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Commodity risk assessment of *Ligustrum delavayanum* topiary plants grafted on *Ligustrum japonicum* from the UK

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Abstract

The European Commission requested the EFSA Panel on Plant Health to prepare and deliver risk assessments for commodities listed in Commission Implementing Regulation (EU) 2018/2019 as 'High risk plants, plant products and other objects'. This Scientific Opinion covers plant health risks posed by evergreen 3- to 20-year-old topiary plants of *Ligustrum delavayanum* grafted on *L. japonicum* in pots imported from the UK, taking into account the available scientific information, including the technical information provided by the UK. All pests associated with the commodity were evaluated against specific criteria for their relevance for this Scientific Opinion. One EU quarantine pest (*Scirtothrips dorsalis*), one EU protected zone quarantine pest [(*Bemisia tabaci* (European populations)] and two EU non-regulated pests (*Diaprepes abbreviatus* and *Epiphyas postvittana*) fulfilled all relevant criteria and were selected for further evaluation. For the selected pests, the risk mitigation measures described in the technical dossier from the UK were evaluated taking into account the possible limiting factors. For these pests, an expert judgement is given on the likelihood of pest freedom taking into consideration the risk mitigation measures acting on the pest, including uncertainties associated with the assessment. While the estimated degree of pest freedom varied among pests, *E. postvittana* was the pest most frequently expected on the commodity. The Expert Knowledge Elicitation indicated, with 95% certainty, that 9,724 or more living sculptures per 10,000 would be free from *E. postvittana*.

Keywords: *Ligustrum*, privet, European Union, commodity risk assessment, plant health, plant pest

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1. Introduction

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

1.1.1. Background

The Plant Health Regulation (EU) 2016/2031[1], on the protective measures against pests of plants, has been applied from 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 in Regulation (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 Act 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 ongoing, 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 organisations needs to be set.

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002, the Commission asked EFSA to provide scientific opinion in the field of plant health for *Ligustrum delavayanum* and *L. japonicum* from the UK taking into account the available scientific information, including the technical dossier provided by the UK.

1.2. Interpretation of the Terms of Reference

The EFSA Panel on Plant Health (hereafter referred to as 'the Panel') was requested to conduct a commodity risk assessment of *Ligustrum delavayanum* and *L. japonicum* from the UK following the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019) taking into account the available scientific information, including the technical information provided by the UK. After assessing the Dossier, the commodity turned out to be produced by grafting *Ligustrum delavayanum* on *L. japonicum* rootstock. *Ligustrum delavayanum* and *L. japonicum* are relatively poorly studied. Therefore, the assessment was performed based on literature search by using all *Ligustrum* species as keywords.

In accordance with the Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, and in particular Article 5(4) of the Protocol on Ireland/Northern Ireland in conjunction with Annex 2 to that Protocol, for the purposes of this Opinion, references to the United Kingdom do not include Northern Ireland.

[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.

The EU quarantine pests that are regulated as a group in the Commission Implementing Regulation (EU) 2019/2072[4] were considered and evaluated separately at species level.

Annex II of Implementing Regulation (EU) 2019/2072 lists certain pests as non-European populations or isolates or species. These pests are regulated quarantine pests. Consequently, the respective European populations, or isolates, or species are non-regulated pests.

Annex VII of the same Regulation in certain cases (e.g. point 32) makes reference to the following countries that are excluded from the obligation to comply with specific import requirements for those non-European populations, or isolates, or species: Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts): Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (SeveroZapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug), San Marino, Serbia, Switzerland, Turkey, Ukraine and the United Kingdom (except Northern Ireland[5]).

Consequently, for those countries,

i) any pests identified, which are listed as non-European species in Annex II of Implementing Regulation (EU) 2019/2072 should be investigated as any other non-regulated pest.
ii) Any pest found in a European country that belongs to the same denomination as the pests listed as non-European populations or isolates in Annex II of Implementing Regulation (EU) 2019/2072 should be considered as European populations or isolates and should not be considered in the assessment of those countries.

Pests listed as 'Regulated Non-Quarantine Pest' (RNQP) in Annex IV of the Commission Implementing Regulation (EU) 2019/2072, and deregulated pests (i.e. pests which were listed as quarantine pests in the Council Directive 2000/29/EC[6] and were deregulated by Commission Implementing Regulation (EU) 2019/2072) were not considered for further evaluation. In case a pest is at the same time regulated as an RNQP and as a protected zone quarantine pest; in this Opinion, it should be evaluated as Quarantine pest.

In its evaluation, the Panel:

- Checked whether the provided information in the technical dossier (hereafter referred to as 'the Dossier') provided by the applicant (United Kingdom, Department for Environment Food and Rural Affairs – hereafter referred to as 'DEFRA') was sufficient to conduct a commodity risk assessment. When necessary, additional information was requested to the applicant.
- Selected the relevant Union quarantine pests and protected zone quarantine pests (as specified in Commission Implementing Regulation (EU) 2019/2072, hereafter referred to as 'EU quarantine pests') and other relevant pests present in the UK and associated with the commodity.
- Did not assess the effectiveness of measures for Union quarantine pests for which specific measures are in place for the import of the commodity from the UK in Commission Implementing Regulation (EU) 2019/2072 and/or in the relevant legislative texts for emergency measures and if the specific country is in the scope of those emergency measures. The assessment was restricted to whether or not the applicant country implements those measures.
- Assessed the effectiveness of the measures described in the Dossier for those Union quarantine pests for which no specific measures are in place for the importation of the commodity from the UK and other relevant pests present in the UK and associated with the commodity.

[4] Commission Implementing Regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031 of the European Parliament and the Council, as regards protective measures against pests of plants, and repealing Commission Regulation (EC) No 690/2008 and amending Commission Implementing Regulation (EU) 2018/2019. OJ L 319, 10.12.2019, pp. 1–279.

[5] In accordance with the Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, and in particular Article 5(4) of the Protocol on Ireland/ Northern Ireland in conjunction with Annex 2 to that Protocol, for the purposes of this Opinion, references to Member States include the United Kingdom in respect of Northern Ireland.

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

Risk management decisions are not within EFSA's remit. Therefore, the Panel provided a rating based on expert judgement regarding the likelihood of pest freedom for each relevant pest given the risk mitigation measures proposed by DEFRA of the UK.

2. Data and methodologies

2.1. Data provided by DEFRA of the UK

The Panel considered all the data and information (hereafter called 'the Dossier') provided by DEFRA of the UK in December 2021 including the additional information provided by DEFRA of the UK in May 2022, after EFSA's request. 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	Technical dossier	Ligustrum commodity information Agrumi-FINAL
2.0	Pest list	Ligustrum_UK_pest_list
3.0	Additional information	Apr2022-EFSA_additional-information-2022-05-04-FINAL
4.0	Details on *Epiphyas postvittana*	Epiphyas postvittana details

The data and supporting information provided by DEFRA of the UK formed the basis of the commodity risk assessment. Table 2 shows the main data sources used by DEFRA of the UK to compile the Dossier (Dossier Sections 1.0 and 2.0).

Table 2: Databases used in the literature searches by DEFRA of the UK

Database	Platform/Link
Aphids on the world's plants	http://www.aphidsonworldsplants.info/
Aphid Species File	http://aphid.speciesfile.org/
APS (The American Phytopathological Society)	https://www.apsnet.org/Pages/default.aspx
Biological Records Centre	https://www.brc.ac.uk/
CABI Crop Protection Compendium	https://www.cabi.org/cpc/
CABI Plantwise Knowledge Bank	https://www.plantwise.org/knowledgebank/
Checklist of Aphids of Britain	https://influentialpoints.com/aphid/Checklist_of_aphids_in_Britain.htm
Database of the World's Lepidopteran Host Plants	http://www.nhm.ac.uk/our-science/data/hostplants/
EPPO Global Database	https://gd.eppo.int/
Fauna Europaea	https://fauna-eu.org/t/
Field Mycology	https://basidiochecklist.science.kew.org/BritishFungi/index.htm
FRDBI (The Fungal Records Database of Britain and Ireland)	http://www.frdbi.info/
GBIF (Global Biodiversity Information Facility)	https://www.gbif.org/
ICAR – National Bureau of Agricultural Insect Resources	https://www.nbair.res.in/
Identification of Common *Phytophthora* Species	http://hpc.ilri.cgiar.org/beca/training/IMBB_2016/Phytophtora_CD_update/start.html
Index Fungorum	http://www.indexfungorum.org/
L'Inventaire national du patrimoine naturel (INPN)	https://inpn.mnhn.fr/accueil/index
MycoBank	http://www.mycobank.org/
Scalenet	https://scalenet.info/
The British Mycological Society Fungal Records Database	https://www.britmycolsoc.org.uk/field_mycology/fungal_recording

Database	Platform/Link
The GB Checklist of Fungal Names	https://basidiochecklist.science.kew.org/BritishFungi/GBCHKLST/gbchklst.htm
The Royal Horticultural Society	https://www.rhs.org.uk/
The Sawflies (Symphyta) of Britain and Ireland	https://www.sawflies.org.uk/
UKmoths	https://ukmoths.org.uk/
UK Plant Health Information Portal	https://planthealthportal.defra.gov.uk/
USDA fungal database	https://nt.ars-grin.gov/fungaldatabases/

2.2. Literature searches performed by EFSA

Literature searches in different databases were undertaken by EFSA to complete a list of pests potentially associated with *Ligustrum* species. The following searches were combined: (i) a general search to identify pests reported on *Ligustrum* species in the databases, and subsequently (ii) a tailored search to identify whether the above pests are present or not in the UK. The searches were run between 18 February 2022 and 1 March 2022. No language, date or document type restrictions were applied in the search strategy.

The Panel used the databases indicated in Table 3 to compile the list of pests associated with *Ligustrum* species. As for Web of Science, the literature search was performed using a specific, ad hoc established search string (see Appendix B). The string was run in 'All Databases' with no range limits for time or language filters. This is further explained in Section 2.3.2.

Table 3: Databases used by EFSA for the compilation of the pest list associated with *Ligustrum* spp.

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/
EUROPHYT	https://webgate.ec.europa.eu/europhyt/
Leaf-miners	http://www.leafmines.co.uk/html/plants.htm
Nemaplex	http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx
New Zealand Fungi	https://nzfungi2.landcareresearch.co.nz/default.aspx?NavControl=search&selected=NameSearch
NZFUNGI – New Zealand Fungi (and Bacteria)	https://nzfungi.landcareresearch.co.nz/html/mycology.asp?ID=
Plant Pest Information Network	https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/
Plant Viruses Online	http://www1.biologie.uni-hamburg.de/b-online/e35/35tmv.htm#Range
Scalenet	http://scalenet.info/associates/
Spider Mites Web	https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php
USDA ARS Fungal 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 Index, FSTA, KCI-Korean Journal Database, Russian Science Citation Index, MEDLINE, SciELO Citation Index, Zoological Record)	Web of Science https://www.webofknowledge.com

Database	Platform/Link
World Agroforestry	http://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749

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. Regulation (EU) 2016/2031; Commission Implementing Regulations (EU) 2018/2019; (EU) 2018/2018 and (EU) 2019/2072) were taken into account.

