disinfected soil is used for potting the plants.
- In the Dossier (Dossier section 3.2), it is argued that the pathogen has been confirmed on Okinawa and Amami islands. The bonsai producers are annually instructed not to move soil and plants belonging to the genus *Pinus* from the smaller islands to the production site on the main island.
- The combination of measures will reduce to virtually zero the probability that *F. circinatum* is present in bonsai destined for export.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- *Fusarium circinatum* could be present in the area surrounding the nurseries; the plants in the nursery may be infested, but treatments are applied, and symptomatic plants are discarded. The treatment may not be fully effective.
- The sampling may be not sufficient to detect the pathogen.
- There are uncertainties regarding the presence of the pathogen and vectors in the surrounding areas.
- The level of inspections and therefore the probability of detection of the fungus are not known for the unregistered nurseries that might deliver bonsai.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

The value of the median is estimated based on:

- *Fusarium circinatum* presence has not been detected through laboratory tests at the export nurseries.
- The infection pressure of the pathogen may be very low.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The Panel considered a skewed distribution to the lower values.

The elicited and fitted values for *F. circinatum* agreed by the Panel are shown in Tables B.9 and B.10 (Figure B.5).

Table B.9: Elicited and fitted values of the uncertainty distribution of pest infestation by *Fusarium circinatum* per 10,000 bonsai plants

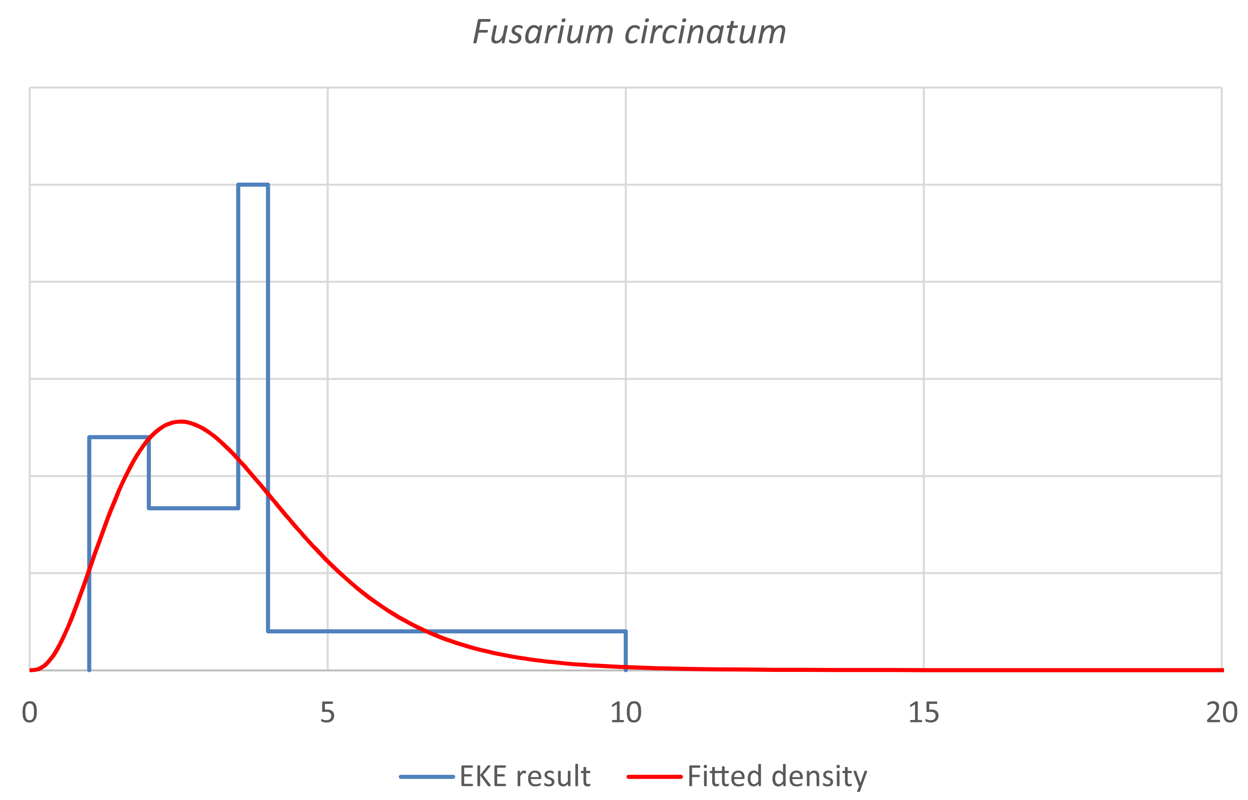
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	1					2		3.5		4					10
Fit-G	0.7	0.9	1.1	1.5	1.8	2.1	2.5	3.1	3.9	4.4	5.0	5.8	6.8	7.7	8.8

Gamma(3.798,0.90427) fitted with @Risk version 7.5.

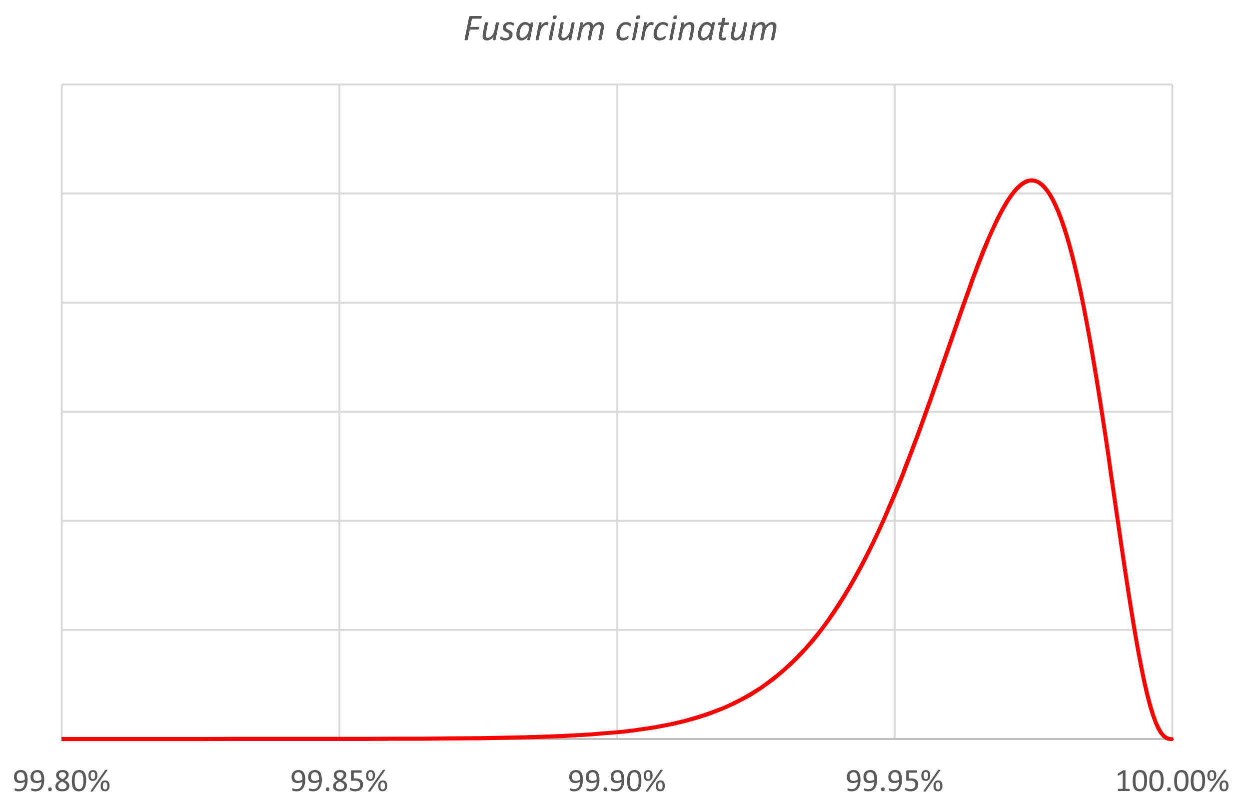
Based on the numbers of estimated infested plants the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.10.

Table B.10: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Fusarium circinatum*

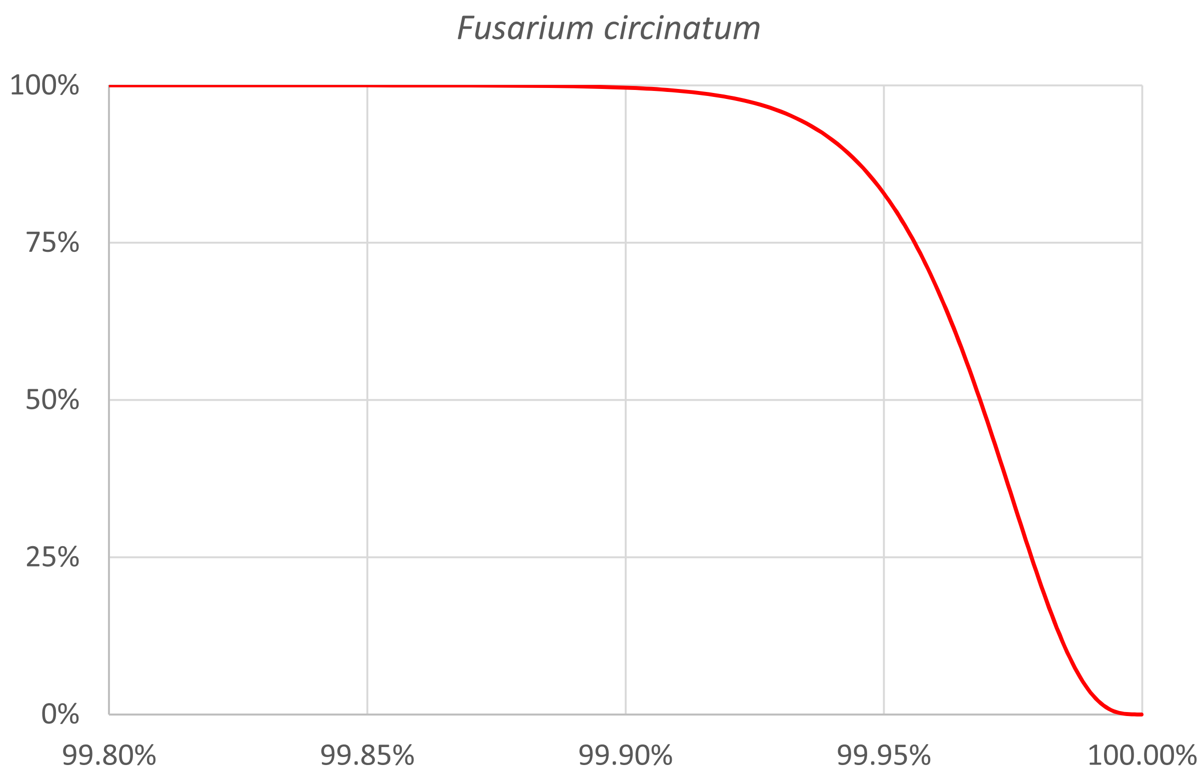
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.90%					99.96%		99.97%		99.98%					99.99%
Fit-G	99.91%	99.92%	99.93%	99.94%	99.95%	99.96%	99.96%	99.97%	99.98%	99.98%	99.98%	99.99%	99.99%	99.99%	99.99%



(a)



(b)



(c)

Figure B.5: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.5.6. Reference list

Bezos D, Martínez-Álvarez P, Sanz-Ros AV, Martín-García J, Fernandez MM and Diez JJ, 2018. Fungal communities associated with bark beetles in *Pinus radiata* plantations in Northern Spain affected by pine pitch canker, with special focus on *Fusarium* species. Forests, 9, 698. https://doi.org/10.3390/f9110698

CABI (Centre for Agriculture and Bioscience International), online_c. *Gibberella circinata* (pitch canker), CABI Invasive Species Compendium, 36 pp. Available online: https://www.cabi.org/isc/datasheet/25153 [Accessed: 4 February 2019]

Dwinell LD, 1978. Susceptibility of southern pines to infection by *Fusarium moniliforme* var. *subglutinans*. Plant Disease Reporter, 62, 108-111.

Dwinell LD, Barrows-Braddus JB and Kuhlman EG, 1985. Pitch canker: a disease complex of southern pines. Plant Disease, 69, 270-276.

EFSA PLH Panel (EFSA Panel on Plant Health), 2010. Risk assessment of *Gibberella circinata* for the EU territory and identification and evaluation of risk management options. EFSA Journal 2010; 8 (6):1620, 93 pp. https://doi.org/10.2903/j.efsa.2010.

Gordon TR, Storer AJ and Wood DL, 2001. The pitch canker epidemic in California. Plant Disease, 85, 1128-1139.

Hernandez-Escribano L, Iturritxa E, Aragonés A, Mesanza N, Berbegal M, Raposo R and Elvira-Recuenco M, 2018. Root infection of canker pathogens, *Fusarium circinatum* and *Diplodia sapinea*, in asymptomatic trees in *Pinus radiata* and *Pinus pinaster.* Forests, 9, 128. https://doi.org/10.3390/f9030128

Hodge GR and Dvorak WS, 2000. Differential responses of Central American and Mexican pine species and *Pinus radiata* to infection by the pitch canker fungus. New Forests, 19(3), 241-258.

Kobayashi F and Taketani A, 1994. Forest insects. Tokyo, Youkendo, 567 pp.

Storer AJ, Gordon TR, Wood DL and Bonello P, 1997. Pitch canker disease of pines: current and future impacts. Journal of Forestry, 95, 21-26.

Swett CL and Gordon TR, 2012. First report of grass species (Poaceae) as naturally occurring hosts of the pine pathogen *Gibberella circinata*. Plant Disease, 96, 908 pp.

Swett CL and Gordon TR, 2017. Exposure to a pine pathogen enhances growth and disease resistance in *Pinus radiata* seedlings. Forest Pathology, 47, 1–10.

B.6. *Lecanosticta acicola*

B.6.1. Organism information

Taxonomic information	Current valid name: *Lecanosticta acicola* (von Thümen) Sydow Synonyms: *Mycosphaerella dearnessii Rostrup*, *Scirrhia acicola* (Dearness) Siggers and *Dothistroma acicola* (von Thümen) Schischkina & Tsanava In the technical dossier, it is referred as *Scirrhia acicola*
Group	FUN
EPPO code	SCIRAC
Regulated status in the EU	Annex II/AII (Council Directive EC/2000/29) This pest is a candidate for regulated non-quarantine pest (Working Group on the Annexes of Council Directive 2000/29/EC, 2016)
Pest status in Japan	Present, no details
Pest status in the EU	Present (Pehl, 1995)
Host status on *P. parviflora*	*Pinus parviflora* is not a host for *Lecanosticta acicola*
PRA information	No pest risk assessment is currently available. However, in Norway the pest is registered as a quarantine pest (2012); it is also included in the A1 list in Russia (2014) and Ukraine (2010)

Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Infested needles show initially straw-yellow spots, changing later to light brown with a dark border and/or a 'bar spot' (i.e. a brown spot on an amber yellow band). The yellow tissue is infiltrated with resin (Sinclair et al., 1987; Hansen and Lewis, 1997)
	Presence of asymptomatic plants	Symptoms appear after 1–6 months, depending on temperature, time of year and pine species
	Confusion with other pathogens/pests	After an accurate observation, symptoms caused by *L. acicola* can be distinguishable from those caused by *Dothistroma septosporum* for the colour of the lesions and the different incidence time (Dossier section 3.2)
Host plant range	*Pinus* spp. Artificial infection of *Picea glauca* was noticed after the application of heavy spore inoculum infection (Siggers, 1944; Evans, 1984) According to EPPO (EPPO, online_d) *P. thunbergii* is a minor host of *L. acicola*	
Pathways	The spores are dispersed by the wind, within and beyond the immediate locality (Dossier section 3.2). Conidia can also be spread by insects or through forestry equipment (e.g. on contaminated tools) (Skilling and Nicholls, 1974) Soil and seeds contaminated with needle debris can be considered as a pathway of spread (Smith et al., 1997)	
Surveillance information	No surveillance for this pathogen is applied	

B.6.2. Possibility of pest presence in the nursery

B.6.2.1. Possibility of entry from the surrounding environment

Lecanosticta acicola is present in Japan. There are no specific surveillance data available related to the production areas. Symptoms (i.e. the disease presence) can be easily detected, even though, at first glance they can be mistaken for those caused by other pathogens (Dossier section 3.2). Conidia are dispersed by natural means (e.g. wind, insects or seeds contaminated with needle debris) and human activity.

Uncertainties:

– There are uncertainties about the presence of the pathogen in the surrounding areas.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery from the surrounding area. The pathogens could be present in the surrounding areas but the transferring rate via spores could be very low.

B.6.2.2. Possibility of entry with new plants

Lecanosticta acicola is present in Japan. Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan.

These plants may be infested with *L. acicola.* There are no specific surveillance data available for the production areas. Symptoms (i.e. the disease presence) are easily detected, even though they can be mistaken for those caused by other pathogens. Supposing that the pathogen is present in the area, it is possible for the spores/mycelium present on the plant to be transferred to the nursery, therefore starting the infection cycle.

Uncertainties:

– There are uncertainties about the presence of the pathogen in the area of origin.
– For the unregistered nurseries that might deliver bonsai, information on the frequency of the inspections and the probability of detection of the fungus, is not available.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pathogen could enter the nursery with new plants.

B.6.2.3. Possibility of entry by growing practices

Irrigation water are not known to be pathways for *L. acicola.* There are no uncertainties.

Soil contaminated with needle debris could be potentially a pathway.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the fungus through growing practices is possible.

B.6.2.4. Information from interceptions

No interceptions on *P. parviflora* bonsai have been recorded. However, *P. parviflora* is not a host for *L. acicola.*

B.6.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *L. acicola* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatments (acetamiprid mid-April; fenitrothion or acetamiprid in May, June, July, August; ethofenprox in June; permethrin in October)	Frequent insecticide treatments are applied Uncertainties: There are no certainties regarding the effectiveness of the treatments in killing the vector before the transmission of the pathogen occurs
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *L. acicola* The active substances are reported to be effective against the pathogen Uncertainties: If the pathogen is present, uncertainties regarding its successful eradication may arise
RRO3	Soil treatment		Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	The soil treatment will remove any fungi potentially present
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	*L. acicola* can affect young and old foliage. The pathogen may be removed through the pruning activity
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the surrounding environment of the nurseries	

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	The frequency of the inspections assures the detection of symptomatic plants that may be present in the export nursery Asymptomatic plants remain undetected (the maximum asymptomatic period is 6 months). No laboratory testing of plants is applied Uncertainties: The incidence of asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		Not applied	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are eventually tested	

B.6.4. Overall likelihood of pest freedom

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Almost certain</td></tr>
<tr><td>Distribution of the likelihood of pest freedom</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>99.95%</td><td>99.96%</td><td>99.97%</td><td>99.97%</td><td>99.98%</td></tr></table></td></tr>
<tr><td>Summary of the information used for the evaluation</td><td>Possibility that the pest could enter exporting nurseries
Lecanosticta acicola is present in Japan. It cannot be excluded that bonsai plants in the nursery are infected by L. acicola either by: (1) introduction of new infected plants from (unregistered) nurseries; (2) introduction of spores from the surrounding environment by natural means; or (3) insects

Measures taken against the pest and their efficacy
The applied measures are: (a) insecticide and fungicide treatments and soil treatment; (b) pruning; (c) removal of symptomatic plants. These measures will greatly reduce the probability that L. acicola infection is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen

Interception records
No interceptions (1999–2018)

Shortcomings of present methods
Bonsai plants are not tested for the asymptomatic presence of L. acicola.

Main uncertainties
– It is uncertain whether the fungicide treatments contribute to the eradication of the pathogen or not</td></tr>
</table>

B.6.5. Elicitation outcomes of the assessment of the pest freedom for *Lecanosticta acicola*

Lecanosticta acicola is very similar to *Fusarium circinatum*. These species are not associated with *P. parviflora*. They are both spread by vectors (insects) and the wind and for both there are uncertainties regarding the pest pressure in Japan.

Nevertheless, as opposed to *F. circinatum*, there is no sampling and testing for *L. acicola*.

However, the asymptomatic period is very short for *L. acicola* (maximum 6 months) and the frequency of visual inspections guarantees that infested plants are detected within the 2 years they spend in the export nursery and the following 3 months in post-entry quarantine. Overall, the Panel considers that the likelihood of pest freedom in the case of *L. acicola,* as compared to the rating for *F. circinatum* is higher.

The elicited and fitted values for *L. acicola* agreed by the Panel are shown in Tables B.11 and B.12. (Figure B.6).

Table B.11: Elicited and fitted values of the uncertainty distribution of pest infestation by *Lecanosticta acicola* per 10,000 bonsai plants

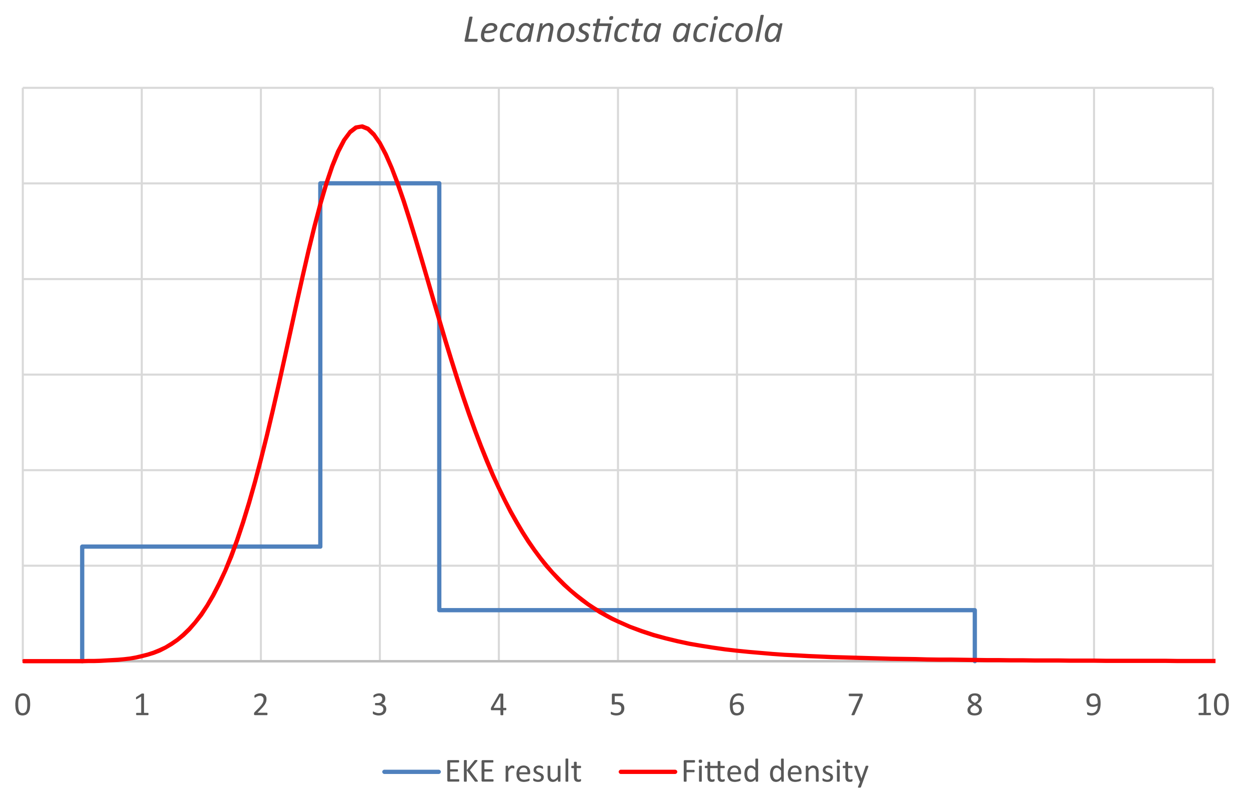
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.5					2.5		3		3.5					8
Fit-LL	1.5	1.7	1.9	2.1	2.3	2.5	2.7	3.0	3.3	3.5	3.8	4.2	4.7	5.2	6.0

Loglogistic(0,2.9777,6.5102) fitted with @Risk version 7.5.

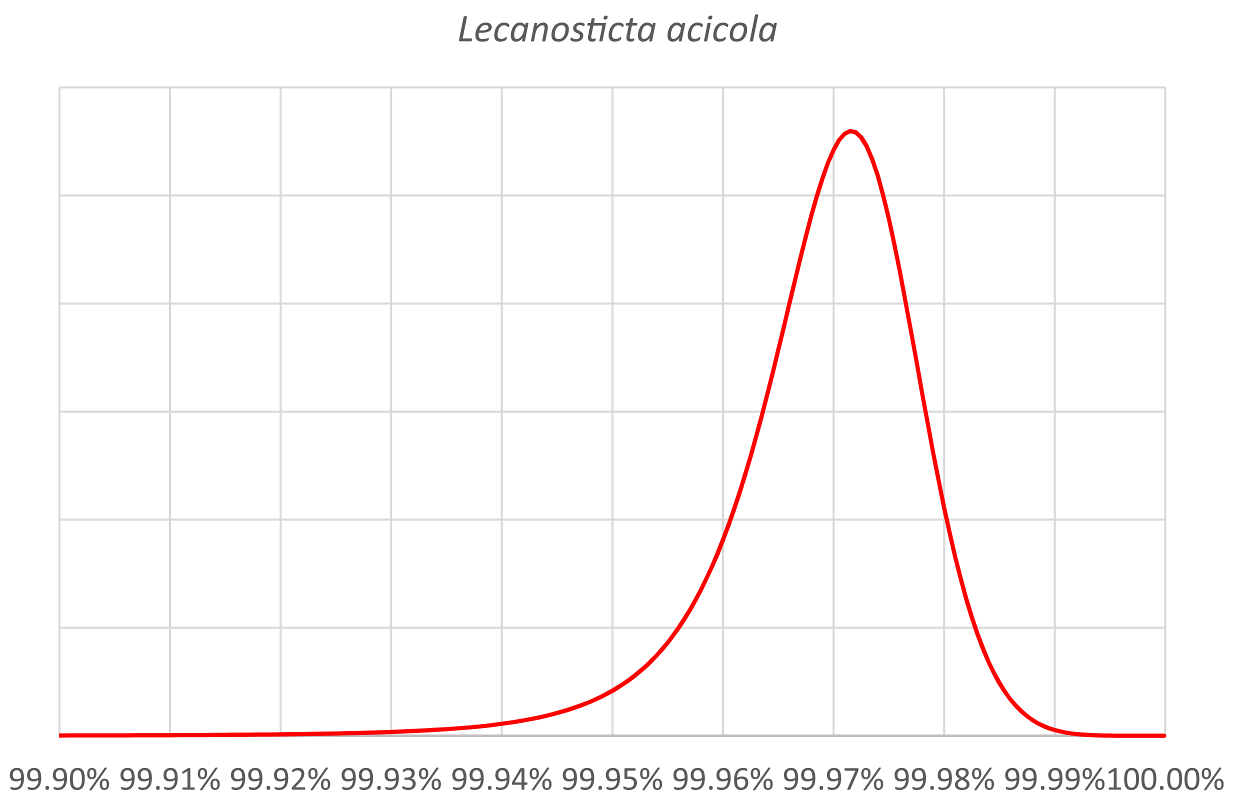
Based on the numbers of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.12.

