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Commodity risk assessment of *Albizia julibrissin* plants from Israel

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Abstract

The EFSA Panel on Plant Health was requested to prepare and deliver risk assessments for commodities listed in the relevant Implementing Acts as 'High risk plants, plant products and other objects' [Commission Implementing Regulation (EU) 2018/2019 establishing a provisional list of high-risk plants, plant products or other objects, within the meaning of Article 42 of Regulation (EU) 2016/2031]. The current Scientific Opinion covers all plant health risks posed by *Albizia julibrissin* imported from Israel, taking into account the available scientific information, including the technical information provided by Israel. The relevance of an EU-regulated pest for this opinion was based on evidence that: (i) the pest is present in Israel; (ii) *A. julibrissin* is a host of the pest and (iii) the pest can be associated with the commodity. The relevance of this opinion for other non EU-regulated pests was based on evidence that (i) the pest is present in Israel; (ii) the pest is absent in the EU; (iii) *A. julibrissin* is a host of the pest; (iv) the pest can be associated with the commodity and (v) the pest may have an impact and can pose a potential risk for the EU territory. Three pests (two insects, *Aonidiella orientalis and Euwallacea fornicatus*; one fungus, *Fusarium euwallaceae*) that fulfilled all criteria were selected for further evaluation. For the three selected pests, the risk mitigation measures proposed in the technical dossier were evaluated. Limiting factors on the effectiveness of the measures were documented. For the selected pests, an expert judgement on the likelihood of pest freedom is given taking into consideration the risk mitigation measures acting on the pest, including uncertainties associated with the assessment. The Panel is 95% sure that 9,950 or more units per 10,000 will be pest free from these three pests.

Keywords: European Union, expert judgement, pest risk reduction options, plant health, silk tree, phytosanitary import requirements

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1. Introduction

1.1. Background and Terms of Reference as provided by European Commission

1.1.1. Background

The new Plant Health Regulation (EU) 2016/2031[1], on the protective measures against pests of plants, has been applied since December 2019. Provisions within the above Regulation are in place for the listing of 'high risk plants, plant products and other objects' (Article 42) on the basis of a preliminary assessment, and to be followed by a commodity risk assessment. A list of 'high risk plants, plant products and other objects' has been published (EU) 2018/2019[2]. Scientific opinions are therefore needed to support the European Commission and the Member States in the work connected to Article 42 of Regulation (EU) 2016/2031, as stipulated in the terms of reference.

1.1.2. Terms of Reference

In view of the above and in accordance with Article 29 of Regulation (EC) No 178/2002[3], the Commission asks EFSA to provide scientific opinions in the field of plant health.

In particular, EFSA is expected to prepare and deliver risk assessments for commodities listed in the relevant Implementing Acts as "High risk plants, plant products and other objects". Article 42, paragraphs 4 and 5, establishes that a risk assessment is needed as a follow-up to evaluate whether the commodities will remain prohibited, removed from the list and additional measures will be applied or removed from the list without any additional measures. This task is expected to be on-going, with a regular flow of dossiers being sent by the applicant required for the risk assessment.

Therefore, to facilitate the correct handling of the dossiers and the acquisition of the required data for the commodity risk assessment, a format for the submission of the required data for each dossier is needed.

Furthermore, a standard methodology for the performance of "commodity risk assessment" based on the work already done by Member States and other international organizations needs to be set.

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002, the Commission asks EFSA to provide scientific opinion in the field of plant health for *A. julibrissin* taking into account the available scientific information, including the technical dossier provided by Israel.

1.2. Interpretation of the Terms of Reference

The European Food Safety Authority (EFSA) Panel on Plant Health (hereafter referred to as 'the Panel') was requested to conduct a commodity risk assessment of *A. julibrissin* plants for planting from Israel based on the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019a).

In its evaluation, the Panel:

- Checked whether the provided information in the Technical Dossier (hereafter called 'the Dossier') was sufficient to conduct a commodity risk assessment. When necessary, additional information was requested from the Israeli Authorities (Ministry of Agriculture and Rural Development, Plant Protection & Inspection Services – PPIS).
- Selected the relevant European Union (EU)-regulated pests and other relevant pests present in Israel and associated with *A. julibrissin* plants for planting (excluding seed).
- Evaluated the effectiveness of the proposed measures (as specified by PPIS) for the relevant organisms on *A. julibrissin* in Israel.

[1] Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants, amending Regulations (EU) 228/2013, (EU) 652/2014 and (EU) 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC. OJ L 317, 23.11.2016, pp. 4–104.

[2] Commission Implementing Regulation (EU) 2018/2019 of 18 December 2018 establishing a provisional list of high-risk plants, plant products or other objects, within the meaning of Article 42 of Regulation (EU) 2016/2031 and a list of plants for which phytosanitary certificates are not required for introduction into the Union, within the meaning of Article 73 of that Regulation C/2018/8877. OJ L 323, 19.12.2018, pp. 10–15.

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

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

2. Data and methodologies

2.1. Data

The Panel considered all the data and information provided by Israel on *A. julibrissin* on 19 May 2019. The Dossier is managed by EFSA.

The structure and overview of the Dossier is shown in Table 1. The number of the relevant section is 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 Israel	EFSA-Q-2019-00107_0001-ISRAEL - Albizia julibrissin_Request.pdf
2.0	Technical dossier on *Albizia julibrissin* (complete document)	Albizia information for EFSA 30_04_2019.docx
3.0	**COMMODITY DATA**	Albizia information for EFSA 30_04_2019.docx
3.1	Taxonomic information	Albizia information for EFSA 30_04_2019.docx
3.2	Plants for planting specification (ISPM 36 – FAO, 2019)	Albizia information for EFSA 30_04_2019.docx
3.7	Production period	Albizia information for EFSA 30_04_2019.docx
3.8	Phytosanitary status and management	Albizia information for EFSA 30_04_2019.docx
3.9	Intended use	Albizia information for EFSA 30_04_2019.docx
3.10	Production area	Albizia information for EFSA 30_04_2019.docx
3.11	Separation of production areas	Albizia information for EFSA 30_04_2019.docx
3.12	Climatic classification	Albizia information for EFSA 30_04_2019.docx
3.13	Pictures and description	Albizia information for EFSA 30_04_2019.docx
4.0	**PESTS LIST**	Pest list for Albizia in Israel - Appendix 1 29_04_2019.docx
4.1	List of all the pests potentially associated with the commodity plant species or genus in the exporting country	Pest list for Albizia in Israel - Appendix 1 29_04_2019.docx
4.3	List of non-regulated pests (Table D2)	Pest list for Albizia in Israel - Appendix 1 29_04_2019.docx
4.4	Details of the literature search according to Appendix B	Pest list for Albizia in Israel - Appendix 1 29_04_2019.docx
5.0	**DATA ON PHYTOSANITARY MITIGATION MEASURES**	Albizia information for EFSA 30_04_2019.docx
5.2	Description of phytosanitary regulations	Albizia information for EFSA 30_04_2019.docx
5.3	Description of surveillance and monitoring	Albizia information for EFSA 30_04_2019.docx
5.4	Trade volumes and frequencies	Albizia information for EFSA 30_04_2019.docx
5.5	Description of post-harvest procedures	Albizia information for EFSA 30_04_2019.docx
5.6	Integration of information	2019.9.1 - Mitigation of specific pests of Albizia according to Appendix E (Additional information).docx

The data and supporting information provided by the PPIS formed the basis of the commodity risk assessment. The following are the main data sources used by the PPIS to compile the requested information (details on search strategies can be found in the Dossier Section 4.4):

1) Biton S, 2017. Garden Pests in Israel. The Ministry of Agriculture, Extension Service [in Hebrew].

2) Centre for Agriculture and Bioscience International (CABI), Crop Protection Compendium (CABI CPC). Available online: https://www.cabi.org/cpc
3) European and Mediterranean Plant Protection Organization Global Database (EPPO). Available online: https://gd.eppo.int/
4) Halperin J, Brosh S and Eshed N, 1989. Annotated list of noxious organisms in ornamental plants in Israel. Tel Aviv, The Ministry of Agriculture, Extension Service, 92 pp. [in Hebrew, with English summary].
5) Google search: 'Albizia' and 'Israel' – [in English and in Hebrew (אלביציה ישראל)]. Per pest in the pest list– Google search by scientific name, scientific name and 'Israel' – [in English and in Hebrew ('ישראל'], (scientific name and 'Europe', 'Distribution', 'Transmission', 'stem', 'branch', 'twig', 'roots', 'import requirements', 'Quarantine', 'Regulatory status', 'Impact', 'Damage'.
6) Heller A, 2018. Deterioration of oak trees. Ministry of Agriculture and Rural Development.
7) Johnson L, 2002. "*Anoplophora glabripennis*". Animal Diversity Web. Available online: https://animaldiversity.org/accounts/Anoplophora_glabripennis/
8) Mendel Z, 2013. Study on the Avocado shot-hole borer, *Euwallacea* aff. *fornicata* and its symbiotic fungus as a basis for development of environmentally friendly management. [In Hebrew].
9) Mendel Z, Protasov A, Wysoki M, Elyihu M, Maoz Y, Sharon M, Zveibil A, Noy A, Ben Yehuda S and Freeman S, 2012. A major threat on the Avocado industry in Israel, an ambrosia beetle that vectors a fusarial pathogen. Alon Hanotea, 66, 30–35. [in Hebrew].
10) Israeli Ministry of Agriculture and Rural Development, Plant Protection and Inspection Services, 2009.
    a) Plant Protection Law – 1956 Plant Import Regulations.
    b) Plant Protection Regulations (Plant Import, Plant Products, Pests and Articles Regulated).
11) Plant Pests of the Middle East. Available online: http://www.agri.huji.ac.il/mepests/pest/
12) The Israeli Phytopathological Society. Available online: https://phytopathology.org.il/%D7%9E%D7%97%D7%9C%D7%95%D7%AA-%D7%A6%D7%9E%D7%97%D7%99%D7%9D/
13) Israeli Ministry of Agriculture and Rural Development sources:
    - Extension service publications. Books that are relevant to the crop group (ornamental trees) were obtained and searched for specific information.
    - PPIS taxonomy laboratories pest lists per crop: Virology, Bacteriology, Mycology, Acarology, Nematology, Entomology.
    - PPIS taxonomy expert consultation concerning relevant pests.
    - Agricultural Research Organization, Volcani Center, expert researcher consultation concerning the crop and relevant pests.
14) Prioninae of the world. *Mesoprionus besikanus* (Fairmaire, 1855). Available online: http://www.prioninae.eu/taxonomy/mesoprionus/besikanus

Literature searches were undertaken by EFSA to complete a list of pests potentially associated with *A. julibrissin* in Israel. Two searches were combined: (i) a general search to identify pests of *Albizia*, particularly *A. julibrissin*, in different databases and (ii) a tailored search to identify whether these pests are present or not in Israel. The searches were run on the 9 July 2019. No language, date or document type restrictions were applied in the search strategy.

The Panel used the following databases (Table 2) to compile the pest list:

- European and Mediterranean Plant Protection Organization Global Database

EPPO (online)

The European and Mediterranean Plant Protection Organization (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.

- CABI Crop Protection Compendium

CABI (online)

The Crop Protection Compendium is an encyclopedic resource that brings together a wide range of different types of science-based information on all aspects of crop protection. It comprises detailed data sheets on pests, diseases, weeds, host crops and natural enemies.

- Other databases

In addition to CABI and EPPO sources of data, other thematic databases have been used to compile the list of potential pests of *A. julibrissin*. The complete list of the database used for compiling the pest list is reported in Table 2. In particular, on Web of Science, the literature search was performed using a specific, ad hoc established search string. The string was run in 'All Databases' with no range limits for time or language filters.

- Other sources

Additional searches, limited to retrieve documents, were run when developing the opinion. The available scientific information, including previous EFSA opinions on the relevant pests and diseases (see pest data sheets in Appendix A) and the relevant literature and legislation (e.g. Council Directive 2000/29/EC, Regulation (EU) 2016/2031; Commission Implementing Regulation 2018/2019 and 2018/2018), was taken into account.

Table 2: Databases used for compiling the pest list

Database	Platform/link
Aphids on World Plants	http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm
CABI Crop Protection Compendium	https://www.cabi.org/cpc/
Database of Insects and their Food Plants	http://www.brc.ac.uk/dbif/hosts.aspx
Database of the World's Lepidopteran Hostplants	https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsml
EPPO Global Database	https://gd.eppo.int/
Google Scholar	https://scholar.google.it/
Leaf-miners	http://www.leafmines.co.uk/html/plants.htm
Nemaplex	http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx
Plant Viruses Online	http://bio-mirror.im.ac.cn/mirrors/pvo/vide/famindex.htm
Scalenet	http://scalenet.info/associates/
Spider Mites Web	https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php
USDA ARS Fungi Database	https://nt.ars-grin.gov/fungaldatabases/fungushost/fungushost.cfm
Web of Science: All Databases (Web of Science Core Collection, CABI: CAB Abstracts, BIOSIS Citation Index, Chinese Science Citation Database, Current Contents Connect, Data Citation IndexFSTA, KCI-Korean Journal Database, Russian Science Citation Index, MEDLINESciELO Citation Index, Zoological Record)	Web of Science https://www.webofknowledge.com
World Agroforestry	http://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749

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, 2019a).

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 were identified. Pests not known to occur in the European Union (EU) and not regulated in the EU were selected based on evidence of their potential impact in the EU. After the first step, all the relevant pests that may need risk mitigation measures were identified.

In the second step, the overall efficacy of the proposed risk mitigation measures for each pest was evaluated. A conclusion on the likelihood of the commodity being free from each of the relevant pests was determined and uncertainties identified using expert judgements. Pest freedom was assessed at the level of individual plants. The pest freedom at level of consignments was not assessed.

2.2.1. Commodity data

Based on the information provided by the PPIS, 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 *A. julibrissin* plants from Israel, a pest list was compiled. The pest list is based on information provided in Dossier Section 4 and Dossier Appendix 1 and on searches performed by the Panel. The pest list (see Microsoft Excel® file in Appendix C) is a document that includes pests that use the host plant at genus level (*Albizia* spp.), retrieved from EPPO GD, CABI CPD. Other databases were consulted at plant species level. An overview of the consulted sources is listed in Table 2.