2.3. Methodology

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

In the first step, pests potentially associated with the commodity in the country of origin (EU-quarantine pests and other pests) that may require risk mitigation measures are identified. The EU non-quarantine pests not known to occur 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 implemented risk mitigation measures for each relevant pest were evaluated.

A conclusion on the pest freedom status of the commodity for each of the relevant pests was determined and uncertainties identified using expert judgements.

Pest freedom was assessed by estimating the number of infested/infected units out of 10,000 exported units. Further details on the methodology used to estimate the likelihood of pest freedom are provided in Section 2.3.4.

2.3.1. Commodity data

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

2.3.2. Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of the commodity from the UK, a pest list was compiled. The pest list is a compilation of all identified plant pests reported as associated with all species of *Ligustrum* based on information provided in Dossier Sections 1.0, 2.0, 3.0 and 4.0 and on searches performed by the Panel. The search strategy and search syntax were adapted to each of the databases listed in Table 3, according to the options and functionalities of the different databases and CABI keyword thesaurus.

The scientific names of the host plants (i.e. *Ligustrum* species) were used when searching in the EPPO Global database and CABI Crop Protection Compendium. The same strategy was applied to the other databases excluding EUROPHYT and Web of Science.

EUROPHYT was investigated by searching for the interceptions associated with *Ligustrum* species imported from the whole world from 1995 to May 2020 and TRACES-NT from May 2020 to 12 April 2022, respectively. For the pests selected for further evaluation, a search in the EUROPHYT and/or TRACES-NT was performed for the years between 1995 and April 2022 for the interceptions from the whole world, at species level.

The search strategy used for Web of Science Databases was designed combining English common names for pests and diseases, terms describing symptoms of plant diseases and the scientific and English common names of the commodity and excluding pests which were identified using searches in other databases. The established search string is detailed in Appendix B and was run on 23 February 2022.

The titles and abstracts of the scientific papers retrieved were screened and the pests associated with *Ligustrum* species were included in the pest list. The pest list was eventually further compiled with other relevant information (e.g. EPPO code per pest, taxonomic information, categorisation, distribution) useful for the selection of the pests relevant for the purposes of this Opinion.

The compiled pest list (see Microsoft Excel® in Appendix D) includes all identified pests that use as host *Ligustrum* species.

The evaluation of the compiled pest list was done in two steps: first, the relevance of the EU-quarantine pests was evaluated (Section 4.1); second, the relevance of any other plant pest was evaluated (Section 4.2).

Pests for which limited information was available on one or more criteria used to identify them as relevant for this Opinion, e.g. on potential impact, are listed in Appendix C (List of pests that can potentially cause an effect not further assessed).

2.3.3. Listing and evaluation of risk mitigation measures

All implemented risk mitigation measures were listed and evaluated. When evaluating the likelihood of pest freedom of the commodity, the following types of potential infection/infestation sources for *Ligustrum delavayanum* and *L. japonicum* in export nursery were considered (see also Figure 1):

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

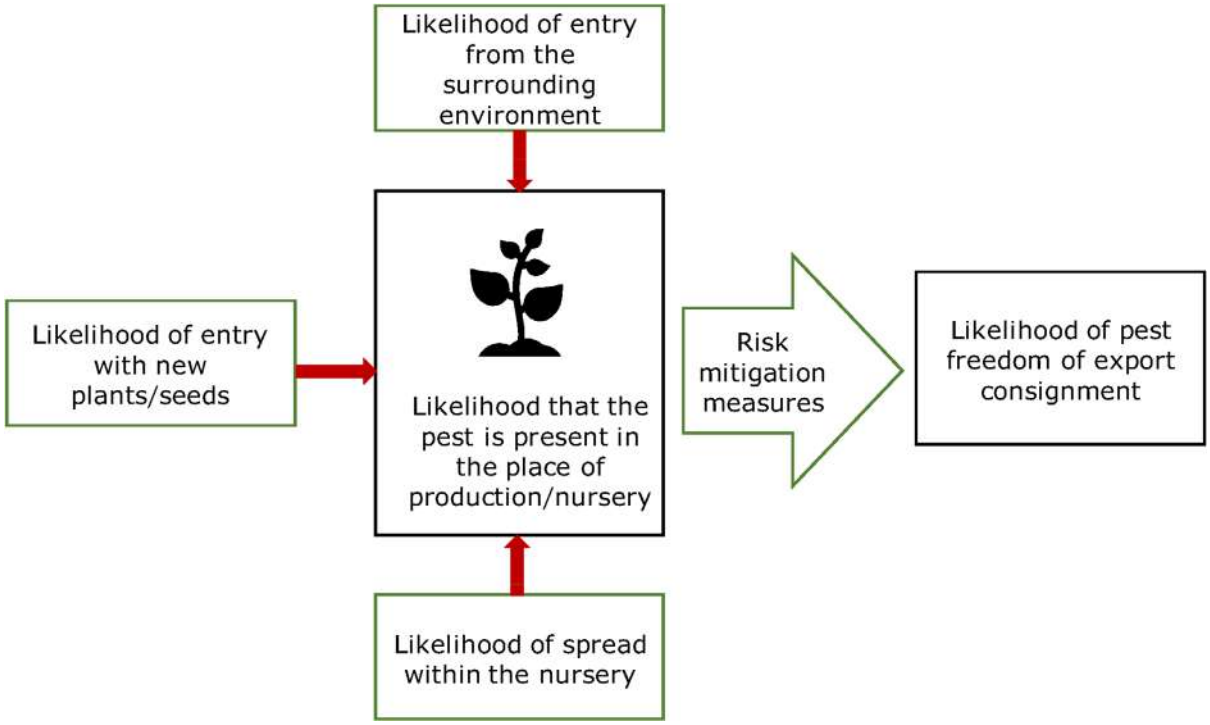

Figure 1: Conceptual framework to assess likelihood that plants are exported free from relevant pests (Source: EFSA PLH Panel, 2019)

The risk mitigation measures proposed by DEFRA of the UK were evaluated with Expert Knowledge Elicitation (EKE) according to the Guidance on uncertainty analysis in scientific assessment (EFSA Scientific Committee, 2018).

Information on the biology, likelihood of entry of the pest to the export nursery, of its spread inside the nursery and the effect of measures on the specific pests were summarised in data sheets of pests selected for further evaluation (see Appendix A).

2.3.4. Expert Knowledge Elicitation

For the evaluation, the commodity is defined as one living sculpture (see below). This sculpture may consist of up to 10 single plants of different sizes and ages, which are planted in a single pot and/or assembled on a single frame. This definition is reasoned by the specific type of the product, which may be customised for an individual order, exported and distributed individually in the EU. To estimate the pest freedom of the commodity, an EKE was performed following EFSA guidance (Annex B.8 of EFSA Scientific Committee, 2018). The specific question for 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

living sculptures will be infested with the relevant pest when arriving in the EU?'. The EKE question was common to all pests for which the pest freedom of the commodity was estimated. Most of the handling and control will be done at the production of the living sculpture. Differences in the production conditions of *L. delavayanum* plants used for one living sculpture are considered in the EKE. In the assessment, only large living sculptures of minimum sizes of 1 m are considered. Smaller living sculptures of younger plants and in smaller pots may have a lower risk but were not separately specified in the dossier.

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 consists of large topiary evergreen plants (hereafter referred as living sculptures) of *Ligustrum delavayanum* plants grafted onto *L. japonicum* rootstocks grown in pots. Individual living sculptures are comprised of multiple plants (up to 8–10) from 3–5 years up to 15–20 years old. The minimum and maximum stem diameter at the base of individual plants composing sculptures are 0.5 and 18 cm, respectively (Figure 2).

Figure 2: Examples of living sculptures: Mickey Mouse and crocodile (Source: Dossier Section 1.0)

The growing medium is peat compost (Petersfield Potting Supreme – medium grade sphagnum peat) (Dossier Sections 1.0 and 3.0) complying with the requirements for growing media as specified in the Annex VII of the Commission Implementing Regulation 2019/2072.

According to ISPM 36 (FAO, 2016), the commodity can be classified as 'rooted plants in pots'.

According to the Dossier Section 1.0, the trade volume ranges between 60 and 100 living sculptures per year. These figures are for complete sculptures. Trade of these living sculptures will mainly be to Northern Ireland and the Republic of Ireland, France (Paris) and Switzerland.

3.2. Description of the production areas

The nursery producing the commodity is Agrumi Ltd, which is located in the New Forest National Park on the south coast of Great Britain (Lat (x): 50.771802, Long (y): -1.625837) (Dossier Sections 1.0 and 3.0).

The PLH Panel identified other plant producing/trading companies using the GIS coordinates provided in the Dossier Section 3.0 (identified with Google Earth). These companies have the same address as the Agrumi nursery. These companies are Folium and Flos Plants Limited; Top Topiary; Web garden center (Folium Flos Plants Limited, online; Top Topiary, online; Web Garden Centre, online). The possible presence of additional companies at the same place trading relevant plant species has been taken into account during the EKE (Figure 3).

Figure 3: Map of the nursery (Source: Dossier Section 1.0)

The area covered by the nursery is less than 2 hectares. There is a house on site which acts as a permanent residence, five outbuildings which function as offices, workshops and storage facilities, along with five poly tunnels (3 × 20 m long and 2 × 27 m long) (Dossier Section 3.0).

The nursery also grows other plant species for living sculptures as shown in the following Table 4.

Table 4: Other plant species present in the nursery

Species	Minimum Height (cm)	Maximum Height (cm)	Age
Buxus sempervirens	20	100	Less than 10 years old
Hedera helix	30	300	Less than 1 year to 10 years
Ilex crenata	30	300	Up to 50 years old
Trachelospermum jasminoides	30	300	Less than 1 year to 10 years

Ligustrum plants are grown in a separate bed in a dedicated section of the nursery, 5 m away from other plant species (Dossier Section 3.0).

The nursery is reported to be kept clear of non-cultivated herbaceous plants. In access areas, non-cultivated herbaceous plants are kept to a minimum and only exist at nursery boundaries. Non-cultivated herbaceous plants grow on less than 1% of the area. The predominant species is rye grass (*Lolium*). Other identified species include dandelions (*Taraxacum officinale*), hairy bittercress (*Cardamine hirsute*), Common daisy (*Bellis perennis*), Creeping Cinquefoil (*Potentilla reptans*) and bluebells (*Hyacinthoides non-scripta*). These are all extremely low in number (Dossier Section 3.0).

There are hedges surrounding the export nursery made up of native hedging species. Species include hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), field maple (*Acer campestre*), hazel (*Corylus avellana*), holly (*Ilex aquifolium*), hornbeam (*Carpinus betulus*), beech (*Fagus sylvatica*), wild service tree (*Sorbus torminalis*), field rose (*Rosa arvensis*), dogwood (*Cornus sanguinea*), dog rose (*Rosa canina*), spindle (*Euonymus europaeus*) and yew (*Taxus baccata*) (Dossier Section 3.0).