Table B.12: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Lecanosticta acicola*

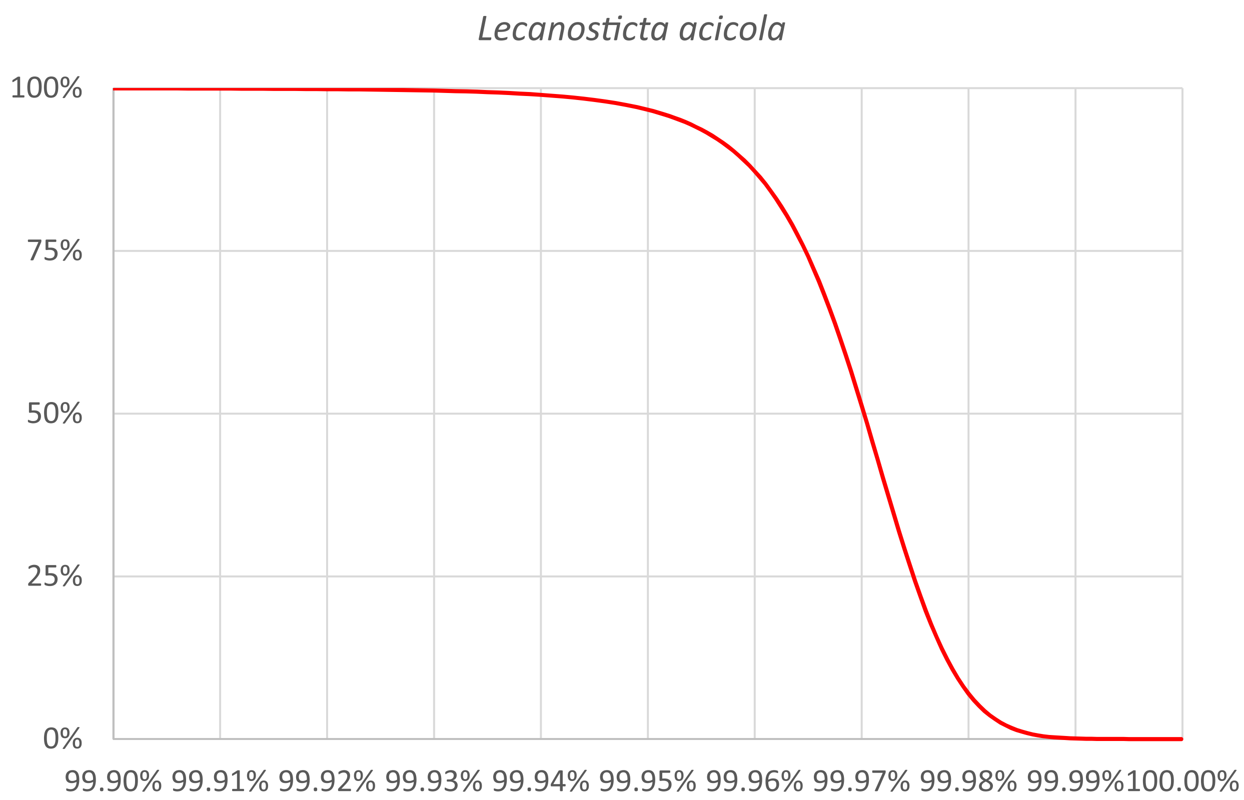
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.92%					99.97%		99.97%		99.98%					100.00%
Fit-LL	99.94%	99.95%	99.95%	99.96%	99.96%	99.96%	99.97%	99.97%	99.97%	99.97%	99.98%	99.98%	99.98%	99.98%	99.99%


Lecanosticta acicola
0
1
2
3
4
5
6
7
8
9
10
EKE result
Fitted density

(a)


Lecanosticta acicola
99.90% 99.91% 99.92% 99.93% 99.94% 99.95% 99.96% 99.97% 99.98% 99.99%100.00%

(b)



(c)

Figure B.6: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.6.6. Reference list

EPPO (European and Mediterranean Plant Protection Organization), online_d. *Lecanosticta acicola* (SCIRAC), EPPO Global Database. Available online: https://gd.eppo.int/taxon/SCIRAC/hosts [Accessed: 12 March 2019]

Evans HC, 1984. The genus *Mycosphaerella* and its anamorphs *Cercoseptoria*, *Dothistroma* and *Lecanosticta* on pines. Mycological Paper, 153, 1-102.

Hansen EM and Lewis KJ, 1997. Compendium of Conifer diseases. American Phytopathological Society. APS Press, St Paul, USA. 101 pp.

Pehl L, 1995. *Lecanosticta*-needle blight - a new disease on pine in the Federal Republic of Germany. Nachrichtenblatt des Deutschen Pflanzenschutzdienstes, 47, 305-309.

Siggers PV, 1944. The brown spot needle blight of pine seedlings. USDA Technical Bulletin, 870, 1-36.

Skilling DD and Nicholls TH, 1974. Brown spot needle disease - biology and control in Scotch pine plantations. USDA Forest Service Research Paper, No. NC-109, 19 pp.

Sinclair WA, Lyon HH and Johnson WT, 1987. Diseases of trees and shrubs. Cornell University Press, Ithaca, New York, USA. 574 pp.

Smith IM, McNamara DG, Scott PR and Holderness M, 1997. Quarantine pests for Europe. 2nd Edition. Data sheets on quarantine pests for the European Union and for the European and Mediterranean Plant Protection Organization. CABI, Wallingford, GB, 1425 pp.

Working Group on the Annexes of Council Directive 2000/29/EC, 2016. Recommendation of the Working Group on the Annexes of Council Directive 2000/29/EC – Section II – Listing of Harmful Organisms as regards the future listing of *Scirrhia acicola*. 2 pp. Available online: https://planthealthportal.defra.gov.uk/assets/uploads/2.1-Mycosphaerella-dearnessii-Scirrhia-acicola.pdf

B.7. *Pseudocercospora pini-densiflorae*

B.7.1. Organism information

Taxonomic information	Current valid name: *Pseudocercospora pini-densiflorae* It is listed in Council Directive EC/2000/29 as *Cercoseptoria pini-densiflorae* In the Japanese dossier, it is referred to as *Pseudocercospora pini-densiflorae*	
Group	FUN	
EPPO code	CERSPD	
Regulated status in the EU	Annex IIAI (Council Directive EC/2000/29)	
Pest status in Japan	Present on several *Pinus* hosts in the three following regions: Honshu, Kyushu and Shikoku	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*Pseudocercospora pini-densiflorae* uses *P. parviflora* as a host (Kobayashi, 2007)	
PRA information	Pest categorisation of *Pseudocercospora pini-densiflorae* (EFSA PLH Panel, 2017)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Coloured lesions appear on a needle leaf starting from July. Symptoms are clearly detectable. *Pseudocercospora pini-densiflorae* overwinters as mycelial masses or immature stromata in the tissues of diseased needles. Symptoms appear around July (Dossier section 3.2)
	Presence of asymptomatic plants	Due to the asymptomatic phase (up to 6 weeks) in host plants, *P. pini-densiflorae* can be inadvertently introduced and can be moved during commercial exchanges (Ivory, 1987)
	Confusion with other pathogens/pests	*Pseudocercospora pini-densiflorae* may be distinguished from closely related pine pathogens (e.g. *Lecanosticta acicola*), after the analysis of some specific morphological characteristics (Dossier section 3.2)
Host plant range	The fungus is known to infect at least 36 *Pinus* species (Quintero, 2015) including *P. thunbergii*	

Pathways	Conidia formed on diseased leaves during a growth period are dispersed by splash dispersal due to rainfall or irrigation events (Sullivan, 2016) The fungus can be introduced and moved through the movement of infested host plants or parts of plants (e.g. bark, leaves and stems), growing media (Venette, 2008) and mycorrhizal soil inocula (Singh et al., 1988)
Surveillance information	No surveillance information is available

B.7.2. Possibility of pest presence in the nursery

B.7.2.1. Possibility of entry from surrounding environment

Pseudocercospora pini-densiflorae is present in Japan on several *Pinus* species including *P. thunbergii* and in regions where production nurseries are located. It is possible for the pathogen to enter the nursery from the surrounding area. The pathogens can be present in surrounding areas but the transfer rate could be very low. Due to the major role played by rain water rather than wind in dispersal, the pathogen spreads efficiently only locally. Symptoms are easy to detect.

Uncertainties:

– There are uncertainties about the presence of the pathogen in the areas surrounding the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery from the surrounding area. The pathogens can be present in the surrounding areas but the transfer rate could be very low.

B.7.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines in the vicinity may nonetheless import trees from nurseries located nearby pine forests, which are very common in Japan. These plants may be infested by *Pseudocercospora pini-densiflorae* but not show any symptoms. However, the asymptomatic period is very short (a few weeks) and symptoms are easily detected.

Pseudocercospora pini-densiflorae is present in Japan on several *Pinus* species including *P. thunbergii* and in three regions (Honshu, Kyushu and Shikoku). *Pseudocercospora pini-densiflorae* use *P. parviflora* as a host.

Uncertainties:

– New plants entering the nurseries can be taken/collected from areas in Japan where *P. pini-densiflorae* is present – no specific information regarding the native location of the new plants entering the nursery is available.
– The level of inspections and, therefore, the probability of detection of the fungus, are not known for the unregistered nurseries that might deliver bonsai.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery with new plants.

B.7.2.3. Possibility of entry by growing practices

Pseudocercospora pini-densiflorae can be present in the growing soil. There are no uncertainties. Plants are repotted every year with disinfected growing media (the heat treatment lasts for 30 min at 90°C).

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of *Pseudocercospora pini-densiflorae* in the nursery through growing practices is possible.

B.7.2.4. Information from interceptions

There are no interceptions reported on *Pinus* bonsai plants, although *Pinus parviflora* is known to be a host for *Pseudocercospora pini-densiflorae.*

B.7.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *P. pini-densiflorae* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop	X	Treatments (oxine-copper in May, August and September; thiophanate-methyl in September; mancozeb in May, June, July and October)	The timing of the treatment is decided in accordance with the life cycle of *P. pini-densiflorae*. The active substances are reported to be effective against this pathogen Uncertainties: In the event that the pathogen is present, it is uncertain whether or not eradication would be successful
RRO3	Soil treatment	X	Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	The treatment is effective to control the pathogen
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The pathogen may be removed through the pruning activity
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	The frequency of inspection assures the detection of symptomatic plants present in the export nursery Asymptomatic plants remain undetected. No laboratory testing of plants is applied Uncertainties: The incidence of the asymptomatic plants in the nursery is unknown
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing	X	Not applied	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants showing symptoms are tested	

B.7.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.95% · Q1: 99.96% · M: 99.97% · Q3: 99.97% · 95%: 99.98%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Pseudocercospora pini-densiflorae* is present in Japan and can be associated with at least 36 *Pinus* species (Quintero, 2015). It cannot be excluded that bonsai plants in the nursery are infested by *P. pini-densiflorae* either by: (1) introduction of new infested plants from (unregistered) nurseries; (2) splash dispersal from the surrounding environment; or (3) growing media. The probability of an introduction from the surrounding area is considered to be low **Measures taken against the pest and their efficacy** The applied measures are: (a) fungicides and soil treatments; (b) removal of symptomatic plants. These measures will greatly reduce the probability that *P. pini-densiflorae* is present in bonsai destined for export. The frequency of the inspections significantly reduces the likelihood of presence of the pathogen **Interception records** In imports of *Pinus* spp. bonsai plants from Japan to the EU over the period 1999–2018, *P. pini-densiflorae* has never been reported. *Pseudocercospora pini-densiflorae* use *Pinus parviflora* as a host **Shortcomings of present methods** Bonsai plants are not tested for the asymptomatic presence of *P. pini-densiflorae* **Main uncertainties** – There is uncertainty regarding surveillance for this pest in the neighbourhood of the nurseries – It is uncertain whether the pathogen eradication would be successful or not using the fungicide treatments
Summary of the information used for the evaluation	*Pseudocercospora pini-densiflorae* is very similar to other foliar pathogens (*Dothistroma septosporum*, *Lecanosticta acicola*) *Pseudocercospora pini-densiflorae* is associated with *P. parviflora*. The period during which symptoms develop is well before the delivery time. The lack of interception data confirms that the probability of entry is low. Overall the Panel considers that the likelihood for pest freedom in the case of *Pseudocercospora pini-densiflorae* is comparable to the other foliar pathogens cited above

B.7.5. Elicitation outcomes of the assessment of the pest freedom for *Pseudocercospora pini-densiflorae*

Pseudocercospora pini-densiflorae is very similar to other foliar pathogens (*Dothistroma septosporum, Lecanosticta acicola*). *Pseudocercospora pini-densiflorae* uses *Pinus parviflora* as a host. The period during which symptoms develop is well before the delivery time. The lack of interception data confirms that the probability of entry is low. Overall the Panel considers that the likelihood for pest freedom in the case of *Pseudocercospora pini-densiflorae* is comparable to that for the other foliar pathogens cited above.

The elicited and fitted values for *Pseudocercospora pini-densiflorae* agreed by the Panel are shown in Tables B.13 and B.14 (Figure B.7).

Table B.13: Elicited and fitted values of the uncertainty distribution of pest infestation by *Pseudocercospora pini-densiflorae* per 10,000 bonsai plants

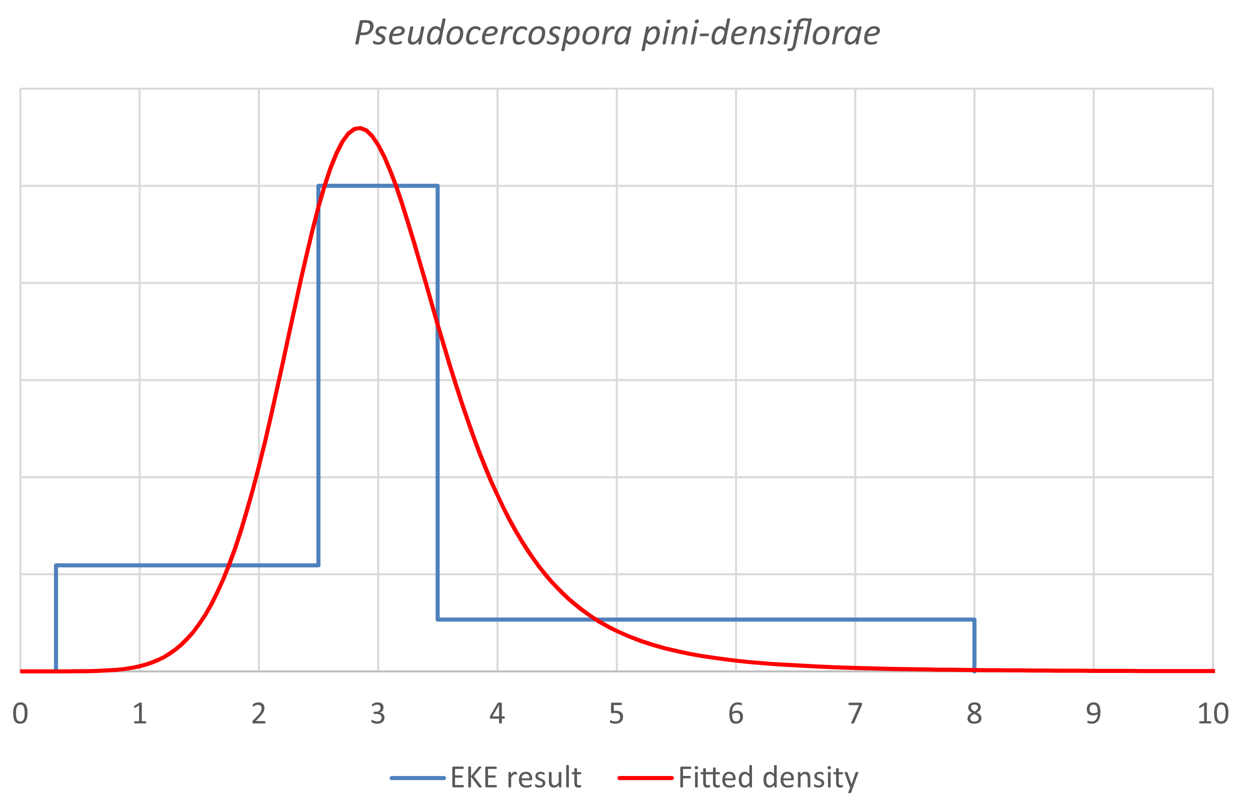
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.3					2.5		3		3.5					8
Fit-LL	1.5	1.7	1.9	2.1	2.3	2.5	2.7	3.0	3.3	3.5	3.8	4.2	4.7	5.2	6.0

Loglogistic(0,2.9777,6.5102) fitted with @Risk version 7.5.

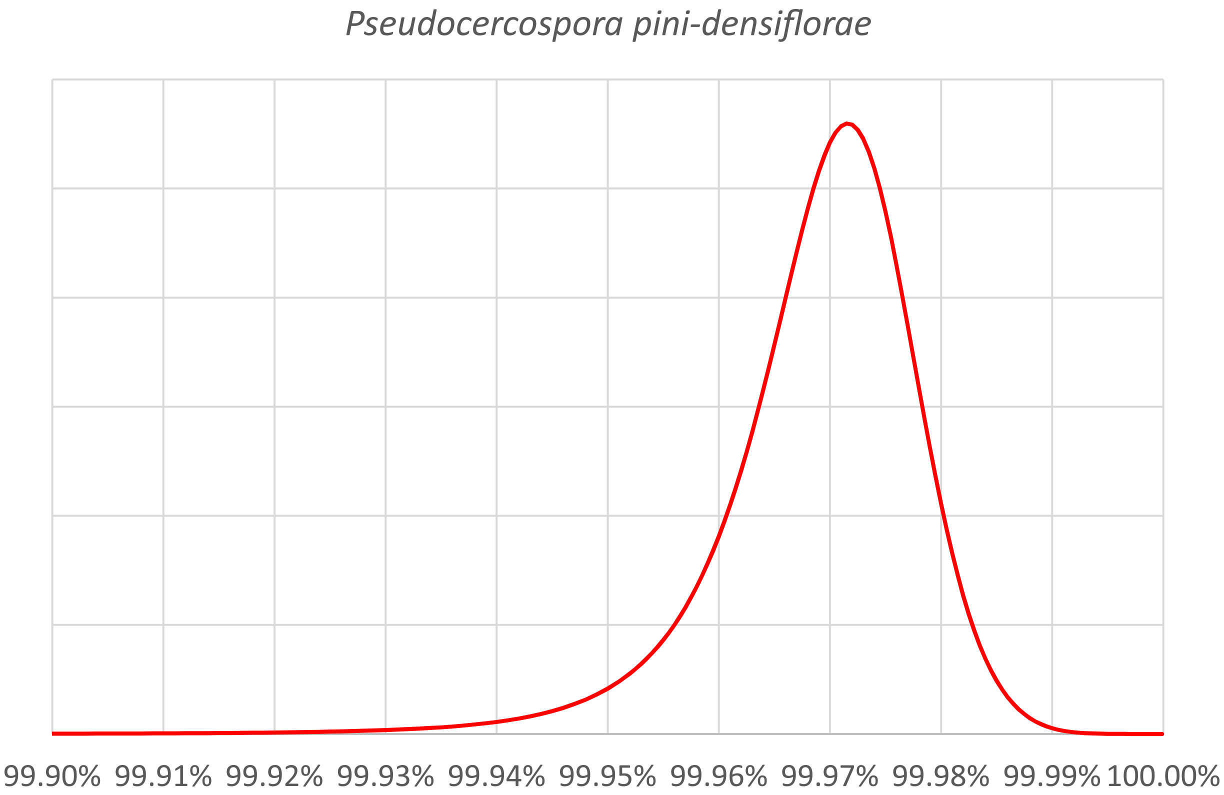
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.14.

Table B.14: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Pseudocercospora pini-densiflorae*

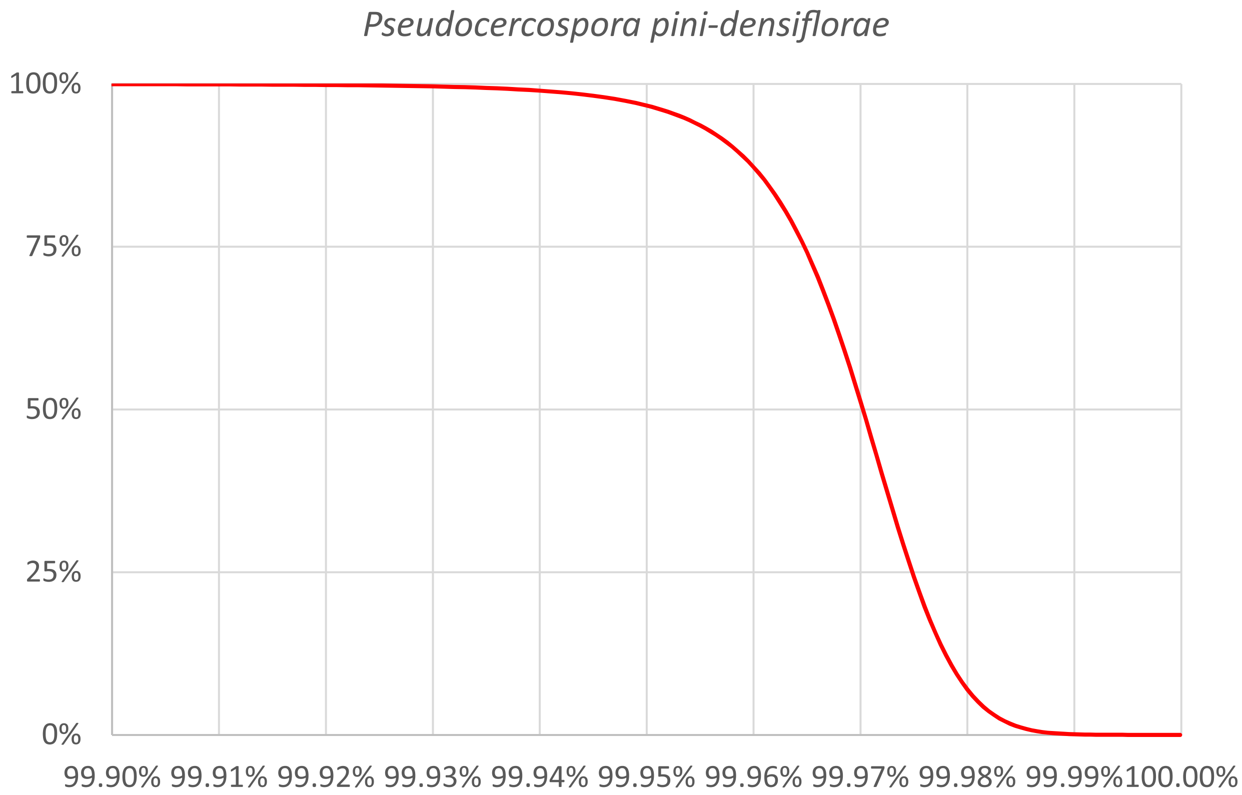
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.92%					99.97%		99.97%		99.98%					100.00%
Fit-LL	99.94%	99.95%	99.95%	99.96%	99.96%	99.96%	99.97%	99.97%	99.97%	99.97%	99.98%	99.98%	99.98%	99.98%	99.99%


Pseudocercospora pini-densiflorae
0
1
2
3
4
5
6
7
8
9
10
EKE result
Fitted density

(a)


Pseudocercospora pini-densiflorae
99.90%
99.91%
99.92%
99.93%
99.94%
99.95%
99.96%
99.97%
99.98%
99.99%
100.00%

(b)



(c)

Figure B.7: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.7.6. Reference list

EFSA PLH Panel (EFSA Panel on Plant Health), 2017. Scientific opinion on the pest categorisation of *Pseudocercospora pini-densiflorae*. EFSA Journal 2017; 15(10):5029, 27 pp. https://doi.org/10.2903/j.efsa.2017.5029.

Ivory MH, 1987. Diseases and disorders of pines in the tropics: a field and laboratory manual. Overseas Research Publication No. 31, Overseas Development Administration, Oxford Forestry Institute, Oxford, UK. 92 pp.

Kobayashi T, 2007. Index of fungi inhabiting woody plants in Japan. Host, Distribution and Literature. Zenkoku-Noson-Kyoiku Kyokai Publishing Co., Tokyo, Japan. 1,227 pp.

Quintero TG, 2015. New pest response guidelines. *Pseudocercospora pini-densiflorae* (Hori & N. Nambu) Deighton. Brown Needle Fungus. USDA, Forest Service, 91 pp.

Singh S, Khan SN and Misra BM, 1988. *Pseudocercoseptoria* needle blight of pines in nurseries: disease spread and control strategies. Forest Pathology, 18, 397–400.

Sullivan M, 2016. CPHST (Center for Plant Health Science and Technology) Pest Datasheet for *Pseudocercospora pini-densiflorae*. USDA-APHISPPQ-CPHST, Raleigh, North Carolina, USA. 10 pp.

Venette RC (ed.), 2008. Exotic Pine Pests: Survey Reference. Cooperative Agriculture Pest Survey (CAPS). USDA Forest Service, St. Paul, Minnesota, USA.

B.8. *Crisicoccus pini*

B.8.1. Organism information

Taxonomic information	*Crisicoccus pini*	
Group	INS	
EPPO code	DACLPI	
Regulated status in the EU	Not regulated in the EU EPPO A2 list (added in 2019)	
Potential for impact in the EU	Damage has been observed in Japan (native range) and in Korea (Boselli and Pellizzari, 2016)	
Pest status in Japan	Present and widespread, not considered a pest	
Pest status in the EU	Transient, under official control in Italy. Present in southern France	
Host status on *P. parviflora*	*Pinus parviflora* is a host for *C. pini*	
PRA information	DEFRA, online Department of Agriculture and Water Resources, 2018	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	White wax cover and honeydew are typical symptoms associated with its presence. *Crisicoccus pini* is a mealybug (Homoptera Pseudococcidae) recently introduced in a small area in north-eastern Italy and in southern France. In Italy, it has already killed a number of pine trees (belonging to the species *P. pinaster* and *P. pinea*) and it is currently under official control while no damage has been observed in France so far. The introduction pathway is suspected to be through plants for planting or bonsai as the insects cannot survive away from the plant; moreover, the females are wingless. Following research carried out in the introduction area in Italy, it has been shown that *C. pini* has several generations per year and all the different parts of the plant can potentially be colonised
	Presence of asymptomatic plants	No, honeydew is a typical symptom

	Confusion with other pathogens/pests	Possible with other mealybugs
Host plant range	*Pinus* spp. including *P. thunbergii*	
Pathways	Plants for planting or bonsai	
Surveillance information	No surveillance is performed in the surrounding areas of the nurseries	

B.8.2. Possibility of pest presence in the nursery

B.8.2.1. Possibility of entry from surrounding environment

Entry from the surrounding environment is possible since different pine species are commonly found in forests close to two of the three major areas where registered nurseries are located (Kagawa and Saitama). Damage has been observed in Japan and in Korea (Boselli and Pellizzari, 2016).

Uncertainties:

– There is no surveillance in the vicinity of the nurseries and no information about density of the populations of *C. pini* in the vicinity of the nurseries.
– According to the maps presented during the hearing on 9 November 2018 (Dossier section 4.3), it is clear that several nurseries are located near the forests. The type of forest, the density of *C. pini* and the exact distance of the forest from the nursery are not known. Consequently, the Panel assumes a constant pressure of *C. pini.* The above aspects were, therefore, taken into account when evaluating the best- and worst-case scenarios.
– It has been introduced in Italy where it has caused considerable damage in coastal pine forests. It is currently under official control even though its control is encountering some difficulties (Boselli and Pellizzari, 2016).

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *C. pini* to enter the nursery from the surrounding area.

B.8.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that areas with no pines may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan.

Export nurseries are inspected six times per year, every month from April to September, to detect any major signs of pest occurrence. Trees showing symptoms of colonisation (e.g. colonisation of the phloem) are removed.

Uncertainties:

– The new plants entering the nurseries can be moved from areas in Japan where *C. pini* occurs – no specific information regarding the location where the new plants are coming from is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *C. pini* to enter the nursery with new plants.

B.8.2.3. Possibility of entry by growing practices

It is unlikely that the pest is introduced with growth medium as the previous soil is removed and replaced with new, pest-free, soil.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *C. pini* to enter the nursery through growing media, water or any other growing practice.

B.8.2.4. Information from interceptions

There are no records of interceptions of *C. pini* on *P. parviflora* although Pseudococcidae not identified at species level were intercepted twice.

B.8.3. Evaluation of the risk reduction option

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *C. pini* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment of the crop against leaf pests (acetamiprid mid-April; fenitrothion or acetamiprid in May, June, July, August; etofenprox in June, permethrin in October)	Insecticides are active against the insects Uncertainties: Mealybugs are affected only when they are fully exposed and not covered by honeydew and wax
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)	X	Prior to export, roots are washed to remove soil. Plants are then repotted with disinfected growing media	Uncertainties: The washing process has to be done carefully to remove insects close to the stem and main roots
RRO5	Root treatment (MEP)	X	Immersion of washed roots in 0.16% fenitrothion (MEP) emulsifiable oil in water for 30 min	The insecticide is effective in killing the insects close to the roots
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	Uncertainties: This is not enough to remove all the mealybugs and it should, therefore, be combined with other methods
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the surrounding environment of the nurseries	Uncertainties: No information regarding the pest pressure in the surrounding area
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	Uncertainties: Mealybugs can be very small and can go undetected
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.8.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Very likely
Distribution of the likelihood of pest freedom	5%: 99.22%; Q1: 99.40%; M: 99.50%; Q3: 99.60%; 95%: 99.71%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It is not possible to exclude the possibility that bonsai plants in the nursery could be colonised by *Crisicoccus pini* either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating mealybugs from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of mealybugs; (b) regular insecticide treatments. These measures are supposed to greatly reduce the probability that *C. pini*-attacked plants are present in consignments destined for export **Shortcomings of present methods.** *Crisicoccus pini* can be difficult to detect due to their small size and concealed condition **Main uncertainties** – Effectiveness of insecticide treatments – Location of export nurseries in relation to distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

B.8.5. Elicitation outcomes of the assessment of the pest freedom for *Crisicoccus pini*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- The symptoms can be detected.
- If the nursery is far from a forest the likelihood of introduction from the environment is very low for the wingless mealybugs.
- Growing the plants on shelves may decrease the chance of spread within the nursery.
- The systemic insecticide treatments are generally effective.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- If pest pressure is low, insects may be difficult to detect.
- Insects can be hidden inside trees or roots.
- Insects can be protected against the insecticides by wax and honeydew.
- Infested plants can be introduced to the exporting nursery.
- Insects are widespread in Japan and can be passively transported.
- There is uncertainty regarding the effectiveness of systemic insecticide treatments against mealybugs.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- Infested plants are generally detected during the 2-year period in the exporting nursery.
- Insecticide treatments are generally effective against the mealybugs.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The protection of the insect colonies by wax and honeydew may reduce the insecticide efficacy.
- Insects can go undetected at low density (i.e. less than five individuals per plant).