Pests with limited information on potential impact are listed in Appendix B (pests that can potentially cause an effect not further assessed).

2.2.3. Listing and evaluation of risk mitigation measures

All current risk mitigation measures were listed and evaluated. When evaluating the likelihood of pest freedom at origin of the following types of potential infection sources for *A. julibrissin* plants in nurseries were considered (see also Figure 1):

- pest entry from surrounding areas,
- pest entry with new plants/seeds,
- pest spread within the nursery.

The risk mitigation measures adopted in the plant nurseries (as communicated by the PPIS) were evaluated with Expert Knowledge Elicitation (EKE) according to the Guidance on uncertainty analysis in scientific assessment (EFSA Scientific Committee, 2018).

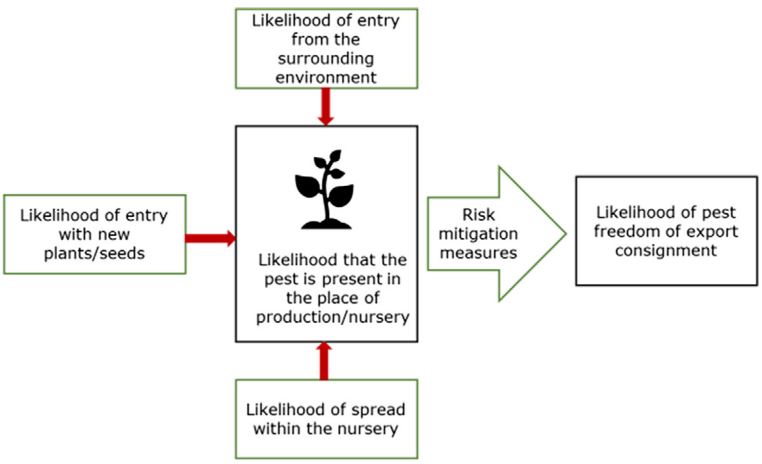

Figure 1: Conceptual framework to assess likelihood that plants are exported free from relevant pests. Source EFSA PLH Panel (2019b)

Information on the biology, likelihood of entry of the pest to the nursery and the effect of the measures on a specific pest were summarised in pest data sheets compiled for each pest selected for further evaluation (see Appendix A).

To estimate the pest freedom of the commodity, a semi-formal Expert Knowledge Elicitation (EKE) was performed following EFSA guidance (Annex B.8 of EFSA Scientific Committee, 2018). The specific question for the semi-formal EKE was: 'Taking into account (i) the risk mitigation measures in place in the nurseries, and (ii) other relevant information, how many of 10,000 *A. julibrissin* plants will be infested with the relevant pest/pathogen when arriving to the EU?'. The EKE question was common to all pests for which the pest freedom of the commodity was estimated. The uncertainties associated with the EKE were taken into account and quantified in the probability distribution applying the semi-formal method described in Section 3.5.2 of the EFSA PLH Guidance on Quantitative Pest Risk Assessment (EFSA PLH Panel, 2018). Finally, the results were reported in terms of the likelihood of pest freedom. The lower 5% percentile of the uncertainty distribution reflects the opinion that pest freedom is with 95% certainty above this limit.

3. Commodity data

3.1. Description of the commodity

The commodity to be imported is *A. julibrissin* (common name: silk tree; family: Fabaceae) bare rooted dormant grafted plants. Plants are delivered to container production nurseries.

The below overview provides the *A. julibrissin* varieties as specified in the Dossier (Dossier Section 3).

Variety	Description
Chocolate Fountain	Pendula variety with red leaves
Evey's Pride	Dark red leaves with nice pink flowers
Ombrella™	Dark green leaves with deep pink flowers
Shidare	Pendula variety with pink flowers
Summer Chocolate	Beautiful dark red/brown leaves
Tropical Dream	Green leaves with pink flowers. Hardy to −20°C without protection

The age of the leafless dormant plants is either 1 year (at a height of 20–120 cm, diameter 1–1.5 cm) or 2 years (150–200 cm height, 1.5–2.5 cm diameter). Roots are rinsed to remove soil.

According to ISPM 36 (FAO, 2019), the commodity can be classified as 'plants for planting – bare root plants'.

3.2. Description of the production areas

The plants destined for export, are grown in different fields from the plants destined for the local market, with 10s to 100s of metres as a minimum distance between a field for the local market and a field for export.

Figure 2 presents the two current sites of *A. julibrissin* cultivation in Israel: Bizaron and Kefar Yehoshua (the southern and the northern spots on the map, respectively).

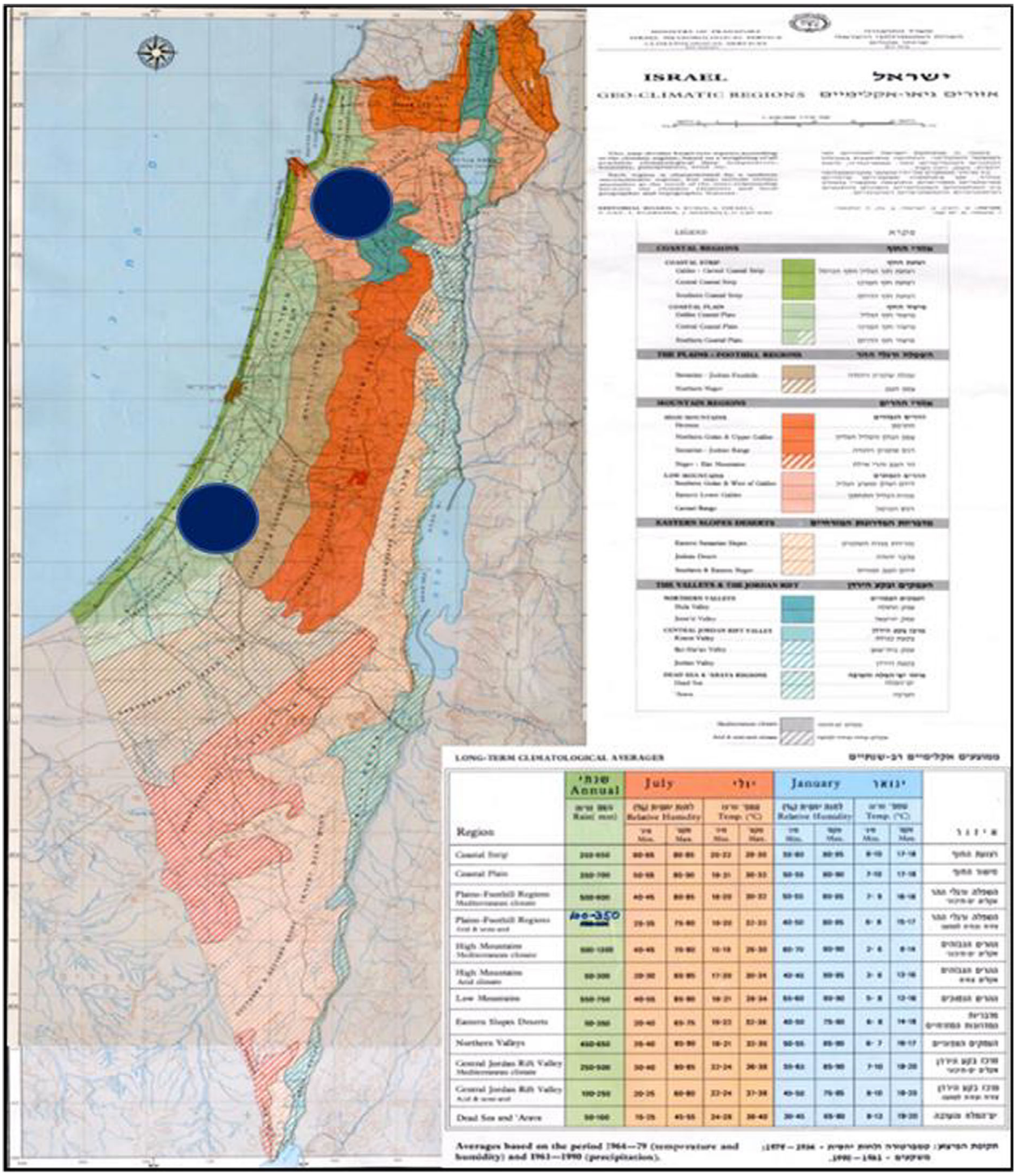

Figure 2: Current sites of *A. julibrissin* cultivation in Israel

Based on the global Köppen–Geiger climate zone classification (Kottek et al., 2006), the climate of both production sites of *A. julibrissin* in Israel is similar to that found in some regions of the southern EU (subgroup Csa, Mediterranean hot summer climates – see Figure 3).

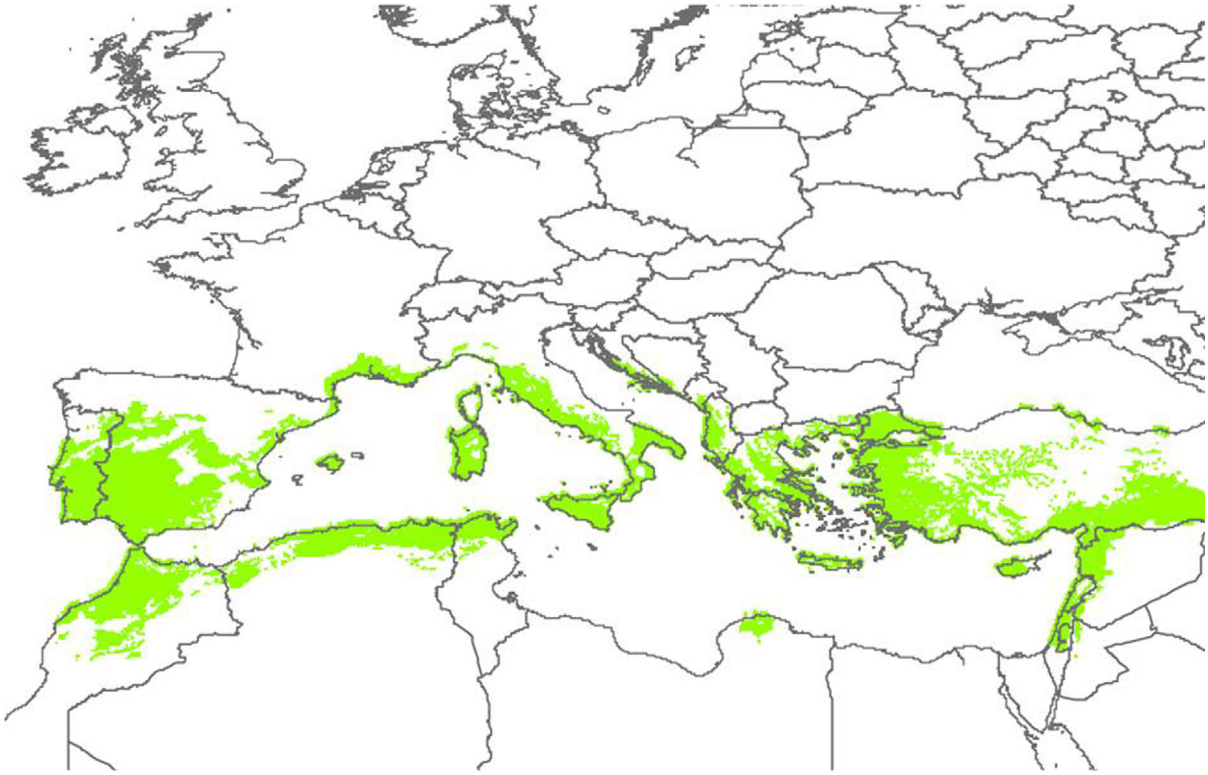

Figure 3: Distribution of Koppen–Geiger climate subgroup Csa (Mediterranean hot summer climates) areas in the Mediterranean basin (MacLeod and Korycinska, 2019)

3.3. Production and handling processes

3.3.1. Growing conditions

Plants are grown in open fields for 1 or 2 years. The mother plants for the scions to be grafted on the *A. julibrissin* seedlings are also grown in open fields in a mother plant stock and treated in the same manner as the young plants.

3.3.2. Source of planting material

Rootstock of plants for export are grown from seeds that are imported from the Netherlands and they are grafted (chip budding) with plant material originated from mother plants grown also in open fields in the nurseries.

3.3.3. Production cycle

The propagation protocol is described as follows:

- Summer before the growing season – open field soil preparation – solar disinfection;
- March – seeding *A. julibrissin* seeds;
- June – chip budding of the different varieties;
- The mother plants are grown in an open field mother plant stock and treated in the same manner as the young plants:
  - During the growing season, production fields are treated in a 3-week cycle with preventative treatments, i.e. rotation of the following pesticides: Atlas (Bifenthrin), Ipon (Dinotefuran), Imidan (Phosmet) and EOS (Eco Oil Spray).
  - Against nematodes: treatment with Nemakor (Fenamiphos).
  - Weeds are treated with Faster (Glufosinate ammonium).
  - The nursery staff monitor all their production fields on a weekly basis.
  - Soil and root samples are tested for nematodes.

- December – lifting the plants from the field, washing the soil off the roots, selecting, grading and packing them in boxes. The boxes are stored in cold storage at 2°C;
- Some plants are maintained in the soil for a second year, then harvested and treated in the same manner as the 1-year-old plants, except packed in nylon wrapping.

3.3.4. Export procedure

The following information on the post-harvest and export procedure was provided by PPIS (Dossier Section 5).

The bare-rooted plants are rinsed and checked individually for selecting and grading.

The plants are then soaked in 'Merpan' 0.5% (fungicide) and stored at 2°C. The chilled storage rooms are at a temperature of 2°C and 70% humidity. The plants are transferred from the storage rooms directly to a reefer container which maintains 2–4°C. The container is loaded onto the ship and unloaded when with the customers in Europe, so that the refrigerated conditions are maintained throughout the shipment.

The plants are packed after Merpan has evaporated to dryness. Here, 20–100 cm tall plants are packed in 60 μm nylon bags and placed in cardboard boxes (120 × 50 × 25) – approximately 200 plants per box. The taller plants are packed in 180 μm nylon bags, approximately 30 plants per bag.

During the months of January and February, 25,000–30,000 *A. julibrissin* plants are exported to the EU.