The area surrounding the nursery is typical of the New Forest which is made up of woodland, heathland and grazing land. Woodland consists of native trees: oak (*Quercus robur*), ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*) and silver birch (*Betula pendula*). Heath habitats are dominated by common heather (*Calluna vulgaris*), bell heather (*Erica cinerea*) and related low-growing shrubs belonging to the heather family of plants (Ericaceae), bracken (*Pteridium*) and gorse (*Ulex europaeus*). The character of the farmland is typified by small fields for grazing, surrounded by hedgerows with mature trees often growing at intervals along them. Hedgerows within the New Forest are part of the area's heritage and the species composition is legally regulated by The Hedgerow Regulations (1997). Species include hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), field maple (*Acer campestre*), hazel (*Corylus avellana*), holly (*Ilex aquifolium*), hornbeam (*Carpinus betulus*), beech (*Fagus sylvatica*), wild service tree (*Sorbus torminalis*), field rose (*Rosa arvensis*), dogwood (*Cornus sanguinea*), dog rose (*Rosa canina*) and spindle (*Euonymus europaeus*) (Dossier Section 3.0).

Private gardens are reported to be low in number in a rural National Park setting. Information on what is cultivated in private gardens is not available (Dossier Section 3.0).

There is no *Ligustrum* growing natively in the local environment. Garden privet (*Ligustrum ovalifolium*) is a common plant in the UK, most frequently associated with hedges used to define property boundaries in urban areas. It is not, however, commonly observed in the New Forest where the nursery is located. A significant determining factor in the prevalence of *Ligustrum* in the National Park is that such a plant (*Ligustrum* spp.) is not permitted by The Hedgerow Regulations (1997). The closest *L. japonicum* /*L. delavayanum* topiary plants that are known are 12 km away in the gardens of Beaulieu. As a specialised, high-value product, the market for the plants is small and there are no other known nurseries which grow such *L. japonicum*/*L. delavayanum* topiary plants in the UK. There are nurseries that grow other species of *Ligustrum* in the UK, only two are within a 50-km radius of the export nursery, the closest being is 7.5 km away in a straight line (Dossier Section 3.0).

Based on the Dossier Section 3.0, the following plants have not been observed to be grown in the nursery and in the local environment (within 2 km from the nursery): *Citrus, Lagerstroemia*, *Viburnum* and Cucurbitaceae (Dossier Section 3.0). However, the PLH Panel noted that some of the other companies located at the same address are trading either *Ligustrum* or other plant species including *Citrus* spp. and palm species (Folium Flos Plants Limited, online; Top Topiary, online; Web Garden Centre, online). *Rubus fruticosus* (blackberry) has been observed growing in the local environment. Information on other fruit plants and trees in the surrounding area and in private gardens is not available (Dossier Section 3.0).

Based on the global Köppen–Geiger climate zone classification (Kottek et al., 2006), the climate of the production areas of *Ligustrum* spp. in the UK is classified as Cfb, i.e. main climate (C): warm temperate; precipitation (f): fully humid; temperature (b): warm summer.

3.3. Production and handling processes

3.3.1. Source of planting material

The scions of the *L. delavayanum*, that are grafted onto the rootstocks, come from mother plants that have been in the nursery in the UK for 7 years but originated from other nurseries in Pistoia, Italy. Imported plants are seed-grown bushes 4–5 year old, 1.5–2.5 cm in diameter. The original substrate in the containerised mother plants coming to the nursery from abroad is a mixture of peat, loam and perlite. *Ligustrum delavayanum* is also grown from seed, in pots, in the nursery (Dossier Section 3.0).

The rootstocks (*L. japonicum*) are grown in pots, from seed, in the nursery (Dossier Section 3.0).

3.3.2. Production cycle

The plants are grown entirely in pots for their whole life, in peat compost (Petersfield Potting Supreme – medium grade sphagnum peat). The peat is supplied weed- and pest-free in either 60 L sealed bags, which are stored on pallets under full protection from the elements and in a fully drained structure, or in 3 m^3 bags. The latter is delivered for repotting and used immediately (Dossier Section 1.0). According to the Dossier Section 1.0, the compost complies with the requirement under Commission Implementing Regulation 2019/2072 Annex VII Item 1 (a) that it 'was stored and maintained under appropriate conditions to keep it free from quarantine pests'.

The nursery combines the small-leaved plant of *L. delavayanum* with the strong root system of *L. japonicum* (Dossier Section 3.0). Grafting of *L. delavayanum* onto rootstocks of *L. japonicum* will typically take place during the spring (March–April) and repotting in the autumn (September–November). Planting could take place any time during the year and will be in response to customer orders (Dossier Section 1.0). Age of the rootstock at the time of grafting is not provided.

According to Dossier Section 3.0, the grafting occurs as follows:

- Step 1 – Smooth and straight cuts are made into the rootstock using a sharpened stainless steel pruning knife. Another cut is made to form a tongue.
- Step 2 – Two stock grafts are pushed together with the tongues overlapping.
- Step 3 – The two combined stock grafts are covered in a flexible and water-resistant grafting wax to seal the wound and keep the graft from drying out. The wax is melted on a stove and applied to the graft using a brush, with careful attention being paid so that all parts of the wound are covered. 200 mm × 8 mm bands of natural elasticated rubber are used to keep cuts tight and secure the graft.

Knives used for grafting are rotated in use and the unused knives are kept in a 1:125 solution of Jet 5 (peroxyacetic acid, hydrogen peroxide and acetic acid). The knives are dipped and wiped with a clean cloth between trees to reduce the risk of virus and bacterial transfer between subjects. This process is also reported to remove any build-up of plant sap on the knives, which can be a pathogen transfer medium. Knives are routinely sharpened after which they are dipped in Jet 5 and wiped before use (Dossier Section 3.0).

The plants are in pots that are well spaced along the bed and are separated from the ground (soil) by three barrier layers – rubber matting, ground cover membrane and 20 mm shingle. Large plants have an additional layer; concrete slabs (60 cm × 60 cm/30 cm and 3 cm thick) are used to keep them stable on the 20 mm shingle (Dossier Section 3.0). During the creation of a living sculpture, every *L. japonicum*/*L. delavayanum* topiary plant to be used is removed from the production bed and repotted into fresh peat growing medium (Petersfield Potting Supreme – medium grade sphagnum peat) (Dossier Section 3.0).

Plants are regularly repotted, when the peat-based growing medium is shaken free, roots trimmed and then the plants potted up using a fresh peat-based growing medium (Dossier Section 3.0).

As part of general maintenance procedures, weeds are routinely removed from the pots as a priority. Weeds are also routinely removed from the area surrounding the production beds and from the nursery in general.

Irrigation water used in the nursery is from the mains supply provided by Southern Water (Dossier Section 3.0).

According to the Dossier Section 1.0, general hygiene measures are undertaken as part of routine nursery production, including:

- Disinfection of tools and equipment between batches/lots;
- Washing and disinfection (the disinfectant used is Dettol, chloroxylenol) of pots before re-use;
- Disinfection (the disinfectant used is Dettol, chloroxylenol) of matting;
- Regular weeding of production beds.

Nursery management is centred on pest prevention and maintaining good levels of nursery hygiene (Dossier Section 1.0). Where necessary, leaves, prunings and weeds are all removed from the nursery to reduce the potential for development of pests and diseases (Dossier Section 1.0).

3.3.3. Pest monitoring during production

The grower is registered as professional operator with the UK NPPO, by the Animal and Plant Health Agency (APHA) and is authorised to issue UK plant passports (Registration number 130284). The Competent Authority inspects crops at least once a year to check they meet the standards set out in the guides. Assessments are normally made based on visual examinations, but samples may be taken for laboratory analysis to get a definitive diagnosis (Dossier Section 1.0).

Once the containerised mother plants of *L. delavayanum* arrive to the nursery, they are visually inspected by internal staff who are looking for evidence of pests and diseases present on the plants. If the plants are pest free, they are moved to the 'production beds' in the nursery. Mother plants are inspected at least weekly, and more frequently during periods of high pest risk (Dossier Section 3.0).

Concerning the substrate used in pots, the quality Assurance certification is available from the producers on request but not routinely provided. The loam is to BS3882, the British Standard for topsoil which states that it must be weed free and plant pathogen free. There is an in-house test for the presence of weed seeds. With each batch of peat, a nursery staff member will pot up a sample of the growing medium, places a transparent plastic bag over it and lets it sit for several weeks to see if any weeds germinate (Dossier Section 3.0).

All water used on the site, including for irrigation, meets the UK standard Water Supply (Water quality) regulation 2016 and the WHO/EU potable water standards Drinking water Directive (98/83/EC and the revised Drinking Water Directive 2020/2184) which includes a total freedom from both human and plant pathogens (Article 2-(7)). Experience of the last 10 years has shown that no evidence of water-borne plant pathogens such as *Pythium* spp., *Phytophthora* spp. or *Thielaviopsis* spp. has been identified in any plant checks made. All mains water conducting pipework fully complies with the UK Water Supply (Water Fittings) regulations of 1999 and the amendments of 2019. Irrigation water used is not stored in any open tanks where air-borne contamination could take place and is entirely isolated from any outside exposure. A past test of the water for pathogens was negative and it was felt that with no infections being experienced on the site no further tests were considered necessary (Dossier Section 3.0).

Pest monitoring is carried out by trained nursery staff via crop walking. Observations of crop walking are documented, and subsequent curative and preventative actions are implemented together with an assessment of phytosanitary risk. The health status of plants is checked by the grower also during routine nursery activities (e.g. weeding, pruning and checking drip irrigation systems) (Dossier Section 1.0).

Additionally, the nursery employs a qualified agronomy consultant who undertakes crop inspections to verify the producer's assessments/needs (Dossier Section 1.0).

The whole crop is inspected visually at least weekly and more frequently during periods of high pest risk. If symptoms of a disease or infestation had been found, samples would be sent away to a laboratory for identification and agronomy support for its control (Dossier Section 3.0).

The surrounding hedge rows are visually inspected on a weekly basis for any alternative host plants that have the capability of supporting *Ligustrum* pests (Dossier Section 3.0).

The nursery follows the Plant Health Management Standard issued by the Plant Healthy Certification Scheme of which DEFRA, Royal Horticultural Society and others contribute to via The Plant Health Alliance Steering Group (Dossier Section 3.0).

During the repotting, there is the opportunity for a visual inspection of the root system by the nursery's experienced nursery staff. Every *L. japonicum*/*L. delavayanum* branch of these selected plants is woven, by hand, onto a steel topiary frame. This process provides the opportunity for visual inspection of every branch for pests by trained nursery staff who specialise in *L. japonicum*/*L. delavayanum* topiary plants (Dossier Section 3.0).

No pests have been observed in the production fields during the last five years (Dossier Section 3.0).

There are no specific surveys in place for pests of *Ligustrum* spp. (Dossier Section 1.0).

In the last 3 years, there have been routine inspections of registered *Ligustrum* producers, both in support of the Plant Passporting scheme and more widely as part of the general quarantine surveillance programme. These checks are in line with the Plant Health (Amendment, etc.) (EU Exit) Regulations 2020[7] and the Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020,[8] which are broadly similar to the EU surveillance programme (Dossier Section 1.0).