The elicited and fitted values for *Crisicoccus pini* agreed by the Panel are shown in Tables B.15 and B.16 (Figure B.8).

Table B.15: Elicited and fitted values of the uncertainty distribution of pest infestation by *Crisicoccus pini* per 10,000 bonsai plants

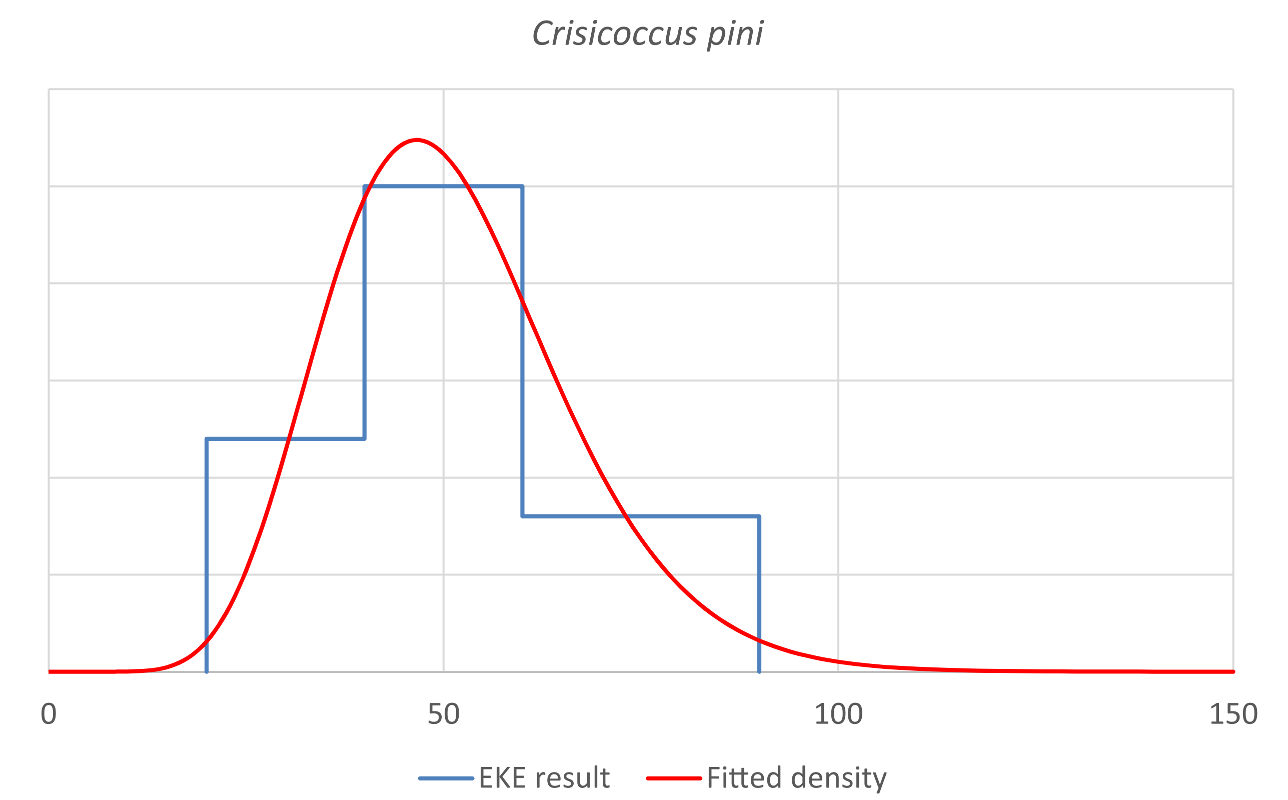
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	20					40		50		60					90
Fit-G	23	26	29	33	37	40	43	50	56	60	65	71	78	85	93

Gamma (11.405,4.4802) fitted with @Risk version 7.5.

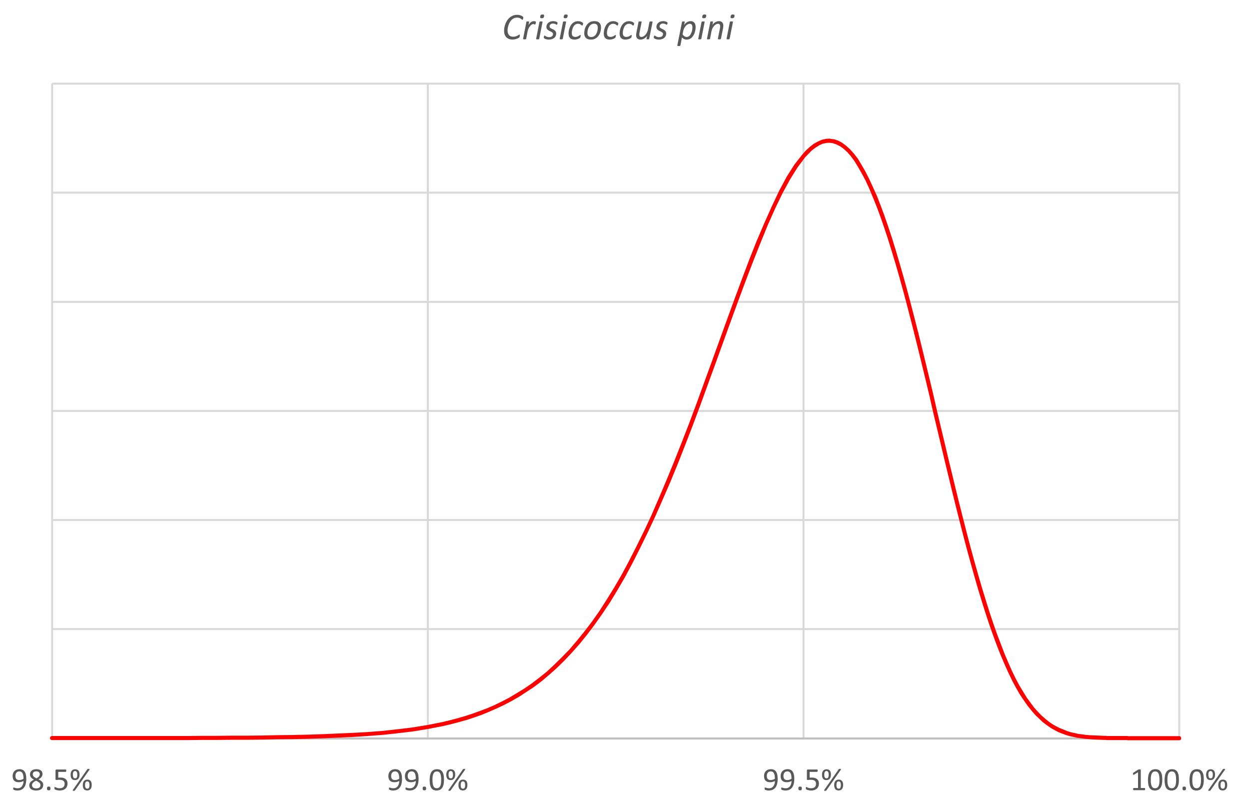
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.16.

Table B.16: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Crisicoccus pini*

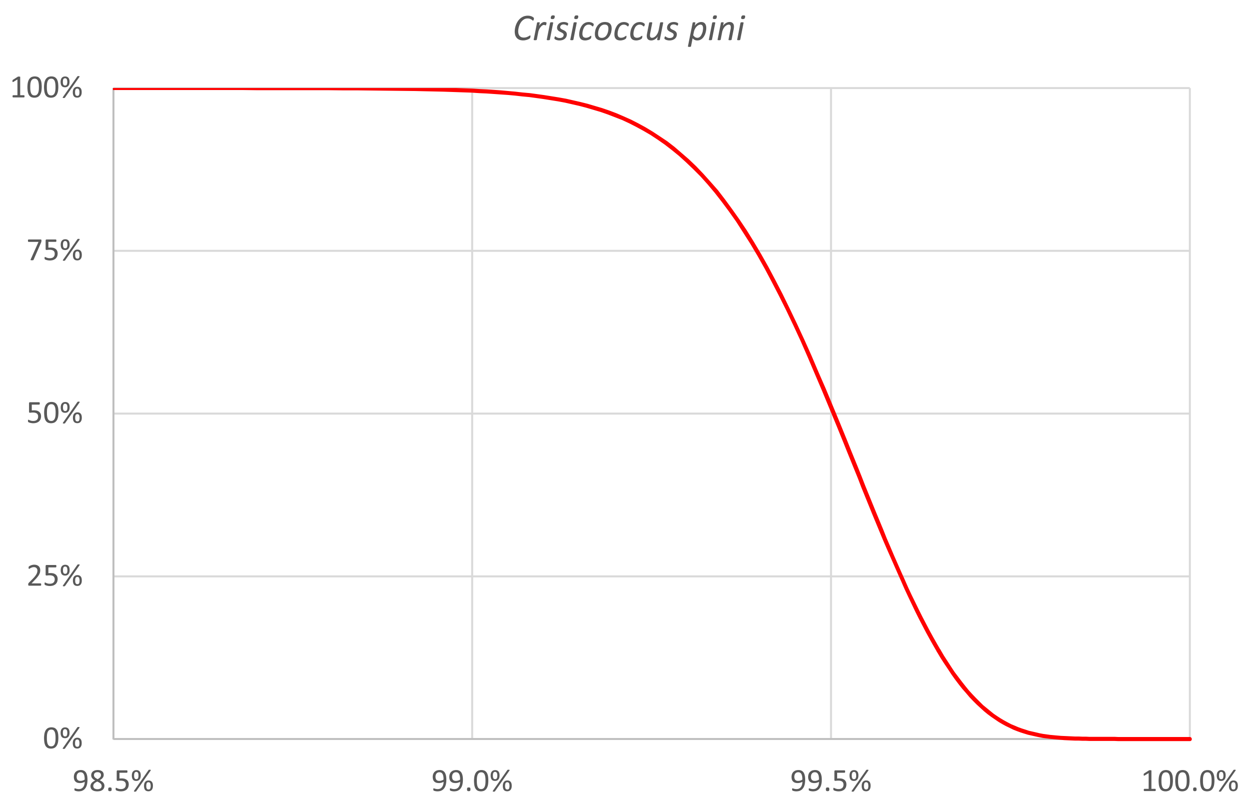
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.10%					99.40%		99.50%		99.60%					99.80%
Fit-G	99.07%	99.15%	99.22%	99.29%	99.35%	99.40%	99.44%	99.50%	99.57%	99.60%	99.63%	99.67%	99.71%	99.74%	99.77%



(a)



(b)



(c)

Figure B.8: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.8.6. Reference list

Boselli M and Pellizzari G, 2016. First record of the Kuwana pine mealybug *Crisicoccus pini* (Kuwana) in Italy: a new threat to Italian pine forests? Zootaxa, 4083, 293-6. https://doi.org/10.11646/zootaxa.4083.2.8

DEFRA (Department for Environment, Food and Rural Affairs), online. UK Plant Health Risk Register. Details for *Crisicoccus pini* – Updated 2018. Available online: https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?cslref=27689

Department of Agriculture and Water Resources. 2018, Draft group pest risk analysis for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports. Canberra, Department of Agriculture and Water Resources, 211 pp. Available online: http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk-analysis/group-pest/draft-mealybugs-report.pdf

B.9. *Dendrolimus sibiricus*

B.9.1. Organism information

Taxonomic information	*Dendrolimus sibiricus* (including *Dendrolimus superans*) *Dendrolimus spectabilis* The identity of the taxa considered here is still under discussion. The pests cited above share similar life histories, cause similar damage to plants and host species and thus present the same threat to the EU. *Dendrolimus superans* is present in Japan and it is not included in the list of EU-regulated pests, although it fits in the clade of *Dendrolimus sibiricus* according to a recent phylogenetic study. For this reason, it is recommended to include it as a regulated pest. *D. spectabilis* is included in the clade of southern species such as *D. punctatus*, which is a serious pest in China (Kononov et al., 2016)	
Group	INS	
EPPO code	DENDSI DENDSA DENDSC	
Regulated status in the EU	Annex IAI (Council Directive EC/2000/29) *Dendrolimus sibiricus, Dendrolimus spectabilis*	
Pest status in Japan	Widespread, occasional outbreaks by *D. superans* in young pine plantations (Kamata, 2002)	
Pest status in the EU	Absent, intercepted (see Section B.9.2.4 below)	
Host status on *P. parviflora*	All *Dendrolimus* spp. use *P. parviflora* as a host (Kobayashi and Taketani, 1994; EFSA PLH Panel, 2018c)	
PRA information	EFSA pest categorisation of *Dendrolimus sibiricus* (EFSA PLH Panel, 2018c) VKM (2018)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	The larvae form a group to eat a needle leaf on only one The larvae form a group to eat only one side of a needle leaf, leaving a saw-tooth shape. Because the remaining part of the needle leaf turns red, it can be detected early. The larvae overwinter in soil. The mature larvae damage leaves by feeding abundantly during the first year (*D. spectabilis*, univoltine) or in the second year (*D. sibiricus* and *D. superans*, semivoltine). The damage caused by the feeding activity is considerable in June and July. The body length of adults varies from 55 mm to 97 mm. A mature larva has an average body length of approximately 80 mm
	Presence of asymptomatic plants	Plants may carry eggs and young larvae and do not show symptoms of defoliation. The eggs incubation period may lasts for 1–3 weeks
	Confusion with other pathogens/pests	All Asian *Dendrolimus* are similar and taxonomic identification is uncertain

Host plant range	All Pinaceae and especially *Pinus* spp. including *P. thunbergii* (EPPO, 2004)
Pathways	Plants for planting. Soil associated with plants
Surveillance information	No surveillance is carried out in the areas surrounding the nurseries

B.9.2. Possibility of pest presence in the nursery

B.9.2.1. Possibility of entry from surrounding environment

Climatic conditions in Japan are excellent for the reproduction of *Dendrolimus* spp. Pine species are commonly located in forests near to at least two of the three major areas where registered nurseries are located (Kagawa and Saitama).

Uncertainties:

- No surveillance is carried out in the area surrounding the nurseries and no information about the density of *Dendrolimus* spp. population in the area is available.
- Visual inspections focusing on feeding symptoms are not always reliable to confirm the absence of *Dendrolimus* spp. because the larvae may not be seen when overwintering in the lower branches of the tree or in the soil.
- From the maps presented during the hearing held on 9 November 2018 (Dossier section 4.3), it is clear that several nurseries are located near forests. The forest quality, the density of the population of *Dendrolimus* spp. and the exact distance of the forest from the nursery are not known. Therefore, the Panel considers that there is a constant pressure of *Dendrolimus* spp. and these aspects were taken into account when the best- and worst-case scenarios were evaluated.
- *Dendrolimus* spp. are widely distributed in Japan.
- *Dendrolimus superans* has caused serious outbreaks on young pine plantations in Japan (Kamata, 2002). The closely related *D. punctatus* is a major pine pest in China, causing the defoliation of millions of hectares of trees, with serious consequences for plant health (Kononov et al., 2016).

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *Dendrolimus* spp. to enter the nursery from the surrounding area. There are no measures in place that could prevent the introduction of female moths from the surrounding area.

B.9.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines nearby may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan.

Export nurseries are inspected six times per year, every month from April to September, to detect any major sign of pest occurrence. Larvae are manually removed.

Uncertainties:

- The new plants entering the nurseries can be taken/collected from other parts of Japan where *Dendrolimus* spp. occur – no specific information regarding the native location of the new plants entering the nursery is available.
- The inspections are not sufficient to exclude the presence of *Dendrolimus* spp. on the new plants as eggs and overwintering larvae.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *Dendrolimus* spp. to enter the nursery with new plants.

B.9.2.3. Possibility of entry by growing practices

It is unlikely that *Dendrolimus* spp. are introduced with growth medium. Soil is in fact removed and new, disinfested soil is used. There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *Dendrolimus* spp. to enter the nursery through growing media, water or any other growing practice.

B.9.2.4. Information from interceptions

Dendrolimus spectabilis larvae were intercepted on a bonsai plant of *P. thunbergii* (whose import is prohibited but was anyway included in a *Pinus pentaphylla (=parviflora)* bonsai consignment from Japan to Germany) (Europhyt No. 117726, 26 April 2018) in spite of the phytosanitary certification and declared treatment with acetamiprid carried out in Japan.

B.9.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *Dendrolimus* spp. is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment of the crop against leaf pests (acetamiprid mid-April; fenitrothion or acetamiprid in May, June, July, August; etofenprox in June; permethrin in October)	The insecticides used would be also effective against *Dendrolimus* spp. when larvae are active on foliage The spraying calendar may not coincide with the timing of occurrence of the caterpillars on the shoots Larvae are not affected when they are dormant on twigs or stems or in the soil
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment	X	Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	Soil treatment is effective Uncertainties: In order to remove the small hibernating larvae, soil has to be carefully removed close to the stem and main roots
RRO4	Root treatment (repotting)	X	Roots are washed prior to export in order to remove the soil and plants are repotted using a disinfected growing media	Root treatment (repotting) is effective Uncertainties: In order to remove the small hibernating larvae, soil has to be carefully removed close to the stem and main roots
RRO5	Root treatment (MEP)	X	Immersion of washed roots in 0.16% fenitrothion (MEP) emulsifiable oil in water for 30 min	Root treatment is effective
RRO6	Protected Cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	The treatment is not fully effective since the caterpillars can be on other parts of the twigs
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	Due to the lack of surveillance it is not possible to have knowledge of the occurrence of the pest in the nursery area

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed Prior to export, the consignment is inspected. Branches are beaten over a white plastic bowl to check for the presence of insects	The visual inspection may not be fully effective because eggs and dormant larvae may not be detected Beating the twigs for visual inspection is not sufficient when the larvae are dormant on branches or stems or in the soil
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.9.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Extremely likely
Distribution of the likelihood of pest freedom	5%: 99.86% · Q1: 99.91% · M: 99.93% · Q3: 99.95% · 95%: 99.97%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by *Dendrolimus* spp. either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) oviposition by female moths immigrating from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of larvae; (b) regular insecticide treatments. These measures will greatly reduce the probability that *Dendrolimus*-attacked plants are present in consignments destined for export **Interception records** There was one reported interception of *D. spectabilis* larvae on bonsai of *P. thunbergii* from Japan in 2018 **Shortcomings of present methods** *Dendrolimus* spp. larvae are difficult to detect or to suppress with insecticides when they are dormant (winter period) on the lower part of the trunk and branches or in the upper soil layer **Main uncertainties:** – Effectiveness of insecticide treatment on dormant larvae – Location of export nurseries in relation to the distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

B.9.5. Elicitation outcomes of the assessment of the pest freedom for *Dendrolimus sibiricus* and *Dendrolimus spectabilis*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- The eggs are laid in small groups and many caterpillars may occur on one plant. The clustering and the size of the caterpillars make them easy to detect.
- The caterpillars are sensitive to pesticides.
- The pests will be detected in the 2-year period.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- The pest is widespread in Japan and the pest pressure can be high.
- *Pinus thunbergii* is a preferred host.
- Introduction of ovipositing females from the environment is possible.
- The praying calendar may not coincide with the occurrence of the caterpillars on the shoots.
- The export delivery to the EU may coincide with the first overwintering of the small caterpillars.
- The larvae may spend two winters in the dormant stage.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The median value reflects the frequency of interceptions.
- If the pest is introduced to the nursery it is likely to be detected.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The possibility that the small larvae are detected can be limited.
- The natural mortality of the caterpillars during the dormant period can be high.

The elicited and fitted values for *Dendrolimus sibiricus* and *Dendrolimus spectabilis* agreed by the Panel are shown in Tables B.17 and B.18 (Figure B.9).

Table B.17: Elicited and fitted values of the uncertainty distribution of pest infestation by *Dendrolimus sibiricus* and *Dendrolimus spectabilis* per 10,000 bonsai plants

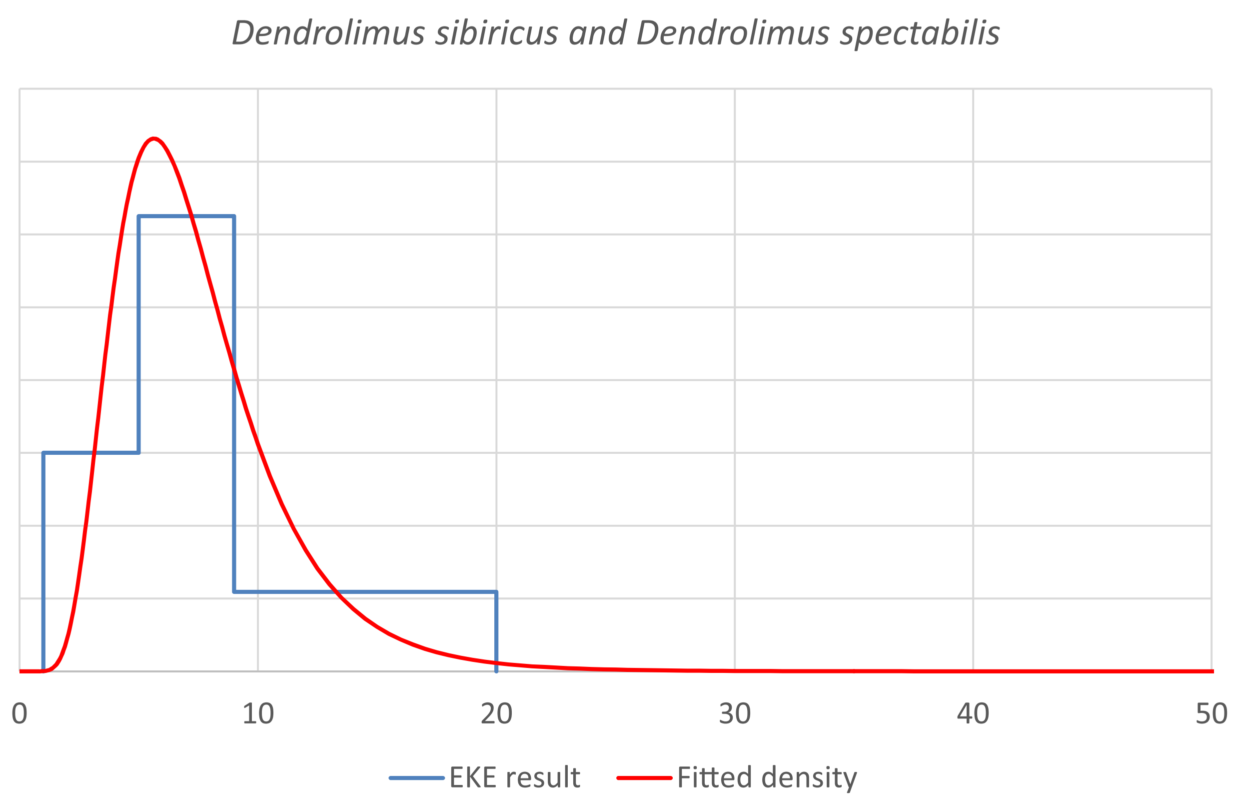
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	1					5		7		9					20
Fit-LN	2.5	2.9	3.3	3.9	4.5	5.1	5.7	6.8	8.3	9.2	10.4	12.0	14.1	16.2	19.0

Lognorm distribution (7.527,3.4721) fitted with @Risk version 7.5.

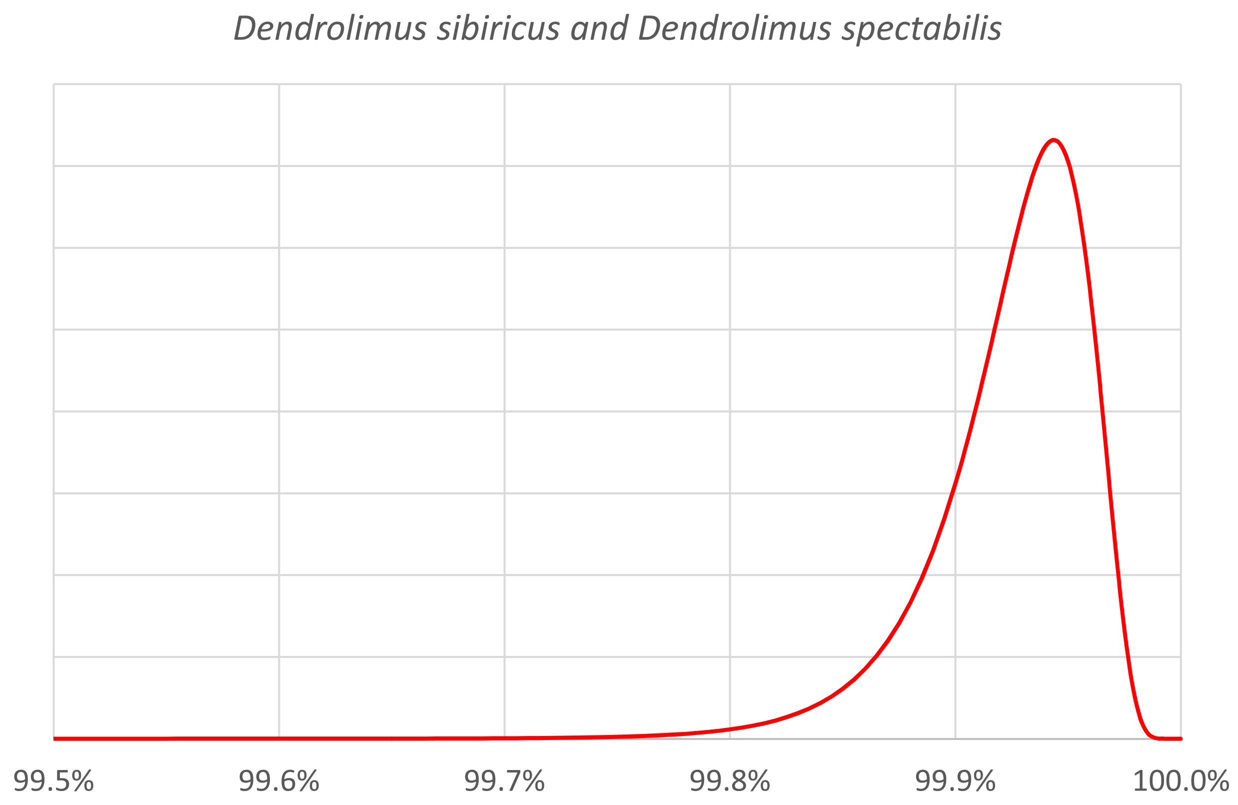
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.18.