4. Identification of pests potentially associated with the commodity

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

The EU listing of union quarantine pests and protected zone quarantine pests (Commission Implementing Regulation (EU) 2019/2072) is based on assessments concluding that the pests can enter, establish, spread and have potential impact in the EU.

Three EU-regulated pest species that are reported to use *Albizia* spp. as a host plant were selected (Table 4) for their potential relevance of being included in this Opinion.

The relevance of an EU-regulated pest for this Opinion was based on evidence that:

- the pest is present in Israel;
- the pest uses *A. julibrissin* as a host;
- 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.

Table 3 presents an overview of the evaluation of these three EU-regulated pest species that are reported to use *Albizia* spp. as a host in regards their relevance for this Opinion. The remarks for individual species can be found in Table 4. For additional information, see also Table B.1 in Appendix B.

Between the three EU-regulated species evaluated, only *Xylella fastidiosa* is present in Israel. Therefore, *Anoplophora glabripennis* and *Toxoptera citricidus* were excluded from further evaluation because they do not meet the selection criteria of presence in the applicant country. As for *X. fastidiosa*, considering that the two production nurseries are located in a *X. fastidiosa* pest-free area, it was either not evaluated as relevant for further assessment.

Table 3: Overview of the evaluation of the three EU-regulated pest species known to use *Albizia* spp. as a host plant for their relevance for this opinion

Pest name according to the EU legislation[(a)]	EPPO code	Group[(b)]	Presence in Israel	*Albizia julibrissin* confirmed as a host (reference)	Pest can be associated with the commodity[(c)]	Pest relevant for the opinion	Remarks
Anoplophora glabripennis	ANOLGL	INS	No	Yes (EPPO GD Online)	No	**No**	
Toxoptera citricidus	TOXOCI	INS	No	No		**No**	
Xylella fastidiosa	XYLEFA	BAC	Yes	Yes (Huang, 2017; EFSA, 2015)	Yes	**No**	Note 1

(a): Commission Implementing Regulation (EU) 2019/2072.
(b): INS: insects; BAC: bacteria.
(c): The question if the pest can be associated with the commodity is evaluated only if the previous two questions are answered with 'yes'.

Table 4: The species-specific note as indicated in Table 4

Note in Table 4	Remark
Note 1	Although the commodity can act as a pathway for *X. fastidiosa* the rating for association of the commodity as pathway is set to 'N' because *Albizia* plants for export are produced in officially approved pest-free areas [Confirmed by PPIS: 2019.9.1 – Mitigation of specific pests of *Albizia* according to Appendix E (Additional information).docx]

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

The information provided by the PPIS, integrated with the search EFSA performed, was evaluated to assess whether there are any other relevant potential quarantine pests of *A. julibrissin* present in the country of export. For these 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 *A. julibrissin* were evaluated to determine their relevance for this opinion based on evidence that:

1) the pest is present in Israel;
2) the pest is absent or has a limited distribution in the EU;
3) the pest uses *A. julibrissin* as a host;
4) one or more life stages of the pest can be associated with the specified commodity;
5) the pest may have an impact in the EU.

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

Based on the information collected, 221 potential harmful organisms known to be associated with *Albizia spp.* were evaluated for their relevance to this opinion. Species were excluded from further evaluation when at least one of the conditions listed above (5-1) was not met. Details can be found in the Appendix C (Microsoft Excel file). Of the evaluated non-EU-regulated species, three pests (*Aonidiella orientalis, Euwallacea fornicatus* and *Fusarium euwallaceae*) were selected for further evaluation because they meet all the selection criteria. *A. orientalis* is a scale pest mostly found in mango production in Israel. *E. fornicatus* and *F. euwallaceae* are pests of avocado production in Israel and are listed in the EPPO A2 list. Additional information on these three pest species can be found in the pest data sheets; *E. fornicatus* and its symbiont fungus *F. euwallaceae* were dealt within a single pest data sheet (Appendix A).

4.3. Overview of interceptions

Based on the information provided by the applicant, the number of plants of *A. julibrissin* exported to the EU range between 25,000 and 30,000 per year.

Data on the interception of harmful organisms on plants of *A. julibrissin* can provide information on some of the organisms that can be present on the exported plants despite the current measures taken. Based on the information available in the EUROPHYT online database, no interceptions of pests have been detected on plants of *A. julibrissin* imported into the EU between 1995 and 2019.

4.4. List of potential pests not further assessed

From the list of pests not selected for further evaluation, the Panel highlighted eight species (listed in Table B.1 in Appendix B) for which the currently available evidence provides no reason to select these species for further evaluation in this opinion. However, these eight species belong to a genus which includes species of pests that have a reported impact.

4.5. Summary of pests selected for further evaluation

The three pests identified to be present in Israel and considered to be reasonably likely to be associated with *A. julibrissin* plants are listed in Table 5. The effectiveness of the risk mitigation measures applied to the commodity was evaluated for these selected pests. The ambrosia bark beetle (*E. fornicatus*) and its symbiotic fungus (*F. euwallaceae*) were evaluated together.

Table 5: List of relevant pests selected for further evaluation

Number	Current scientific name	Taxonomic information	Group[(a)]	Regulatory status
1	*Aonidiella orientalis*	Hemiptera, Diaspididae	INS	Not regulated in the EU
2	*Euwallacea fornicatus*	Coleoptera, Curculionidae	INS	Not regulated in the EU
3	*Fusarium euwallaceae*	Hypocreales, Nectriaceae	FUN	Not regulated in the EU

(a): FUN: fungi; INS: insects.

5. Risk mitigation measures

For each pest, the Panel assessed the possibility that it could be present in an *A. julibrissin* nursery and assessed the probability that pest freedom of a consignment is achieved by the proposed risk mitigation measures acting on the pest under evaluation.

The information used for the evaluation of the effectiveness of the risk mitigation measures is summarised in a pest data sheet (see Appendix A).

5.1. Possibility of pest presence in the nurseries

For each pest, the Panel evaluated the possibility that the pest could be present in an *A. julibrissin* nursery by evaluating the possibility that *A. julibrissin* in the nursery are infected either by:

- introduction of the pest (e.g. insects, spores) from the environment surrounding the nursery;
- introduction of the pest with new plants/seeds;
- spread of the pest within the nursery.

5.2. Risk mitigation measures applied in Israel

The Dossier Section 5.2 contains information on the phytosanitary regulations and inspection systems related to the plant of interest (*A. julibrissin*) where it has been reported:

— The PPIS (Plant Protection and Inspection Services), Ministry of Agriculture and Rural Development is the regulatory body that oversees the regulations for the production of this commodity is adhered. Although there are no specific regulations for the production of *A. julibrissin* in Israel, there are general requirements as indicated by The Law of Supervision of Plant and Plant Product Export (1954).[4]
— The Israeli Plant and Plant Products Exportation Supervision Regulations (1979).[5]
— ISPM standards (adopted).[6]

With the information provided by PPIS (Dossier Sections 3 and 5), the Panel summarised the risk mitigation measures (Table 6) that are currently applied in the production nurseries.

Table 6: Overview of currently applied risk mitigation measures for *A. julibrissin* plants designated for export to the EU from Israel described as reported in the PPIS declaration and classified according to the type of Risk Reducing Options (RROs) listed in EFSA PLH (2018)

Number of the RRO	Risk reduction option	Current measures in Israel
RRO1	Characteristics of the production field	The plants destined for export, are grown in different fields from the crops destined for the local market, with 10s to 100s of metres as a minimum distance between a field for the local market and a field for export
RRO2	Soil treatment	In summer, before a new crop, open field soil preparation and solarisation
RRO3	Rotation of the growing fields	Rotation of the growing fields between different locations in the manner of a 'growing cycle'
RRO4	Insecticide treatment	During the growing season, production fields are treated in a 3-week cycle with preventative treatments, i.e. rotation of the following pesticides: Atlas (Bifenthrin), Ipon (Dinotefuran), Imidan (Phosmet) and EOS (Eco Oil Spray)
RRO5	Fungicide treatment	Post-harvest treatment: The bare-rooted plants are rinsed and soaked in 'Merpan' 0.5%. The plants are packed after Merpan has evaporated to dryness
RRO6	Nematicide treatment	Against nematodes: treatment with Nemakor (Fenamiphos)

[4] https://fs.knesset.gov.il//2/law/2_lsr_208430.PDF (In Hebrew, no English version).
[5] https://www.moag.gov.il/ppis/Laws/Regulation/Pages/1979-%20pikuah%20al%20yatzu.aspx (In Hebrew, no English version)
[6] https://www.ippc.int/en/core-activities/standards-setting/ispms/

Number of the RRO	Risk reduction option	Current measures in Israel
RRO7	Treatment against weeds	Weeds are treated with Faster (Glufosinate ammonium)
RRO8	Root treatment	December – lifting of 1 or 2 years plants from the field, washing the soil off the roots, selecting, grading and packing them in boxes
RRO9	Sampling and testing	Root samples with attached soil are tested once during the active growth for nematodes
RRO10	Official Supervision by PPIS	All plants for planting exported from Israel originate from nurseries that are approved by PPIS and are under PPIS inspection Whenever a harmful organism of interest is found at any production site, the grower is required to inform PPIS and to treat the site as appropriate. During consecutive inspections, if there is no further evidence to the presence of the pest, the PPIS considers the site of production to be free from this harmful organism. (Dossier, FVO report) Additional information on the applied phytosanitary procedures in plants for export in Israel can be found in the European Commission report of an audit performed in Israel in March 2018, on the Export Controls of plants.[(a)] Report number 2018-6493
RRO11	Inspections of nurseries that export plants	Every 21 days, the PPIS of Israel carries out an official inspection in the nursery and an additional regular comprehensive self-inspection is performed weekly Before export the bare-rooted plants are rinsed and checked individually for selecting and grading
RRO12	Surveillance and monitoring	No information available on specific surveys in the natural environment or the surrounding environment of the production areas (i.e. inspections outside production fields)

(a): Report number 2018-6493, http://ec.europa.eu/food/audits-analysis/audit_reports/details.cfm?rep_id=4008

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

For each relevant pest, the effective risk mitigation measures were identified. Any limiting factors on the effectiveness of the measures were documented. 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 A.

Based on this information, for each relevant pest, an expert judgement has been given for the likelihood of pest freedom taking into consideration the risk mitigation measures acting on the pest and their combination.

An overview of the evaluation of each relevant pest is given in the sections below (Sections 5.3.1 and 5.3.2).

5.3.1. *Aonidiella orientalis*

Rating of the likelihood of pest freedom	*Pest free with some exceptional case (99.5%–99.9%) (Between 9,950 and 9,990 of 10,000 plants)*[(a)]				
Distribution of the likelihood of pest freedom	5%	Q1	M	Q3	95%
	99.16%	99.70%	99.80%	99.87%	99.93%

Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** The oriental scale *A. orientalis* is present in Israel and reported as a pest in mango production. The insect has a wide host plant range and it is possible that the pest is present in areas where *A. julibrissin* plants are grown for export. *A. julibrissin* plants destined for export as well as their mother plants for scion collection are grown in the open field and it is possible that these plants are colonised by dispersing insects from the surrounding environment. Transfer from sources in the surrounding environment to the nursery plants is estimated to be low. Scale insect is unable to fly, and their local movement is dependent on crawlers that are transported by the wind or by phoretic dispersal (e.g. birds) **Measures taken against the pest/pathogen and their efficacy** The relevant applied measures in the nursery are: (i) regular application of insecticides; (ii) inspections over a 3-week interval; (iii) isolation of production site from other production fields within the nursery; (iv) only dormant leafless plants are exported. The combination of regular inspections and insecticide treatments is likely to eliminate any colonising scale insects **Interception records** There are no records of interceptions **Shortcomings of current measures/procedures** Plants and mother plants for the scions collection are grown in open fields. Residual efficacy of the applied insecticides may not protect the plants for the full rotation period. Newly infested trees may be difficult to detect **Main uncertainties** Pest pressure and the proximity of population sources in the surrounding environment are unknown Newly infested trees may be difficult to detect No information on the composition of the surrounding vegetation of export nurseries and other species present in the nursery

(a): EFSA PLH Panel (2019a).

5.3.2. *Euwallacea fornicatus* and *Fusarium euwallaceae*

Rating of the likelihood of pest freedom	*Pest free with some exceptional case (99.5%–99.9%) (Between 9,950 and 9,990 of 10,000 plants)*				
Distribution of the likelihood of pest freedom	5%	Q1	M	Q3	95%
	99.57%	99.81%	99.89%	99.94%	99.98%
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** The polyphagous shot hole borer (PSHB) and *F. euwallaceae* are widespread in Israel and occur in the area where the export nurseries are located. The insect (vector) and the fungus can be present in several plant species such as avocado (*Persea americana*), castor bean (*Ricinus communis*), box elder (*Acer negundo*), *Quercus pedunculiflora*, *Quercus robur*, *Platanus occidentalis*, *Platanus orientalis* and *Acer buergerianum* in the surrounding environment. *A. julibrissin* plants for exports are grown in open fields; therefore, they can be invaded by incoming infested beetles. *A. julibrissin* is reported to be a reproductive host for PSHB in the USA. The exported plants are at maximum 2-year-old and the diameter of the stem may not be large enough to host the PSHB. However, mother plants for scion collection are older; therefore, they are expected to be able to host both the beetle and the fungus **Measures taken against the pest/pathogen and their efficacy** The relevant applied measures are: (i) regular application of insecticides and fungicides treatments; (ii) inspections at 3 weeks interval; (iii) isolation from other production fields within the nursery; (iv) only dormant leafless plants are exported These measures will greatly reduce the probability that *E. fornicatus* and *F. euwallaceae* are present in consignments destined for export					

	Interception records There are no records of interceptions **Shortcomings of current measures/procedures** Plants and mother plants for the scions collection are grown in open fields. Residual efficacy of the applied insecticides may not protect the plants for the full rotation period. Newly infested trees may be difficult to detect. No surveillance trapping has been put in place to ensure the absence of *E. fornicatus* in the plots **Main uncertainties** Pest pressure and the proximity of population sources in the surrounding environment are unknown Trees may be too young for beetle attack Newly infested trees may be difficult to detect The age of mother plants for scion collection No information on the composition of the surrounding vegetation of export nurseries and other species present in the nursery

Table 7 and Figure 4 show a comparison of the likelihood of pest freedom after the evaluation of the currently proposed risk mitigation measures for all evaluated pests.