3.3.4. Pest management during production

Biological control (Nemasys L (*Steinernema kraussei*)) is applied three times per year (in spring and late summer) against vine weevil (*Otiorhynchus sulcatus*) as a prophylactic measure. Vine weevil has not been observed in the nursery (Dossier Section 3.0).

The upper and lower leaf sections of the crop are sprayed weekly with SB Plant Invigorator, a product that, as reported by the manufacturer, works as an insecticide/acaricide/fungicide and is used to control whitefly, aphid, spider mite, mealy bug, scale and psyllid (Dossier Section 3.0). As a result of routine crop inspections, plants and pests would be speedily controlled with fully approved non-

[7] Plant Health (Amendment etc.) (EU Exit) Regulations 2020 of 14 December 2020, No. 1482, 80 pp. Available online: https://www.legislation.gov.uk/uksi/2020/1482/contents/made

[8] Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020, No. 1527, 276 pp. Available online: https://www.legislation.gov.uk/uksi/2020/1527/contents/made

chemical control measures and applied by staff certificated in a safe and environmentally sound way (Dossier Section 3.0).

Chemical crop protection products are only used when necessary (Dossier Section 1.0). There has been no reason to use any chemical treatments on the commodity in the nursery in response to a pest outbreak to date (Dossier Section 3.0).

3.3.5. Inspections before export

A final inspection, within 2 weeks before export, is conducted by the UK Animal and Plant Health Agency (APHA) as part of the issuing of a phytosanitary certificate. Phytosanitary certificates are only issued if the *Ligustrum* meets the required plant health standards after inspection and/or testing according to appropriate official procedures (Dossier Section 3.0).

The protocol is to destroy any plants infested/infected by pests during inspections before export. All other host plants would be treated in the nursery. This has never happened to date so the protocol has yet to be applied (Dossier Section 3.0).

3.3.6. Export procedure

The commodity will be sent by lorry and can be exported any time of the year. Large orders will be sent on a dedicated transport. Smaller orders will be despatched using specialist horticultural transporters. The plants are transported in bespoke galvanised metal containers which can be forklifted, or in large black plastic containers on ISPM15 certified wood pallets. The containers are wrapped in polythene (pallet wrap) to ensure compost is contained in transit (Dossier Section 1.0).

4. Identification of pests potentially associated with the commodity

The search for potential pests associated with *Ligustrum* species rendered 875 species (see Microsoft Excel® file in Appendix D).

4.1. Selection of relevant EU-quarantine 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.

Seventeen EU-quarantine species that are reported to use *Ligustrum* spp. as a host plant were evaluated (Table 5) for their relevance of being included in this Opinion.

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

a) the pest is present in the UK;
b) the commodity is a host of the pest;
c) one or more life stages of the pest can be associated with the specified commodity.

Pests that fulfilled all criteria were selected for further evaluation.

Table 5 presents an overview of the evaluation of the 17 EU-quarantine pest species that are reported as associated with the commodity.

Of these 17 EU-quarantine pest species evaluated, two species [*Bemisia tabaci* (European populations) and *Scirtothrips dorsalis*] are present in the UK and both of them are known to use *Ligustrum* spp. as hosts and be associated with the commodity. These two species were selected for further evaluation.

Table 5: Overview of the evaluation of the 17 EU-quarantine pest species known to use *Ligustrum* species as host plants for their relevance for this Opinion

No.	Pest name according to EU legislation[(a)]	EPPO Code	Group	Pest present in the UK	*Ligustrum* confirmed as a host (reference)	Pest can be associated with the commodity	Pest relevant for the Opinion
1	*Aleurocanthus woglumi*	ALECWO	Insects	No	*Ligustrum* (CABI, online)	Not evaluated	No
2	*Ambrosiodmus rubricollis* as Scolytinae spp. (non-European)	AMBDRU	Insects	No	*Ligustrum*, *L. lucidum* (EPPO, 2020)	Not evaluated	No
3	*Anthonomus bisignifer*	ANTHBI	Insects	No	*Ligustrum sinense* (Zhang et al., 2008)	Not evaluated	No
4a	*Bemisia tabaci* (European populations)	BEMITA	Insects	Yes	*Ligustrum lucidum*, *L. quihoui*, *L. ovalifolium*, *L. vicaryi* (CABI, online)	Yes	Yes
4b	*Bemisia tabaci* (non-European populations)	BEMITA	Insects	No	*Ligustrum lucidum*, *L. quihoui*, *L. ovalifolium*, *L. vicaryi* (CABI, online)	Not evaluated	No
5	*Euwallacea fornicatus sensu lato*	XYLBFO	Insects	No	*Ligustrum compactum* (EPPO, online; EPPO, 2020)	Not evaluated	No
6	*Homalodisca vitripennis*	HOMLTR	Insects	No	*Ligustrum* (EPPO, online)	Not evaluated	No
7	*Lopholeucaspis japonica*	LOPLJA	Insects	No	*Ligustrum* (García Morales et al., online)	Not evaluated	No
8	*Lycorma delicatula*	LYCMDE	Insects	No	*Ligustrum lucidum* (EPPO, online)	Not evaluated	No
9	*Meloidogyne enterolobii*	MELGMY	Nematodes	No	*Ligustrum* (EPPO, online)	Not evaluated	No
10	*Oemona hirta*	OEMOHI	Insects	No	*Ligustrum* (EPPO, online)	Not evaluated	No
11	*Phymatotrichopsis omnivora*	PHMPOM	Fungi	No	*Ligustrum* (EPPO, online; Farr and Rossman, online)	Not evaluated	No
12	*Ripersiella hibisci*	RHIOHI	Insects	No	*Ligustrum ovalifolium* (CABI, online; EPPO, online)	Not evaluated	No
13	*Scirtothrips citri*	SCITCI	Insects	No	*Ligustrum* (CABI, online)	Not evaluated	No
14	*Scirtothrips dorsalis*	SCITDO	Insects	Yes	*Ligustrum japonicum* (CABI, online)	Yes	Yes
15	*Xiphinema americanum sensu stricto*	XIPHAA	Nematodes	No	*Ligustrum* (Ferris, online)	Not evaluated	No
16	*Xylella fastidiosa*	XYLEFA	Bacteria	No	*Ligustrum sinense* (CABI, online; EPPO, online)	Not evaluated	No
17	*Xylosandrus arquatus* as Scolytinae spp. (non-European)	–	Insects	No	*Ligustrum robustum* (Shaw et al., 2018)	Not evaluated	No

(a): Commission Implementing Regulation (EU) 2019/2072.

4.2. Selection of other relevant pests (non-quarantine in the EU) associated with the commodity

The information provided by the UK, integrated with the search performed by EFSA, was evaluated in order to assess whether there are other potentially relevant pests potentially associated with the commodity species present in the country of export. For these potential pests that are non-regulated in the EU, pest risk assessment information on the probability of entry, establishment, spread and impact is usually lacking. Therefore, these pests were also evaluated to determine their relevance for this Opinion based on evidence that:

a) the pest is present in the UK;
b) the pest is (i) absent or (ii) has a limited distribution in the EU;
c) commodity is a host of the pest;
d) one or more life stages of the pest can be associated with the specified commodity;
e) the pest may have an impact.

For non-regulated species with a limited distribution (i.e. present in one or a few EU MSs) and fulfilling the other criteria (i.e. c, d and e), either one of the following conditions should be additionally fulfilled for the pest to be further evaluated:

- official phytosanitary measures have been adopted in at least one EU MS;
- any other reason justified by the working group (e.g. recent evidence of presence).

Pests that fulfilled the above listed criteria were selected for further evaluation.

Based on the information collected, 858 potential pests known to be associated with the species commodity were evaluated for their relevance to this Opinion. Species were excluded from further evaluation when at least one of the conditions listed above (a-e) was not met. Details can be found in Appendix D (Microsoft Excel® file). Of the evaluated EU non-quarantine pests, two pests (*Diaprepes abbreviatus* and *Epiphyas postvittana*) were selected for further evaluation because they met all of the selection criteria. More information on these two pests can be found in the pest data sheets (Appendix A).

4.3. Overview of interceptions

Data on the interception of harmful organisms on plants of *Ligustrum* spp. can provide information on some of the organisms that can be present on *Ligustrum* spp. despite the current measures taken. According to EUROPHYT, online (accessed on 12 April 2022) and TRACES-NT, online (accessed on 12 April 2022), there were no interceptions of plants for planting of *Ligustrum* from the UK destined to the EU Member States due to the presence of harmful organisms between the years 1995 and 12 April 2022.

There were 67 interceptions of plants for planting of *Ligustrum* from China, Republic of Korea and Netherlands destined to the EU Member States due to the presence of harmful organisms (*Dialeurodes citri*, *Helicotylenchus dihystera*, *Helicotylenchus* sp., *Heliothis* sp., *Meloidogyne* sp., Nematodes, *Pratylenchus*, *Pratylenchus* sp., *Pseudaulacaspis pentagona*, *Tylenchorhynchus* sp. and *Xiphinema americanum sensu lato*) between the years 1995 and 12 April 2022.

4.4. List of potential pests not further assessed

From the list of pests not selected for further evaluation, the Panel highlighted five species (see Appendix C) for which currently available evidence provides no reason to select these species for further evaluation in this Opinion. A specific justification of the inclusion in this list is provided for each species in Appendix C.

4.5. Summary of pests selected for further evaluation

The four pests satisfying all the relevant criteria listed above in Sections 4.1 and 4.2 are included in Table 6. The effectiveness of the risk mitigation measures applied to the commodity was evaluated for these selected pests.

Table 6: List of relevant pests selected for further evaluation

Number	Current scientific name	EPPO code	Name used in the EU legislation	Taxonomic information	Group	Regulatory status
1	*Bemisia tabaci*	BEMITA	*Bemisia tabaci* Genn. (European populations)	Hemiptera Aleyrodidae	Insects	EU Protected Zone quarantine pest according to Commission Implementing Regulation (EU) 2019/2072
2	*Diaprepes abbreviatus*	DPREAB	–	Coleoptera Curculionidae	Insects	Not regulated in the EU
3	*Epiphyas postvittana*	TORTPO	–	Lepidoptera Tortricidae	Insects	Not regulated in the EU
4	*Scirtothrips dorsalis*	SCITDO	*Scirtothrips dorsalis* Hood	Thysanoptera Thripidae	Insects	EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072

5. Risk mitigation measures

For the selected pests (Table 6), the Panel evaluated the likelihood that it could be present in the *Ligustrum* nursery by evaluating the possibility that the commodity in the export nurseries is infested either by:

- introduction of the pest from the environment surrounding the nursery;
- introduction of the pest with new plants/seeds;
- spread of the pest within the nursery.

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

5.1. Risk mitigation measures applied in the UK

With the information provided by the UK (Dossier Sections 1.0, 2.0, 3.0 and 4.0), the Panel summarised the risk mitigation measures (see Table 7) that are implemented in the production nursery.