Table B.18: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Dendrolimus sibiricus* and *Dendrolimus spectabilis*

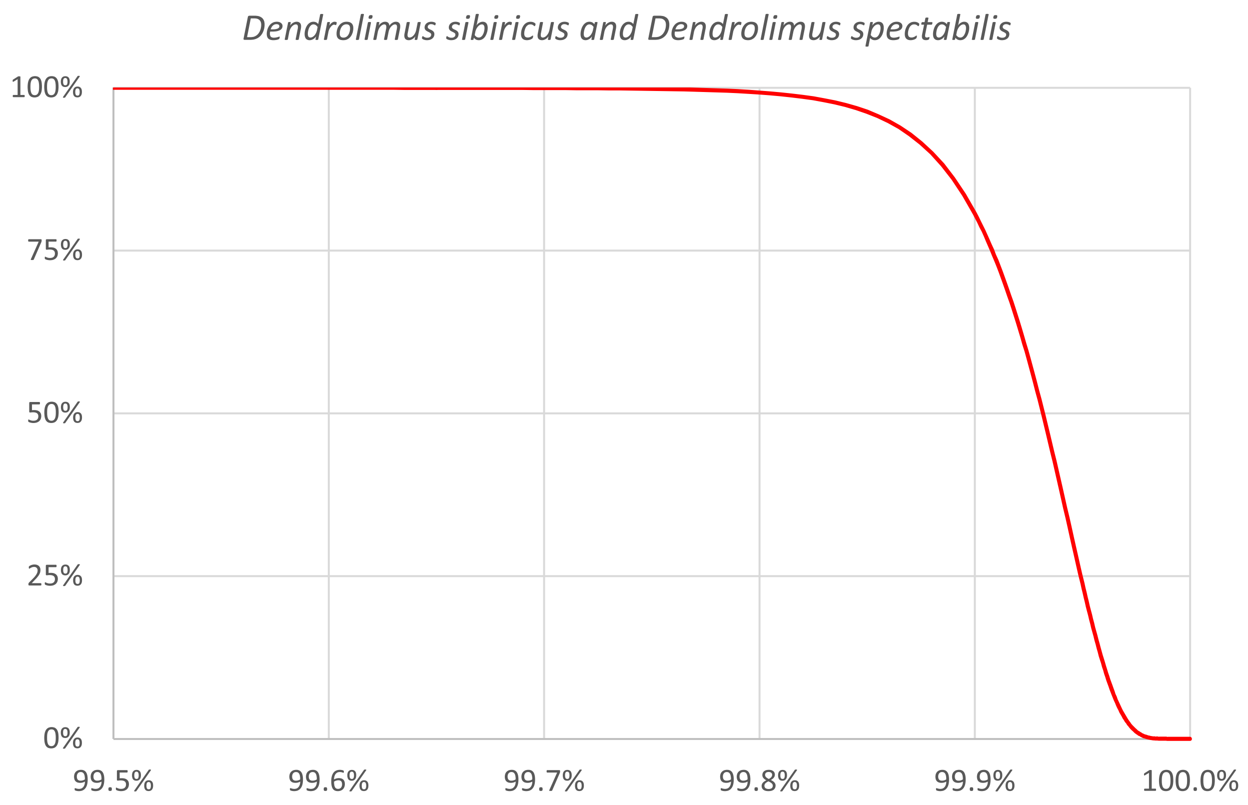
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.80%					99.91%		99.93%		99.95%					99.99%
Fit-LN	99.81%	99.84%	99.86%	99.88%	99.90%	99.91%	99.92%	99.93%	99.94%	99.95%	99.96%	99.96%	99.97%	99.97%	99.98%


Dendrolimus sibiricus and Dendrolimus spectabilis
0
10
20
30
40
50
EKE result
Fitted density

(a)


Dendrolimus sibiricus and Dendrolimus spectabilis
99.5%
99.6%
99.7%
99.8%
99.9%
100.0%

(b)



(c)

Figure B.9: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.9.6. Reference list

EFSA PLH Panel (EFSA Panel on Plant Health), 2018c. Scientific opinion on pest categorisation of *Dendrolimus sibiricus*. EFSA Journal 2018; 16(6):5301, 29 pp. https://doi.org/10.2903/j.efsa.2018.5301

EPPO, 2004. Mini data sheet on *Dendrolimus spectabilis*. 1 p. Available online: https://gd.eppo.int/download/doc/1062_minids_DENDSC.pdf

Kamata N, 2002. Outbreaks of forest defoliating insects in Japan 1950-2000. Bulletin of Entomological Research, 92, 109-117.

Kobayashi F and Taketani A, 1994. Forest insects. Tokyo, Youkendo, 567 pp.

Kononov A, Ustyantsev K, Wang B, Mastro VC, Fet V, Blinov A and Baranchikov Y, 2016. Genetic diversity among eight *Dendrolimus* species in Eurasia (Lepidoptera: Lasiocampidae) inferred from mitochondrial COI and COII, and nuclear ITS2 markers. BMC Genetics, 17 (3) 157, 173-191. https://doi.org/10.1186/s12863-016-0463-5

VKM (Norwegian Scientific Committee for Food and Environment), 2018. Pest risk assessment of *Dendrolimus sibiricus* and *Dendrolimus superans*. Opinion of the Panel on Plant Health of the Norwegian Scientific Committee for Food and Environment. VKM report 2018:08, Norwegian Scientific Committee for Food and Environment (VKM), Oslo, Norway, 69 pp.

B.10. *Dendrolimus spectabilis*

The data on *Dendrolimus spectabilis* can be found in Appendix B.9.

B.11. *Monochamus alternatus*

The data on *Monochamus alternatus* can be found in Appendix B.18.

B.12. *Pissodes nitidus*

B.12.1. Organism information

Taxonomic information	*Pissodes nitidus* *Pissodes obscurus*	
Group	INS	
EPPO code	PISONI for *Pissodes nitidus* PISOOB for *Pissodes obscurus*	
Regulated status in the EU	Annex IIAI (Council Directive EC/2000/29) for *Pissodes* spp. non-European	
Pest status in Japan	Present and widespread on pines	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*Pissodes* spp. use *Pinus parviflora* as a host	
PRA information	EFSA pest categorisation 2018 (EFSA PLH Panel, 2018d)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	*Pissodes nitidus* is a pest of young pines in East Asia. Damage varies among regions, and the most severe damage has been reported on *Pinus koraiensis* in northern China (Jin, 1989). Similarly to the American *Pissodes strobi* and *Pissodes terminalis*, it attacks terminals, which reduces annual growth and causes deformities. Several years of attack produce a stem that cannot be used as saw timber. The larvae feed under the bark and the adults feed mainly on shoots *Pissodes obscurus* is not a pest in its areas of origin (Russia, Japan and Korea) and no information on its life history is available. *Pissodes obscurus* is a secondary pest that attacks declining trees. The larvae feed under the bark and the adults feed mainly on shoots

	Presence of asymptomatic plants	Plants carrying adults can be asymptomatic
	Confusion with other pathogens/pests	All *Pissodes* spp. are similar and can be easily mistaken for each other
Host plant range	*Pinus* spp. There is no information available on the host status of *P. thunbergii* for either *Pissodes* species	
Pathways	Plants for planting	
Surveillance information	There is no specific information on surveillance in the areas surrounding the nursery	

B.12.2. Possibility of pest presence in the nursery

B.12.2.1. Possibility of entry from surrounding environment

Pine species are commonly located in forests near to at least two of the three major areas where registered nurseries are located (Kagawa and Saitama), so it is possible for the pest to enter the nursery from the surrounding environment. Damage has not been observed in Japan but it has in China (on *P. nitidus*).

Uncertainties:

- No surveillance is carried out in the surrounding area of the nurseries and no information about the density of the *Pissodes* population in the area is available.
- Visual inspections focusing on feeding symptoms are not always reliable enough to confirm the absence of *Pissodes*.
- From the maps presented during the hearing held on 9 November 2018 (Dossier section 4.3). it is clear that several nurseries are located near forests. The forest quality, the density of the population of *Pissodes* beetles and the exact distance of the forest from the nursery are not known. Therefore, the Panel considers that there is a constant pressure of *Pissodes* and these aspects were taken into account when the best- and worst-case scenarios were evaluated.
- The proximity of the nursery to the forest is important: deteriorating trees found in the forest may be used by beetles as breeding places. There are no data on the frequency of declining trees in forest patches surrounding the nurseries.
- Damage has been described on *Pinus koraiensis* in the north-east of China.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *Pissodes* to enter the nursery from the surrounding area. There are no measures in place that could prevent the introduction of *Pissodes* from the surrounding area to the nurseries.

B.12.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan so that even areas with no pines nearby may import trees from nurseries located near to pine forests, which are very common in Japan.

Export nurseries are inspected six times per year, every month from April to September, to detect any major signs of pest occurrence. Trees with symptoms of colonisation of the phloem are removed.

Uncertainties:

- The new plants entering the nurseries can be taken/collected from other parts of Japan where *Pissodes* is present – no specific information regarding the native location of the new plants entering the nursery is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *Pissodes* to enter the nursery with new plants.

B.12.2.3. Possibility of entry by growing practices

Considering the biology of the pest, it is possible to exclude soil and water and other growing practices as pathways which can be used by the pest to enter the nursery. There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *Pissodes* to enter the nursery through growing media, water or any other growing practice.

B.12.2.4. Information from interceptions

There are no records of interceptions.

B.12.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *Pissodes* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment against *M. alternatus* (fenitrothion 80% (8–10.67 kg/ha) or acetamiprid 2% (0.16–0.4 kg/ha) spraying in early May, mid-June and mid-July) should also be effective against *Pissodes*	To prevent any possible attack by *Pissodes*, frequent insecticide treatments are applied. The insecticide applications cover the whole period that can be used by *Pissodes* to immigrate into the nurseries for maturation feeding and oviposition Uncertainties: There are no data available on the time it takes before *Pissodes* beetles are killed by the insecticide
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning		No effect	
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	Uncertainties: There is no information available regarding both *Pissodes* species pressure in the surrounding areas of the nurseries
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed Prior to export the consignment is inspected. Branches are beaten over a white plastic bowl to check for the presence of insects	Visual inspection is effective, symptoms can be easily detected Uncertainties: It is not certain whether the feeding scars can be easily identified, depending on their age In the nurseries, all plants with symptoms are removed. However, no specific analyses on discarded plants to detect the *Pissodes* are conducted

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	
RRO 11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice. Plants with symptoms are tested	

B.12.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.985%; Q1: 99.989%; M: 99.991%; Q3: 99.993%; 95%: 99.995%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by *Pissodes* either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating beetles from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of symptomatic plants; (b) regular application of insecticide treatments These measures will greatly reduce the probability that *Pissodes*-attacked plants are present in consignments destined for export **Shortcomings of present methods** *Pissodes* attack can be difficult to detect in the early phase **Main uncertainties** – Effectiveness of insecticide treatments – Location of export nurseries in relation to distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

B.12.5. Elicitation outcomes of the assessment of the pest freedom for *Pissodes nitidus* and *Pissodes obscurus*

The rating for both *Pissodes* species was based on the rating for *Thecodiplosis japonensis.* The general rating is considered to be lower, taking into consideration the fact that *Pissodes* are more easily detected, are not present in the soil and the pest pressure is lower.

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Symptoms that appear as a consequence of larvae feeding are easy to detect for both species and they develop in a few months after colonisation.
- Insecticides are effective against the adults.
- There is uncertainty about *P. thunbergii* being a host for *Pissodes* spp.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- The pressure of both *Pissodes* species is unknown.
- The adult maturation feeding symptoms are hardly detectable for either *Pissodes* species.
- Insecticides do not kill the larvae.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- Infested plants are easy to detect and adults are killed by the insecticides.
- The culture of the plant in the nurseries contributes to the maintenance of the plants' resistance to *Pissodes obscurus*.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The efficacy of the insecticide depends on the developmental stage of the insect.

The elicited and fitted values for *Pissodes nitidus* and *Pissodes obscurus* agreed by the Panel are shown in Tables B.19 and B.20 (Figure B.10).

Table B.19: Elicited and fitted values of the uncertainty distribution of pest infestation by *Pissodes nitidus* and *Pissodes obscurus* per 10,000 bonsai plants

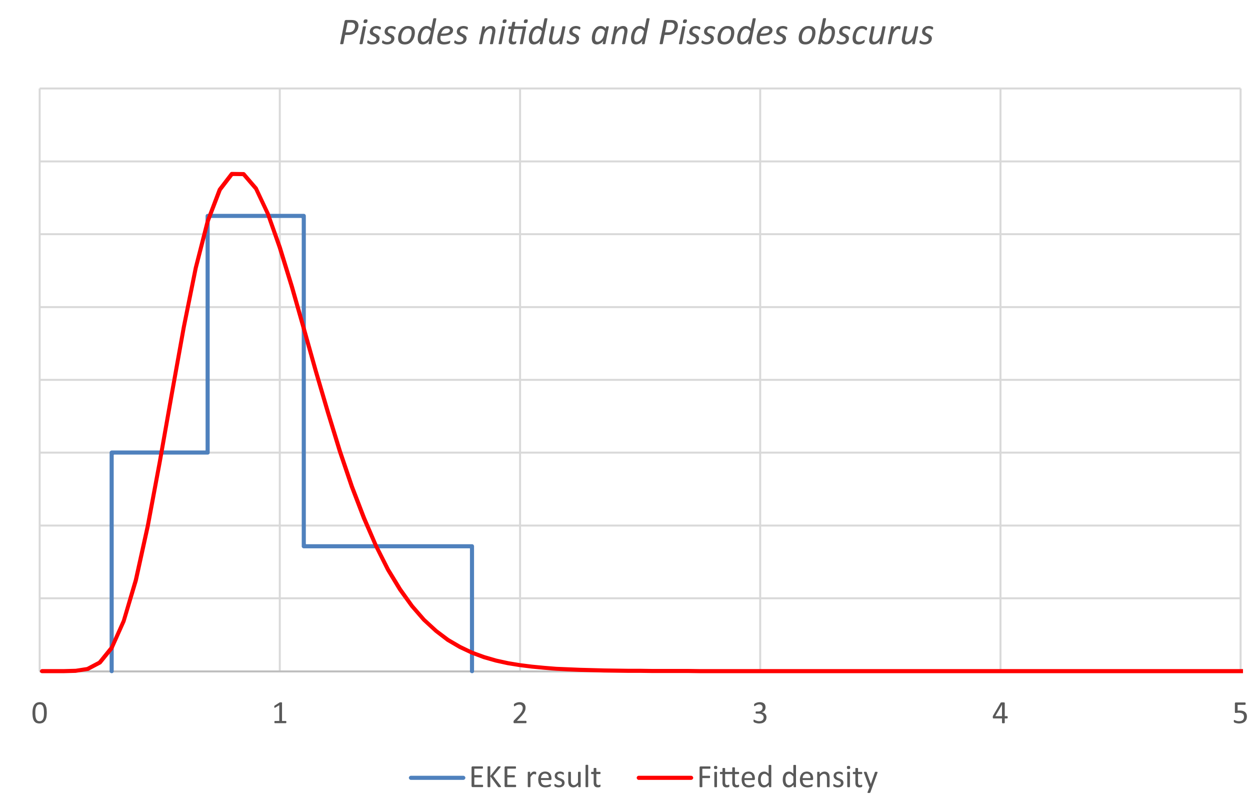
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.3					0.7		0.9		1.1					1.8
Fit-G	0.36	0.43	0.49	0.56	0.63	0.70	0.77	0.89	1.03	1.11	1.21	1.33	1.48	1.61	1.78

Gamma distribution (9.173,0.10083) fitted with @Risk version 7.5.

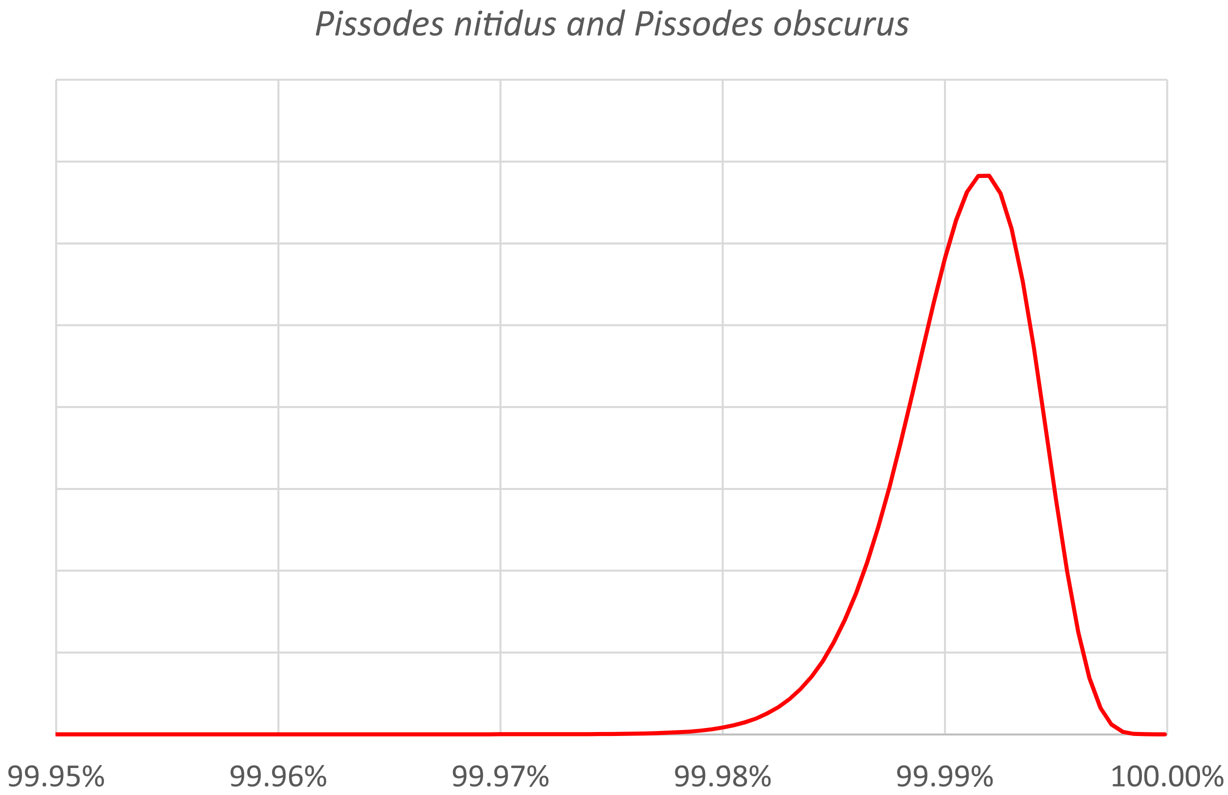
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.20.

Table B.20: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Pissodes nitidus* and *Pissodes obscurus*

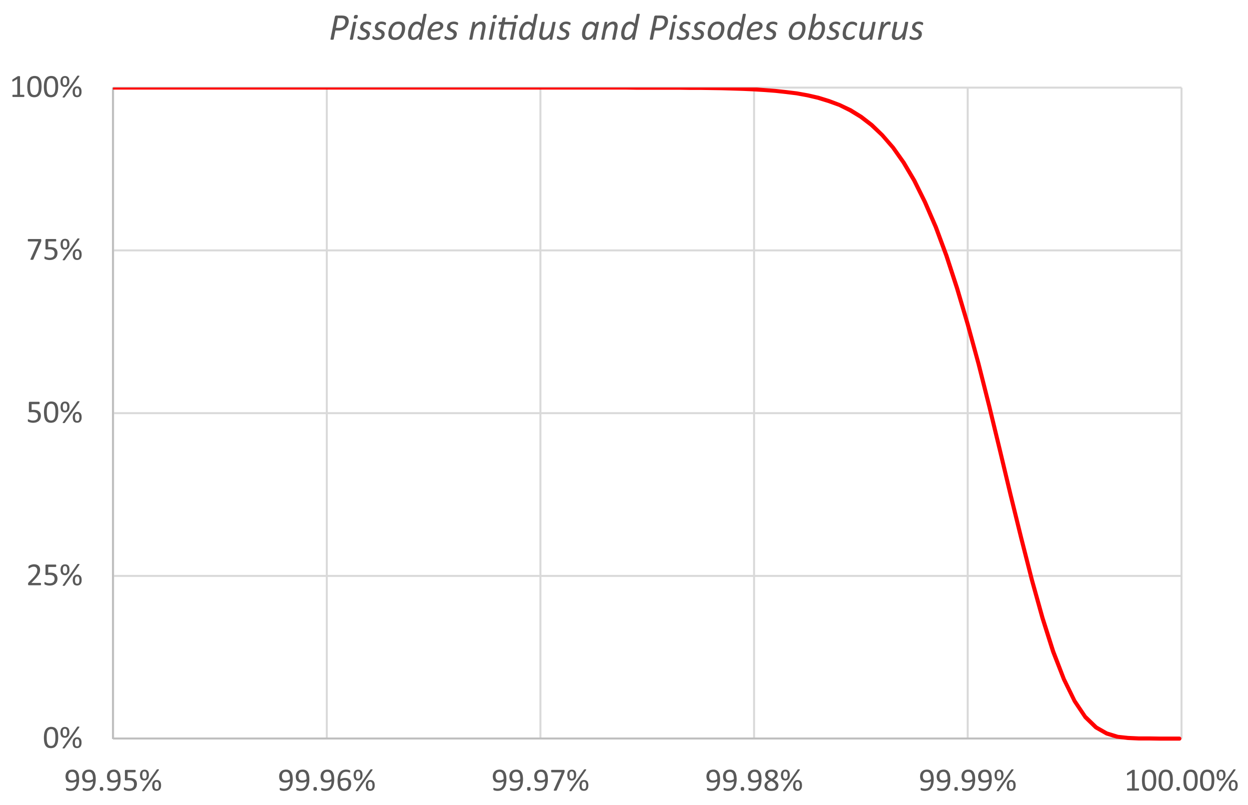
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.982%					99.989%		99.991%		99.993%					99.997%
Fit-G	99.982%	99.984%	99.985%	99.987%	99.988%	99.989%	99.990%	99.991%	99.992%	99.993%	99.994%	99.994%	99.995%	99.996%	99.996%


Pissodes nitidus and Pissodes obscurus
0
1
2
3
4
5
EKE result
Fitted density

(a)


Pissodes nitidus and Pissodes obscurus
99.95%
99.96%
99.97%
99.98%
99.99%
100.00%

(b)



(c)

Figure B.10: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.12.6. Reference list

EFSA PLH Panel (EFSA Panel on Plant Health), 2018d. Scientific Opinion on the pest categorisation of non-EU *Pissodes* spp. EFSA Journal 2018; 16(6):5300, 29 pp. https://doi.org/10.2903/j.efsa.2018.5300

Jin L, 1989. *Pissodes nitidus* Roelofs, the yellow-spotted pine weevil (*Coleoptera: Curculionidae*): a serious pest of Korean pine plantations in northeast China. In: Alfaro RI and Glover SG (eds.). Insects affecting reforestation: biology and damage. Forestry Canada, Pacific Forestry Centre, Victoria, British Columbia. pp. 186–193.

B.13. *Pissodes obscurus*

The data on *Pissodes obscurus* can be found in Appendix B.12.

B.14. *Popillia japonica*

B.14.1. Organism information

Taxonomic information	*Popillia japonica* (Coleoptera: Rutelidae)	
Group	INS	
EPPO code	POPIJA	
Regulated status in the EU	Annex IAII of Council Directive 2000/29/EC	
Pest status in Japan	Present	
Pest status in the EU	Present, under official control	
Host status on *P. parviflora*	*Popillia japonica* does not use *P. parviflora* as a host	
PRA information	EFSA pest categorisation (EFSA PLH Panel, 2018e) EPPO (2016) PM 9/21(1) *Popillia japonica*: procedures for official control (EPPO, 2016)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Not applicable, *Pinus* is not a host
	Presence of asymptomatic plants	Not applicable, *Pinus* is not a host
	Confusion with other pathogens/pests	Not applicable, *Pinus* is not a host
Host plant range	Highly polyphagous, larvae on graminaceous species and adults on broad-leaved trees	
Pathways and mode of spread	Soil and growing media as such or attached to plants for planting where larvae can be present	
Surveillance information	No pest-specific surveys are conducted in the surrounding environment	

B.14.2. Possibility of pest presence in the nursery

B.14.2.1. Possibility of entry from surrounding environment

Pests can be present in the environment surrounding the nursery. However, since *Pinus* spp. is not a host plant for *Popillia japonica*, the probability that the adults of this species from the surrounding environment could enter into the nursery is considered negligible.

Taking into consideration the above evidence, the Panel considers that it is not possible for the insect to enter the nursery from the surrounding area.

B.14.2.2. Possibility of entry with new plants

Pinus spp. is not a host plant for *Popillia japonica*. *Popillia japonica* can actually be present in the soil in unregistered nurseries delivering plants to export nurseries. However, this eventuality is considered unlikely.

Taking into consideration the above evidence, the Panel considers that it is not possible for the insect to enter the nursery with new plants or soil growing media.

B.14.2.3. Possibility of entry by growing practices

The larval and pupal life stages of *Popillia japonica* can be present in untreated soil and growing media.

Taking into consideration the above evidence, the Panel considers that the transfer of *Popillia japonica* to the nursery is theoretically possible but the measures adopted and the environmental conditions where bonsai trees are grown, reduce the risk to virtually zero.

B.14.2.4. Information from interceptions

There are no records of interceptions of *Popillia japonica* on *Pinus parviflora* bonsai plants.

B.14.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *Popillia japonica* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment applied against *Monochamus alternatus* by using fenitrothion 80% (8–10.67 kg/ha) or acetamiprid 2% (0.16–0.4 kg/ha) spraying in early May, mid-June and mid-July, should also be effective against *Popillia japonica*	Adults are not expected to feed on *Pinus* trees
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment	X	Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	Very effective in removing any larvae
RRO4	Root treatment (repotting)	X	Prior to export roots are washed to remove all soil particles and plants are repotted using disinfected growing media	Very effective in removing any larvae
RRO5	Root treatment (MEP)	X	Prior to export washed roots are immersed in MEP for 30 min	Very effective in removing any larvae
RRO6	Protected cultivation	X	Potted plants are cultivated 50 cm above ground on concrete tables	Very effective in preventing the presence of the larvae
RRO7	Pruning		No effect	
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are eventually removed Prior to export, the consignment is inspected. Branches are beaten over a white plastic bowl to check for the presence of insects. A soil test may be collected to inspect for the presence of nematodes (European Commission, 2008)	Adults will be detected if present. Larvae in the soil may remain undetected
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.14.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 100.00%; Q1: 100.00%; M: 100.00%; Q3: 100.00%; 95%: 100.00%
Summary of the information used for the evaluation	In theory, it is possible that *Popillia japonica* larvae and pupae are present in the soil or growing media used for potting bonsai plants. However, the treatments carried out at the nurseries are very effective: bonsai plants are repotted every year with pest-free growing media and roots are washed and immersed in MEP before export. These measures guarantee that potted plants are free from *P. japonica*

B.14.5. Elicitation outcomes of the assessment of the pest freedom for *Popillia japonica*

In theory, it is possible that *Popillia japonica* larvae and pupae are present in soil or growing media used for potting bonsai plants. However, treatments carried out in the nurseries are very effective: bonsai plants are repotted every year with pest-free growing media and roots are washed and immersed in MEP before export. These measures guarantee that potted plants are free from *P. japonica*.

The elicited and fitted values for *Popillia japonica* agreed by the Panel are shown in Tables B.21 and B.22.

Table B.21: Elicited and fitted values of the uncertainty distribution of pest infestation by *Popillia japonica* per 10,000 bonsai plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0					0		0		0					0
Fit-C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Constant (0).

Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.22.

Table B.22: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Popillia japonica*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	100.00%					100.00%		100.00%		100.00%					100.00%
Fit-C	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

B.14.6. Reference list

EFSA PLH Panel (EFSA Panel on Plant Health), 2018e. Scientific Opinion on the pest categorisation of *Popillia japonica*. EFSA Journal 2018; 16(11):5438, 30 pp. https://doi.org/10.2903/j.efsa.2018.5438issn:1831-4732

EPPO (European and Mediterranean Plant Protection Organization), 2016. PM 9/21(1) *Popillia japonica*: procedures for official control. EPPO Bulletin, 46, 543–555. https://doi.org/10.1111/epp.12345

European Commission, 2008. Final report of a mission carried out in Japan from 04 November to 13 November 2008 in order to evaluate the system of official controls and the certification of bonsai type plants for export to the European Union. 28 pp. Available online: http://ec.europa.eu/food/fvo/act_getPDF.cfm?PDF_ID=7274

B.15. *Sirex nitobei*

B.15.1. Organism information

Taxonomic information	*Sirex nitobei* *Urocerus japonicus*	
Group	INS	
EPPO code	SIRXNI URCEJA	
Regulated status in the EU	Not regulated in the EU	
Pest status in Japan	Present and widespread, not considered a primary pest	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*Pinus parviflora* is a host for *Sirex nitobei* and *Urocerus japonicus*	
PRA information		
Other relevant information for the assessment Sirex literature can be found on FABI, online		
Symptoms	**Main type of symptoms**	Both woodwasps are secondary pests since they both infest already weakened or dead trees. Eggs are laid in tree trunks together with symbiotic fungi. When they hatch, larvae eat wood and fungi. The generation time may vary from 1 to 2 years. The holes from which they emerge are round. Their life history is very similar to the European woodwasps and to the invasive globally spread genus *Sirex*. Since these wasps may carry associated microorganisms, attention should be paid
	Presence of asymptomatic plants	No
	Confusion with other pathogens/pests	No
Host plant range	*Pinus* spp. including *P. thunbergii*	
Pathways	Plants for planting with a significant amount of wood (old bonsai trees)	
Surveillance information	There is no information available on surveillance in the areas surrounding the nurseries	

B.15.2. Possibility of pest presence in the nursery

B.15.2.1. Possibility of entry from surrounding environment

Pine species are commonly located in forests close to at least two of the three major areas where registered nurseries are located (Kagawa and Saitama). The possibility that the pest could enter from the surrounding environment is, therefore, high. Damage has been observed in Japan and in Korea where the pests are likely to have been introduced.