Table 7: Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against *Aonidiella orientalis*, *Euwallacea fornicatus* and *Fusarium euwallacea* on *Albizia julibrissin* designated for export to the EU. In panel A, the median value for the assessed level of pest freedom for each pest is indicated by 'M', the 5% percentile is indicated by L and the 95% percentile is indicated by U. The percentiles together span the 90% uncertainty range regarding pest freedom. The pest freedom categories are defined in panel B of the table

Group	Pest species	Pest Freedom Category							
		Almost always pest free	Pest free with few exceptional cases	Pest free with some exceptional cases	Extremly frequently pest free	Very frequently pest free	Frequently pest freee	More often than not pest free	Sometimes pest free
INS	*Aonidiella orientalis*		L	M	U				
INS	*Euwallacea fornicatus*		L	M	U				
FUN	*Fusarium euwallacea*		L	M	U				

FUN: fungi; INS: insects.
Panel A

Pest Freedom Classes	Description of classes	Percent plants pest free (as percentage)
1	Almost always pest free	99.95% < x ≤ 100%
2	Pest free with few exceptional cases	99.90% < x ≤ 99.95%
3	Pest free with some exceptional cases	99.5% < x ≤ 99.9%
4	Extreme frequently pest free	99.0% < x ≤ 99.5%
5	Very frequently pest free	95% < x ≤ 99%
6	Frequently pest freee	90% < x ≤ 95%
7	More often than not pest free	50% < x ≤ 90%
8	Sometimes pest free	0% ≤ x ≤ 50%

Panel B

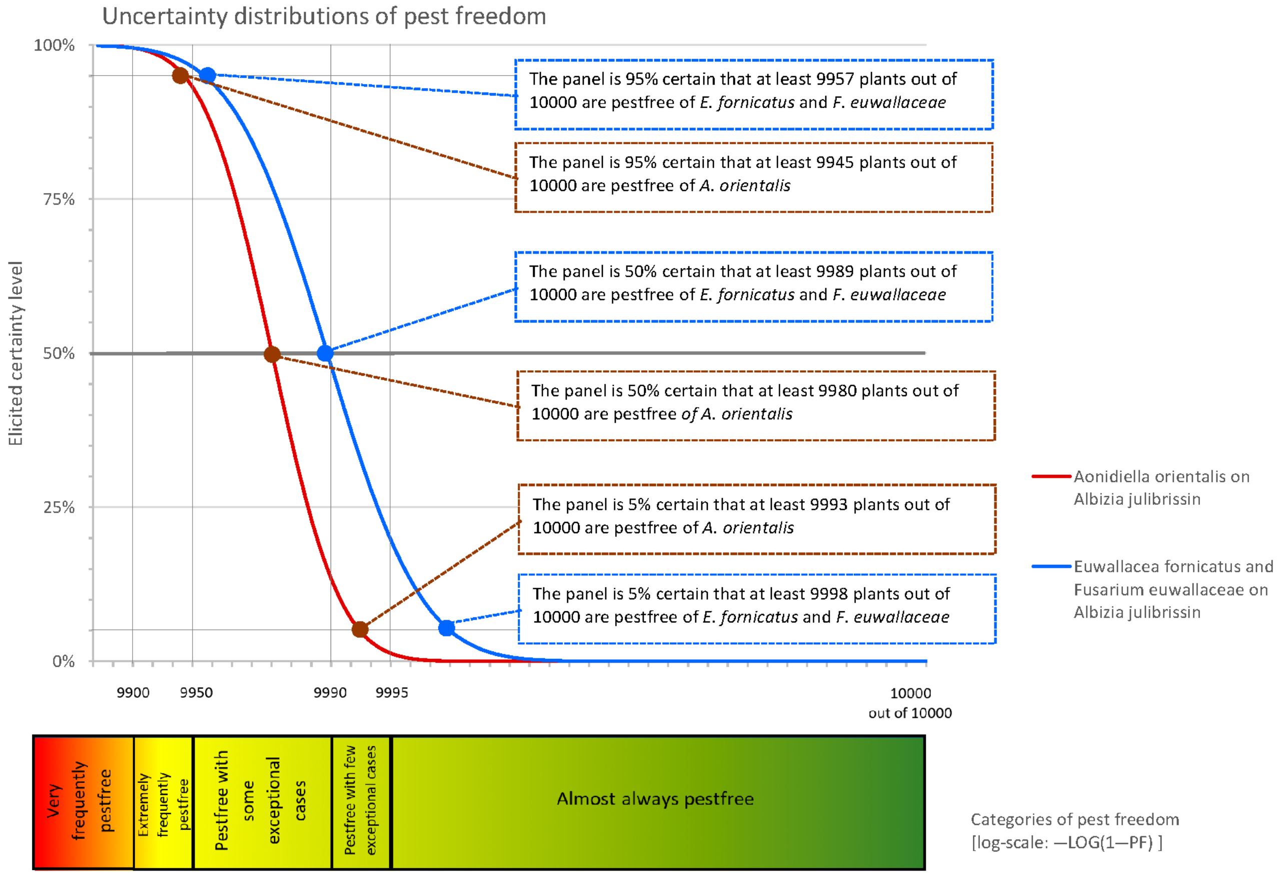

Figure 4: Elicited certainty (y-axis) of the number of pest-free *Albizia julibrissin* plants (x-axis; log-scaled) out of 10,000 plants designated for export to the EU introduced from Israel for all evaluated pests visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%). The labels shown in the figure are reported as examples for facilitating the understanding of the graph

6. Conclusions

There are three pests identified to be present in Israel and considered to be potentially associated with *Albizia julibrissin* plants and relevant for the EU. For these pests (*Aonidiella orientalis*, *Euwallacea fornicatus* and *Fusarium euwallaceae*), the likelihood of pest freedom after the evaluation of the currently proposed risk mitigation measures applied on *A. julibrissin* destined for export to the EU was estimated.

The Panel is 95% sure that 9,900 or more units per 10,000 will be pest free.

Apart from the three evaluated pests, there are eight species for which the current available evidence provides no reason to select them for further evaluation in this opinion. However, it should be noted that these eight species belong to a genus that includes other species with reported significant impact.

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Glossary

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 1995, 2017)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2017)
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2017).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017)
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units

Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2017)
Measures	Control (of a pest) is defined in ISPM 5 (FAO 2017) as 'Suppression, containment or eradication of a pest population' (FAO, 1995). Control measures are measures that have a direct effect on pest abundance. Supporting measures are organisational measures or procedures supporting the choice of appropriate Risk Reduction Options that do not directly affect pest abundance
Pathway	Any means that allows the entry or spread of a pest (FAO, 2017)
Phytosanitary measures	Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (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)
Regulated non-quarantine pest	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017)
Risk mitigation measure = 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. An RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO, 2017)

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
NEM	Nematode
PLH	Plant Health
PPIS	Plant Protection & Inspection Services of Israel
PSHB	Polyphagous shot hole borer
PRA	Pest Risk Assessment
RRO	Risk Reduction Option = Risk Mitigation Measures

Appendix A – Data sheets of pests selected for further evaluation

A.1. *Aonidiella orientalis*

A.1.1. Organism information

Taxonomic information	*Aonidiella orientalis* (Newstead, 1894) Other scientific names: *Aonidiella cocotiphagus, Aonidiella taprobana, Aspidiotus cocotiphagus, Aspidiotus orientalis, Aspidiotus osbeckiae, Aspidiotus pedronis, Aspidiotus taprobanus, Chrysomphalus orientalis, Chrysomphalus pedroniformis, Chrysomphalus pedronis, Evaspidiotus orientalis, Furcaspis orientalis* Order: Hemiptera Family: Diaspididae Common name: Oriental scale	
Group	Insects	
EPPO code	AONDOR	
Regulated status	The pest is not regulated in the EU, neither listed by EPPO It is a quarantine pest in Morocco (CABI, online)	
Pest status in Israel	Present, no further details (CABI, online). It has been reported as a mango pest in Israel (Wysoki et al., 1993) The pest was first recorded at the Arava Valley (from the Gulf of Elat to the Dead sea), in the South of Israel (Ben-Dov, 1985). Over the years the pest spread to the North of the country where it was found around Lake Kinneret (Sea of Galilee) and, as reviewed by Wysoki et al. (1993) is now widely distributed in Israel	
Pest status in the EU	Absent	
Host status on *Albizia julibrissin*	*A. julibrissin* has been reported as a host plant for *A. orientalis* (Moghaddam, 2013)	
Pest Risk Analysis information	No pest risk assessment is currently available	
Other relevant information for the assessment		
Symptoms	**Main type of symptoms**	Leaves are damaged due to the pest feeding exhibiting characteristic chlorotic streaks and plant vigour is reduced due to the removal of plant sap. Feeding often causes depressions, discoloration and distortion of leaves (CABI, online). The pest can cause yellowing or death of the leaves and consequent defoliation, dieback of twigs and fruit discoloration and early drop (Rajagopal and Krishnamoorthy, 1996; CABI, online)
	Presence of asymptomatic plants	Plant damage might not be obvious in early infestation, but the presence of scales on the plants could be observed During the crawler stage, infestation is difficult to be noted. As reviewed by Elder et al. (1995), males need approximately 19.5 days to develop from the crawler stage to adult at 25°C, while females need on average 44 days from the crawler stage to production of the first crawler of the subsequent generation at the same temperature
	Confusion with other pathogens/pests	*A. orientalis* is one of a group of many similar species not easy to be distinguished. These includes *A. aurantii* Maskell, *A. comperei* McKenzie, *A. eremocitri* McKenzie, *A. inornata* McKenzie, *A. citrina* Coquillett and *A. taxus* Leonardi (EPPO, 2005). A microscope observation is needed for identification
Host plant range	*A. orientalis* is a polyphagous pest with a wide host range, including approximately 74 families and 163 genera (García Morales et al., 2016) except conifers. *A. julibrissin* is reported as host plant for *A. orientalis*. It has been described as an economically important pest due to damage on *Citrus*, *Ficus*, mango, papaya, bananas and palm trees. In Israel, it has been reported as a serious pest of mango (Wysoki et al., 1993)	

Pathways	Plants for planting, fruits The pest is mainly found on leaves, but in heavy infestations also on branches, trunks, shoots and fruits of the host plants (CABI, online) The main dispersal stage is the first (crawling) instar, which can be dispersed naturally by wind or animals. After selecting a feeding site, the scale becomes sessile and no further dispersal occurs
Surveillance information	No surveillance information for this pest is currently available from Israel. There is no information on whether the pest has ever been found in the nurseries or their surrounding environment

A.1.2. Possibility of pest presence in the nurseries

A.1.2.1. Possibility of entry from the surrounding environment

After hatching, the larvae (first instar crawlers) migrate to settle on the leaves, fruit and stems of the host plant where they remain until maturity. Crawlers may be carried to neighbouring plants by wind (Waterhouse and Sands, 2001) or by hitchhiking on clothing, equipment, or animals (Leathers, 2016). According to Hennessey et al. (2013), the percentage of crawlers settling on a tree from an infested fruit is higher when the infested commodity (e.g. a fruit) is in contact with the tree than when it is placed 2 m away. Most of the stages of *A. orientalis* remain attached to a host during most of their lives. The only mobile stage is the first instar-nymph (i.e. crawler stage), but it is not considered to be a good coloniser of new environments because it is small, fragile, not able to fly and slow in movements (Hennessey et al., 2013). Additionally, crawlers tend to remain and feed on plants close to the one they hatched on.

Human activities can facilitate the long-distance dispersal of the crawlers (Hennessey et al., 2013).

Plants are grown in the open field. The pest is widespread in Israel, especially in mango production areas (Wysoki et al., 1993). If mango is produced in the neighbourhood of the export nurseries transfer of the insect may be possible.

Uncertainties:

- There are uncertainties about the presence of the pest and of suitable host plants (e.g. mango orchards) in the areas surrounding the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest/pathogen to enter the nurseries from the surrounding area.

A.1.2.2. Possibility of entry with new plants/seeds

The source of the planting material to produce *Albizia* mother plants destined to be the source of scions for production for export is imported seeds from the Netherlands. The pest is not seed transmitted, it is therefore possible to exclude plants/seeds as an entry pathway to the nursery.

Uncertainties:

- There are no uncertainties.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is not possible for *A. orientalis* to enter the nurseries with new plants/seeds.

A.1.2.3. Possibility of spread within the nursery

It is possible that *A. orientalis* is present on alternative host species within the nurseries from which it can spread to the production fields destined for export. The transfer is dependent on the distance between the alternative host plants and *A. julibrissin* plants destined for export. Human-assisted introduction and spread within the nursery could happen by workers/sales representatives coming from infested fields.

Production sites of *A. julibrissin* for export are isolated from other production sites at a distance of tens to hundreds of meters.

The growing practices applied in the nurseries are not expected to affect the pest presence in the nurseries. Plants are grown in open fields, but growing media and water are not known to be pathways for *A. orientalis*.

Uncertainties

- No information is available related to the plant species produced in the nurseries beside *A. julibrissin*.
- No information is available for the isolation or proximity of the mother plant stock for scion collection to other species in the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nurseries is possible.

A.1.3. Information from interceptions

Considering imports of *A. julibrissin* plants, from Israel to the EU, between 1995 and 2019, there are no records of interceptions of harmful organisms (EUROPHYT, online).

A.1.4. Evaluation of the Risk Reduction Options

In the table below, all the risk mitigation measures (RROs) currently applied in Israel are summarised and an indication of their effectiveness on *A. orientalis* is provided.