Table 7: Overview of implemented risk mitigation measures for *Ligustrum* plants designated for export to the EU from the UK

Number	Risk mitigation measure	Implementation in the UK
1	Registration of production sites	The grower is registered as professional operator with the UK NPPO, by the Animal and Plant Health Agency (APHA) and is authorised to issue UK plant passports (Registration number 130284) (Dossier Section 1.0).
2	Certification of propagation material and substrates	The nursery follows the Plant Health Management Standard issued by the Plant Healthy Certification Scheme of which DEFRA, Royal Horticultural Society and others contribute to via The Plant Health Alliance Steering Group (Dossier Section 3.0). Concerning the substrate used in pots, the quality assurance certification is available from the producers on request but not routinely provided. The loam is to BS3882, the British Standard for topsoil which states that it must be weed free and plant pathogen free (Dossier Section 3.0).
3	Physical separation	The plants are kept in open air in pots that are well spaced along the bed and are separated from the ground (soil) by three barrier layers – rubber matting, ground cover membrane and 20 mm shingle. Large plants have an additional layer; concrete slabs (60 cm x 60 cm /30 cm and 3 cm thick) are used to keep them stable on the 20 mm shingle (Dossier Section 3.0).

Number	Risk mitigation measure	Implementation in the UK
4	Surveillance, monitoring and sampling	The Competent Authority inspects crops at least once a year to check they meet the standards set out in the guides. Assessments are normally made based on visual examinations, but samples may be taken for laboratory analysis to get a definitive diagnosis (Dossier Section 1.0). Once the containerised mother plants of *L. delavayanum* arrive to the nursery, they are visually inspected by internal staff who are looking for evidence of pests present on the plants. If the plants are pest and disease free, they are moved to the 'production beds' in the nursery. Mother plants are inspected at least weekly, and more frequently during periods of high pest risk (Dossier Section 3.0). There is an in-house test for the presence of weed seeds. With each batch of peat, a nursery staff member will pot up a sample of the growing medium, place a transparent plastic bag over it and let it sit for several weeks to see if any weeds germinate (Dossier Section 3.0). Pest monitoring during production is carried out by trained nursery staff via crop walking. Observations of crop walking are documented, and subsequent curative and preventative actions are implemented together with an assessment of phytosanitary risk. The health status of plants is checked by the grower also during routine nursery activities (e.g. weeding, pruning and checking drip irrigation systems) (Dossier Section 1.0). Additionally, the nursery employs a qualified agronomy consultant who undertakes crop inspections to verify the producer's assessments/needs (Dossier Section 1.0). The whole crop is inspected visually at least weekly and more frequently during periods of high pest risk. If a symptom of a disease or infestation had been found, samples would be sent away to a laboratory for identification and agronomy support for its control (Dossier Section 3.0). The surrounding hedge rows are visually inspected for any alternative host plants that have the capability of supporting *Ligustrum* pests on a weekly basis (Dossier Section 3.0). The nursery follows the Plant Health Management Standard issued by the Plant Healthy Certification Scheme of which DEFRA, Royal Horticultural Society and others contribute to via The Plant Health Alliance Steering Group (Dossier Section 3.0). During the repotting, there is the opportunity for a visual inspection of the root system by the nursery's experienced nursery staff. Every *L. japonicum* /*L. delavayanum* branch of these selected plants is woven, by hand, onto a steel topiary frame. This process provides the opportunity for visual inspection of every branch for pests and diseases by trained nursery staff who specialise in *L. japonicum* /*L. delavayanum* topiary plants (Dossier Section 3.0). There are no specific surveys in place for pests of *Ligustrum* (Dossier Section 1.0). In the last three years there have been routine inspections of registered *Ligustrum* producers, both in support of the Plant Passporting scheme and more widely as part of the general quarantine surveillance programme. These checks are in line with the Plant Health (Amendment etc.) (EU Exit) Regulations 2020 and the Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020, which is broadly similar to the EU surveillance programme (Dossier Section 1.0).

Number	Risk mitigation measure	Implementation in the UK
5	Hygiene measures	General hygiene measures are undertaken as part of routine nursery production, including: – Disinfection of tools and equipment between batches/lots; – Washing and disinfection (the disinfectant used is Dettol, chloroxylenol) of pots before re-use; – Disinfection (the disinfectant used is Dettol, chloroxylenol) of matting; – Regular weeding of production beds. Knives used for grafting are rotated in use and the unused knives are kept in a 1:125 solution of Jet 5 (peroxyacetic acid, hydrogen peroxide and acetic acid). The knives are dipped and wiped with a clean cloth between trees to reduce the risk of virus and bacterial transfer between subjects. This process is also reported to remove any build-up of plant sap on the knives, which can be a pathogen transfer medium. Knives are routinely sharpened after which they are dipped in Jet 5 and wiped before use (Dossier Section 3.0). As part of general maintenance procedures weeds are routinely removed from the pots as a priority. Weeds are also routinely removed from the area surrounding the production beds and from the nursery in general. The plants are well spaced along the bed and separated from the ground (soil) by three barrier layers – rubber matting, ground cover membrane and shingle (Dossier Section 3.0). Nursery management is centred on pest prevention and maintaining good levels of nursery hygiene. Where necessary, leaves, prunings and weeds are all removed from the nursery to reduce the potential for development of pests (Dossier Section 1.0).
6	Irrigation water	All water used on the site, including for irrigation, meets the UK standard Water Supply (Water quality) regulation 2016 and the WHO/EU potable water standards, (Drinking water Directive (98/83/EC and the revised Drinking Water Directive 2020/2184) which includes a total freedom from both human and plant pathogens (Article 2-(7)). Experience of the last 10 years has shown that no evidence of water-borne plant pathogens such as *Pythium* spp., *Phytophthora* spp. or *Thielaviopsis* spp. have been identified in any plant checks made. All main water conducting pipework fully complies with the UK Water Supply (Water Fittings) regulations of 1999 and the amendments of 2019. Irrigation water used is not stored in any open tanks where air-borne contamination could take place and is entirely isolated from any outside exposure. A past test of the water for pathogens was negative and it was felt that with no infections being experienced on the site no further tests were considered necessary (Dossier Section 3.0).
7	Application of pest control products	Biological control (Nemasys L (*Steinernema kraussei*)) is applied three times per year (in spring and late summer) against vine weevil (*Otiorhynchus sulcatus*) as a prophylactic measure. Vine weevil has not been observed (Dossier Section 3.0). The upper and lower leaf sections of the crop are sprayed weekly with SB Plant Invigorator, a product that as reported by the manufacturers works as an insecticide/acaricide/fungicide. The product is used to control whitefly, aphids, spider mites, mealybugs, scales and psyllids (Dossier Section 3.0). As a result of routine crop inspections, plants and pests would be speedily controlled with fully approved non-chemical control measures and applied by staff certificated in a safe and environmentally sound way (Dossier Section 3.0).

Number	Risk mitigation measure	Implementation in the UK
		Chemical crop protection products are only used when necessary (Dossier Section 1.0). There has been no reason to use any chemical treatments on the commodity in the nursery in response to a pest outbreak to date (Dossier Section 3.0).
8	Inspections and management of plants before export	A final inspection, within two weeks before export, is conducted by the UK Animal and Plant Health Agency (APHA) as part of the issuing of a phytosanitary certificate. Phytosanitary certificates are only issued if the *Ligustrum* meets the required plant health standards after inspection and/or testing according to appropriate official procedures (Dossier Section 3.0). The protocol is to destroy any plants infested by pests during inspections before export. All other host plants would be treated in the nursery. This has never happened to date so the protocol has yet to be applied (Dossier Section 3.0).
9	Separation during transport to the destination	The commodity will be sent by lorry and can be exported any time of the year. Large orders will be sent on a dedicated transport. Smaller orders will be despatched using specialist horticultural transporters. The plants are transported in bespoke galvanised metal containers which can be forklifted, or in large black plastic containers on ISPM15 certified wood pallets. The containers are wrapped in polythene (pallet wrap) to ensure compost is contained in transit (Dossier Section 1.0).

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

For each evaluated pest, the relevant risk mitigation measures acting on the pest 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 selected relevant pest, an expert judgement is given for the likelihood of pest freedom taking into consideration the risk mitigation measures and their combination acting on the pest.

An overview of the evaluation of each relevant pest is given in the sections below (Sections 5.2.1–5.2.4). The outcome of the EKE regarding pest freedom after the evaluation of the currently proposed risk mitigation measures is summarised in Section 5.2.5.

5.2.1. Overview of the evaluation of *Bemisia tabaci* (European populations) (Hemiptera; Aleyrodidae)

Rating of the likelihood of pest freedom	Pest free with some exceptional cases (based on the Median).				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest-free plants	**9,932** out of 10,000 sculptures	**9,975** out of 10,000 sculptures	**9,988** out of 10,000 sculptures	**9,994** out of 10,000 sculptures	**9,998** out of 10,000 sculptures
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**2** out of 10,000 sculptures	**6** out of 10,000 sculptures	**12** out of 10,000 sculptures	**25** out of 10,000 sculptures	**68** out of 10,000 sculptures
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** The pest is present in the UK, with few occurrences but continuously intercepted. UK outbreaks of *B. tabaci* have been restricted to greenhouses. The pest is extremely polyphagous with a very wide host range. Other traded plants present in the surroundings of the nursery could be a source of the				

	pest. Polytunnels in the nursery could act as a reservoir of the pest. The pest could go undetected during inspections if present in the hidden parts of living sculptures. **Measures taken against the pest and their efficacy** *Bemisia tabaci* is a Quarantine Pest in the UK; therefore, plants should be free from *B. tabaci*. General measures expected to be most efficient include the inspections, insecticide treatments (if the pest is detected), clipping of leaves and weeding, which removes potential sources of insects. However, inspections may fail if the pest is present inside the living sculptures. **Interception records** In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *B. tabaci* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online). There were four interceptions of *B. tabaci* from the UK in 2007 and 2015 on other plants already planted likely produced under protected conditions (EUROPHYT, online). **Shortcomings of current measures/procedures** None. **Main uncertainties** – Possibility of development of the pest outside greenhouses. – Pest abundance in the nursery and the surroundings. – The precision of surveillance and the application of measures targeting the pest. – Host suitability of *L. delevayanum* and *L. japonicum* to the pest. – Whether the pest and the symptoms inside the living sculptures are visible during inspections. – If the plant species traded by the other companies are grown and/or stored close to the production site.

For more details, see relevant pest data sheet on *Bemisia tabaci* (European populations) (Section A.1 in Appendix A).

5.2.2. Overview of the evaluation of *Diaprepes abbreviatus* (Coleoptera; Curculionidae)

Rating of the likelihood of pest freedom	Almost always pest free (based on the Median).				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest-free plants	**9,993** out of 10,000 sculptures	**9,996** out of 10,000 sculptures	**9,998** out of 10,000 sculptures	**9,999.1** out of 10,000 sculptures	**9,999.8** out of 10,000 sculptures
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**0.2** out of 10,000 sculptures	**0.9** out of 10,000 sculptures	**2** out of 10,000 sculptures	**4** out of 10,000 sculptures	**7** out of 10,000 sculptures
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** The pest has been reported as an introduced species, established indoors in a tropical glasshouse in SW England. It is a very polyphagous pest, feeding on the roots and foliage of more than 300 host species. Other traded plants present in the surroundings of the nursery could be a source of the pest, although there is uncertainty on the ability of the pest to survive outdoors. The pest could go undetected during inspection if eggs are just laid and larvae did not start feeding on the roots yet.				