Uncertainties:

- No surveillance is carried out in the area surrounding the nurseries and no information on the density of the woodwasps population in the area is available.
- Visual inspections that focus on feeding symptoms are not always reliable enough to confirm the absence of woodwasps.
- From the maps presented during the hearing held on 9 November 2018 (Dossier section 4.3), it is clear that several nurseries are located near forests. The forest quality, the density of the woodwasp population and the exact distance of the forest from the nursery are not known. Therefore, the Panel considers that there is a constant pressure of woodwasps and the above aspects were taken into account when the best- and worst-case scenarios were evaluated.
- The proximity of the nursery to the forest is important; deteriorating trees found in the forest may be used by the woodwasps as breeding places. There are no data about the frequency of declining trees in forest patches surrounding the nurseries.
- *Sirex noctilio*, a related species native to Europe, has become a major pest of pine plantations in the southern hemisphere.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for woodwasps to enter the nursery from the surrounding area. There are no measures in place that could prevent the woodwasps' introduction.

B.15.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan so that even areas with no pines nearby may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan.

Export nurseries are inspected six times per year, every month from April to September, to detect any major signs of pest occurrence. Trees with symptoms of colonisation of the phloem are removed.

Uncertainties:

- The new plants entering the nurseries can be taken/collected from other parts of Japan where woodwasps are present – no specific information regarding the native location of the new plants entering the nursery is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the woodwasps to enter the nursery with new plants.

B.15.2.3. Possibility of entry by growing practices

Considering the biology of the pests, it is possible to exclude soil and water and other growing practices as pathways by which the pests could enter the nursery. There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for the woodwasps to enter the nursery through growing media, water or any other growing practice.

B.15.2.4. Information from interceptions

There are no records of interceptions on *P. parviflora*.

B.15.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on woodwasps is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment applied against *Monochamus alternatus* by using fenitrothion 80% (8–10.67 kg/ha) or acetamiprid 2% (0.16–0.4 kg/ha) spraying in early May, mid-June and mid-July, should also be effective against woodwasps	The insecticides used are effective against woodwasps adults but do not kill the stem boring larvae. The insecticide applications cover the whole period that can be used by woodwasps to immigrate into the nurseries for oviposition Uncertainties: Adults may escape the pesticide between one application and another
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning		No effect	
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	Uncertainties: The lack of surveillance means that the occurrence of the pest in the nursery area is not known
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	Visual inspection is effective, symptoms can be easily detected Uncertainties: In the nurseries, all plants showing symptoms are removed. However, no specific analyses on discarded plants to detect the woodwasps are conducted
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	Uncertainties: Colonisation from nearby forests is possible
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.15.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.990%; Q1: 99.993%; M: 99.995%; Q3: 99.997%; 95%: 99.999%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by woodwasps either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating wasps from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of symptomatic plants; (b) regular application of insecticide treatments. These measures will greatly reduce the probability that woodwasp-attacked plants are present in consignments destined for export **Shortcomings of present methods** Woodwasp attack can be difficult to detect in the early phase **Main uncertainties** – Effectiveness of insecticide treatments – Location of export nurseries in relation to the distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

B.15.5. Elicitation outcomes of the assessment of the pest freedom for *Sirex nitobei* and *Urocerus japonicus*:

The rating for both woodwasps was based on the rating for *Pissodes.* The general rating is considered to be lower than *Pissodes,* taking into consideration the fact that woodwasps prefer to colonise stressed and large bonsai trees.

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Bonsai trees of a small size are not suitable for woodwasp colonisation.
- Insecticide treatments are effective.
- Trees are generally resistant to the larvae development.
- There are no records of interceptions despite the wide trade of *P. parviflora* bonsai plants in the last 20 years.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- Bonsai trees of a large size are suitable for woodwasp colonisation.
- Stressful conditions for the trees may lead to better conditions for woodwasps colonisation.
- Long development time of the larvae (from 1 to 3 years).

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- Infested plants will generally be detected during the 2-year period in the exporting nursery.
- Insecticide treatments are generally effective against immigrating adults.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The efficacy of the insecticide treatment depends on the developmental stage of the insect.

The elicited and fitted values for *Sirex nitobei* and *Urocerus japonicus* agreed by the Panel are shown in Tables B.23 and B.24 (Figure B.11).

Table B.23: Elicited and fitted values of the uncertainty distribution of pest infestation by *Sirex nitobei* and *Urocerus japonicus* per 10,000 bonsai plants

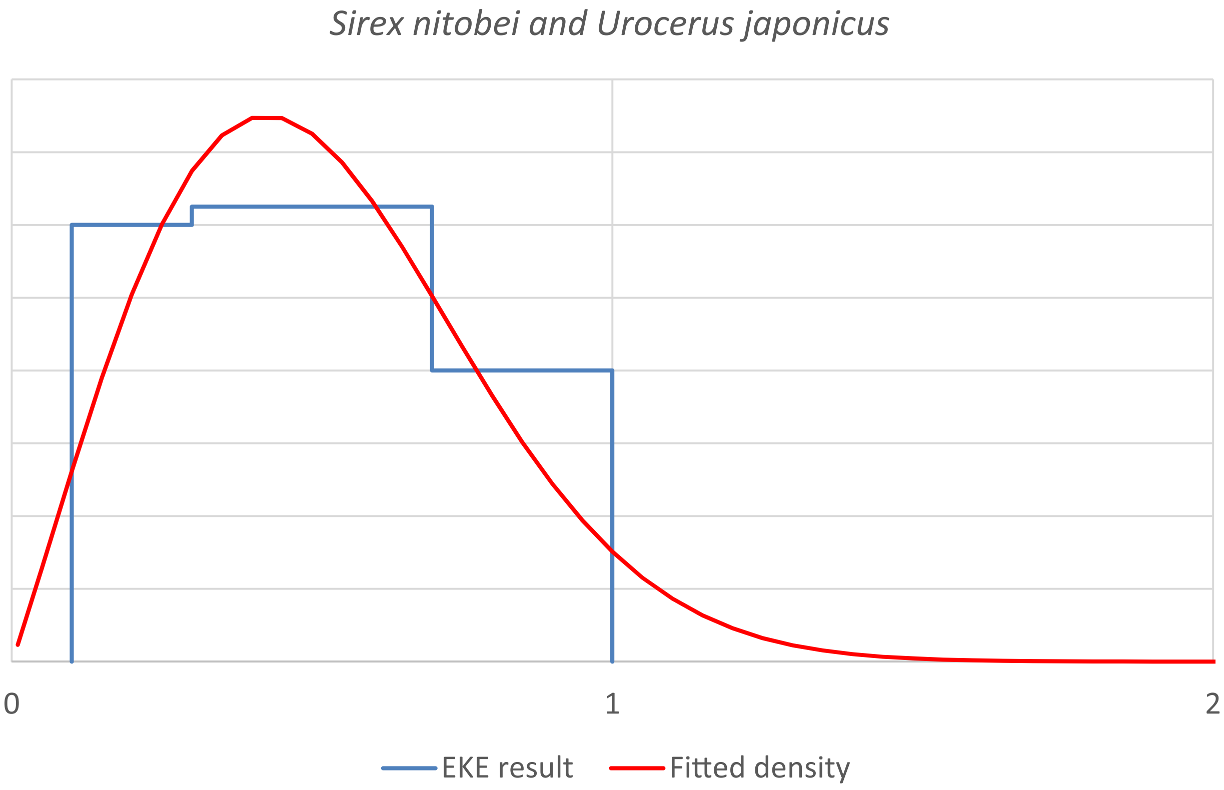
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.1					0.3		0.5		0.7					1
Fit-W	0.063	0.10	0.14	0.20	0.26	0.32	0.38	0.49	0.61	0.68	0.77	0.88	0.99	1.100	1.224

Weibull(2.0666,0.58472) fitted with @Risk version 7.5.

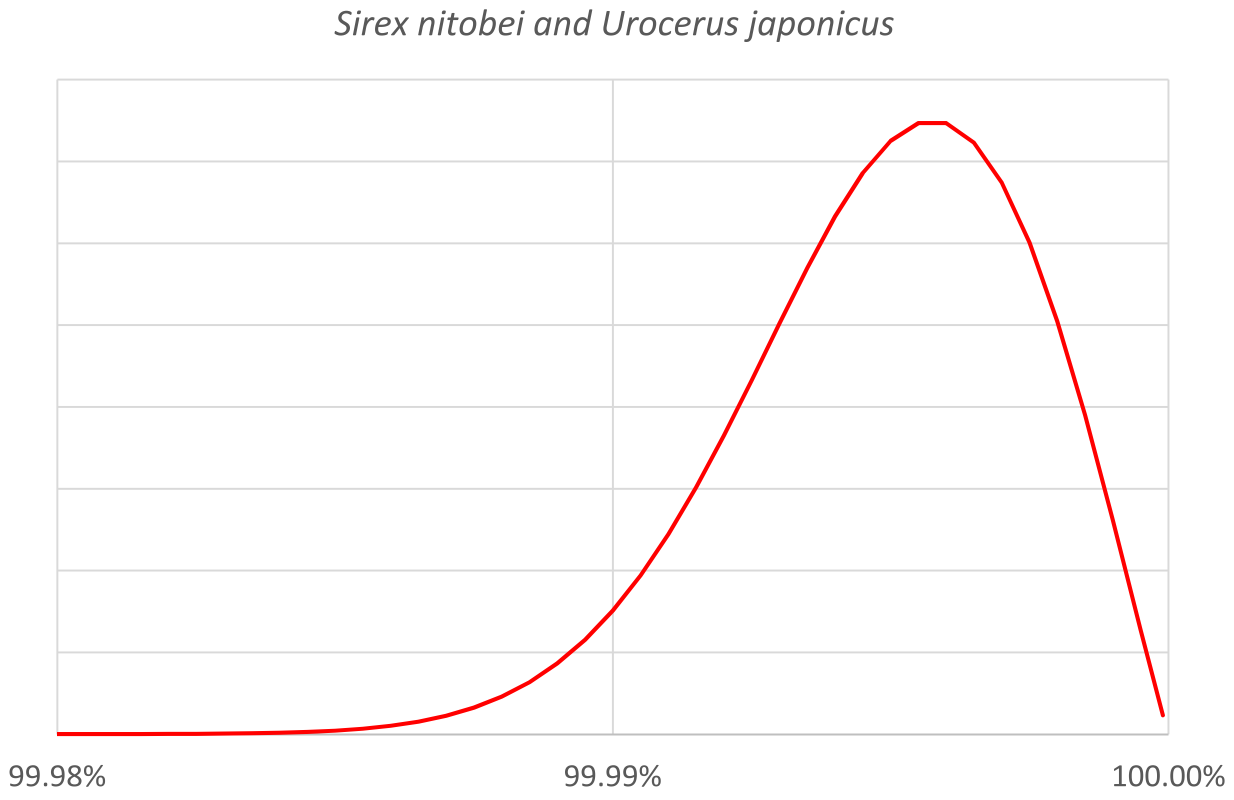
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.24.

Table B.24: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Sirex nitobei* and *Urocerus japonicus*

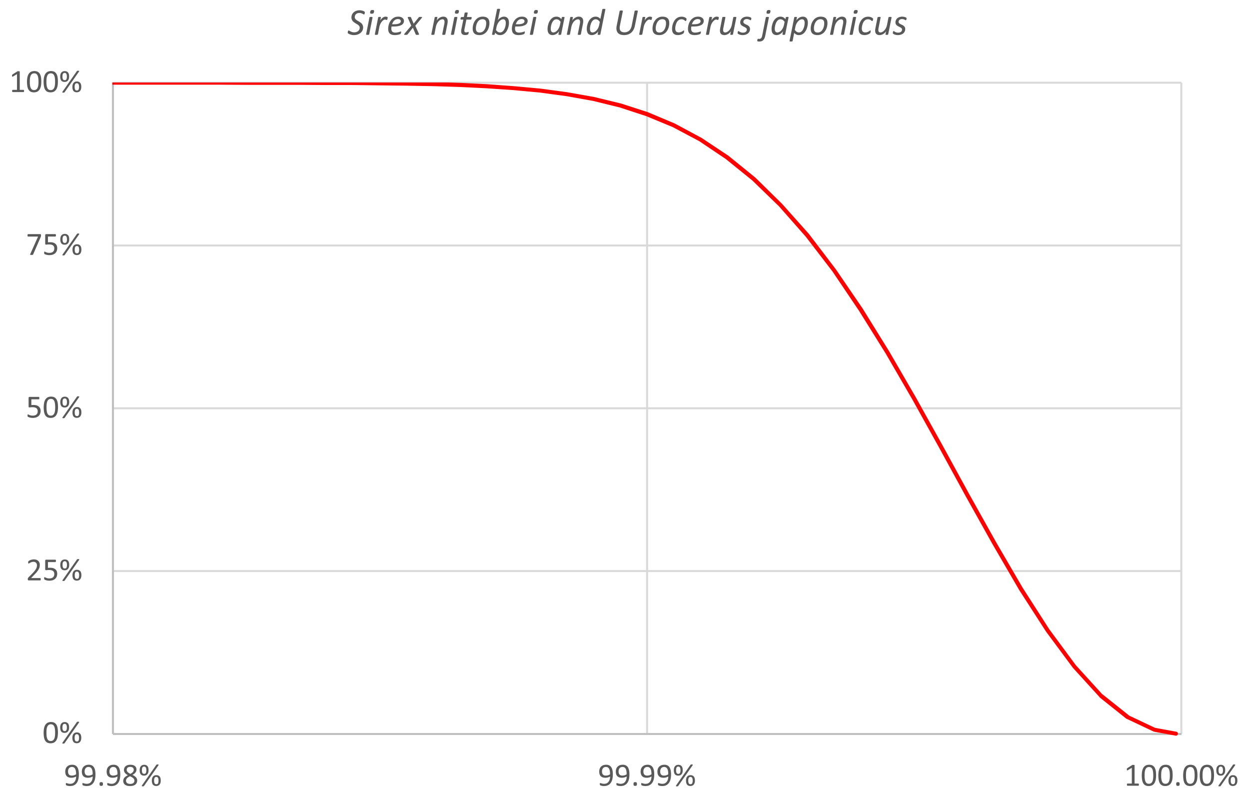
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.990%					99.993%		99.995%		99.997%					99.999%
Fit-W	99.988%	99.989%	99.990%	99.991%	99.992%	99.993%	99.994%	99.995%	99.996%	99.997%	99.997%	99.998%	99.999%	99.999%	99.999%


Sirex nitobei and Urocerus japonicus
0
1
2
EKE result
Fitted density

(a)



(b)



(c)

Figure B.11: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.15.6. Reference list

FABI (Forestry and Agricultural Biotechnology Institute), online. Sirex literature. University of Pretoria. Available online: https://fabinet.up.ac.za/index.php/sirex-literature

B.16. *Thecodiplosis japonensis*

B.16.1. Organism information

Taxonomic information	*Thecodiplosis japonensis*	
Group	INS	
EPPO code	THEOJA	
Regulated status in the EU	Annex IAI (Council Directive EC/2000/29)	
Pest status in Japan	Present and widespread, not considered a pest	
Pest status in the EU	Absent	
Host status on *P. parviflora*	*P. parviflora* is not a host for *Thecodiplosis japonensis*	
PRA information		
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	*Thecodiplosis japonensis* is a gall midge (Diptera: Cecidomyiidae) with a life history very similar to that of *Thecodiplosis brachyntera,* an European pine pest, well-known in young pine plantations all over Europe. The type of gall caused by *T. brachyntera* is very similar to the one caused by *T. japonensis*. This species is regulated in the EU and is a relevant invasive pest in Korea. It has also been on the EPPO alert list for a few years (EPPO, online_a) It has never been intercepted on *P. parviflora* because *P. parviflora* is not a host
	Presence of asymptomatic plants	Plants carrying eggs and young larvae can be asymptomatic. Soil can carry puparia
	Confusion with other pathogens/pests	No
Host plant range	*Pinus* spp. including especially *P. thunbergii*	
Pathways	Plants for planting. Soil with plants	
Surveillance information	No surveillance is carried out in the areas surrounding the nurseries	

B.16.2. Possibility of pest presence in the nursery

B.16.2.1. Possibility of entry from surrounding environment

Pine species are commonly located in forests close to at least two of the three major areas where registered nurseries are located (Kagawa and Saitama), so it is highly possible for the pest to enter the nursery from the surrounding environment. Damage has been observed in Japan and in Korea where it has likely been introduced.

Uncertainties:

- No surveillance is carried out in the area surrounding the nurseries and no information about the density of *T. japonensis* populations in the area is available.
- From the maps presented during the hearing held on 9 November 2018 (Dossier section 4.3), it is clear that several nurseries are located near forests. The forest quality, the density of *T. japonensis* and the exact distance of the forest from the nursery are not known. Therefore, the Panel considers that there is a constant pressure of *T. japonensis* and the above aspects were taken into account when the best- and worst-case scenarios were evaluated.
- It has been introduced in Korea where it has become a relevant pest for pine forests.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *T. japonensis* to enter the nursery from the surrounding area. There are no measures in place that could it.

B.16.2.2. Possibility of entry with new plants

Registered nurseries may import trees from unregistered nurseries located in Japan (Dossier section 4.9) so that even areas with no pines nearby may nonetheless import trees from nurseries located near to pine forests, which are very common in Japan.

Export nurseries are inspected six times per year, every month from April to September, to detect any major signs of pest occurrence. Trees with symptoms of colonisation of the phloem are removed.

Uncertainties:

- The new plants entering the nurseries can be taken/collected from other parts of Japan where *T. japonensis* occurs – no specific information regarding the native location of the new plants entering the nursery is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *T. japonensis* to enter the nursery with new plants.

B.16.2.3. Possibility of entry by growing practices

It is unlikely that the pest is introduced into the nursery with growth medium. Soil is in fact removed and new, disinfested soil is used. There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *T. japonensis* to enter the nursery through growing media, water or any other growing practice.

B.16.2.4. Information from interceptions

There are no data available. The species has been introduced to Korea where it has become a serious pest.

B.16.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *T. japonensis* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Insecticide treatment against leaf pests (acetamiprid mid-April; fenitrothion or acetamiprid in May, June, July, August; etofenprox in June, permethrin in October)	Insecticides are active against the adults but they are less effective against the eggs and the larvae since they are inside the galls Uncertainties: Insects are present on the tree only for a short period of time
RRO2	Fungicide treatment of crop		No effect	

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO3	Soil treatment	X	Plants are repotted every year with disinfected growing media (heat treatment for 30 min at 90°C)	Uncertainties: Soil has to be carefully removed close to the stem and main roots
RRO4	Root treatment (repotting)	X	Prior to export roots are washed to remove all soil particles and plants are repotted with disinfected growing media	Uncertainties: Soil has to be carefully removed close to the stem and main roots
RRO5	Root treatment (MEP)	X	Immersion of washed roots in 0.16% fenitrothion (MEP) emulsifiable oil in water for 30 min	Uncertainties: There are no data available on the effectiveness of MEP on pupae
RRO6	Protected cultivation		No effect	
RRO7	Pruning	X	Decandling, removal of new shoots (in May)	Uncertainties: The pruning activity is not sufficient in order to remove all the galls. It should be combined with other methods in order to be fully effective
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the environment surrounding the nurseries	Uncertainties: The lack of surveillance means that the occurrence of the pest in the nursery area is not known
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (from April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	Uncertainties: Galls can be very small and can go undetected
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for a minimum of two consecutive years in the officially registered export nursery	Uncertainties: Colonisation from nearby forests is possible
RRO11	Sampling and testing		No effect	
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice during that period. Plants with symptoms are tested	

B.16.4. Overall likelihood of pest freedom:

Rating of the likelihood of pest freedom	Almost certain
Distribution of the likelihood of pest freedom	5%: 99.973% · Q1: 99.983% · M: 99.987% · Q3: 99.991% · 95%: 99.994%

5%	Q1	M	Q3	95%
99.973%	99.983%	99.987%	99.991%	99.994%

Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are colonised by *Thecodiplosis japonensis* either by: (1) introduction of new attacked plants from (unregistered) nurseries; or (2) immigrating *T. japonensis* from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of galls; (b) regular application of insecticide treatments. These measures will greatly reduce the probability that *T. japonensis*-attacked plants are present in consignments destined for export **Shortcomings of present methods** *Thecodiplosis japonensis* galls can be difficult to detect due to their small size **Main uncertainties** – Effectiveness of the insecticide treatments – Location of export nurseries in relation to the distance from pine forests – Occurrence of local outbreaks in forests close to the nurseries

B.16.5. Elicitation outcomes of the assessment of the pest freedom for *Thecodiplosis japonensis*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- The pest is easy to detect.
- Insecticide treatments are very effective.
- Pupae will be removed by repotting and root washing.
- The pupae are in the upper soil layer.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- The pest is widespread and its introduction into the nursery is very likely to occur.
- *Pinus thunbergii* is a good host.
- The efficacy of the root treatment with MEP is unknown.
- The pupae can be carried with the plants.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The median value is skewed to the lower values as the measures are likely to be effective.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- Pest pressure can vary according to local conditions.

The elicited and fitted values for *Thecodiplosis japonensis* agreed by the Panel are shown in Tables B.25 and B.26 (Figure B.12).

Table B.25: Elicited and fitted values of the uncertainty distribution of pest infestation by *Thecodiplosis japonensis* per 10,000 bonsai plants

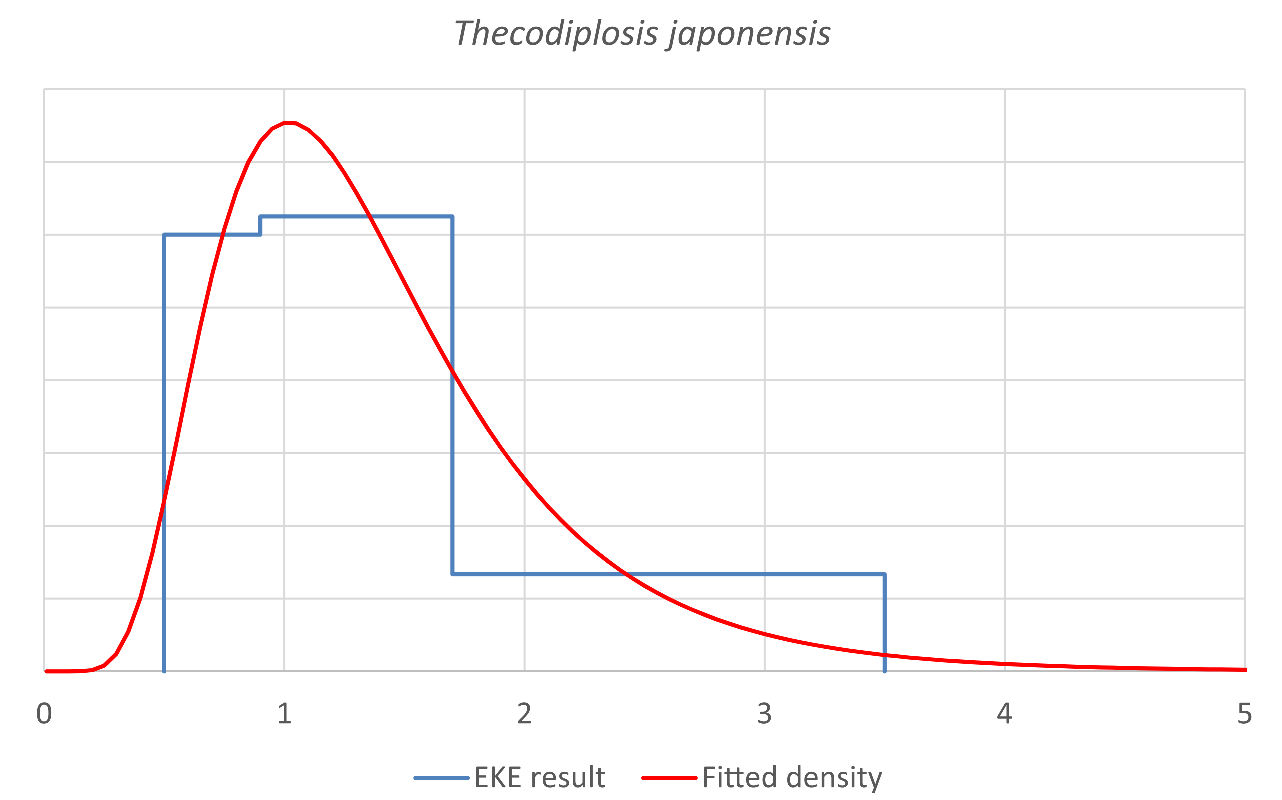
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	0.5					0.9		1.3		1.7					3.5
Fit-LN	0.43	0.51	0.59	0.70	0.81	0.92	1.03	1.27	1.55	1.73	1.98	2.30	2.72	3.15	3.74

Lognorm(1.4105,0.69435) fitted with @Risk version 7.5.

Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.26.