Number of the RRO	Risk reduction options	Current measures in Israel	Relevant	Evaluation of RROs for *A. orientalis*
RRO1	Characteristics of the production field	The plants destined for export, are grown in different fields from the crops destined for the local market, with 10s to 100s of meters as a minimum distance between a field for the local market and a field for export	Yes	The dispersal of the pest is depended on the movement of the crawlers that are mainly dispersed by the wind. Introduction in the nursery is depended on the distance of other hosts in the environment Uncertainties It is not known whether the nursery fields are isolated from neighbouring fields where other host plants of the pest may be present The exact distance between fields destined for exports and other production fields of the nursery is not known (tens to hundreds m) No data on the location of the mother plant stock used for scion collection
RRO2	Soil Treatments	In summer, before a new crop, open field soil preparation and solarisation	No	
RRO3	Rotation of the growing fields	Rotation of the growing fields between different locations in a manner of a ‘growing cycle’	No	
RRO4	Insecticide treatment	During the growing season, production fields are treated in a 3-week cycle with preventative treatments, i.e. rotation of the following pesticides: Atlas (Bifenthrin), Ipon (Dinotefuran), Imidan (Phosmet) and EOS (Eco Oil Spray)	Yes	All the insecticides applied in a 3-week cycle are considered effective against the crawlers. Residual efficacy of the applied insecticides may not protect the plants for the full rotation period
RRO5	Fungicide treatment	Post-harvest treatment: The bare rooted plants are rinsed and soaked in ‘Merpan’ 0.5%. The plants are packed after Merpan has evaporated to dryness	No	

Number of the RRO	Risk reduction options	Current measures in Israel	Relevant	Evaluation of RROs for *A. orientalis*
RRO6	Nematicide treatment	Against nematodes: treatment with Nemakor (Fenamiphos)	No	
RRO7	Treatment against weeds	Weeds are treated with Faster (Glufosinate ammonium)	No	
RRO8	Root treatment washing	December – lifting the plants from the field, washing the soil off the roots, selecting, grading and packing them in boxes. Some plants are maintained in the soil for a second year, then harvested and treated in the same manner as the 1-year-old plants	No	
RRO9	Sampling and testing	Root samples with attached soil are tested once during the active growth for nematodes	No	
RRO10	Official Supervision by PPIS	All plants for planting exported from Israel originate from nurseries that are approved by PPIS and are under PPIS inspection Whenever a harmful organism of interest is found at any production site, the grower is required to inform PPIS and to treat the site as appropriate. During consecutive inspections, if there is no further evidence to the presence of the pest, the PPIS considers the site of production to be free from this harmful organism. (Dossier, FVO report)	Yes	
RRO11	Inspections of nurseries that export plants	The production sites are regularly monitored on a weekly basis. Every 21 days, the Plant Protection and Inspection Service of Israel is carrying out an official inspection in the nursery and an additional regular comprehensive self-inspection is performed weekly Before export the bare-rooted plants are rinsed and checked individually for selecting and grading	Yes	Early infestation is not easy to detect as only the presence of scales could be observed after thorough inspection of the plants
RRO 12	Surveillance and monitoring	No information available on specific surveys in the natural environment/ surrounding environment of the production areas (i.e. inspections outside production fields)	Yes	There is no evidence provided that plants are produced in a pest-free area

A.1.5. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	*Pest free with some exceptional case (99.5%–99.9%) (Between 9,950 and 9,990 of 10,000 plants)*				
Distribution of the likelihood of pest freedom	5%	Q1	M	Q3	95%
	99.16%	99.70%	99.80%	99.87%	99.93%

Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** The oriental scale *A. orientalis* is present in Israel and reported as a pest in mango production. The insect has a wide host plant range and it is possible that the pest is present in areas where *A. julibrissin* plants are grown for export. *A. julibrissin* plants destined for export as well as their mother plants for scion collection are grown in the open field and it is possible that these plants are colonised by dispersing insects from the surrounding environment. Transfer from sources in the surrounding environment to the nursery plants is estimated to be low. Scale insect is unable to fly, and their local movement is dependent on crawlers that are transported by the wind or by phoretic dispersal (e.g. birds) **Measures taken against the pest/pathogen and their efficacy** The relevant applied measures in the nursery are: (i) regular application of insecticides; (ii) inspections over a 3-week interval; (iii) isolation of production site from other production fields within the nursery; (iv) only dormant leafless plants are exported. The combination of regular inspections and insecticide treatments is likely to eliminate any colonising scale insects **Interception records** There are no records of interceptions **Shortcomings of current measures/procedures** Plants and mother plants for the scions collection are grown in open fields. Residual efficacy of the applied insecticides may not protect the plants for the full rotation period. Newly infested trees may be difficult to detect **Main uncertainties** Pest pressure and the proximity of population sources in the surrounding environment are unknown Newly infested trees may be difficult to detect No information on the composition of the surrounding vegetation of export nurseries and other species present in the nursery

A.1.6. Elicitation outcomes of the assessment of the pest freedom for *Aonidiella orientalis*

Summary of evidence

Condition	Evidence	Uncertainties
Albizia* plants in the nursery are suitable for the pest *A. orientalis		There are no uncertainties
***A. orientalis* is present in the surrounding environment of the nursery**	There is no evidence provided that the nurseries are located in a pest-free area for the insect (Dossier Section 3.10) The pest is widespread in Israel, it has an impact at least on mango crops (Wysoki et al., 1993) and has a large host range (Scalenet, online) The mother plant stock are plants kept in the field for many years	There are no data available on the pest pressure in the area surrounding the nurseries There are no data available on the age of mother plant stock
The dispersal capacity of the pest is appropriate to migrate from the surrounding environment into the nursery	The dispersal phase of *A. orientalis* is the first instar, or crawler, which has legs. Crawlers can walk up to perhaps 1 m but can be distributed across much greater distances by wind, flying insects and birds and transport of infested plant material by man (Naturalis Biodiversity Center, online)	There are uncertainties related to the frequency of the reported dispersal events. The scale insect mainly disperses in the crawling phase and it is possible that it is transported by wind from the surrounding environment to production sites

Condition	Evidence	Uncertainties
The production method does not prevent immigrating pests	Plants are grown in open fields (Dossier Section 3.2)	There are no uncertainties
Efficacy of applied measures	During the growing period of the plants, insecticide treatments are applied in a 3-week cycle with four products (Dossier Section 5.6) Nursery plants are frequently inspected (every week by nursery staff and at a 3-week interval by NPPO) (Dossier Section 3.8) Plants for export are dormant and have no leaves	Not all insecticides are fully effective against the adults

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

- Insecticide treatments are very effective.
- The pest is not introduced in the nursery with planting material (seeds) so that crawlers from population sources in the surrounding environment have to migrate into the production fields. The distance between the fields destined for export and the alternative hosts of the pest is very large. Therefore, transfer from sources in the surrounding environment to the nursery plants is very difficult for a crawling insect.
- Suitable hosts (e.g. Mango) are not present in the production area.
- Any infesting pest will be detected during the frequent official inspections of the nursery, especially on dormant plants.
- The pressure of the pest population is low. There is no evidence in the last 10 years confirming a high impact of this pest in Israel. Scale insects have a very patchy distribution within a field, so the density of the population can be either very high/low at a local level.
- Hygienic procedures in the nurseries are appropriate.

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

- Not all insecticides are fully effective against the pest (insecticide resistance).
- The production area is next to an infested (abandoned) mango orchard or there are many infested host plants in the environment.
- The pest could go undetected during inspections of the nursery.
- Nursery workers own/work in mango groves and introduce hitchhiking insects to the nursery.
- Crawlers are transported by wind currents from the surrounding environment to the nursery.
- Hygienic procedures in the nurseries are not appropriate.

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:

- Transfer from sources in the surrounding environment to the nursery plants is very difficult for a crawling insect.
- The combination of regular inspections and insecticide treatments is likely to eliminate any colonising scale insects.

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

- The precision is given by the level of uncertainty which is higher for the values above the median.

The following Tables show the elicited and fitted values for pest/pathogen infestation (Tale A.1.1) and freedom (Table A.1.2 i.e. 1-infestation proportion expressed as percentage) agreed by the Panel: graphical representation is shown in Figure A.1.1.

Table A.1.1: Elicited and fitted values of the uncertainty distribution of pest infestation by *A. orientalis* per 10,000 plants

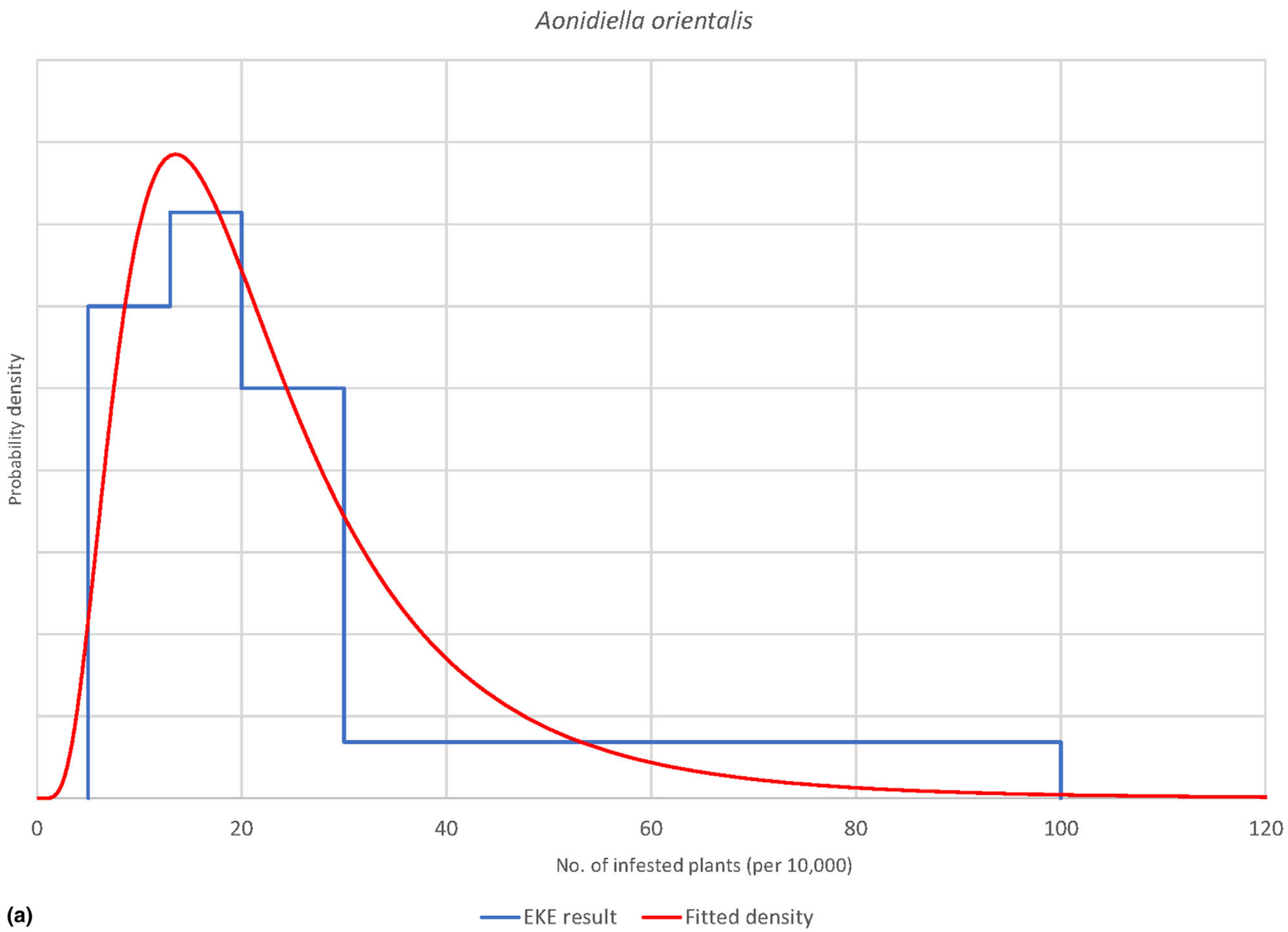
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	5.0					13.0		20.0		30.0					100.0
Fit-W	4.70	5.89	7.17	8.98	10.91	13.08	15.21	19.86	25.94	30.18	36.18	43.96	55.06	66.94	84.01

Fit-W is the Lognormal distribution (2.99, 0.62) fitted with @Risk version 7.5.

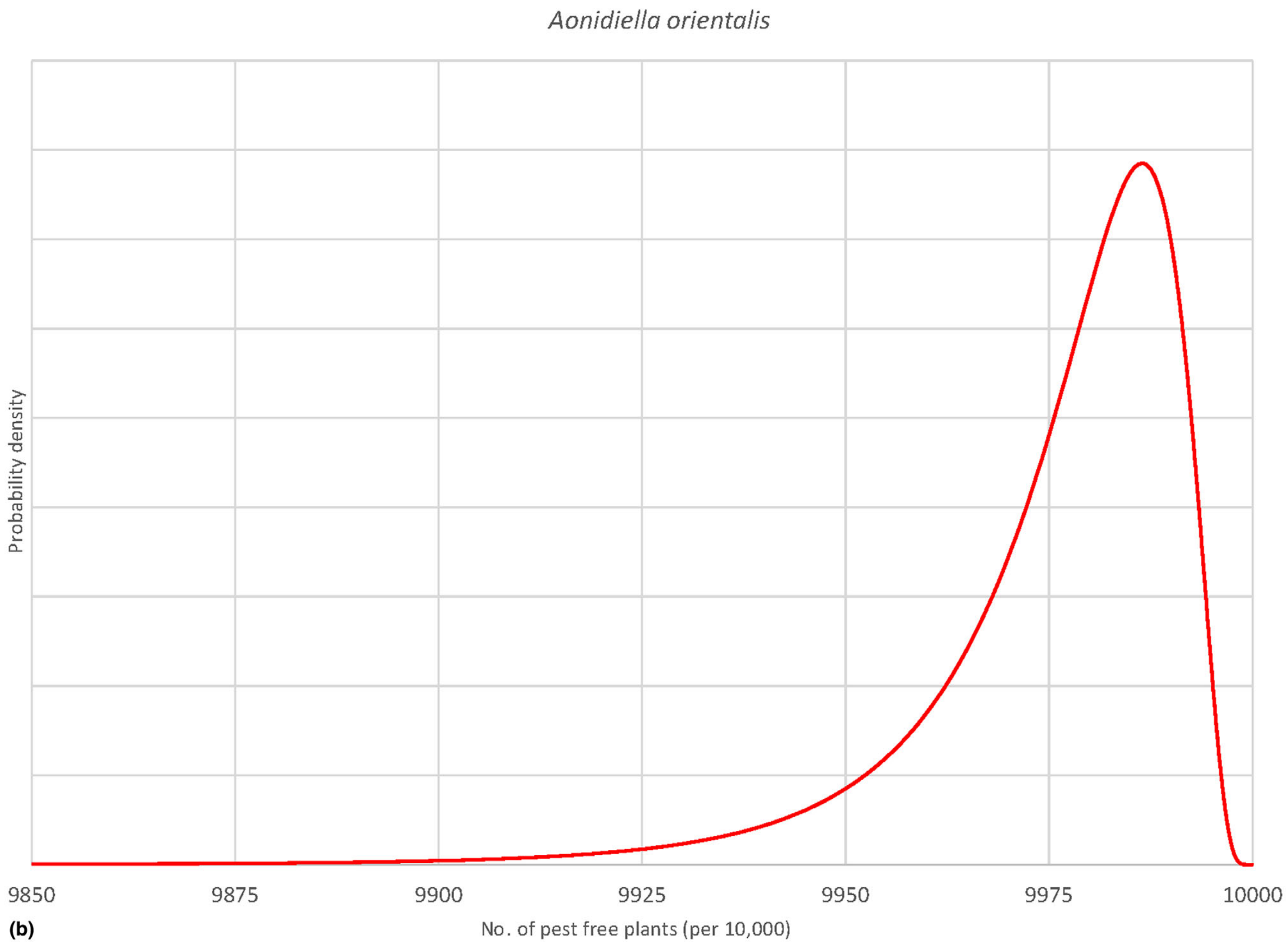
Table A.1.2: Elicited and fitted values of the uncertainty distribution of propotion of pest freedom for *A. orientalis*

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.000					99.700		99.800		99.870					99.950
Fit-W	99.160	99.331	99.449	99.560	99.638	99.698	99.741	99.801	99.848	99.869	99.891	99.910	99.928	99.941	99.953

Fit-W is the Lognormal distribution (2.99, 0.62) fitted with @Risk version 7.5.