	Measures taken against the pest and their efficacy There are no specific measures in place against this pest. General measures expected to be most efficient include inspections, entomopathogenic nematode treatments (Nemasys L (*Steinernema kraussei*)), insecticide treatments (if the pest is detected), repotting with clean and certified soil after root shaking, pruning and clipping of leaves. However, inspections may fail if the eggs are present inside the living sculptures and the larvae did not start feeding on the roots. The clipping of the leaves can reduce the number of eggs laid by the weevil. Although not targeted to the pest, entomopathogenic nematodes treatment may potentially have an effect against it. **Interception records** In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *D. abbreviatus* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online). **Shortcomings of current measures/procedures** Applied measures are not specifically targeting the pest. **Main uncertainties** – Possibility of development of the pest outside greenhouses. – Whether the eggs and the symptoms inside the living sculptures are visible during inspections. – Potential effect of entomopathogenic nematodes treatment. – The exact location of the tropical glasshouse where the pest was detected and established in SW England. – If the plant species traded by the other companies are grown and/or stored close to the production site.

For more details, see relevant pest data sheet on *Diaprepes abbreviatus* (Section A.2 in Appendix A).

5.2.3. Overview of the evaluation of *Epiphyas postvittana* (Lepidoptera; Tortricidae)

Rating of the likelihood of pest freedom	Very frequently pest free (based on the Median).				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free plants	**9,724** out of 10,000 sculptures	**9,805** out of 10,000 sculptures	**9,882** out of 10,000 sculptures	**9,945** out of 10,000 sculptures	**9,984** out of 10,000 sculptures
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**16** out of 10,000 sculptures	**55** out of 10,000 sculptures	**118** out of 10,000 sculptures	**195** out of 10,000 sculptures	**276** out of 10,000 sculptures
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** The pest is known to be widespread in the Southern England and could infest the commodity, which is grown outdoors. Although *Ligustrum delevayanum* is not reported as a host, other *Ligustrum* species are hosts, sometimes major hosts. In addition, the pest is very polyphagous making the association with the commodity likely. The pest could go undetected during inspections if present in the hidden parts of living sculptures. **Measures taken against the pest and their efficacy** There are no specific measures in place against this pest. General measures expected to be most efficient include the inspections, insecticide treatments (if the pest is detected) and the clipping of leaves. However, inspections may fail if the pest is present inside the living sculptures. The clipping of the leaves can reduce the number of eggs laid by the moth.				

	Interception records In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Epiphyas postvittana* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online). **Shortcomings of current measures/procedures** Applied measures are not specifically targeting the pest. **Main uncertainties** – Pest pressure in nursery and the surroundings. – Whether the pest and the symptoms inside the living sculptures are visible during inspections. – Host suitability of *L. delevayanum* to the pest.

For more details, see relevant pest data sheet on *Epiphyas postvittana* (Section A.3 in Appendix A).

5.2.4. Overview of the evaluation of *Scirtothrips dorsalis* (Thysanoptera; Thripidae)

Rating of the likelihood of pest freedom	Almost always pest free (based on the Median).				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free plants	**9,990** out of 10,000 sculptures	**9,995** out of 10,000 sculptures	**9,997** out of 10,000 sculptures	**9,998.5** out of 10,000 sculptures	**9,999.5** out of 10,000 sculptures
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**0.5** out of 10,000 sculptures	**1.5** out of 10,000 sculptures	**3** out of 10,000 sculptures	**5** out of 10,000 sculptures	**10** out of 10,000 sculptures
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** The pest was found for the first time in the UK in December 2007 in a greenhouse approximately 150 km away from the nursery. Although it has been under official control, there is no information of the pest being able to spread beyond the greenhouse. The pest is represented by a complex where populations can be specialised on different hosts; however, the strain present in the UK has not been screened yet. Other traded plants present in the surroundings of the nursery could be a source of the pest. Polytunnels in the nursery could act as a reservoir of the pest. The pest could go undetected during inspections, if present in the hidden parts of living sculptures. **Measures taken against the pest and their efficacy** *Scirtothrips dorsalis* is a Quarantine Pest in the UK; therefore, plants should be free from quarantine pests. General measures expected to be most efficient include the inspections, insecticide treatments (if the pest is detected), weeding and the clipping of leaves. However, inspections may fail if the pest is present inside the living sculptures. **Interception records** In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Scirtothrips dorsalis* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online). **Shortcomings of current measures/procedures** None.				

	Main uncertainties – Presence of the pest in the UK. – The precision of surveillance and the application of measures targeting the pest. – Possibility of spread beyond the infested greenhouse. – Possibility of development of the pest outside greenhouses. – If the plant species traded by the other companies are grown and/or stored close to the production site. – Pest pressure in nursery and the surroundings. – Whether the pest and the symptoms inside the living sculptures are visible during inspections.

For more details, see relevant pest data sheet on *Scirtothrips dorsalis* (Section A.4 in Appendix A).

5.2.5. Outcome of Expert Knowledge Elicitation

Table 8 and Figure 4 show the outcome of the EKE regarding pest freedom after the evaluation of the implemented risk mitigation measures for all the evaluated pests.

Figure 5 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the implemented risk mitigation measures for living sculptures of *L. delavayanum* grafted on *L. japonicum* designated for export to the EU for *Epiphyas postvittana*.

Table 8: Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against selected pests on living sculptures of *Ligustrum delavayanum* grafted on *L. japonicum* 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

Number	Group	Pest species	Sometimes pest free	More often than not pest free	Frequently pest free	Very frequently pest free	Extremely frequently pest free	Pest free with some exceptional cases	Pest free with few exceptional cases	Almost always pest free
1	Insects	*Bemisia tabaci* (European populations)					L	M		U
2	Insects	*Diaprepes abbreviatus*							L	MU
3	Insects	*Epiphyas postvittana*				LM		U		
4	Insects	*Scirtothrips dorsalis*							L	MU

PANEL A

	Pest freedom category	Pest-free plants out of 10000
	Sometimes pest free	≤ 5,000
	More often than not pest free	5,000 to ≤ 9,000
	Frequently pest free	9,000 to ≤ 9,500
	Very frequently pest free	9,500 to ≤ 9,900
	Extremely frequently pest free	9,900 to ≤ 9,950
	Pest free with some exceptional cases	9,950 to ≤ 9,990
	Pest free with few exceptional cases	9,990 to ≤ 9,995
	Almost always pest free	9,995 to ≤ 10,000

Legend of pest freedom categories	
L	Pest freedom category includes the elicited lower bound of the 90% uncertainty range
M	Pest freedom category includes the elicited median
U	Pest freedom category includes the elicited upper bound of the 90% uncertainty range

PANEL B

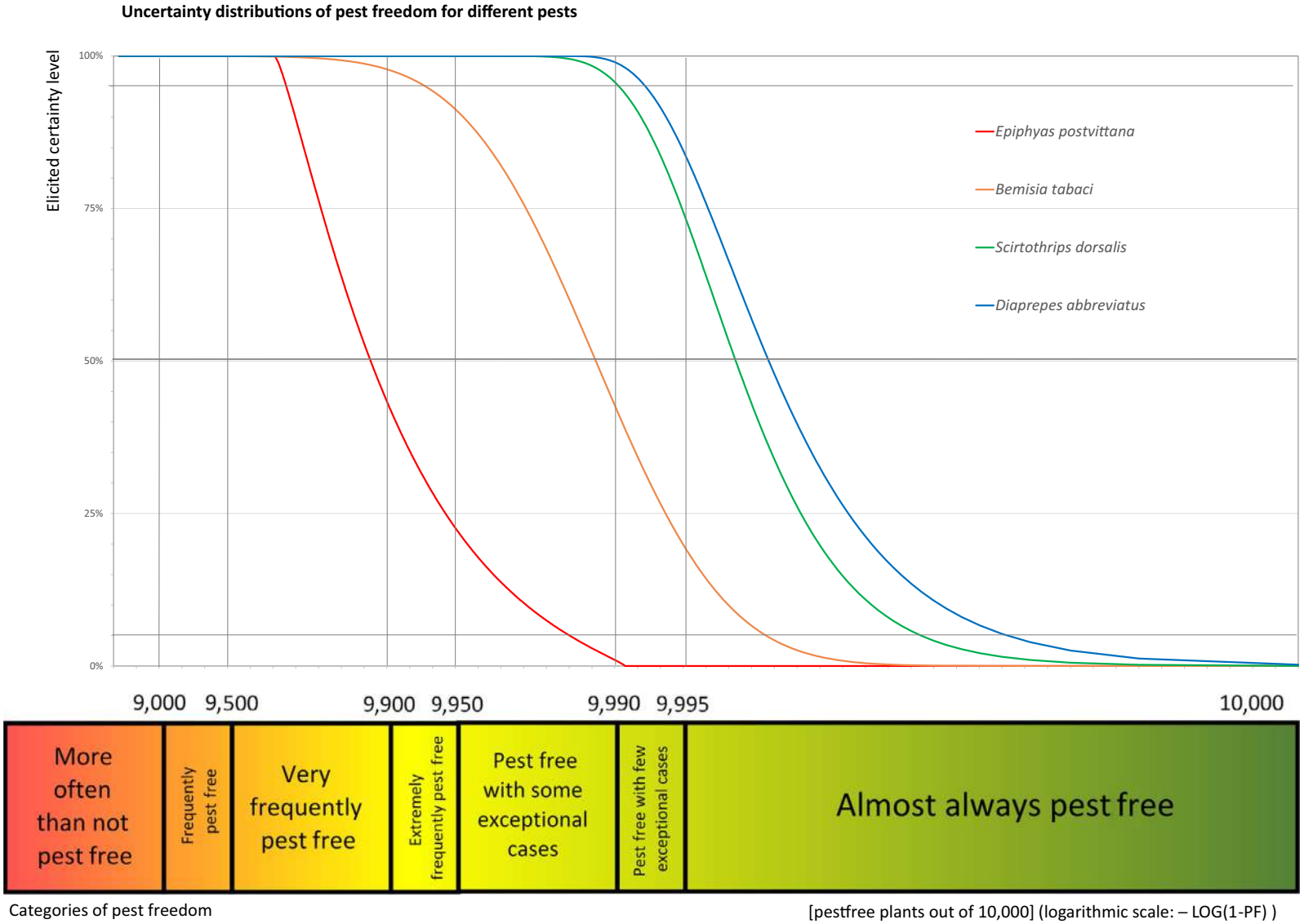

Figure 4: Elicited certainty (y-axis) of the number of pest-free living sculptures of *Ligustrum delavayanum* grafted on *L. japonicum* (x-axis; log-scaled) out of 10,000 plants designated for export to the EU from the UK for all evaluated pests visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%)