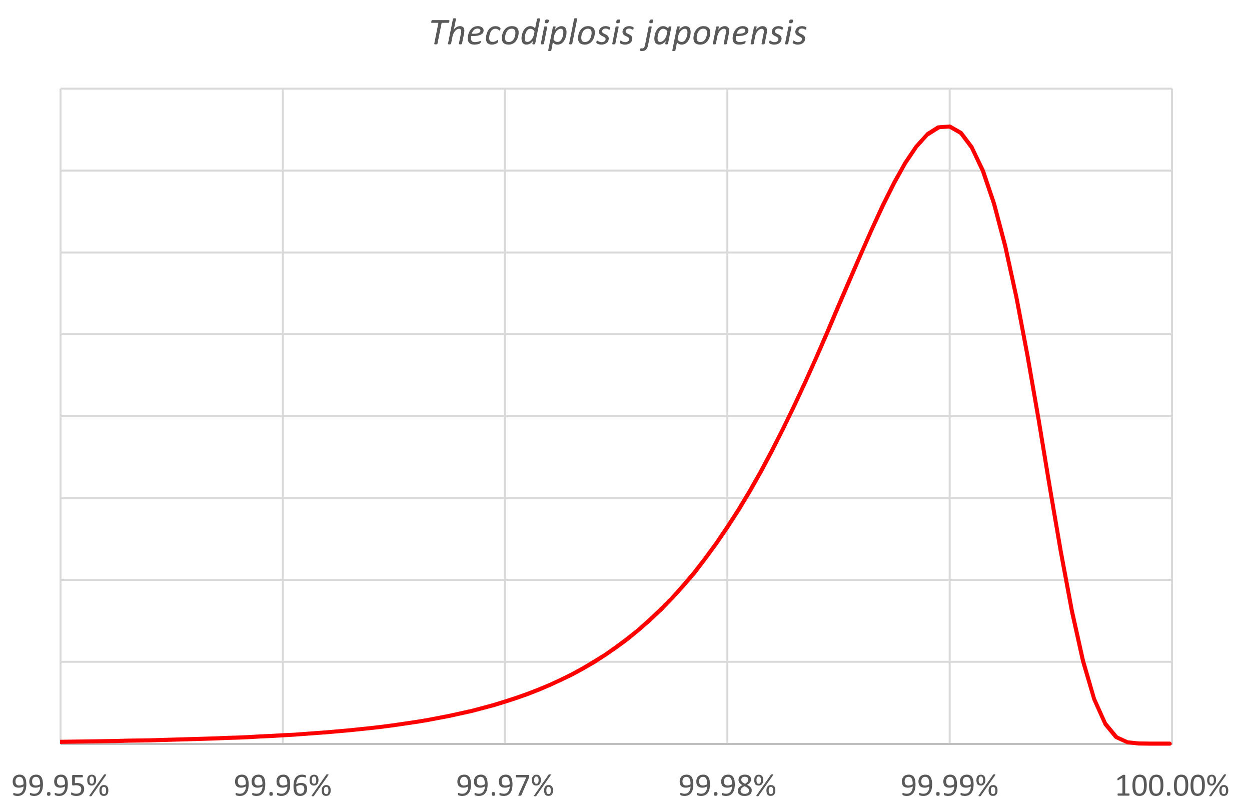
Table B.26: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Thecodiplosis japonensis*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.965%					99.983%		99.987%		99.991%					99.995%
Fit-LN	99.963%	99.968%	99.973%	99.977%	99.980%	99.983%	99.985%	99.987%	99.990%	99.991%	99.992%	99.993%	99.994%	99.995%	99.996%

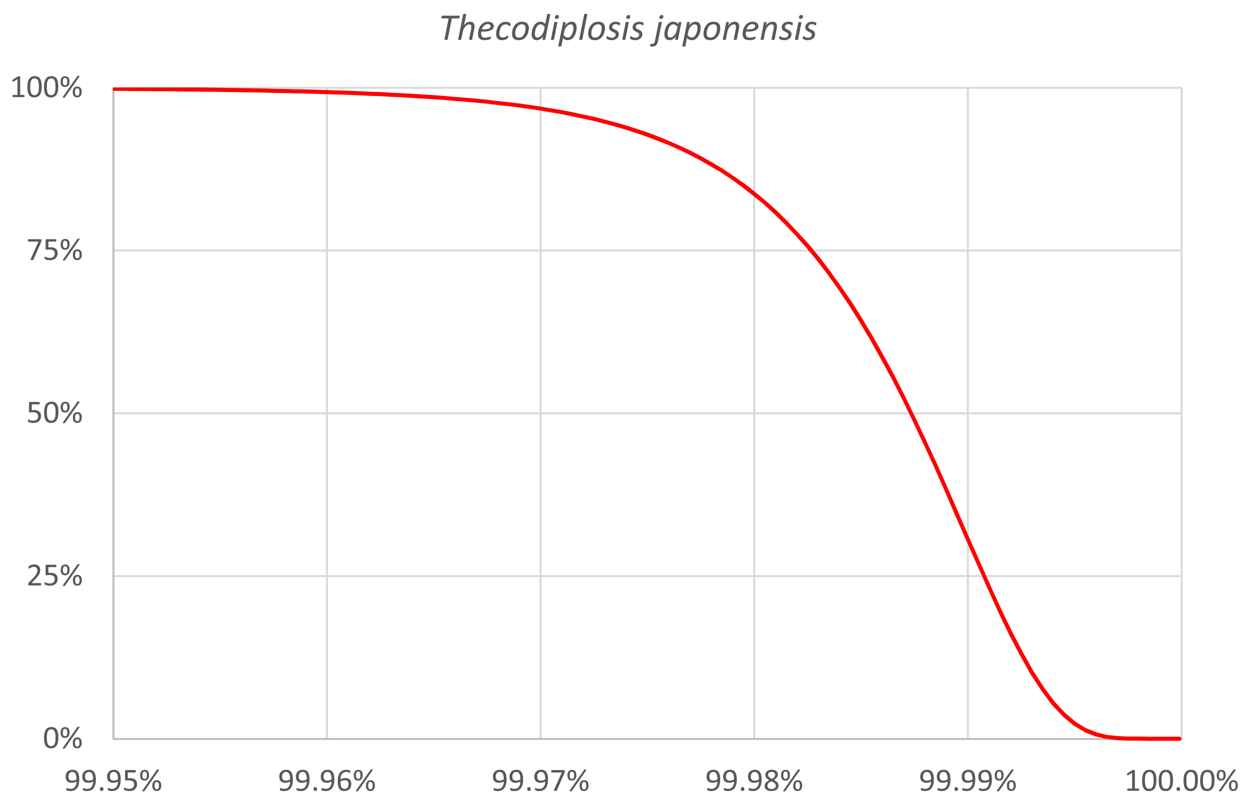


Thecodiplosis japonensis
0
1
2
3
4
5
EKE result
Fitted density

(a)



(b)



(c)

Figure B.12: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B.16.5. Reference list

EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO Global Database. Available online: https://www.eppo.int/[Accessed: 26 November 2018]

B.17. *Urocerus japonicus*

The data on *Urocerus japonicus* can be found in Appendix B.15.

B.18. *Bursaphelenchus xylophilus*

B.18.1. Organism information

Taxonomic information	*Bursaphelenchus xylophilus* (Steiner & Buhrer, 1934) Nickle, 1970. Syn: *Bursaphelenchus lignicolus* Mamiya & Enda, 1972 *Aphelenchoides xylophilus* Steiner & Buhrer, 1934	
	Monochamus alternatus Hope, 1842 Syn. *Monochamus tesserula* Bates, 1873	
Group	NEM & INS	
EPPO code	BURSXY = *Bursaphelenchus xylophilus* MONCAL = *Monochamus alternatus*	
Regulated status in the EU	BURSXY: Annex IIAII (Council Directive EC/2000/29) MONCAL: Annex IAI (Council Directive EC/2000/29)	
Pest status in Japan	*Bursaphelenchus xylophilus* occurs in extensive areas in Japan (with Hokkaido as a possible exception) on the hosts *Pinus thunbergii*, *P. densiflora* and *P. luchuensis*. (Kishi, 1995) *Monochamus alternatus* is present and widespread in Japan (EPPO, online_e)	
Pest status in the EU	*Bursaphelenchus xylophilus* is present in Portugal and present (few occurrences) under eradication in Spain (EPPO, online_f). It is absent in other Member States of the EU *Monochamus alternatus* is absent in the EU	
Host status on *P. parviflora*	*B. xylophilus* and *M. alternatus* use *P. parviflora* as a host (Kishi, 1995)	
PRA information	Pest Risk Analysis (PRA) for the territories of the European Union (as PRA area) on *Bursaphelenchus xylophilus* and its vectors in the genus *Monochamus*. (Evans et al., 1996) Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway - Part 1. (VKM, 2008) Report of a Pest Risk Analysis for *Bursaphelenchus xylophilus*, 09/15449. (EPPO, 2009) Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway – Part 2. (Sundheim et al., 2010) Scientific Opinion on the pest categorisation of non-EU *Monochamus* spp. (EFSA PLH Panel, 2018f)	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	*Bursaphelenchus xylophilus:* susceptible species like *P. thunbergii*, *P. densiflora* and *P. luchuensis* wilt and die due to the pine wilt disease (Mamiya, 1983; Kishi, 1995) *Monochamus alternatus*: wood shavings appear from cracks in the bark. Larval galleries arise following larval feeding activities in the cambium. Oval entry holes are made by the larvae when entering the wood. Round exit holes are made by the imago when leaving the pupal chamber (Mamiya, 1984; Kishi, 1995)
	Presence of asymptomatic plants	Trees infested with *B. xylophilus* (pine wood nematode, hereinafter also PWN) in autumn may die during the following year (Mamiya, 1983). Trees may remain asymptomatic for months before the disease manifests. Takeuchi (2008) reported the occurrence of latent infections in pine trees infested by *B. xylophilus*, confirming

		that individual trees of *P. thunbergii* can remain asymptomatic for a minimum of 2 years in pine stands. Due to asymptomatic infections, *B. xylophilus* can be inadvertently introduced into pest-free countries through trade and can be moved during commercial exchanges
	Confusion with other pathogens/pests	Pine wilt symptoms are difficult to distinguish from damage caused by other pests like bark beetles. Roots that have been physically damaged may also show symptoms resembling pine wilt disease
Host plant range	The PWN is known to infect at least 17 *Pinus* species, aside from other genera including *Abies, Cedrus, Larix, Picea, Pseudotsuga* and *Tsuga* (EPPO, 2009)	
Pathways	Plants for planting, wood and wood packaging material can be a pathway for the PWN. In Japan, the Cerambycidae beetle *M. alternatus* is a vector for the PWN; it transmits the fourth stage dispersal juveniles 'dauerjuveniles' (J_{IV}) to trees. The beetles get infested by the J_{IV} stages after eclosion in the pupal chambers when the nematodes enter the tracheal system of the beetle (Mamiya, 1984; Kishi, 1995). The PWN can also spread through wood-to-wood contacts (Malek and Appleby, 1984; Halik and Bergdahl, 1992; Sousa et al., 2011) Wood and wood packaging material can be pathways for the *M. alternatus*, especially for the immature stages of the beetle. Plants for planting are an unlikely pathway since *M. alternatus* is known to attack large declining trees. It is expected, however, that plants for planting may be used for maturation feeding by adults	
Surveillance information	No surveillance information is available During the hearing held on 9 November 2018, the Japanese delegation reported that both surveillance of damage and measures of containment are adopted in large patches of forest (Dossier section 4.9). As for smaller patches, such as those close to the nurseries (e.g. Kagawa and Saitama areas, as indicated in Dossier section 4.9), surveillance and measures are not in place. From the maps provided by the Japanese MAFF, showing the location of the registered nurseries, it appears that many small patches of pine forest, susceptible to PWN, are located within a radius of less than 2 km (e.g. *Pinus densiflora* in the Kagawa area)	

B.18.2. Possibility of pest presence in the nursery

B.18.2.1. Possibility of entry from surrounding environment

In Japan, climatic conditions are excellent for the reproduction of *B. xylophilus* and the development of pine wilt disease. Damage by *B. xylophilus* in forest sites is, in fact, common. The vector *M. alternatus* spreads PWN locally for up to 2.4 km per flight (Kobayashi et al., 1984). *Bursaphelenchus xylophilus* is present in most prefectures in Japan on pine species including *P. thunbergii* (Mamiya, 1988). There are no pest-free areas for *B. xylophilus*. As for the production area, no specific recent surveillance data are available but previous information indicates that 27–100% of *M. alternatus* may carry (J_{IV}) of *B. xylophilus* in Japan, with mean loads of 171–35,031 juveniles per beetle (Kishi, 1995).

The symptoms of pine wilt disease are easy to detect. *Monochamus alternatus* present in the surroundings of the nursery could enter the nursery for maturation feeding on the bonsai trees. In one of the three major areas where registered nurseries are located (Chiba, see Dossier sections 4.1 and 4.3), susceptible pine species do not occur, whereas they are common in forests which are close to the other two main areas (Kagawa and Saitama).

Uncertainties:

- No surveillance in the area surrounding the nurseries is conducted and no information about the density of the population of *M. alternatus* in the area surrounding the nurseries is available.
- Visual inspections that focus on feeding symptoms are not always reliable enough to confirm the absence of *M. alternatus*.
- From the maps presented during the hearing held on 9 November 2018 (Dossier section 4.3), it is clear that several nurseries are located near the forests. The forest health condition, the density of the population of *M. alternatus* and the exact distance of the forest from the nursery are not known. Therefore, the Panel considers that there is a constant pressure of *M. alternatus* and these aspects were taken into account when evaluating the best- and worst-case scenarios.

– *Monochamus alternatus* is widely distributed from subtropical to cool-temperate areas (Nakamura-Matori, 2008). There is uncertainty on the local density of the population of *M. alternatus.*
– *Monochamus alternatus* is known to be a vector of PWN in Japan (Kishi, 1995). One *M. alternatus* beetle can carry from very few to more than 200,000 PWN (Kishi, 1995). The maturation feeding may happen several times during their lifespan.
– The proximity of the nursery to the forest is important since deteriorating trees may serve as breeding sites for beetles. There are no data about the rate of declining trees in forest patches surrounding the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *M. alternatus* and PWN to enter the nursery from the surrounding area. There are no measures in place that could prevent the introduction of infested *M. alternatus* adults into the nurseries.

B.18.2.2. Possibility of entry with new plants

Trees may be imported from unregistered nurseries located in Japan (Dossier section 4.9) to registered nurseries; accordingly, even areas with no pines around may obtain trees from nurseries located close to pine forests. Such plants may be infested by the PWN without showing wilt symptoms. The pest pressure in the area of origin seems to be high. All the nurseries are located in the central and southern regions of Honshu as shown in the Dossier section 4.1. In these areas, *B. xylophilus* has been present since the 1920s. (Futai, 2008).

Uncertainties:

– The new plants entering the nurseries can be taken/collected from other parts of Japan where the PWN is present – no specific information regarding the location where the new plants come from is available.
– The inspections cannot exclude the possibility that the new plants are infested by the PWN. There are six visual inspection per year in the nursery, but sampling for a laboratory test is performed only once before the export.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *M. alternatus* and PWN to enter the nursery through new plants coming from the surrounding environment.

B.18.2.3. Possibility of entry by growing practices

The biology of the pest excludes soil and water and other growing practices as pathways within the nursery.

There are no uncertainties related to this statement.

Taking this into consideration the Panel considers that it is not possible for *M. alternatus* and PWN to enter the nursery through growing media, water or any other growing practice.

B.18.2.4. Information from interceptions

There have been no interceptions (1999–2018) of *B. xylophilus* on *P. parviflora* bonsai trees. This may be an indication of the low presence of PWN in bonsai plants destined for export. However, it should be noted that *P. thunbergii* is a highly suitable host, which grows at lower altitudes with a potentially higher exposure to PWN than *P. parviflora.*

B.18.3. Evaluation of risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on the PWN or *M. alternatus* is provided.

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
RRO1	Insecticide treatment of crop	X	Treatment of bonsai with insecticide against *M. alternatus* by applying fenitrothion 80% (8–10.67	Frequent insecticide treatments are applied in order to prevent any possible maturation feeding by *M. alternatus.* The insecticide

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
			kg/ha) or acetamiprid 2% (0.16–0.4 kg/ha) spraying in early May, mid-June and mid-July	applications cover the whole period which may be used by *M. alternatus* to migrate into the nurseries for maturation feeding. However, it is uncertain whether the beetles are immediately killed or whether they manage to reach the treated plants and transmit PWN by feeding Uncertainties: There are no data available on the time it takes before *M. alternatus* is immobilised and killed by the insecticide
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment		No effect	
RRO4	Root treatment (repotting)		No effect	
RRO5	Root treatment (MEP)		No effect	
RRO6	Protected cultivation		No effect	
RRO7	Pruning		No effect	
RRO8	Surveillance	X	No pest-specific surveillance is carried out in the surrounding environment of the nurseries	
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed Prior to export the consignment is inspected. Branches are beaten over a white plastic bowl to check for the presence of insects	The routine inspections are more likely to reveal signs of activity from *M. alternatus* than latent infections of PWN. A thorough check of every plant is carried out only once before the delivery. If a plant shows symptoms (e.g. discolouration or wilting), it is removed from the export stocks and used for the internal market or destroyed. Some data are available to estimate how often this occurs. Three years of analysis on *P. thunbergii* to be delivered to Turkey (2016–2018) showed that around 10% of the plants were excluded from export and 0.3% of the plants were destroyed (Dossier section 4.9) Uncertainties: – There are six visual inspections per year in the nursery, but there is an uncertainty as to how easily the feeding scars can be found depending on the age of the feeding scars – All plants with symptoms are removed from the nursery. However, no

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
				specific analyses on discarded plants are conducted to detect the presence of PWN – In a 3-year analysis of *P. thunbergii* for delivery to Turkey, about 10% of plants were removed for several reasons (e.g. symptoms, not fulfilling quality requirements, use for domestic market). However, the health status of the remaining 90% of plants is not known (healthy versus asymptomatic) – There is uncertainty about the cause of death of the discarded or dead plants; therefore, the presence of PWN was not excluded
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery	
RRO11	Sampling and testing		Not applied	
RRO12	Post-entry quarantine	X	Exported plants remain for at least 3 months in a post-quarantine station in the EU where they are inspected twice. Plants with symptoms are tested	

B.18.4. Overall likelihood of pest freedom

<table>
<tr><td>Rating of the likelihood of pest freedom</td><td>Bursaphelenchus xylophilus (PWN): Very likely
Monochamus alternatus: Almost certain</td></tr>
<tr><td>Distribution of the likelihood of pest freedom of PWN</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>99.06%</td><td>99.42%</td><td>99.60%</td><td>99.74%</td><td>99.88%</td></tr></table></td></tr>
<tr><td>Distribution of the likelihood of pest freedom of M. alternatus</td><td><table><tr><td>5%</td><td>Q1</td><td>M</td><td>Q3</td><td>95%</td></tr><tr><td>100.00%</td><td>100.00%</td><td>100.00%</td><td>100.00%</td><td>100.00%</td></tr></table>No uncertainties
The possibility that M. alternatus is carried with bonsai plants destined for export to the EU is excluded. If larvae are present in the wood, plants would be immediately destroyed as their presence is an obvious symptom. Adults are not expected to be present on exported plants</td></tr>
</table>

Summary of the information used for the evaluation of PWN	**Probability that the pest could enter exporting nurseries** It cannot be excluded that bonsai plants in the nursery are infected by PWN either by: (1) introduction of new PWN-infected plants from (unregistered) nurseries; or (2) maturating feeding of PWN-infected *M. alternatus* beetles immigrating from nearby forests **Measures taken against the pest and their efficacy** The applied measures are: (a) removal of symptomatic plants; (b) removal of plants with feeding scars; and (c) regular insecticide treatments. These measures will greatly reduce the probability that PWN-infected plants are present among bonsai destined for export **Interception records** So far (1999–2018), the nematode has never been intercepted on bonsai plants of *P. parviflora*. However, it should be noted that *P. parviflora* is a poor host for PWN, while *P. thunbergii* is a highly susceptible host. In exports to Turkey, around 10% of the plants were discarded, including wilting plants (i.e. potentially PWN-infected). It is unknown how many of these discarded plants were really PWN-infected and therefore the percentage of asymptomatic PWN-infected plants is unknown **Shortcomings of present methods** Asymptomatic plants are not tested so PWN-infected plants may remain undetected. Such infections can potentially originate from infected plants introduced into the export nursery. It is uncertain whether the insecticide treatments can fully prevent the maturation feeding activity of PWN-infected *M. alternatus* beetles immigrating from the environment The possibility that *M. alternatus* is carried with bonsai plants destined for export to the EU is excluded: the presence of larvae in the wood would be immediately detected as an obvious symptom and the plants would be destroyed **Main uncertainties** – The frequency of nematode infections of *M. alternatus* in the area surrounding the export nurseries is not known – The location of export nurseries in relation to the distance from forests hosting PWN and *M. alternatus* is not known – The effectiveness of insecticide applications in preventing maturation feeding and transmission of PWN is not known – Inspections that focus on feeding scars of *M. alternatus* may fail to detect these symptoms – The percentage of asymptomatic PWN-infected plants is not known

B.18.5. Elicitation outcomes of the assessment of the pest freedom for *Bursaphelenchus xylophilus*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- *Monochamus* density is too low and the dispersal of infested beetles from the environment surrounding export nurseries is unlikely.
- New infested plants become symptomatic during the 2-year period in the export nursery and are discarded.
- Plants with feeding scars from *M. alternatus* are removed.
- Treatments in the nurseries are effective (e.g. correct timing of application and most of the beetles killed).

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- The export nursery is located near a forest where declining trees and PWN are present.
- The density of *Monochamus* is very high and beetles disperse from the forest to find suitable host plants in the export nursery for maturation feeding.
- Beetles can enter the nursery and despite the application of insecticides adults are able to feed and transmit the nematode.

- Transmission occurs a few months before export and asymptomatic plants are not detected by visual inspections.
- New infested plants remain asymptomatic during the 2-year period in the export nursery.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The median takes into account the fact that the surrounding area of the nurseries comprises both possibilities of having low or high dispersal of *Monochamus* depending on the proximity of the forest to the nursery.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The precision is affected by high uncertainty due to the absence of specific data on the density and nematode infection rate of *Monochamus* in the areas surrounding the nurseries. The frequency of asymptomatic infections is unknown.

The elicited and fitted values for *B. xylophilus* agreed by the Panel are shown in Tables B.27 and B.28 (Figure B.13).

Table B.27: Elicited and fitted values of the uncertainty distribution of pest infestation by *Bursaphelenchus xylophilus* per 10,000 bonsai plants

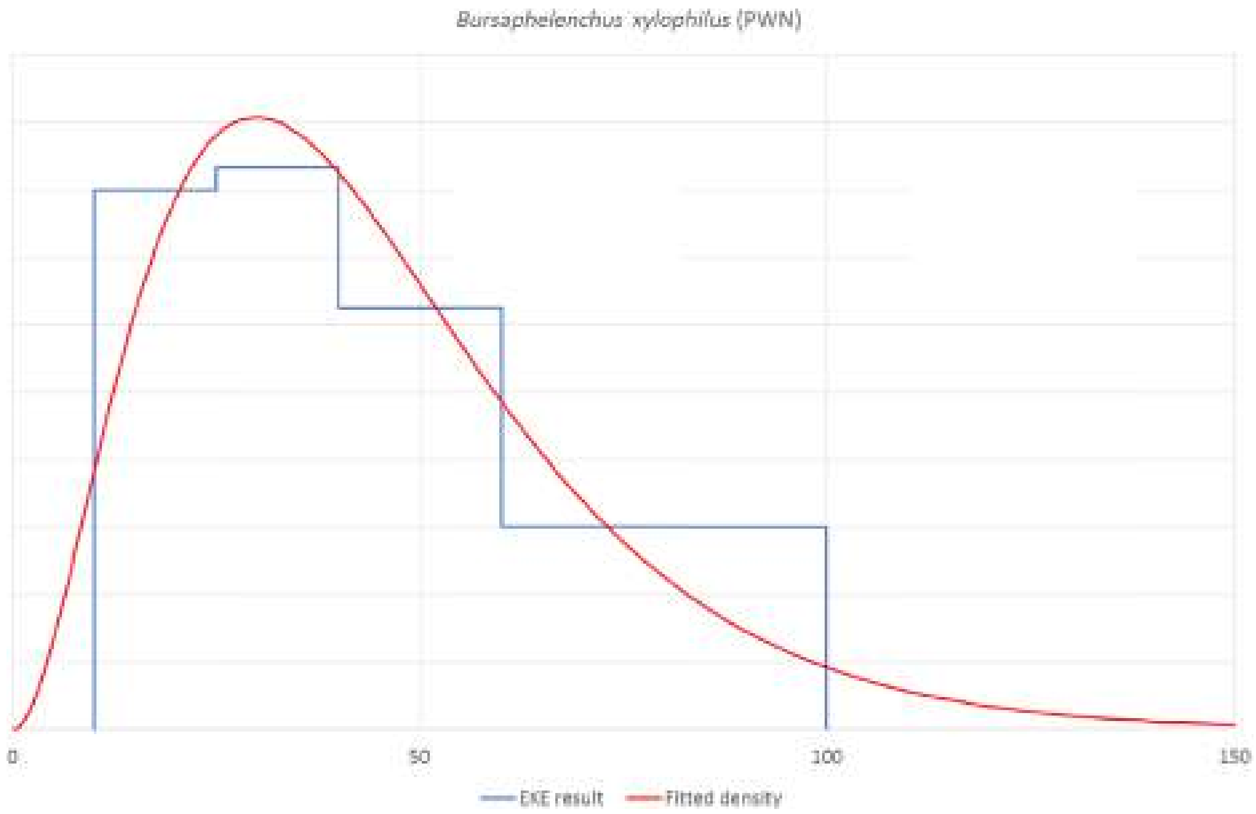
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	10					25		40		60					100
Fit-G	6.5	9.3	12	16	21	26	30	40	51	58	68	79	94	108	125

Gamma(3.0087,14.88) fitted with @Risk version 7.5.

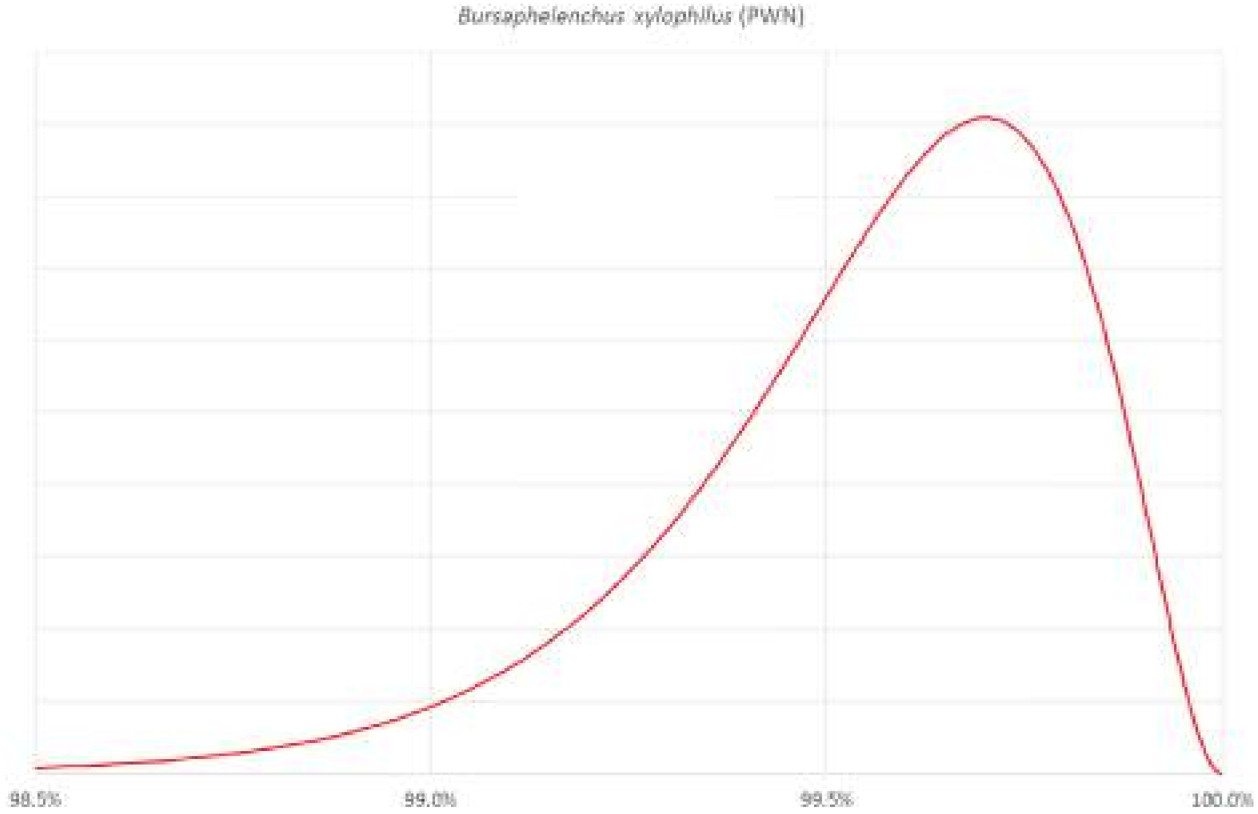
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.28.

Table B.28: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Bursaphelenchus xylophilus*

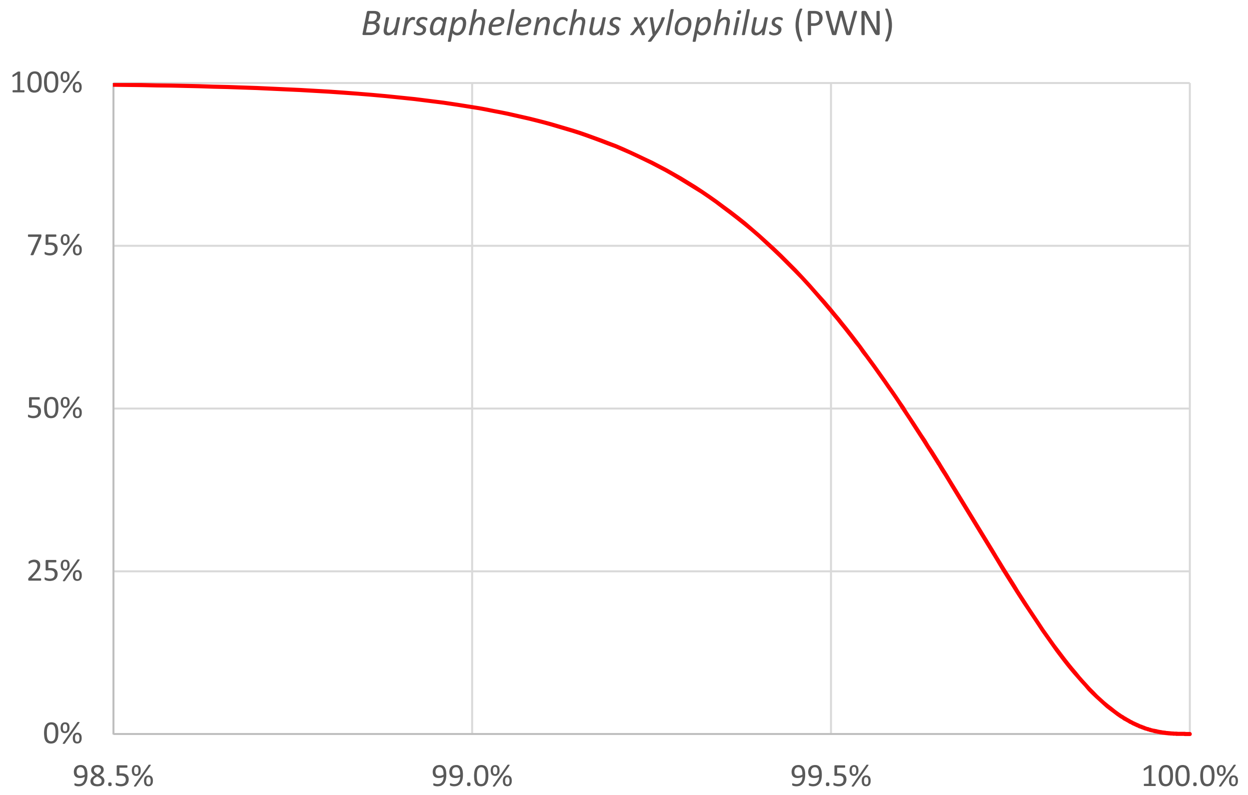
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.00%					99.40%		99.60%		99.75%					99.90%
Fit-G	98.75%	98.92%	99.06%	99.21%	99.32%	99.42%	99.49%	99.60%	99.70%	99.74%	99.79%	99.84%	99.88%	99.91%	99.93%


Bursaphelenchus xylophilus (PWN)
0
50
100
150
EKE result
Fitted density

(a)



(b)



(c)

Figure B.13: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

The elicited and fitted values for *M. alternatus* agreed by the Panel are shown in Tables B.29 and B.30.