Aonidiella orientalis
Probability density
0
20
40
60
80
100
120
No. of infested plants (per 10,000)
EKE result
Fitted density

(a)


Aonidiella orientalis
Probability density
9850
9875
9900
9925
9950
9975
10000
No. of pest free plants (per 10,000)

(b)

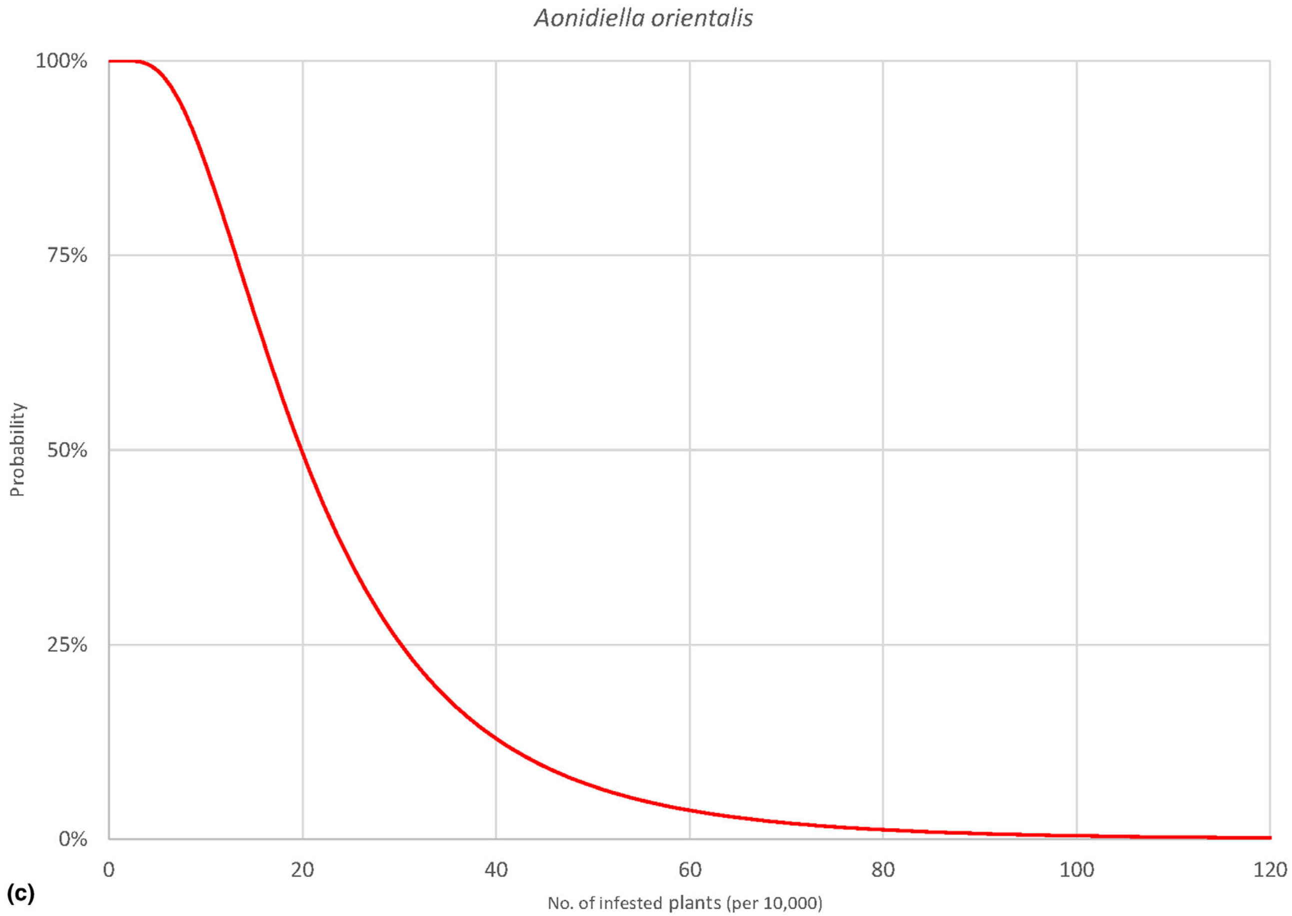


Figure A.1.1: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest-free plants per 10,000 (i.e. 1-pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 plants

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A.2. *Euwallacea fornicatus and Fusarium euwallaceae*

A.2.1. Organism information

Taxonomic information	**Insect** *Euwallacea fornicatus* (Eichhoff, 1868) In the EPPO Global Database *Euwallacea fornicatus* (polyphagus shot hole borer – PSHB) is considered as a species complex which includes: *E. fornicatus* sensu stricto, *E. fornicatior*, *E. whitforiodendrus* and *E. Kuroshio*. However, a recent taxonomic review of the species complex by Smith et al. (2019) proposed the following classification: *Euwallacea fornicatus* (= *E. tapatapaoensis* (Schedl, 1951); = *E. whitfordiodendrus* (Schedl, 1942)) syn. res.); *E. fornicatior* (Eggers, 1923) (= *E. schultzei* (Schedl, 1951) syn. nov.); *E. kuroshio* (Gomez and Hulcr, 2018) and *E. perbrevis* (Schedl, 1951) stat. res EPPO code: XYLBFO Order: Coleoptera Family: Curculionidae Common name: Polyphagous Shot Hole Borer (PSHB) Name used in the Dossier: *Euwallacea fornicatus*

	Fungus *Fusarium euwallaceae* S. Freeman, Z. Mendel, T. Aoki & O'Donnell Current valid name: *Fusarium euwallaceae* EPPO code: FUSAEW Order: Hypocreales Family: Nectriaceae Name used in the Dossier: *Fusarium euwallaceae*
Regulated status	The insect *E. fornicatus* and the fungus *F. euwallaceae* are currently not regulated in the EU Both, *E. fornicatus* and *F. euwallaceae* are listed in the EPPO A2 list and in the EPPO Alert list (formerly) (i.e. recommended for regulation)
Pest status in Israel	*E. fornicatus* and *F. euwallaceae* are present in Israel (Gomez et al., 2018; EPPO online)
Pest status in the EU	*E. fornicatus* is not present in the EU. *E. fornicatus* is reported as 'Absent, pest eradicated' in Poland (EPPO, online)
Host status on *Albizia julibrissin*	The insect *E. fornicatus* is reported to use *A. julibrissin* as a host plant (Eskalen et al., 2013) The fungus *F. euwallaceae* is reported to use *A. julibrissin* as a host plant (de Beer and Paap, 2019; Coleman et al., 2019), also in Israel (Mendel et al., 2017) Some plant species are reported to be used only as feeding hosts by PSHB where reproductive life stages (e.g. tunneling larvae, male beetles) are not reported (non-reproductive host). In the USA, *Albizia* is categorized as a reproductive host for PHSB (Greer et al., 2018). In Israel, *Albizia* is reported as a host for *E. fornicatus*, but there is no evidence concerning the use of *Albizia* as a reproductive host plant. However, the fungus was isolated from *Albizia* in Israel (Mendel et al., 2017), indicating that the beetle can transfer the fungus by feeding on the plants
Pest Risk Analysis information	Rapid Pest Risk Analysis (PRA) for polyphagous shot hole borer (*Euwallacea* sp.) and Fusarium Dieback (*Fusarium euwallaceae*) (FERA, 2015) Express PRA for the Ambrosia beetle *Euwallacea* sp. including all the species within the genus *Euwallacea* that are morphologically similar to *E. fornicatus* (Ministerio de Agricultura, Alimentacion y Medio Ambiente, 2015) Report of a Pest Risk Analysis for *Euwallacea fornicatus* sensu lato and *Fusarium euwallaceae* (EPPO, 2017)

Other relevant information for the assessment		
Biology		The polyphagous shot hole borer (PSHB) has a complex association with symbiotic fungi, particularly with *F. euwallaceae*. As reviewed by Paap et al. (2018) adults female beetles create galleries in the trees where they introduce the symbiotic fungus (being transported through the mandibular mycangia) which colonises gallery walls, becoming a food source for developing larvae and adult beetles Successful reproduction occurs mainly in thin branches which usually desiccate after about two beetle generations. If larger branches are colonised, the beetle can survive for longer periods, and may produce more generations before moving to a new breeding site (branch, tree or plantation) (Ministerio de Agricultura, Alimentacion y Medio Ambiente, 2015)
Symptoms	**Main type of symptoms**	The symptoms caused by the beetle on a tree depends on the response to the fungus infection and vary among hosts species. The beetles infest stems and branches of various diameters (from 2 to > 30 cm, corresponding to 1- to 30-year-old growth) (Mendel et al., 2012) and commonly attack the main stem and larger branches of trees and shrubs (EPPO, 2017; CABI, online) After the attack of the beetle, the fungus invades the vascular tissue of the tree. It may interfere with water and mineral transport, cause brownish staining of the xylem, cambial necrosis, branch dieback and in the worst-case scenario, the death of the tree (Ministerio de Agricultura, Alimentacion y Medio Ambiente, 2015). In general, there is a correlation between severity of the beetle attack (which therefore increases severity of infection by *Fusarium* sp.) and the observed dieback (Eskalen et al., 2013)

		F. euwallacea infections can be associated with an abundant production of blue to brownish macroconidia (Freeman et al., 2013). The symptoms include also leaf yellowing and wilting of the branches, which, when there is heavy yield, break down at the section where the beetle galleries are located. Those symptoms, together with the ones caused by the fungus associated to the beetle, could lead to the death of young and mature trees (Ministerio de Agricultura, Alimentacion y Medio Ambiente, 2015; EPPO, 2016; EPPO, 2017) A good description of symptoms on several host plant species is given by the California Department of Fish and Wildlife (online)
	Presence of asymptomatic plants	Newly infested trees exhibit few external symptoms. While there is no visible injury in the cortex at early stage of colonisation, examination of the wood under the infested spot bored by the beetle, reveals the brownish staining of the xylem and necrosis caused by the fungus (Mendel et al., 2012)
	Confusion with other pathogens/pests	In the EPPO Global Database *E. fornicatus* is considered as a complex species which includes: *E. fornicatus* sensu stricto, *E. fornicatior*, *E. whitforiodendrus* and *E. Kuroshio*. However, a recent taxonomic review of the species complex by Smith et al. (2019) proposed the following classification: *Euwallacea fornicatus* (= *E. tapatapaoensis* (Schedl, 1951); = *E. whitfordiodendrus* (Schedl, 1942) syn. res.) *E. fornicatior* (Eggers, 1923) (= *E. schultzei* (Schedl, 1951) syn. nov.); *E. kuroshio* (Gomez and Hulcr, 2018) and *E. perbrevis* (Schedl, 1951) stat. res.
Host plant range	*E. fornicatus* is one of the few ambrosia beetles that can infest healthy plants (EPPO, 2017). Eskalen et al. (2013) reported that, in the USA, more than 200 tree species were used as a host plant by *E. fornicatus* and of these species, 113 were reported as a host for the fungus *F. euwallacea* therefore, classified as reproductive hosts. Fungal infection is most likely due to susceptibility of the tree to the fungus if the beetle is able to penetrate into or through the cambium layer of tissue (Eskalen et al., 2013) According to EPPO, a non-complete list of *E. fornicatus* host plants include: *Acer buergerianum, Acer macrophyllum, Acer negundo, Acer palmatum, Acer paxii, Albizia julibrissin, Alectryon excelsus, Ailanthus altissima, Alnus rhombifolia, Castanospermum australe, Cercidium floridum, Erythrina corallodendrum, Eucalyptus ficifolia, Ilex cornuta, Liquidambar styraciflua, Parkinsonia aculeata, Persea americana, Platanus racemosa, Platanus x acerifolia, Populus fremontii, Populus trichocarpa, Prosopis articulata, Quercus suber, Quercus agrifolia, Quercus engelmannii, Quercus lobata, Quercus robur, Ricinus communis, Salix babylonica, Salix gooddingii, Salix laevigata, Wisteria floribund*a (EPPO, 2016, 2017) *F. euwallaceae* causes serious damage to more than 20 tree species, and, according to Eskalen et al. (2013) it was isolated from 113 different plant species. An attempted beetle attack may serve as an infection site for the fungus in both reproductive and non-reproductive hosts of PSHB, however in some cases *Fusarium* sp. was not able to infect the tissue (Eskalen et al., 2013) In Israel, avocado (*Persea Americana)* is the host reporting the most significant economic damage, but several ornamental species are also affected, such *as Ricinus communis, Acer negundo, Quercus pedunculiflora, Quercus robur, Platanus occidentalis, Platanus orientalis,* and *Acer buergerianum* (Mendel et al., 2017)	
Pathways	According to the PRA of EPPO (2017), the main pathways of entry are: plants for planting (except seeds) and wood of PSHB reproductive host species	
	Surveillance information	Every 21 days the PPIS is carrying out an official inspection in the nursery and an additional regular comprehensive self-inspection is performed weekly. There is no information available on surveillance of the natural environment of the production sites

A.2.2. Possibility of pest presence in the nurseries

A.2.2.1. Possibility of entry from the surrounding environment

In Israel, *Ricinus communis* (castor bean), *Acer negundo* (box elder), *Quercus pedunculiflora*, *Quercus robur*, *Persea americana*, *Platanus occidentalis*, *Platanus orientalis*, and *Acer buergerianum* are reported as reproductive hosts for PSHB and hosts of its associated fungus (*F. euwallaceae)* (Mendel et al., 2017). These reproductive hosts are significant drivers for the population dynamics of the beetle and the fungal disease. Therefore, the presence of such species in the environment of the nurseries with *Albizia* plants is an important factor for the possible migration of infected beetles into the nursery.