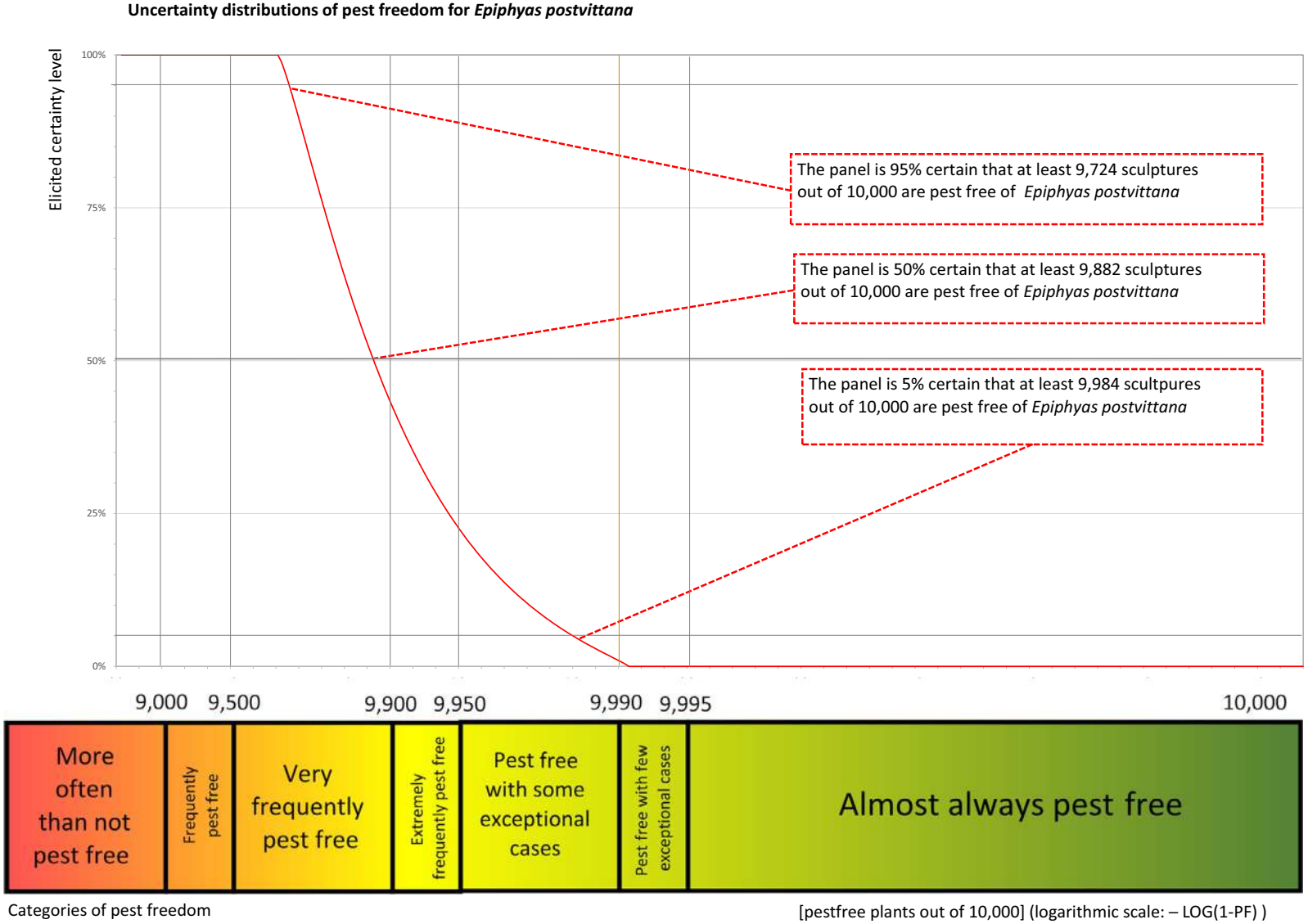

Figure 5: Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the implemented risk mitigation measures for plants designated for export to the EU based on the example of *Epiphyas postvittana*

6. Conclusions

There are four pests identified to be present in the UK and considered to be potentially associated with living sculptures of *L. delavayanum* grafted on *L. japonicum* imported from the UK and relevant for the EU.

These pests are *Bemisia tabaci* (European populations), *Diaprepes abbreviatus*, *Epiphyas postvittana* and *Scirtothrips dorsalis*. The likelihood of the pest freedom after the evaluation of the implemented risk mitigation measures for living sculptures of *L. delavayanum* grafted on *L. japonicum* designated for export to the EU was estimated.

For *Bemisia tabaci* (European populations), the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'pest free with some exceptional cases' with the 90% uncertainty range reaching from 'extremely frequently pest free' to 'almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,932 and 10,000 living sculptures per 10,000 will be free from *B. tabaci* (European populations).

For *Diaprepes abbreviatus*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'almost always pest free' with the 90% uncertainty range reaching from 'pest free with few exceptional cases' to 'almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,993 and 10,000 living sculptures per 10,000 will be free from *D. abbreviatus*.

For *Epiphyas postvittana*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'very frequently pest free' with the 90% uncertainty range reaching from 'very frequently pest free' to 'pest free with some exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,724 and 10,000 living sculptures per 10,000 will be free from *E. postvittana*.

For *Scirtothrips dorsalis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'almost always pest free' with the 90% uncertainty range reaching from 'pest free with few exceptional cases' to 'almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,990 and 10,000 living sculptures per 10,000 will be free from *S. dorsalis*.

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Abbreviations

CABI	Centre for Agriculture and Bioscience International
DEFRA	Department for Environment Food and Rural Affairs
EKE	Expert Knowledge Elicitation
EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
ISPM	International Standards for Phytosanitary Measures
NPPO	National Plant Protection Organisation
PLH	Plant Health
PRA	Pest Risk Assessment
RNQPs	Regulated Non-Quarantine Pests

Glossary

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).
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 mitigation measures 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	A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A risk mitigation measure 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).

Appendix A – Data sheets of pests selected for further evaluation

A.1. *Bemisia tabaci* (European populations)

A.1.1. Organism information

Taxonomic information	Current valid scientific name: *Bemisia tabaci* Synonyms: *Aleurodes inconspicua*, *Aleurodes tabaci*, *Bemisia achyranthes*, *Bemisia bahiana*, *Bemisia costa-limai*, *Bemisia emiliae*, *Bemisia goldingi*, *Bemisia gossypiperda*, *Bemisia gossypiperda mosaicivectura*, *Bemisia hibisci*, *Bemisia inconspicua*, *Bemisia longispina*, *Bemisia lonicerae*, *Bemisia manihotis*, *Bemisia minima*, *Bemisia minuscula*, *Bemisia nigeriensis*, *Bemisia rhodesiaensis*, *Bemisia signata*, *Bemisia vayssieri* Name used in the EU legislation: *Bemisia tabaci* Genn. (European populations) Order: Hemiptera Family: Aleyrodidae Common name: cassava whitefly, cotton whitefly, silver-leaf whitefly, sweet-potato whitefly, tobacco whitefly Name used in the Dossier: –
Group	Insects
EPPO code	BEMITA
Regulated status	The pest is listed in Annex III as EU protected zone quarantine pest *Bemisia tabaci* Genn. (European populations) for Ireland and Sweden. *Bemisia tabaci* is included in the EPPO A2 list (EPPO, online_a). The species is a quarantine pest in Belarus, Moldova, Norway and New Zealand. It is on A1 list of Azerbaijan, Chile, Georgia, Kazakhstan, Ukraine and the United Kingdom. It is on A2 list of Bahrain, East Africa, Southern Africa, Russia, Turkey and EAEU (= Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia) (EPPO, online_b).
Pest status in the UK	*Bemisia tabaci* (European populations) is present in the UK, with few occurrences (CABI, online; EPPO, online_c) and it is continuously intercepted in the UK. The intercepted populations were identified as Middle East-Asia Minor 1 (=MEAM1) and Mediterranean (=MED) (Cuthbertson, 2013). From 1998–2015 there were between 7–35 outbreaks per year of *B. tabaci* in the UK and all the findings were subject to eradication. The UK outbreaks of *B. tabaci* have been restricted to greenhouses and there are no records of the whitefly establishing outdoors during summer (Cuthbertson and Vänninen, 2015; Bradshaw et al., 2019).
Pest status in the EU	*Bemisia tabaci* (European populations) is widespread in the EU – Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Finland, France, Germany, Greece, Hungary, Italy, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia and Spain (CABI, online; EPPO, online_c). It is absent from Denmark, Estonia, Ireland, Latvia, Lithuania, Slovakia and Sweden (CABI, online; EPPO, online_c). In the EU *B. tabaci* (European populations) is mainly present in the greenhouses, with exception of Mediterranean coastal region (Cyprus, Greece, Malta, Italy, south of France, certain parts of Spain and Portugal), where the whitefly occurs also outdoors (EFSA PLH Panel, 2013).
Host status on *Ligustrum*	*Ligustrum lucidum*, *L. quihoui* and *L. vicaryiis* are reported hosts of *Bemisia tabaci* in China (Li et al., 2011; CABI, online). There is no information on whether *B. tabaci* can also attack *Ligustrum japonicum*, *L. delavayanum* or other *Ligustrum* species.

PRA information	Available Pest Risk Assessments: – Scientific Opinion on the risks to plant health posed by *Bemisia tabaci* species complex and viruses it transmits for the EU territory (EFSA PLH Panel, 2013); – Scientific Opinion on the commodity risk assessment of *Persea americana* from Israel (EFSA PLH Panel, 2021); – Scientific report on the commodity risk assessment of specified species of *Lonicera* potted plants from Turkey (EFSA PLH Panel, 2022a); – Scientific Opinion on the commodity risk assessment of *Jasminum polyanthum* unrooted cuttings from Uganda (EFSA PLH Panel, 2022b); – UK Risk Register Details for *Bemisia tabaci* non-European populations (DEFRA, online_a); – UK Risk Register Details for *Bemisia tabaci* European populations (DEFRA, online_b).