Table B29: Elicited and fitted values of the uncertainty distribution of pest infestation by *Monochamus alternatus* per 10,000 bonsai plants

Percentile	**1%**	**2.5%**	**5%**	**10%**	**17%**	**25%**	**33%**	**50%**	**67%**	**75%**	**83%**	**90%**	**95%**	**97.5%**	**99%**
EKE	0					0		0		0					0
Fit-C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Constant (0)

Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.30.

Table B.30: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Monochamus alternatus*

Percentile	**1%**	**2.5%**	**5%**	**10%**	**17%**	**25%**	**33%**	**50%**	**67%**	**75%**	**83%**	**90%**	**95%**	**97.5%**	**99%**
EKE	100.00%					100.00%		100.00%		100.00%					100.00%
Fit-C	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

B.18.6. Reference list

EFSA PLH Panel (EFSA Panel on Plant Health), 2018f. Scientific Opinion on the pest categorisation of non-EU *Monochamus* spp. EFSA Journal 2018; 16(11):5435, 35 pp. https://doi.org/10.2903/j.efsa.2018.5435

EPPO (European and Mediterranean Plant Protection Organization), 2009. Report of a Pest Risk Analysis for *Bursaphelenchus xylophilus*, 09/15449. 63 pp. Available online: https://pra.eppo.int/getfile/e575b4b0-3f6c-4195-9245-0b630d57dc58

EPPO (European and Mediterranean Plant Protection Organization), online_e. *Monochamus alternatus* (MONCAL), EPPO Global Database. Available online: https://gd.eppo.int/taxon/MONCAL [Accessed 21 March 2019]

EPPO (European and Mediterranean Plant Protection Organization), online_f. *Bursaphelenchus xylophilus* (BURSXY), EPPO Global Database. Available online: https://gd.eppo.int/taxon/BURSXY/distribution [Accessed: 12 March 2019]

Evans HF, McNamara DG, Braasch H, Chadoeuf J and Magnusson C, 1996. Pest Risk Analysis (PRA) for the territories of the European Union (as PRA area) *on Bursaphelenchus xylophilus* and its vectors in the genus *Monochamus*. EPPO Bulletin, 26, 199-249.

Futai K, 2008. Pine Wilt in Japan: From First Incident to the Present. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T (eds.). Pine Wilt Disease. Springer, Tokyo, pp. 5-12.

Halik S and Bergdahl DR, 1992. Survival and infectivity of *Bursaphelenchus xylophilus* in wood chip-soil mixtures. Journal of Nematology 24, 495-503.

Kishi Y, 1995. The pine wood nematode and the Japanese pine sawyer. Thomas Company Ltd., Futaba Prints, Tokyo. 302 pp.

Kobayashi F, Yamane A and Ikeda T, 1984. The Japanese Pine Sawyer Beetle as the Vector of Pine Wilt Disease. Annual Review of Entomology, 29, 115-135.

Malek RB and Appleby JE, 1984. Epidemiology of pine wilt in Illinois. Plant Disease, 68, 180-186.

Mamiya Y, 1983. Pathology of the pine wilt disease caused by *Bursaphelenchus xylophilus*. Annual Review of Phytopathology, 21, 201-220.

Mamiya Y, 1984. The pine wood nematode. In: Nickle WR (eds.). Plant and Insect Nematodes. Marcel Dekker, New York, USA. pp. 589-626.

Mamiya Y, 1988. History of pine wilt disease in Japan. The journal of nematology, 20(2), 219-226.

Nakamura-Matori K, 2008. Vector-Host Tree Relationships and the Abiotic Environment. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T (eds.). Pine Wilt Disease. Springer Japan, Tokyo. pp. 144-161. https://doi.org/10.1007/978-4-431-75655-2

Sousa E, Naves P, Bonifacio L, Henriques J, Inacio ML and Evans H, 2011. Assessing risks of pine wood nematode *Bursaphelenchus xylophilus* transfer between wood packaging by simulating assembled pallets in service. EPPO Bulletin, 41, 423–431.

Sundheim L, Økland B, Magnusson C, Solberg B, Rafoss T, 2010. Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway – Part 2. Opinion of the Plant Health Panel of the Scientific Committee for Food Safety, 08/906-6_final, ISBN 978-82-8259-002-0 (Electronic edition). 21 pp.

Takeuchi Y, 2008. Host Fate Following Infection by the Pine Wood Nematode. In: Zhao BG, Futai K, Sutherland JR and Takeuchi T, (eds.). Pine Wilt Disease. Springer, Tokyo, Japan. pp. 235-249.

VKM (Norwegian Scientific Committee for Food Safety), 2008. Pest risk assessment of the Pine Wood Nematode (PWN) *Bursaphelenchus xylophilus* in Norway - Part 1. Opinion of the Panel on Plant Health of the Norwegian Committee of Food Safety, 08/906-4 Final, ISBN 978-82-8082-271-0. VKM, Oslo, Norway, 48 pp.

B.19. *Xiphinema americanum* Cobb. *sensu lato*

B.19.1. Organism information

Taxonomic information	Currently valid name: *Xiphinema americanum* Cobb. *sensu lato* (hereafter *X. americanum s.l.*) This is a group of closely related species. Currently *X. americanum s.l.* contains 61 species (EPPO, 2017) In Asia (EPPO, 2017): *X. franci*, *X. himalayensis*, *X. inequale*, *X. incognitum*, *X. kosaigudense*, *X. laevishriratum*, *X. lamberti*, *X. minor*, *X. neoelongatum*, *X. oxycaudatum*, *X. pachistanense*, *X. pseudoguirane*, *X. sheri*, *X. silvaticum* and *X. thornei*

Group	NEM	
EPPO code	XIPHAM = *X. americanum sensu lato* XIPHAA = *X. americanum sensu stricto*	
Regulated status in the EU	*X. americanum s.l.* non-European populations, which includes *X. americanum sensu stricto,* are regulated by Council Directive 2000/29/EC and listed in Annex IAI	
Pest status in Japan	Within *X. americanum s.l.*, the species *X. incognitum* was described by Lamberti and Bleve-Zacheo (1979). According to J.F. Southey of the Plant Pathology Laboratory, Harpenden England, it had been associated with various bonsai trees from Japan (Lamberti and Bleve-Zacheo, 1979). This species was reported to be associated with *Pinus thunbergii* in Japan (Shishida, 1983)	
Pest status in the EU	Absent	
Host status on *P. parviflora*	No information	
PRA information	No information	
Other relevant information for the assessment *Xiphinema* spp. are closely associated with the roots of the host plants. This is because these nematodes normally feed on deep root tissues close to the vascular bundle in the elongation zone and root tips (Cohn, 1970), using their long stylets. This makes them firmly connected to the root system. Even when washing roots free of soil using a high-pressure water jet some nematodes may remain attached. Fenitrothion is an organophosphate insecticide, which has nematostatic properties. It inhibits the activity of acetylcholinesterase so that acetylcholine accumulates in the synapses and impairs normal nerve signalling. In this way, fenitrothion temporarily makes nematodes immobile and unable to feed. After a period of time surviving nematodes regain their movement and feeding activity, but their fitness may be reduced (Haydock et al., 2013). It is unlikely that concentrations of 0.1–0.16% of MEP can be 100% effective in killing the nematodes that remain on the roots after washing. This may explain the EU interceptions in the period 1999–2018		
Symptoms	**Main type of symptoms**	Reduced root systems lacking lateral roots and high probability of reduced vitality of the infested trees
	Presence of asymptomatic plants	*Xiphinema americanum* has a generation time of a minimum of 1 year. Like other *Xiphinema* spp., it has a long lifespan and a low reproductive rate (Halbrendt and Brown, 1993). Eggs of *X. americanum* may need up to 2 months to hatch (Malek, 1969). Since nematode populations build up slowly in the soil, above-ground parts of infested plants may show no symptoms until the root damage is advanced
	Confusion with other pathogens/pests	Symptoms can be mistaken for those caused by other root pests
Host plant range	*Xiphinema* spp. have wide host ranges including forest trees, agricultural crops and horticultural crops (Siddiqi, 1973), as well as wild plants (Thomas, 1970). Reports of the presence of *X. incognitum* have been shown for 35 species of woody plants including *P. thunbergii* in Japan (Shishida, 1983)	
Pathways	Plants for planting, growth medium and soil	
Surveillance information	No extensive surveillance information are currently available from Japan	

B.19.2. Possibility of pest presence in the nursery

B.19.2.1. Possibility of entry from surrounding environment

The pest can only enter together with plants.

B.19.2.2. Possibility of entry with new plants

Xiphinema spp. are closely associated with the roots of the host plants. These nematodes, in fact, normally feed from deep root tissues of the elongation zone and root tips (Cohn, 1970) using their long stylets. Due to their feeding behaviour, *X. americanum s.l.* may occasionally be carried inside the nursery on other plants, where they can be found in the rhizospheres.

Repotting plants with heat-treated growth medium will not remove the nematodes from the root systems. Plants infested with the nematodes at low levels may enter the nurseries without showing above-ground symptoms of decline. Since *Xiphinema* spp. are well known to inhabit both natural woodlands and forest soils (Siddiqi, 1973), X. incognitum may be present on plants of *P. thunbergii* entering bonsai nurseries. There are no pest-free areas for *Xiphinema* spp. in Japan.

Uncertainties:

– No systematic surveys are carried out for *Xiphinema* spp. in Japan.
– The distribution of *X. americanum s.l.* is not well known.
– Asymptomatic infections may occur.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *X. americanum s.l. to* enter the nursery on new plants.

B.19.2.3. Possibility of entry by growing practices

Groundwater, used for watering, does not contain *X. americanum s.l.* Since the nematode would not survive heat-treatment at 90°C for 30 min duration, the possibility of entering the nursery by growing practices is extremely unlikely.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *X. americanum s.l.* to enter the nursery through growing media, water or any other growing practice.

B.19.2.4. Information from interceptions

Considering imports of bonsai plants, belonging to *Pinus* spp., from Japan to the EU, between 1999 and 2018, *X. americanum s.l.* was intercepted on three occasions (0.002%) and *Xiphinema* sp. on eight occasions (0.006%) out of the 127,525 inspected bonsai plants (EUROPHYT, online; European Commission, 2008; ISEFOR Database see Eschen et al., 2017). The total interception frequency for *Xiphinema* so far is 0.009%.

B.19.3. Evaluation of the risk reduction options

In the table below, all the RROs currently applied in Japan are summarised and an indication of their effectiveness on *X. americanum s.l.* is provided.

Risk reduction option		**Effect on pest**	**Current measures in Japan**	**Evaluation and uncertainties**
RRO1	Insecticide treatment of crop		No effect	
RRO2	Fungicide treatment of crop		No effect	
RRO3	Soil treatment	X	Heat treatment of new growing media for repotting at 90°C for 30 min	The soil heat treatment is very effective against the nematodes
RRO4	Washing	X	Washing roots free of soil using a high-pressure water jet	Nematodes are connected firmly to the roots, and some individuals may still remain after washing
RRO5	Root treatment (MEP)	X	Immersion of washed roots in 0.16% fenitrothion (MEP) emulsifiable oil in water for 30 min	No data on treatment efficacy are available for *X. americanum s.l.* on *Pinus thunbergii* After treatment of *Ilex crenata* root balls with sumithion (MEP 0.1 and 0.2%), nematodes were recovered after 12, 31 and 62 days (Dossier section 4.5) Fenitrothion has a low ovicidal activity (Takeda et al., 2015) so

Risk reduction option		Effect on pest	Current measures in Japan	Evaluation and uncertainties
				intrauterine eggs of gravid females may survive the treatment *Xiphinema americanum* and *Xiphinema* spp. have occasionally been intercepted in the EU
RRO6	Protected cultivation	X	Potted plants are cultivated 50 cm above ground on concrete tables	This measure protects the potted plants from the introduction of *X. americanum s.l.* from the soil in the export nursery
RRO7	Pruning		No effect	
RRO8	Surveillance		No effect	
RRO9	Visual inspection	X	All plants destined for export in the nursery are inspected six times per year (April to September over a 2-year period) for the presence of harmful organisms (a total of 12 inspections). Infested plants are removed	*Xiphinema americanum s.l.* may need a long time to cause diagnostic symptoms on the above-ground parts of plants
RRO10	Registration	X	Each export nursery is registered and all plants destined for export are labelled individually. Plants are held and trained for at least two consecutive years in the officially registered export nursery	Plants may show no above-ground symptoms for a period longer than 2 years
RRO11	Sampling and testing	X	A soil test may be taken for an analysis of the presence of nematodes in order to verify pest freedom after a finding in an export consignment (Dossier section 3.2; European Commission, 2008)	Soil sampling is not done on a routine basis *Xiphinema americanum s.l.* is easy to detect through soil sample analyses
RRO12	Post-entry quarantine	X	Exported plants stay for a minimum of 3 months in a post-quarantine station in the EU and are inspected at least twice. Plants showing symptoms are tested	Even when *X. americanum* is present plants may stay asymptomatic

B.19.4. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	Very likely
Distribution of the likelihood of pest freedom	5%: 99.36%; Q1: 99.57%; M: 99.71%; Q3: 99.82%; 95%: 99.93%
Summary of the information used for the evaluation	**Possibility that the pest could enter exporting nurseries** *Xiphinema americanum sensu lato* is present in Japan. Another species, which belongs to the same species complex, *X. incognitum*, has been described in Japan. There are no regular surveys for *Xiphinema* spp. in Japan. Specie belonging to this genus have broad host ranges, especially trees, so members of the *X. americanum s.l.* species complex may be present on *P. thunbergii* bonsai plants imported to the exporting nurseries

	Measures taken against the pest and their efficacy Repotting plants imported to the exporting nursery in heat-treated soil may not remove nematodes feeding inside the root ball. Washing with water jets may not be a very effective measure either in removing nematodes strongly attached to roots. Immersion of washed roots in nematicide only immobilise the pest temporarily. Symptoms of root damage from these nematodes develop slowly and may go unnoticed at the time of export and during post-export quarantine **Interception records** During the imports of bonsai plants of *P. parviflora* to the EU between 1999 and 2018, *X. americanum s.l.* was intercepted on three occasions (0.002%) and *Xiphinema* spp. on eight occasions (0.006%) out of 127,525 plants (EUROPHYT, online) **Shortcomings of present methods** *Xiphinema* spp. are not visible to the naked eye and will go unnoticed during inspections. They are difficult to get rid of because they are strongly attached to the roots and are only temporarily immobilised by the nematicides applied. Damage can take many years to develop **Main uncertainties** – The frequency of the pest on plants imported to the nursery is unknown – Washing the roots is of unclear efficacy – Treatment with MEP may only have a temporary effect Development of symptoms is slow and unspecific

B.19.5. Elicitation outcomes of the assessment of the pest freedom for *Xiphinema americanum sensu lato*

1) Reasoning for a scenario which would lead to a reasonably low number of infested consignments (lower limit)

- Using heat-treated growth medium for repotting plants brought into the export nursery.
- Washing roots from the soil.
- Immersion of roots in 0.16% fenitrothion (MEP) before export.
- Excluding symptomatic plants from export.

2) Reasoning for a scenario which would lead to a reasonably high number of infested consignments (upper limit)

- No information about the abundance of the nematode in Japan.
- RROs are not 100% effective.
- Asymptomatic plants may go undetected.
- There were 11 interceptions of *Xiphinema* spp. in the EU between 1999 and 2018.
- The plants may be imported from uncertified infested nurseries.

3) Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- The value is mainly based on the three interceptions of *Xiphinema s.l.* in the EU.
- Soil heat-treatment is used before repotting
- Immersion of roots in 0.16% fenitrothion (MEP) before export.

4) Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The estimated values reflect:

- the degree to which *X. americanum s.l.* is successfully removed when repotting;
- the variable effects of root washings and MEP treatment;
- the uncertainties caused by species identification and sampling rate;
- the frequency of asymptomatic plants at the time of export.

The elicited and fitted values for *Xiphinema americanum sensu lato* agreed by the Panel are shown in Tables B.31 and B.32 (Figure B.14).

Table B.31: Elicited and fitted values of the uncertainty distribution of pest infestation by *Xiphinema americanum sensu lato* per 10,000 bonsai plants

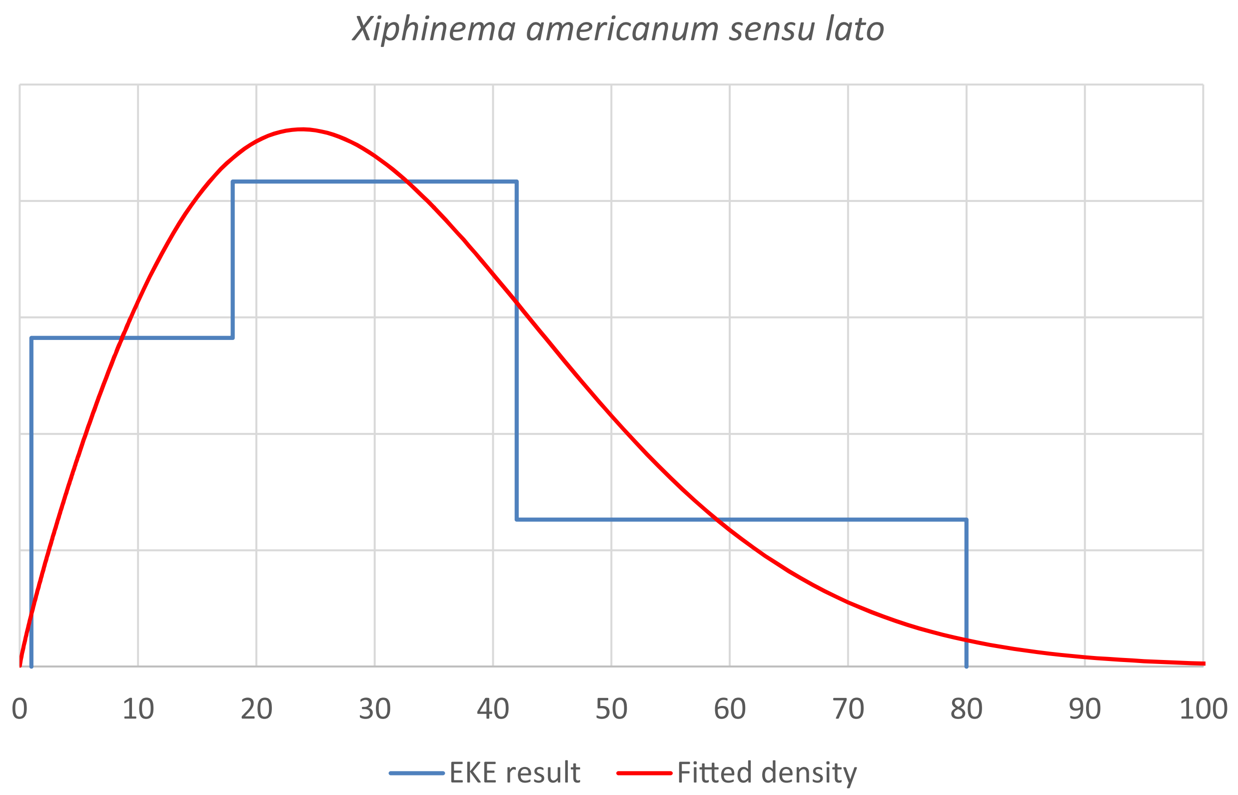
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	1					18		30		42					80
Fit-W	3.1	5.0	7.3	11	14	18	22	29	38	43	49	56	64	72	81

Weibull(1.8775,35.729) fitted with @Risk version 7.5.

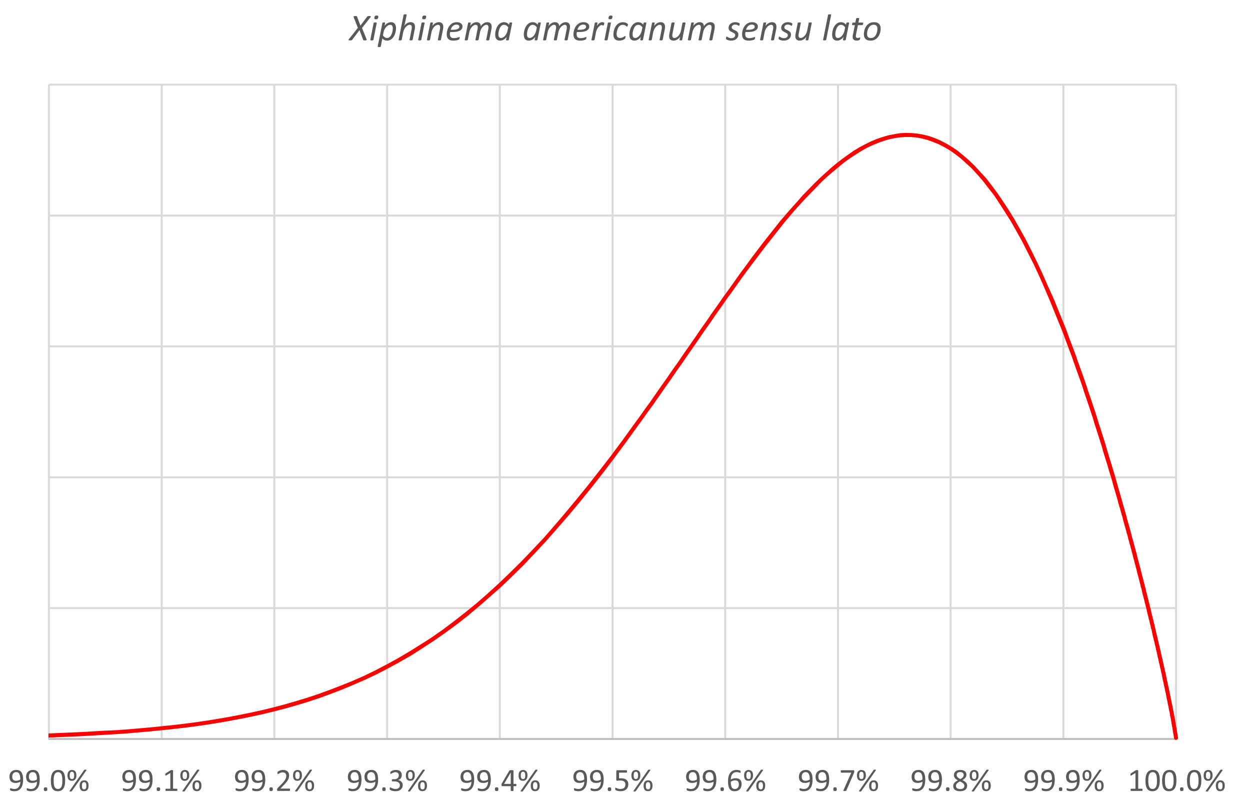
Based on the number of estimated infested plants, the likelihood of estimated pest freedom was calculated. The fitted values of the uncertainty distribution of the likelihood of pest freedom are shown in Table B.32.

Table B.32: Elicited and fitted values of the uncertainty distribution of likelihood of pest freedom for *Xiphinema americanum sensu lato*

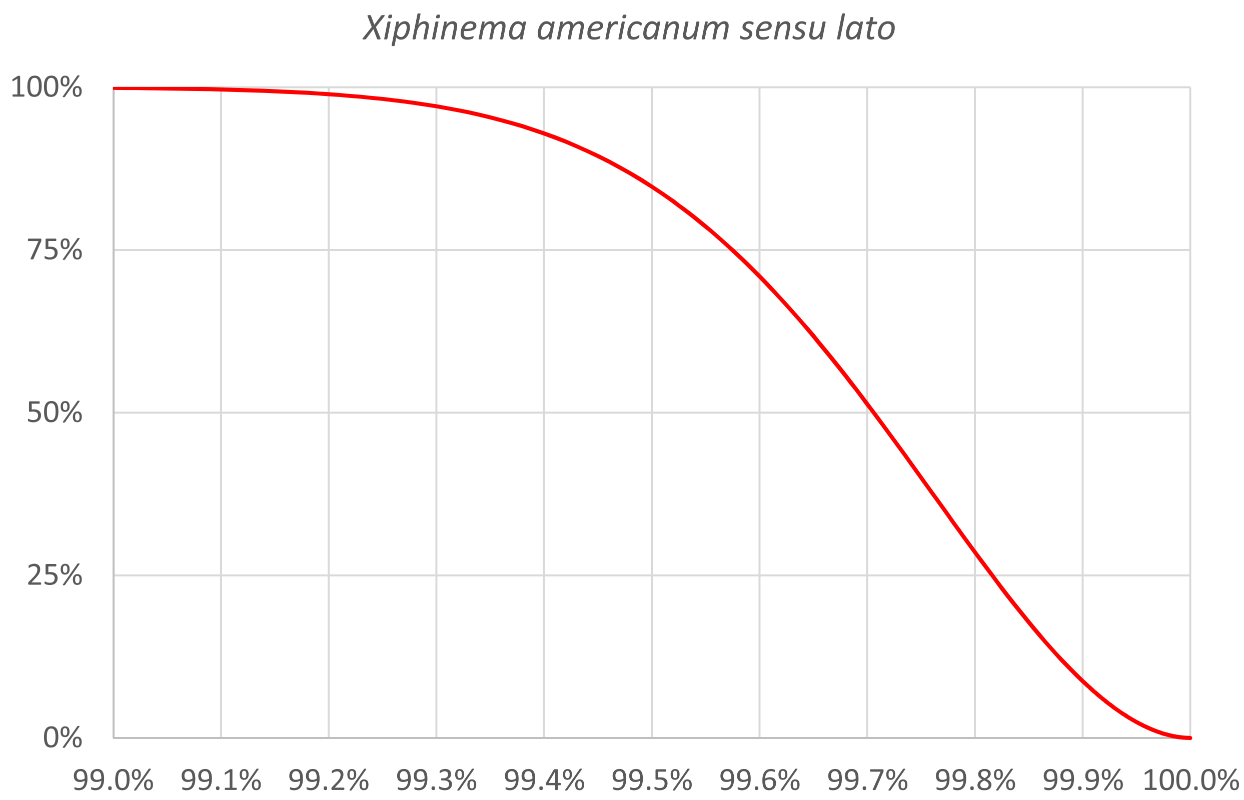
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.20%					99.58%		99.70%		99.82%					99.99%
Fit-W	99.19%	99.28%	99.36%	99.44%	99.51%	99.57%	99.62%	99.71%	99.78%	99.82%	99.86%	99.89%	99.93%	99.95%	99.97%


Xiphinema americanum sensu lato
0
10
20
30
40
50
60
70
80
90
100
EKE result
Fitted density

(a)


Xiphinema americanum sensu lato
99.0%
99.1%
99.2%
99.3%
99.4%
99.5%
99.6%
99.7%
99.8%
99.9%
100.0%

(b)



(c)

Figure B.14: (a) Comparison of judged values for the uncertainty distribution of pest infestation per 10,000 bonsai plants (histogram in blue) and fitted distribution (red line); (b) density function to describe the uncertainties of the likelihood of pest freedom; (c) descending distribution function of the likelihood of pest freedom

B19.6. References

Cohn E, 1970. Observations on the Feeding and Symptomatology of *Xiphinema* and *Longidorus* on Selected Host Roots. Journal of Nematology, 2, 167-173.