F. euwallaceae can be introduced into the nursery only by the insect vector *E. fornicatus*. There are divergences in the literature about the flying capacity of *Euwallacea sp*. It is considered that the beetle (only females can fly) is able to fly up to about 457 m (EPPO, 2017). Calnaido (1965) reported an estimated flight distance of 864 m without external help (e.g. wind) while Owens et al. (2019) found a maximum dispersal distance of 400 m. In any case, only a few insects fly this distance. Wind speed and direction can have a great effect on the number of beetles that disperse as well as on the distance they can cover within a single flight (Owens et al., 2019).

EPPO (2017) define as a risk area where there are many agricultural, forest and urban species that could be attacked: e.g. *Acacia* spp*., Acer negundo, Citrus* spp*., Ficus carica, Persea americana, Platanus, Populus, Quercus* and *Salix*.

There is no evidence if the nurseries are located in a pest free area for *F. euwallaceae,* so the Panel assumes that both *F. euwallaceae* and *E. fornicatus* can be present in the production areas of *Albizia* destined for export to the EU.

The Dossier states that the production fields of plants destined for export are isolated tens to hundreds of meters from fields of plants destined for local market. However, no information is provided on the presence of host plants such as *Albizia*, *Acacia* spp*., Acer negundo, Citrus* spp*., Ficus carica, Persea americana, Platanus, Populus, Quercus, Salix* in the surrounding neighbourhood of the nurseries.

<u>Uncertainties:</u>

- There is no surveillance information on the presence or population pressure of the beetles in the area where nurseries are located.
- No information available on the presence of the fungus in the area where nurseries are located.
- No information available on the proximity of the nurseries to sources of infected insect vectors or on the presence of host plants of the pathogen and the vector in the surrounding environment (at a distance of about 500 m) of the production field.

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

A.2.2.2. Possibility of entry with new plants/seeds

The source of the planting material to produce *Albizia* mother plants destined to be the source of scions for production for export is imported seeds from the Netherlands.

Plants are grown from seeds imported from the Netherlands and therefore entry with new plants/seeds is highly unlikely.

<u>Uncertainties:</u>

- There are no uncertainties

Taking into consideration the above evidence and uncertainties, the Panel considers that it is highly unlikely for the insect and the pathogen to enter the nursery with new plants/seeds.

A.2.2.3. Possibility of spread within the nursery

Introduction by the use of infected soil or water is not relevant for this risk assessment.

It is also highly unlikely that the pathogen and its vector are transported by means of growing practices.

<u>Uncertainties</u>

- No information is available related to the plant species produced in the nurseries beside *A. julibrissin*.
- No information is available for the isolation or proximity of the mother plant stock for scion collection to other species in the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nurseries is possible.

A.2.3. Information on trade and interceptions

Approximately 25,000-30,000 *A. julibrissin* plants are imported annually from Israel to the EU. In the EUROPHYT database (1995–2019), considering all the import of *A. julibrissin* to the EU there are only two records of notification for which no harmful organism was reported (EUROPHYT, online).

A.2.4. Evaluation of the risk reduction options

In the table below, all the risk mitigation measures (RROs) currently applied in Israel are summarised and an indication of their effectiveness on *E. fornicatus* and *F. euwallaceae* is provided.

Number of the RRO	Risk reduction options	Current measures in Israel	Relevant	Evaluation of RROs for *E. fornicatus*
RRO1	Characteristics of the production field	The plants destined for export, are grown in different fields from the crops destined for the local market, with 10s to 100s of meters a minimum distance between a field for the local market and a field for export		Beetles may immigrate the production fields from the surrounding environment. Dispersal distance is reported up to 400 m
RRO2	Soil Treatments	In summer, before a new crop, open field soil preparation and solarisation	No	
RRO3	Rotation of the growing fields	Rotation of the growing fields between different locations in a manner of a 'growing cycle'	No	
RRO4	Insecticide treatment	During the growing season, production fields are treated in a 3-week cycle with preventative treatments, i.e. rotation of the following pesticides: Atlas (Bifenthrin), Ipon (Dinotefuran), Imidan (Phosmet) and EOS (Eco Oil Spray)	Yes	Residual efficacy of the applied insecticides may not protect the plants for the full rotation period
RRO5	Fungicide treatment	Post-harvest treatment: The bare rooted plants are rinsed and soaked in 'Merpan' 0.5%. The plants are packed after Merpan has evaporated to dryness	Yes	Merpan is a preventative treatment. Therefore, it has no effects on plants that are already infected Chilling storage is not expected to kill the fungus inside the plant
RRO6	Nematicide treatment	Against nematodes: treatment with Nemakor (Fenamiphos)	No	
RRO7	Treatment against weeds	Weeds are treated with Faster (Glufosinate ammonium)	No	
RRO8	Root treatment washing	December – lifting one or two years the plants from the field, washing the soil off the roots, selecting, grading and packing them in boxes	No	
RRO9	Sampling and testing	Root samples with attached soil are tested once during the active growth for nematodes	No	

Number of the RRO	Risk reduction options	Current measures in Israel	Relevant	Evaluation of RROs for *E. fornicatus*
RRO10	Official Supervision by PPIS	All plants for planting exported from Israel originate from nurseries that are approved by PPIS and are under PPIS inspection. Whenever a harmful organism of interest is found at any production site, the grower is required to inform PPIS and to treat the site as appropriate. During consecutive inspections, if there is no further evidence to the presence of the pest, the PPIS considers the site of production to be free from this harmful organism. (Dossier, FVO report)	Yes	
RRO11	Inspections of nurseries that export plants	The production sites are regularly monitored on a weekly basis. Every 21 days the Plant Protection and Inspection Service of Israel is carrying out an official inspection in the nursery and an additional regular comprehensive self-inspection is performed weekly Before export the bare rooted plants are rinsed and checked individually for selecting and grading	Yes	Given the inspection frequency it is likely that the vector is detected. However, newly infested trees may be difficult to detect
RRO 12	Surveillance and monitoring	No information available on specific surveys in the natural environment/ surrounding environment of the production areas (i.e. inspections outside production fields)	Yes	No specific surveillance protocol has been described for *E. fornicatus* around and within production plots

A.2.5. Overall likelihood of pest freedom

Rating of the likelihood of pest freedom	*Pest free with some exceptional case (99.5% – 99.9%) (Between 9,950 and 9,990 of 10,000 plants)*				
Distribution of the likelihood of pest freedom	5%	Q1	M	Q3	95%
	99.57%	99.81%	99.89%	99.94%	99.98%
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** The polyphagous shot hole borer (PSHB) and *F. euwallaceae* are widespread in Israel and occur in the area where the export nurseries are located. The insect (vector) and the fungus can be present in several plant species such as avocado (*Persea americana*), castor bean (*Ricinus communis*), box elder (*Acer negundo*), *Quercus pedunculiflora*, *Quercus robur*, *Platanus occidentalis*, *Platanus orientalis* and *Acer buergerianum* in the surrounding environment. *A. julibrissin* plants for exports are grown in open fields, therefore they can be invaded by incoming infected beetles. *A. julibrissin* is reported to be a reproductive host for PSHB in the USA. The exported plants are at maximum two-years old and the diameter of the stem may not be large enough to host the PSHB. However, mother plants for scion collection are older, therefore, it is possible to host both the beetle and the fungus				

	Measures taken against the pest/pathogen and their efficacy The relevant applied measures are: (i) regular application of insecticides and fungicides treatments; (ii) inspections at three weeks interval; (iii) isolation from other production fields within the nursery; (iv) only dormant leafless plants are exported These measures will greatly reduce the probability that *E. fornicatus* and *F. euwallaceae* are present in consignments destined for export **Interception records** There are no records of interceptions **Shortcomings of current measures/procedures** Plants and mother plants for the scions collection are grown in open fields. Residual efficacy of the applied insecticides may not protect the plants for the full rotation period. Newly infested trees may be difficult to detect. No surveillance trapping has been put in place to ensure the absence of *E. fornicatus* in the plots **Main uncertainties** Pest pressure and the proximity of population sources in the surrounding environment is unknown Trees may be too young for beetle attack Newly infested trees may be difficult to detect The age of mother plants for scion collection No information on the composition of the surrounding vegetation of export nurseries and other species present in the nursery

A.2.6. Elicitation outcomes of the assessment of the pest freedom for *Euwallacea fornicatus* and *Fusarium euwallacea*

Condition	Evidence	Uncertainties
***Albizia* plants in the nursery are suitable/attractive for feeding by beetles and fungal colonisation**	Export plants in nursery are 1-2 years old (Dossier Section 3.2) Mother plant stock are older and bigger and may be more prone for attack (Dossier Section 3.7) Beetles are reported to attack branches of various diameters (from 2 to > 30 cm, corresponding to 1- to 30-year-old growth) (Mendel, 2012; 2017)	Trees may be too young for beetle attack Exact diameter of the export trees is unknown Exact age of the mother plant stock is unknown
The vector and fungus are present in the surrounding environment of the nursery	There is no evidence if the nurseries are located in a pest free area for the vector and fungus (Dossier Section 5.6) There is proximity with the area where avocado is grown (i.e. major inoculum and vector sources) and the location of the export nurseries (Dossier Section 3.10) Vector and fungus have a large host range and for example the following plant species are known to be attacked in Israel *Acacia* spp., *Acer negundo, Citrus* spp., *Ficus carica, Persea americana, Platanus, Populus, Quercus, Salix* (EPPO, 2017)	No information on the composition of the surrounding vegetation of export nurseries and other species present in the nursery Information on population density is lacking

Condition	Evidence	Uncertainties
	The production fields of plants destined for export are isolated tens to hundreds of meters from fields of plants for local market (Dossier Section 3.11) The insect vector and fungus have not been reported in the exporting nurseries in Israel (Dossier Section 5.6)	
The dispersal capacity of the vector is appropriate to migrate from the surrounding environment into the nursery	Dispersal capacity is reported to be up to 400 m (Owens, 2019) Wind speed and direction can have a great effect on the number of beetles that disperse as well as on the distance they can cover with a single flight (Owens et al., 2019)	The proximity of population sources and export nurseries is unknown
The production method does not prevent migrating vectors	Plants are grown in the open field (Dossier Section 3.2)	
Efficacy of applied measures	During the growing period of the plants, insecticide treatments are applied in a 3-week cycle with four products. Effective insecticide treatment of colonized trees is difficult because *E. fornicatus* feeds deep in the wood of infested branches (CABI) Plants for export are soaked in a fungicide (Merpan). In the dossier (Appendix E - Dossier) it is stated that 'preventive fungicide treatments are applied on mother plants of the grafted scions large enough in diameter to host *E. fornicatus*' Nursery plants are frequently inspected (every week by nursery staff and at a 3-week interval by NPPO) (Dossier Section 3.8) Plants for export are dormant and have no leaves	No details are given on product and frequency of the fungicides applied to the mother plants

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

- Production areas are isolated from the area where the vector and the pathogen are present.
- Plants in the surrounding environment are not hosts of the vector and the pathogen.
- Low pressure of the vector.
- The inspection regime would be effective (detection of the vector).
- Scions are collected only from mother plants that are free from *E. fornicatus*.
- The insect vector and the fungus are not reported in the exporting nurseries in Israel.
- The age and size of the exported plants is unsuitable for colonisation.

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

- Production areas are in places where the vector and the pathogen are present.
- Host plants of the vector and the pathogen are abundant in the surrounding environment (e.g. *Persea* sp.).
- High pressure of the vector (abandoned infested/infected neighbouring fields).
- Asymptomatic plants remain undetected.

- Presence of the vector in the environment is not detected.
- Risk mitigation measures in place are not fully effective, insecticide and fungicide treatment cannot prevent colonisation of 2-year-old trees and mother plants.

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:

- The age and size of the export plants are not optimal for beetle attack;
- The plants are regularly treated with insecticides and fungicides;
- Plants are regularly inspected at three weeks interval;
- There are no records of interceptions;
- The dispersal capacity of PSHB is limited.

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

- The clarification is given by the level of uncertainty which is higher for the values above the median.

The following Tables show the elicited and fitted values for pest/pathogen infestation (Table A.2.1) and freedom (Table A.2.2 i.e. 1-infestation proportion expressed as percentage) agreed by the Panel: graphical representation is shown in Figure A.2.1

Table A.2.1: Elicited and fitted values of the uncertainty distribution of pest infestation by *Euwallacea fornicatus* and *Fusarium euwallaceae* per 10,000 plants

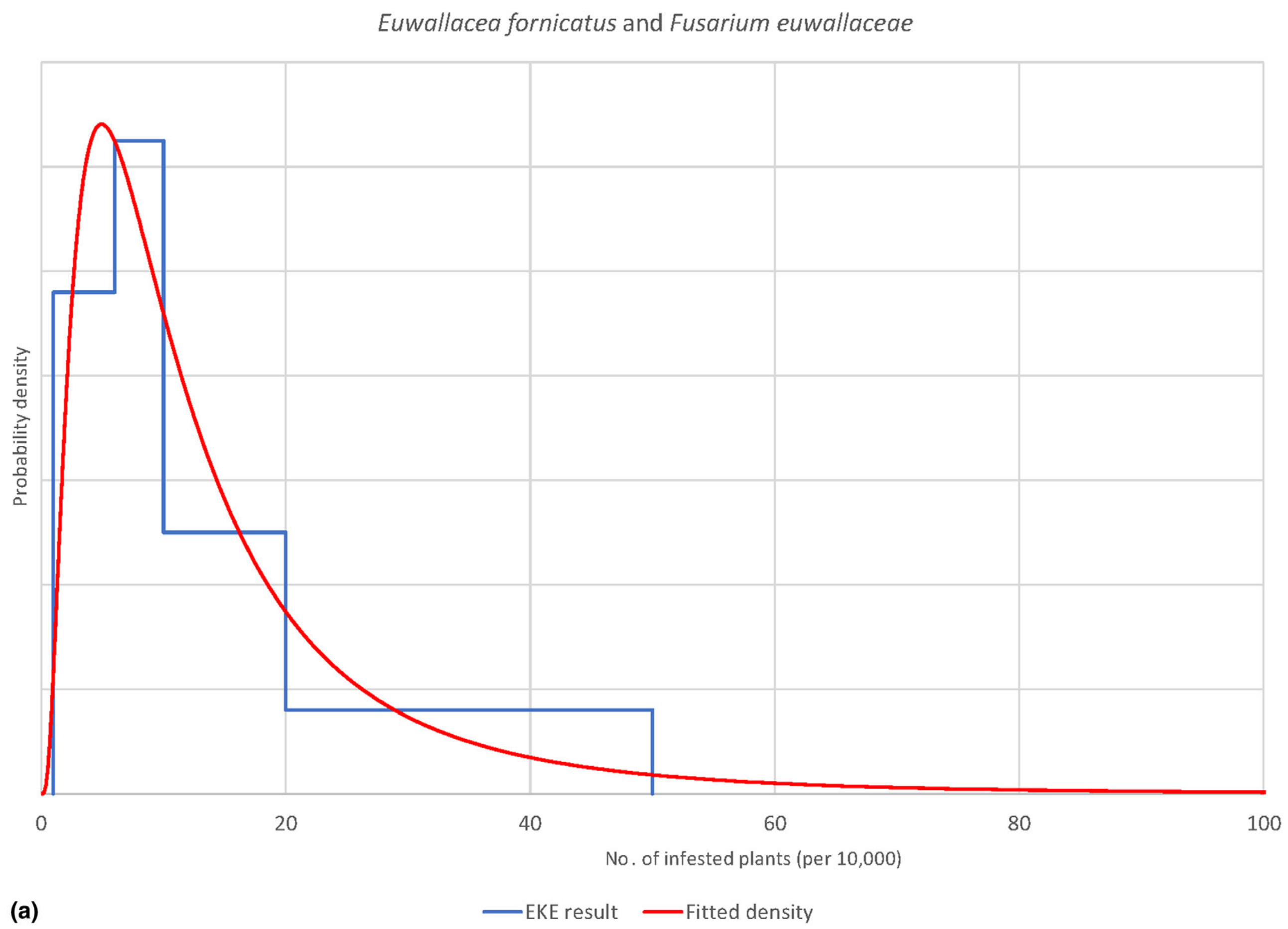
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	1.0					6.0		10.0		20.0					50.0
Fit-G	1.39	1.92	2.52	3.45	4.53	5.83	7.20	10.46	15.19	18.76	24.18	31.74	43.48	57.12	78.46

Fit-G is the Lognormal distribution (15.222,16.09) fitted with @Risk version 7.5.

Table A.2.2: Elicited and fitted values of the uncertainty distribution of proportion of pest freedom for *Euwallacea fornicatus* and *Fusarium euwallaceae*

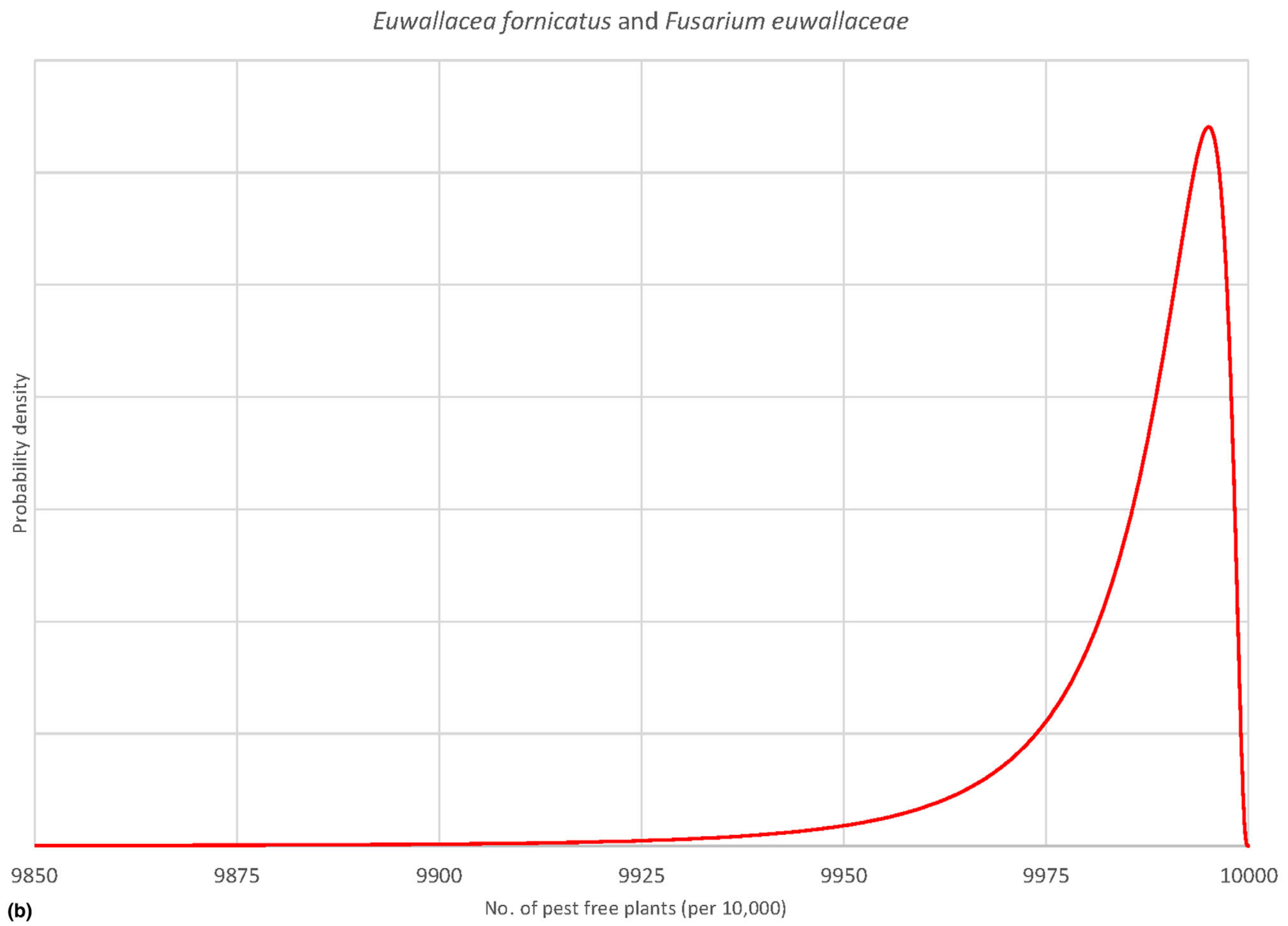
Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
EKE	99.500					99.800		99.900		99.940					99.990
Fit-G	99.215	99.429	99.565	99.683	99.758	99.812	99.848	99.895	99.928	99.942	99.955	99.966	99.975	99.981	99.986

Fit-G is the Lognormal distribution (15.222, 16.09) fitted with @Risk version 7.5.



Euwallacea fornicatus and *Fusarium euwallaceae*
Probability density
0
20
40
60
80
100
No. of infested plants (per 10,000)
EKE result
Fitted density

(a)


Euwallacea fornicatus and *Fusarium euwallaceae*
Probability density
9850
9875
9900
9925
9950
9975
10000
No. of pest free plants (per 10,000)

(b)

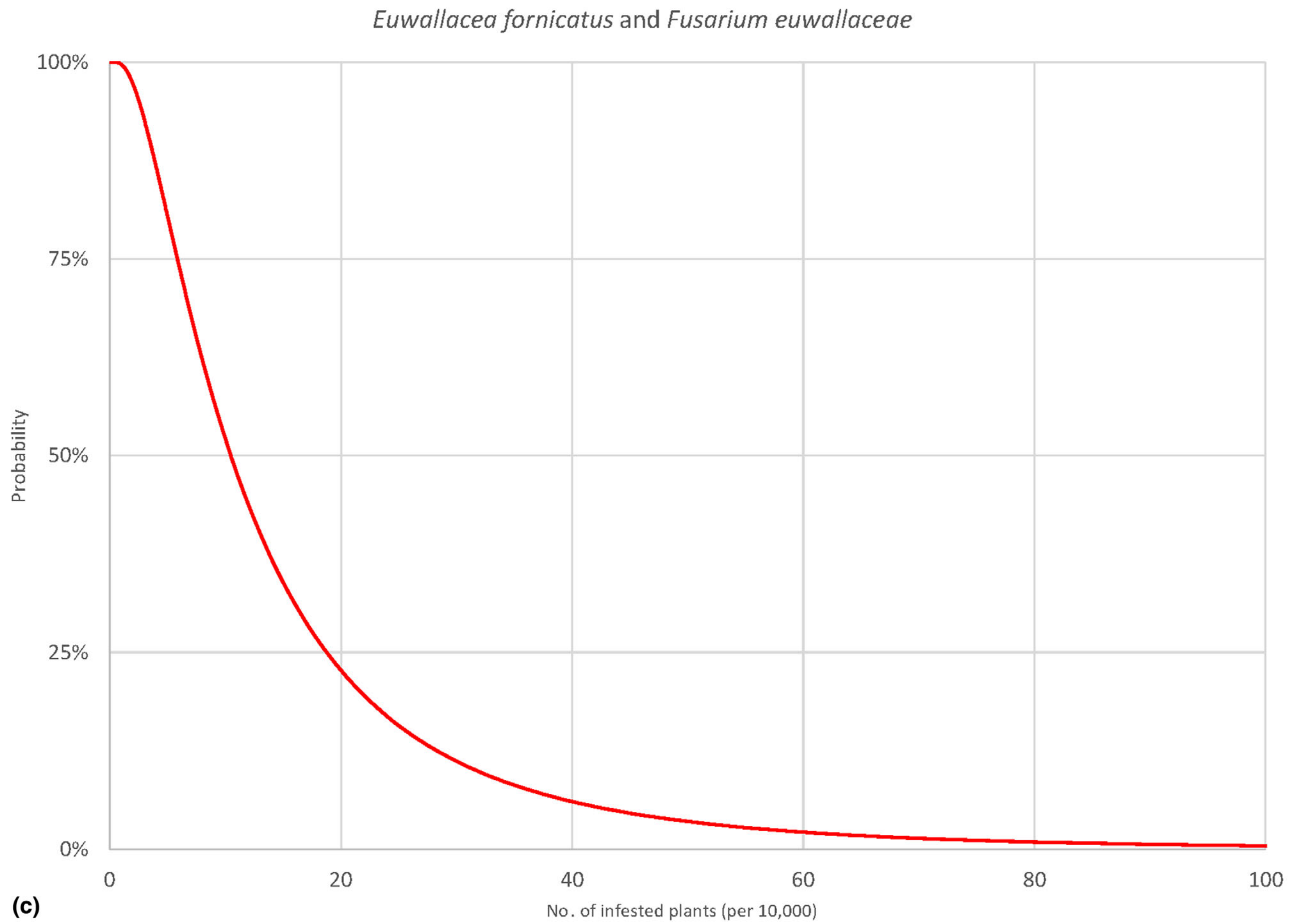


Figure A.2.1: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest free plants per 10,000 (i.e. 1-pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 plants

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Appendix B – List of pests that can potentially cause an effect not further assessed

Table B.1: List of pests present in Israel which can potentially cause an impact not further assessed

Group	Pest species of *Albizia julibrissin*	Taxonomic information	Reasoning for inclusion and uncertainties
INS	*Ferrisia malvastra*	Hemiptera, Pseudococcidae	Scale; reported on *Albizia julibrissin;* known polyphagous pest; present in ISR and Spain (only)
INS	*Maconellicoccus hirsutus*	Hemiptera, Pseudococcidae	Scale; present in Greece; absent according to EPPO; present in Israel as Quarantine species
INS	*Nipaecoccus viridis*	Hemiptera, Pseudococcidae	Scale; known as pest; present in Israel (CABI); known pest in Israel for the genus *Albizia*; uncertainty if *A. julibrissin* is a host
INS	*Russellaspis pustulans*	Hemiptera, Asterolecaniidae	Scale; genus reported as pest; reported on other *Albizia* species; present in Israel (Scalenet); uncertainty if *A. julibrissin* is a host
NEM	*Xiphinema elongatum*	Dorylaimida, Longidoridae	Present in Israel; absent in the EU; *Xiphinema* genus includes polyphagous pests; host status on *Albizia* uncertain
NEM	*Xiphinema ingens*	Dorylaimida, Longidoridae	Present in Israel; absent in the EU; *Xiphinema* genus includes polyphagous pests; host status on *Albizia* uncertain
NEM	*Xiphinema pini*	Dorylaimida, Longidoridae	Present in Israel; absent in the EU; *Xiphinema* genus includes polyphagous pests; host status on *Albizia* uncertain
NEM	*Xiphinema insigne*	Dorylaimida, Longidoridae	Present in Israel; absent in the EU; *Xiphinema* genus includes polyphagous pests; host status on *Albizia* uncertain

Appendix C – Excel file with the pest list of *Albizia julibrissin*

Excel file with all EU and non-EU regulated pests.