EPPO (European and Mediterranean Plant Protection Organization), 2017. PM 7/95(2). *Xiphinema americanum sensu lato*. EPPO Bulletin, 47, 198-210. https://doi.org/10.1111/epp.12382

Eschen R, Douma JC, Grégoire JC, Mayer F, Rigaux L and Potting RPJ, 2017. A risk categorisation and analysis of the geographic and temporal dynamics of the European import of plants for planting. Biological Invasions, 19, 3243-3257. https://doi.org/10.1007/s10530-017-1465-6

European Commission, 2008. Final report of a mission carried out in Japan from 04 November to 13 November 2008 in order to evaluate the system of official controls and the certification of bonsai type plants for export to the European Union. 28 pp. Available online: http://ec.europa.eu/food/fvo/act_getPDF.cfm?PDF_ID=7274

EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 14 January 2019]

Halbrendt JM and Brown DJF, 1993. Aspects on biology and development of *Xiphinema americanum* and related species. Journal of Nematology, 25, 355-360.

Haydock PPJ, Woods SR, Grove IG and Hare MC, 2013. Chemical control of nematodes. In: Perry NR and Moens M (eds.). Plant Nematology. 2nd Edition. Malta, CAB International Gutenberg Press Ltd., pp. 459-479.

Lamberti F and Bleve-Zacheo T, 1979. Studies on *Xiphinema americanum sensu lato* with descriptions of fifteen new species (*Nematoda: Longidoridae*). Nematologia Mediterranea, 7, 51-106.

Malek RB, 1969. Population fluctuations and observations of the life cycle of *Xiphinema americanum* associated with cottonwood (*Populus deltoides*) in South Dakota. Proceedings of the Helminthological Society of Washington, 36, 270-274.

Siddiqi MR, 1973. *Xiphinema americanum*. C. I. H. Descriptions of plant-parasitic nematodes. Set 2, no. 29, Wallingford, CAB international, 4 pp.

Shishida Y, 1983. Studies of nematodes parasitic on woody Plants 2. Genus *Xiphinema* Cobb, 1913. Japanese Journal of Nematology, 12, 1-14.

Takeda A, Shito T, Kato M, Hisaka H and Shibata T, 2015. Control of the dagger nematode *Xiphinema brevicolle* (*Dorylaimida: Longidoridae*) in wrapped root balls of the Japanese holly *Ilex crenata* (*Celastrales: Aquifoliaceae*) by drenching in a fenitrothion or benomyl solution. Nematological Research, 14, 27-33. https://doi.org/10.3725/jjn.45.27

Thomas PR, 1970. Host status of some plants for *Xiphinema diversicaudatum* (Micol.) and their susceptibility to viruses transmitted by this species. Annals of Applied Biology, 65, 169-178.

Appendix C – Tables

Table C.1: Evaluation of the EU-regulated pest species relevant for bonsai of *Pinus* spp.

Pestnamein Council Directive 2000/29/EC or Commission Decision EC/2002/778	Current Scientific Name	Taxonomic information	Feedingguild	Pestof *Pinus* spp. present in the country of export	Uncertainty about pest status	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Pestrelevant for the opinion	Remarks
Acleris spp. (non-European)	*Acleris* spp. (non-EU)	Lepidoptera, Tortricidae	Defoliator	N	N	N	N	N	N	
Arceuthobium spp. (non-European)	*Arceuthobium* spp. (non-EU)	parasitic plant	Parasitic plant	N	N	N	N	N	N	
Atropellis spp.	*Atropellis* spp.	Ascomycetes, Helotiales, Dermateaceae		Y	N	N	N	N	N	
Bursaphelenchus xylophilus	*Bursaphelenchus xylophilus*	Nematode		Y	N	Y	Y	Y	Y	
Cercoseptoria pini-densiflorae	*Pseudocercospora pini-densiflorae*	Ascomycota, Capnodiales, Mycosphaerellaceae		Y	N	Y	Y	N	Y	
Choristoneura spp. (non-European)	*Choristoneura* spp. (non-EU)	Lepidoptera, Tortricidae	Defoliator	N	N	N	N	N	N	
Coleosporium asterum	*Coleosporium asterum*	Basidiomycota, Pucciniales, Coleosporiaceae		Y	N	Y	Y	Y	Y	
Coleosporium eupatorii	*Coleosporium eupatorii*	Basidiomycota, Pucciniales, Coleosporiaceae		Y	N	N	N	N	N	
Coleosporium paederiae	*Coleosporium paederiae*	Basidiomycota, Pucciniales, Coleosporiaceae		Y	N	N	N	N	N	
Coleosporium phellodendri	*Coleosporium phellodendri*	Basidiomycota, Pucciniales, Coleosporiaceae		Y	N	Y	Y	N	Y	

Pestnamein Council Directive 2000/29/EC or Commission Decision EC/2002/778	Current Scientific Name	Taxonomic information	Feedingguild	PestofPinus spp. present in the country of export	Uncertainty about pest status	P.thunbergii confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Pestrelevant for the opinion	Remarks
Cronartium spp.(non-European)	*Cronartium orientale*	Basidiomycota, Pucciniales, Cronartiaceae		Y	N	Y	Y	N	Y	
Dendroctonus micans	*Dendroctonus micans*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	Y	N	N	N	Y	N	
Dendrolimus sibiricus	*Dendrolimus sibiricus*	Lepidoptera, Lasiocampidae	Defoliator	Y	N	Y	Y	N	Y	
Dendrolimus spectabilis	*Dendrolimus spectabilis*	Lepidoptera, Lasiocampidae	Defoliator	Y	N	Y	Y	N	Y	In 2018 interception on *P. thunbergii*
Endocronartium spp. (non-European)	*Endocronartium* spp.	Basidiomycota, Pucciniales, Cronartiaceae		Y	N	N	N	N	N	
Gibberella circinata	*Fusarium circinatum*	Ascomycota, Hypocreales, Nectriaceae		Y	N	Y	Y	Y	Y	
Gremmeniella abietina	*Gremmeniella abietina*	Ascomycota, Helotiales, Helotiaceae		Y	N	N	N	N	N	
Inonotus weirii	*Inonotus weirii*	Basidiomycota, Hymenochaetales, Hymenochaetaceae		Y	N	N	N	N	N	
Ips amitinus	*Ips amitinus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	N	N	N	N	EU Protected Zone species

Pestnamein Council Directive 2000/29/EC or Commission Decision EC/2002/778	Current Scientific Name	Taxonomic information	Feedingguild	Pestof*Pinus* spp. present in the country of export	Uncertainty about pest status	*P. thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Pestrelevant for the opinion	Remarks
Ips cembrae	*Ips cembrae*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	N	N	N	N	EU Protected Zone species
Ips duplicatus	*Ips duplicatus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	Y	N	N	N	N	N	EU Protected Zone species
Ips sexdentatus	*Ips sexdentatus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	N	N	N	N	EU Protected Zone species
Ips typographus	*Ips typographus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	Y	N	N	N	N	N	EU Protected Zone species
Melampsora medusae	*Melampsora medusae*	Basidiomycota, Pucciniales, Melampsoraceae		Y	N	N	N	N	N	
Monochamus spp. (non-European)	*Monochamus alternatus*	Coleoptera, Cerambycidae	Wood borer, shoot feeder	Y	N	Y	Y	N	Y	
Peridermium kurilense	*Cronartium kurilense* (Index Fungorum)/*C. kamtschaticum* (EPPO)	Basidiomycota, Pucciniales, Cronartiaceae		Y	N	N	N	N	N	
Pissodes spp. (non-European)	*Pissodes nitidus*	Coleoptera, Curculionidae	Bark weevil	Y	Y	N	Y	Y	Y	
Pissodes spp. (non-European)	*Pissodes obscurus*	Coleoptera, Curculionidae	Bark weevil	Y	Y	N	Y	Y	Y	

Pestnamein Council Directive 2000/29/EC or Commission Decision EC/2002/778	Current Scientific Name	Taxonomic information	Feedingguild	Pestof*Pinus* spp. present in the country of export	Uncertainty about pest status	*P. thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Pestrelevant for the opinion	Remarks
Popillia japonica	*Popillia japonica*	Coleoptera, Rutelidae	Defoliator, root feeder	Y	N	N	Y	Y	Y	
Scirrhia acicola	*Lecanosticta acicola*	Ascomycota, Capnodiales, Mycosphaerellaceae		Y	N	Y	Y	N	Y	
Scirrhia pini	*Dothistroma septosporum*	Ascomycota, Capnodiales, Mycosphaerellaceae		Y	N	Y	Y	N	Y	
Scolytidae spp. (non-European)	*Cryphalus fulvus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Cryphalus laricis*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Ips acuminatus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Orthotomicus angulatus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Orthotomicus tosaensis*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Pityophthorus jucundus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Polygraphus proximus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	

Pestnamein Council Directive 2000/29/EC or Commission Decision EC/2002/778	Current Scientific Name	Taxonomic information	Feedingguild	Pestof*Pinus* spp. present in the country of export	Uncertainty about pest status	*P. thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Pestrelevant for the opinion	Remarks
Scolytidae spp. (non-European)	*Tomicus brevipilosus*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	Y	Y	N	N	
Scolytidae spp. (non-European)	*Tomicus minor*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	N	Y	N	N	
Scolytidae spp. (non-European)	*Tomicus piniperda*	Coleoptera, Curculionidae, Scolytinae	Bark beetle	N	N	N	Y	N	N	
Thecodiplosis japonensis	*Thecodiplosis japonensis*	Diptera, Cecidomyiidae	Gall maker	Y	N	Y	Y	N	Y	
Xiphinema americanum sensu lato non-European populations.	*Xiphinema americanum sensu lato* non-European populations.	Nematode		Y	Y	Y	Y	N	Y	

Table C.2: Evaluation of the EU non-regulated pest species associated with *Pinus* spp. in Japan

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
INS	*Oligonychus ununguis*	Acarina	Cell sucker	Y	Y	Y	N	Y	Y	N	
INS	*Callidiellum rufipenne*	Coleoptera, Cerambycidae	Wood borer	Y	Y	Y	N	N	N	N	
INS	*Basilepta pallidula*	Coleoptera, Chrysomelidae	Defoliator	N	Y	Y	Y	N	Y	N	**Y**
INS	*Scepticus griseus*	Coleoptera, Curculionidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Scepticus insularis*	Coleoptera, Curculionidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Anomala albopilosa*	Coleoptera, Scarabaeidae	Defoliator, root feeder	N	Y	Y	N	N	N	N	
INS	*Heptophylla picea*	Coleoptera, Scarabaeidae	Defoliator, root feeder	N	Y	Y	N	N	N	N	
INS	*Mimela testaceipes*	Coleoptera, Scarabaeidae	Defoliator, root feeder	N	Y	Y	N	N	N	N	
INS	*Polyphylla albolineata*	Coleoptera, Scarabaeidae	Defoliator, root feeder	N	Y	Y	N	N	N	N	
INS	*Contarinia matsusintome*	Diptera, Cecidomyiidae	Gall maker	N	Y	Y	N	N	N	N	**Y**
INS	*Tipula aino*	Diptera, Tipulidae	Root feeder	N	N	Y	N	N	N	N	
INS	*Pineus laevis*	Homoptera, Adelgidae	Cell sucker	N	Y	Y	N	N	N	N	
INS	*Pineus cembrae*	Homoptera, Adelgidae	Cell sucker	Y	Y	Y	N	N	N	N	
INS	*Pineus harukawai*	Homoptera, Adelgidae	Cell sucker	N	Y	Y	N	N	N	N	
INS	*Pineus pini*	Homoptera, Adelgidae	Cell sucker	Y	Y	Y	N	N	N	N	
INS	*Cinara formosana*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Cinara piniformosana*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Cinara pinidensiflora*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Cinara shinjii*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Eulachnus thunbergii*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	Y	N	**Y**

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
INS	*Schizolachnus orientalis*	Homoptera, Aphididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Aphrophora flavipes*	Homoptera, Aphrophoridae	xylem sucker	N	Y	Y	N	N	N	N	
INS	*Aspidiotus cryptomeriae*	Homoptera, Diaspididae	Phloem sucker	N	Y	Y	N	N	Y	N	**Y**
INS	*Diaspidiotus makii*	Homoptera, Diaspididae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Hemiberlesia pitysophila*	Homoptera, Diaspididae	Phloem sucker	N	Y	Y	N	N	Y	N	**Y**
INS	*Lepidosaphes pini*	Homoptera, Diaspididae	Phloem sucker	Y	Y	Y	N	N	N	N	
INS	*Lepidosaphes pitysophila*	Homoptera, Diaspididae	Phloem sucker	N	N	Y	N	N	N	N	
INS	*Drosicha pinicola*	Homoptera, Monophlebidae	Phloem sucker	N	Y	Y	N	N	N	N	
INS	*Matsucoccus matsumurae*	Homoptera, Margarodidae	Phloem sucker	N	Y	Y	N	N	N	N	**Y**
INS	*Glaucias subpunctatus*	Heteroptera, Pentatomidae	Phloem sucker	N	Y	Y	Y	N	Y	N	**Y**
INS	*Crisicoccus pini*	Homoptera, Pseudococcidae	Phloem sucker	N	Y	Y	N	Y	N	Y	
INS	*Neodiprion sertifer*	Hymenoptera, Diprionidae	Defoliator	Y	Y	Y	N	Y	N	N	
INS	*Nesodiprion japonicus*	Hymenoptera, Diprionidae	Defoliator	N	Y	Y	N	N	N	N	**Y**
INS	*Acantholyda nipponica*	Hymenoptera, Pamphiliidae	Defoliator	N	Y	Y	N	N	N	N	**Y**
INS	*Cephalcia variegata*	Hymenoptera, Pamphiliidae	Defoliator	N	Y	Y	N	N	N	N	**Y**
INS	*Sirex nitobei*	Hymenoptera, Siricidae	Wood-fungus borer	N	Y	Y	N	Y	N	Y	
INS	*Urocerus japonicus*	Hymenoptera, Siricidae	Wood-fungus borer	N	Y	Y	N	Y	N	Y	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
INS	*Xeris spectrum*	Hymenoptera, Siricidae	Wood-fungus borer	Y	Y	Y	N	Y	N	N	
INS	*Diprion nipponica*	Hymenoptera, Diprionidae	Defoliator	N	Y	Y	N	N	N	N	**Y**
INS	*Metacosma* sp.	Lepidoptera, Tortricidae	Defoliator	N	N	N	Y	N	N	N	
INS	*Conogethes pinicolalis*	Lepidoptera, Crambidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Dioryctria abietella*	Lepidoptera, Pyralidae	Shoot-cone feeder	Y	Y	Y	N	Y	N	N	
INS	*Dioryctria pryeri*	Lepidoptera, Pyralidae	Shoot-cone feeder	N	Y	Y	N	N	N	N	
INS	*Calliteara argentata*	Lepidoptera, Erebidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Stenolechia kodamai*	Lepidoptera, Gelechidae	Defoliator	N	N	Y	N	N	N	N	
INS	*Lymantria dispar*	Lepidoptera, Erebidae	Defoliator	Y	N	Y	N	Y	N	N	
INS	*Dioryctria sylvestrella*	Lepidoptera, Pyralidae	Phloem feeder	Y	Y	Y	N	Y	N	N	
INS	*Hyloicus caligineus*	Lepidoptera, Sphingidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Archips oporanus*	Lepidoptera, Tortricidae	Defoliator	Y	N	N	N	Y	N	N	
INS	*Epinotia pinivorana*	Lepidoptera, Tortricidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Gravitarmata margarotana*	Lepidoptera, Tortricidae	Shoot-cone feeder	Y	Y	Y	N	N	N	N	
INS	*Petrova coeruleostriana*	Lepidoptera, Tortricidae	Shoot feeder	N	N	N	N	N	N	N	
INS	*Petrova cristata*	Lepidoptera, Tortricidae	Shoot feeder	N	Y	Y	N	N	N	N	
INS	*Rhyacionia duplana*	Lepidoptera, Tortricidae	Shoot feeder	N	Y	Y	N	N	N	N	**Y**
INS	*Rhyacionia dativa*	Lepidoptera, Tortricidae	Shoot feeder	N	Y	Y	N	N	N	N	**Y**
INS	*Thaumatographa eremnotorna*	Lepidoptera, Tortricidae	Defoliator	N	Y	Y	N	N	N	N	
INS	*Ocnerostoma friesei*	Lepidoptera, Yponomeutidae	Defoliator	Y	N	N	N	N	N	N	
INS	*Gryllotalpa orientalis*	Orthoptera, Gryllotalpidae	Root feeder	N	N	N	N	N	N	N	
FUN	*Armillariella mellea*		Leaf, stem, new shoot	Y	Y	Y	N	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Armillaria ostoyae*		Leaf, stem, new shoot	Y	N	N	N	N	N	N	
FUN	*Macrophomina phaseolina*		Root, stem	Y	Y	Y	N	N	N	N	
FUN	*Rhizoctonia solani*		Leaf	Y	Y	Y	N	N	N	N	
FUN	*Rhizoctonia solani*		Stem, root	Y	Y	Y	N	N	N	N	
FUN	*Septoria pini-pumilae*		Leaf	N	N	N	N	N	N	N	
FUN	*Racodium therryanum*		Leaf, stem	N	Y	Y	N	N	N	N	
FUN	*Diaporthe conorum*		Branch, stem	Y	Y	Y	N	N	N	N	
FUN	*Gloeophyllum sepiarium*		Stem	Y	N	N	N	N	N	N	
FUN	*Helicobasidium mompa*		Root	N	Y	Y	N	N	N	N	
FUN	*Cenangium acuum*		Leaf	Y	N	N	N	N	N	N	
FUN	*Cenangium ferruginosum*		Branch	Y	Y	Y	N	N	N	N	
FUN	*Phacidium abietis*		Leaf	N	N	N	N	N	N	N	
FUN	*Botrytis cinerea*		Leaf	Y	Y	Y	N	N	N	N	
FUN	*Dermea pinicola*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Waltonia pinicola*		Branch, stem	N	Y	Y	N	N	N	N	
FUN	*Ascocalyx pinicola*		Stem	N	Y	Y	N	N	N	N	
FUN	*Lachnellula calyciformis*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Lachnellula abietis*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Lachnellula microspora*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Lachnellula pini*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Lachnellula subtilissima*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Naemacyclus niveus*		Leaf	Y	Y	Y	N	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P. thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Sclerotinia kitajimana*		Leaf, branch	N	N	N	N	N	N	N	
FUN	*Tympanis hypopodia*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Tympanis truncatula*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Trichaptum abietinum*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Cylindrocladium scoparium*		Stem, root	Y	Y	Y	N	N	N	N	
FUN	*Fusarium lateritium*		Stem, root	Y	Y	Y	N	N	N	N	
FUN	*Fusarium moniliforme*		Stem, root	Y	Y	Y	N	N	N	N	
FUN	*Fusarium oxysporum*		Stem, root	Y	Y	Y	N	N	N	N	
FUN	*Fusarium oxysporum*		Root	Y	Y	Y	N	N	N	N	
FUN	*Fusarium roseum*		Stem, root	Y	N	N	Y	N	N	N	
FUN	*Fusarium solani*		Stem, root	Y	N	N	Y	N	N	N	
FUN	*Nectria viridescens*		Branch	Y	N	N	N	N	N	N	
FUN	*Sphaeropsis sapinea*		Leaf, branch	Y	Y	Y	N	Y	N	N	
FUN	*Ophiostoma piliferum*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Ophiostoma pluriannulatum*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Lophium mytilinum*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Ophiostoma ips*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Ophiostoma minus*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Ophiostoma piceae*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Leptographium lundbergii*		Stem	Y	N	N	N	N	N	N	
FUN	*Rhizina undulata*		Root	Y	Y	Y	N	N	N	N	
FUN	*Cucurbidothis pithyophila*		Branch, stem, leaf	Y	N	N	N	N	N	N	
FUN	*Rhizosphaera kalkhoffii*		Leaf, new shoot	Y	Y	Y	N	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Fomitopsis pinicola*		Stem	Y	Y	Y	N	N	N	N	
FUN	*Ganoderma lucidum*		Root, stem	Y	Y	Y	N	N	N	N	
FUN	*Perenniporia subacida*		Root, stem	Y	N	N	N	N	N	N	
FUN	*Phaeolus schweinitzii*		Root, stem	Y	Y	Y	N	N	N	N	
FUN	*Fomitopsis officinalis*		Stem	Y	N	N	N	N	N	N	
FUN	*Coriolopsis polyzona*		Stem	N	N	N	N	N	N	N	
FUN	*Pycnoporus coccineus*		Stem	N	Y	Y	N	N	N	N	
FUN	*Coleosporium bletiae*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Coleosporium cimicifugatum*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium clematidis*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium clematidis-apiifoliae*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Coleosporium fauriae*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium horianum*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium lycopi*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Coleosporium neocacaliae*		Leaf	Y	N	N	N	N	N	N	
FUN	*Coleosporium pedunculatum*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Coleosporium pini-asteris*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium pini-densiflorae*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium pini-pumilae*		Leaf	N	N	N	N	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Coleosporium plectranthi*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium saussureae*		Leaf	N	N	N	N	N	N	N	
FUN	*Coleosporium tussilaginis*		Leaf	Y	Y	Y	N	N	N	N	
FUN	*Coleosporium xanthoxyli*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Coleosporium yamabense*		Leaf	N	N	N	N	N	N	N	
FUN	*Cronartium flaccidum*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Melampsora larici-populina*		Leaf	Y	N	N	N	N	N	N	
FUN	*Endocronartium sahoanum*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Endocronartium sahoanum* var. *hokkaidoense*		Branch, stem	NO DATA						N	**Y**
FUN	*Endocronartium yamabense*		Branch, stem	N	N	N	N	N	N	N	
FUN	*Lophodermium iwatense*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Lophodermium pinastri*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Lophodermium pini-pumilae*		Leaf	N	N	N	N	N	N	N	
FUN	*Davisomycella hiratsukae*		Leaf	N	N	N	N	N	N	N	
FUN	*Tryblidiopsis pinastri*		Branch, stem	Y	N	N	N	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Tryblidiopsis pinastri*		Branch, stem	Y	N	N	N	N	N	N	
FUN	*Heterobasidion annosum*		Root	y	N	N	N	N	N	N	
FUN	*Thelephora terrestris*		Stem, branch, leaf	Y	Y	Y	N	N	N	N	
FUN	*Pestalotiopsis glandicola*		Leaf, stem	N	Y	Y	N	N	N	N	
FUN	*Pestalotiopsis neglecta*		Leaf, stem	Y	N	N	Y	N	N	N	
FUN	*Rosellinia necatrix*		Root	Y	N	N	N	N	N	N	
FUN	*Discosia pini*		Leaf	N	Y	Y	N	N	N	N	
FUN	*Pestalotiopsis foedans*		Leaf, stem	N	Y	Y	N	N	N	N	
FUN	*Phellinus pini*		Stem	Y	N	N	N	N	N	N	
FUN	*Cylindrocarpon destructans*		Unknown	Y	Y	Y	N	N	N	N	
FUN	*Armillaria gallica*		Root	Y	N	N	N	N	N	N	
FUN	*Ganoderma neo-japonicum*		Root	N	NO DATA					N	**Y**
FUN	*Scoleconectria cucurbitula*		Unknown	Y	N	N	N	N	N	N	
FUN	*Onnia orientalis*		Unknown	NO DATA						N	**Y**
FUN	*Lophodermium conigenum*		Unknown	Y	Y	Y	N	N	N	N	
FUN	*Aposphaeria pini-densiflorae*		Unknown	N	N	N	N	N	N	N	
FUN	*Cenangium pini*		Unknown	N	N	N	N	N	N	N	
FUN	*Massarinula pini*		Unknown	N	N	N	N	N	N	N	
FUN	*Lophodermium nitens*		Unknown	Y	N	N	N	N	N	N	
FUN	*Septonema pini-densiflorae*		Unknown	N	N	N	Y	N	N	N	

Group*	Pestspecies of *Pinus* spp.	Taxonomic information	Feeding guild/plant part	Presentin the EU	*P.thunbergii* confirmed as a host	Canthepest be associated with the commodity?	Uncertainty about association	Evidencefor impact outside the EU?	Uncertainty about impact	Pestrelevant for opinion	Listofpotential pests not further assessed further
FUN	*Dasyscyphus acuum*		Unknown	Y	N	N	N	N	N	N	
FUN	*Macrophoma pini-densiflorae*		Unknown	N	Y	Y	N	N	N	N	
FUN	*Gloeophyllum subferrugineum*		Stem	N	Y	Y	N	N	N	N	
FUN	*Phellinus chrysoloma*		Unknown	y	N	N	N	N	N	N	
FUN	*Nectria fuckeliana*		Unknown	Y	N	N	N	N	N	N	
FUN	*Pestalotiopsis disseminata*		Unknown	Y	N	N	Y	N	N	N	
FUN	*Leptographium truncatum*		Stem	N	Y	Y	N	N	N	N	
FUN	*Apiosporium pinophilum*		Unknown	Y	N	N	N	N	N	N	
FUN	*Peridermium pini-koraiensis*		Unknown	N	N	N	N	N	N	N	
FUN	*Pestalotiopsis populi-nigrae*		Unknown	N	Y	Y	N	N	N	N	
NEM	*Bursaphelenchus mucronatus*			Y	Y	Y	N	N	N	N	

*: FUN: fungi; INS: insect.

Table C.3: List of potential pests not further assessed

Group*	Pest species of *Pinus* spp.	Taxonomic information	Feeding guild/ plant part	Remarks
FUN	*Endocronartium sahoanum* var. *hokkaidoense*		Branch, stem	Uncertainty, not enough informative data available
FUN	*Ganoderma neo-japonicum*		Root	Uncertainty, not enough informative data available
FUN	*Onnia orientalis*		Unknown	Uncertainty, not enough informative data available
INS	*Acantholyda nipponica*	Hymenoptera, Pamphiliidae	Defoliator	Minor pest in Japan, no evidence of impact, very similar to other web-spinning sawflies in Europe. *Acantholyda* are rarely pests of pines
INS	*Aspidiotus cryptomeriae*	Homoptera, Diaspididae	Phloem sucker	Invasive in North America, unlikely it could become a pest in the EU. Minor pest in Japan, no evidence of impact, very similar to European Diaspidinae scales
INS	*Basilepta pallidula*	Coleoptera, Chrysomelidae	Defoliator	Damage unknown in Japan. A close relative, *Cryptocephalus pini*, is a pest in the EU and shares a very similar life history
INS	*Cephalcia variegata*	Hymenoptera, Pamphiliidae	Defoliator	Minor pest in Japan, no evidence of impact. Very similar to European sawflies
INS	*Contarinia matsusintome*	Diptera, Cecidomyiidae	Gall maker	Minor pest in Japan, no evidence of impact. No similarity with European species, unknown if European pine species can be a host. There is very limited information available
INS	*Diprion nipponica*	Hymenoptera, Diprionidae	Defoliator	Minor pest in Japan, no evidence of impact, very similar to European *Diprion pini*
INS	*Eulachnus thunbergii*	Homoptera, Aphididae	Phloem sucker	Invasive in Australia on introduced *Pinus radiata*. Minor pest in Japan, no evidence of impact, very similar to European *Eulachnus* species
INS	*Glaucias subpunctatus*	Heteroptera, Pentatomidae	Phloem sucker	Polyphagous bug similar to the marmorated stink bug that is causing considerable damage in the EU
INS	*Hemiberlesia pitysophila*	Homoptera, Diaspididae	Phloem sucker	Invasive in China, unlikely it could become a pest in the EU. Minor pest in Japan, no evidence of impact, very similar to European Diaspidinae scales
INS	*Matsucoccus matsumurae*	Homoptera, Margarodidae	Phloem sucker	Introduced in various parts of the world, to prioritise because similar species are pests in the EU. Minor pest in Japan, no evidence of impact, very similar to the European *Matsucoccus pini*
INS	*Nesodiprion japonicus*	Hymenoptera, Diprionidae	Defoliator	Minor pest in Japan, no evidence of impact, very similar to European pine-feeding diprionid sawflies
INS	*Rhyacionia dativa*	Lepidoptera, Tortricidae	Shoot feeder	Minor pest in Japan, no evidence of impact, associated with seed cone which do not occur on bonsai. Lack of information on the susceptibility of European *Pinus* species. The European native species of *Rhyacionia* are important pest species
INS	*Rhyacionia duplana*	Lepidoptera, Tortricidae	Shoot feeder	Minor pest in Japan, no evidence of impact, associated with seed cone which do not occur on bonsai. Lack of information on the susceptibility of European *Pinus* species. The European native species of *Rhyacionia* are important pest species

*: FUN: fungi; INS: insect.