Other relevant information for the assessment

Biology	*Bemisia tabaci* is a cosmopolitan whitefly present on almost all continents except for Antarctica (CABI, online; EPPO, online_c). In the literature, it is reported as either native to Africa, Asia, India, North America or South America (De Barro et al., 2011). However, based on mtCO1 (mitochondrial cytochrome oxidase 1) sequence, its origin is most likely to be sub-Saharan Africa (De Barro, 2012). *Bemisia tabaci* is a complex of at least 40 cryptic species that are morphologically identical but distinguishable at molecular level (Khatun et al., 2018). The species differ from each other in host association, spread capacity, transmission of viruses and resistance to insecticides (De Barro et al., 2011). *Bemisia tabaci* develops through three life stages: egg, nymph (four instars) and adult (Walker et al., 2010). Nymphs of *B. tabaci* mainly feed on phloem in minor veins of the underside leaf surface (Cohen et al., 1996). Adults feed on both phloem and xylem of leaves (Walker et al., 2010, citing others). Honeydew is produced by both nymphs and adults (Davidson et al.,1994). *Bemisia tabaci* is multivoltine with up to 15 generations per year (Ren et al., 2001). The life cycle from egg to adult requires from 2.5 weeks up to 2 months depending on the temperature (Norman et al., 1995) and the host plant (Coudriet et al., 1985). In the southern California desert on field-grown lettuce (from 27 October 1983 to 4 January 1984), *B. tabaci* completed at least one generation (Coudriet et al., 1985). In Israel, the reproduction of *B. tabaci* was much reduced in winter months, but adults emerging in December survived and started ovipositing at the end of the cold season (Avidov, 1956). The most cold-tolerant stage are eggs (–2°, –6°, –10°C) and the least tolerant are large nymphs. Short periods of exposure in 0° to –6°C have little effect on mortality. As the temperature lowers to –10°C, the duration of time required to cause significant mortality shortens dramatically (Simmons and Elsey, 1995). Females can lay more than 300 eggs (Gerling et al., 1986), which can be found mainly on the underside of the leaves (CABI, online). Females develop from fertilised and males from unfertilised eggs (Gerling et al., 1986). Eggs are yellowish white and with age turn golden brown. Their size is about 0.19–0.20 mm long and 0.10–0.12 mm wide. First instar nymph (=crawler) is scale-like, elliptical, darker yellow in colour and about 0.26 mm long and 0.15 mm wide. Crawlers have legs and crawl actively on leaves before they settle down and moult through second (0.38 mm long and 0.24 mm wide), third (0.55 mm long and 0.35 mm wide) and fourth instar nymph (0.86 mm long and 0.63 mm wide) (Hill, 1969). Fourth instar nymph (=pupa) stops feeding and moults into an adult (Walker et al., 2010, citing others). Adult emerges through a 'T'-shaped rupture in the pupal case (El-Helaly et al., 1971). Adults are pale yellow and have two pairs of white wings dusted with a white waxy powder (Hill, 1969). Female is approximately 1 mm long. Males are smaller about 0.8 mm long (EFSA PLH Panel, 2013).

	Out of all life stages, only first instar nymph (=crawler) and adults are mobile. Movement of crawlers by walking is very limited, usually within the leaf where they hatched (Price and Taborsky, 1992) or to more suitable neighbouring leaves. The average distance was estimated within 10–70 mm (Summers et al., 1996). For these reasons, they are not considered to be good colonisers. On a contrary, adults can fly reaching quite long distances in a search of a permanent host. According to Cohen et al. (1988), some of the marked individuals were trapped 7 km away from the initial place after 6 days. Long-distance passive dispersal by wind is also possible (Byrne, 1999). *Bemisia tabaci* is an important agricultural pest that is able to transmit more than 121 viruses (belonging to genera *Begomovirus*, *Crinivirus*, *Ipomovirus*, *Carlavirus* and *Torradovirus*) and cause significant damage to food crops such as tomatoes, cucurbits, beans and ornamental plants (EFSA PLH Panel, 2013). However, these viruses are not reported to infect *Ligustrum* species. Possible pathways of entry for *B. tabaci* are plants for planting including cuttings and rooted ornamental plants; cut flowers and branches with foliage; fruits and vegetables; human-assisted spread; natural spread such as wind (EFSA PLH Panel, 2013).	
Symptoms	**Main type of symptoms**	Main symptoms of *Bemisia tabaci* on plants are chlorotic spotting, decrease of plant growth, deformation of fruits, deformation of leaves, intervein yellowing, leaf yellowing, leaf curling, leaf crumpling, leaf vein thickening, leaf enations, leaf cupping, leaf loss, necrotic lesions on stems, plant stunting, reduced flowering, reduced fruit development, silvering of leaves, stem twisting, vein yellowing, wilting, yellow blotching of leaves, yellow mosaic of leaves, presence of honeydew and sooty mould. These symptoms are plant responses to the feeding of the whitefly and to the presence of transmitted viruses (EPPO, 2004; EFSA PLH Panel, 2013; CABI, online).
	Presence of asymptomatic plants	Symptoms of *B. tabaci* being present on the plants are usually visible. However, *B. tabaci* is a vector of several viruses and their infection could be asymptomatic.
	Confusion with other pests	*Bemisia tabaci* can be easily confused with other whitefly species such as *B. afer*, *Trialeurodes lauri*, *T. packardi*, *T. ricini*, *T. vaporariorum* and *T. variabilis*. A microscopic slide is needed for morphological identification (EPPO, 2004). Different species of *B. tabaci* complex can be distinguished using molecular methods (De Barro et al., 2011).
Host plant range	*Bemisia tabaci* is an extremely polyphagous pest with a wide host range, including more than 1,000 different plant species (Abd-Rabou and Simmons, 2010). Some of the many hosts of *B. tabaci* are *Abelmoschus esculentus, Amaranthus blitoides, Amaranthus retroflexus, Arachis hypogaea*, *Atriplex semibaccata*, *Bellis perennis, Borago officinalis*, *Brassica oleracea* var. *botrytis*, *Brassica oleracea* var. *gemmifera*, *Brassica oleracea* var. *italica*, *Bryonia dioica*, *Cajanus cajan*, *Capsella bursa-pastoris*, *Capsicum annuum*, *Citrus* spp., *Crataegus* spp., *Cucumis sativus*, *Cucurbita pepo*, *Erigeron canadensis*, *Euphorbia pulcherrima*, *Gerbera jamesonii*, *Glycine max*, *Gossypium* spp., *Gossypium hirsutum*, *Hedera helix*, *Ipomoea batatas*, *Lactuca sativa*, *Lactuca serriola*, *Lavandula coronopifolia*, *Ligustrum lucidum*, *Ligustrum quihoui*, *Ligustrum vicaryiis*, *Manihot esculenta*, *Melissa officinalis*, *Nicotiana tabacum*, *Ocimum basilicum*, *Origanum majorana*, *Oxalis pes-caprae*, *Phaseolus* spp., *Phaseolus vulgaris*, *Piper nigrum*, *Potentilla* spp., *Prunus* spp., *Rosa* spp., *Rubus fruticosus*, *Salvia officinalis*, *Salvia rosmarinus*, *Senecio vulgaris*, *Sinningia speciosa*, *Solanum lycopersicum*, *Solanum melongena*, *Solanum nigrum*, *Solanum tuberosum, Sonchus oleraceus, Stellaria media, Tagetes erecta, Taraxacum officinale, Thymus serpyllum, Urtica urens, Vitis vinifera* and many more (Li et al., 2011; EFSA PLH Panel, 2013; CABI, online; EPPO, online_c). For a full host list, refer to Li et al. (2011), EFSA PLH Panel (2013); CABI (online) and EPPO (online_c).	

Reported evidence of impact	*Bemisia tabaci* (European populations) is EU protected zone quarantine pest.
Evidence that the commodity is a pathway	*Bemisia tabaci* is continuously intercepted in the EU on different commodities including plants for planting (EUROPHYT/TRACES-NT, online). Therefore, the commodity is a pathway for *B. tabaci*.
Surveillance information	*Bemisia tabaci* (European populations) is present in the UK with few occurrences (CABI, online; EPPO, online_c). Surveillance in the nursery did not result in the detection of the pest during the last five years (Dossier Section 3.0).

A.1.2. Possibility of pest presence in the nursery

A.1.2.1. Possibility of entry from the surrounding environment

Bemisia tabaci (European populations) is present in the UK with few occurrences (location not specified) (CABI, online; EPPO, online_c) and is continuously intercepted in the UK. The UK outbreaks of *B. tabaci* have been restricted to glasshouses and there are no records of *B. tabaci* establishing outdoors during summer (Cuthbertson and Vänninen, 2015; Bradshaw et al., 2019). Bradshaw et al. (2019) indicate that theoretically *B. tabaci* (in summertime) could complete one generation across most of Scotland, and one to three generations over England and Wales. However, the temperatures experienced during the cold days and nights during summer may be low enough to cause chilling injury to *B. tabaci*, thereby inhibiting development and preventing establishment in the UK. It is unlikely, therefore, that this pest will establish outdoors in the UK under current climate conditions.

The possible entry of *B. tabaci* from surrounding environment to the nursery may occur through adult dispersal and passively on wind currents (Cohen et al., 1988; Byrne, 1999; EFSA PLH Panel, 2013).

Bemisia tabaci is polyphagous species that can infest number of different plants. Suitable hosts of *B. tabaci* like *Crataegus* spp., *Prunus* spp., *Rosa* spp. and *Rubus fruticosus* are present within 2 km from the nursery. Other nurseries where *Ligustrum* plants are cultivated are about 7.5 km in a straight line from the nursery (Dossier Section 3.0), but other plant producing/trading companies are on the same address as Agrumi nursery (identified with Google Earth using the GIS coordinates provided in the Dossier). These companies are trading more plant species including *Citrus* spp. and palms.

Uncertainties:

- Exact locations where the whitefly is present.
- Possibility of spread beyond the infested greenhouses.
- Possibility of the whitefly to survive the UK winter or summer in outdoor conditions.
- If the plant species traded by the other companies are grown and/or stored close to the production site.
- Presence of plant species that are not described as hosts of *Bemisia tabaci* so far.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery from surrounding environment, even though it is only reported to be present in greenhouses. In the surrounding area, suitable hosts are present and the pest can spread by wind and adult flight.

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

The scions of *L. delavayanum* are either grown from seeds in pots or they come from mother plants that are located in the nursery. The mother plants originate from other nurseries in Pistoia, Italy, where the pest is present. The rootstocks of *L. japonicum* are grown in pots, from seeds, in the nursery (Dossier Section 3.0). Therefore, no new plants except for mother plants of *L. delavayanum* enter the nursery from outside and seeds are not a pathway for the whitefly.

In addition to *Ligustrum* plants, the nursery also produces other plants for living sculptures (Dossier Section 3.0). Out of them, *Hedera helix* is a suitable host for the whitefly. However, there is no information on how and where the plants are produced. Therefore, if the plants are first produced in another nursery, the whitefly could possibly travel with them.

The nursery is using peat compost (Petersfield Potting Supreme – medium grade sphagnum peat), which is weed and pest free. Plants are regularly re-potted, during which the old peat compost is shaken free, roots trimmed and then the plants potted up using fresh peat (Dossier Sections 1.0 and 3.0).

Uncertainties:

- No information is available on the provenance of new plants of *Hedera helix* used for plant production in the area of the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery with new plants (*Hedera helix*) used for plant production in the area. The entry of the pest with new plants or seeds of *Ligustrum* the Panel considers as not possible.

A.1.2.3. Possibility of spread within the nursery

Ligustrum plants are grown in containers outdoors in the open air.

The whitefly can attack other suitable living sculptures (such as *Hedera helix*), mother trees, non-cultivated herbaceous plants (*Bellis perennis*, *Potentilla* sp., *Taraxacum officinale*) present within the nursery and hedges surrounding the nursery (*Crataegus* spp., *Prunus* spp. and *Rosa* spp.).

There are five poly tunnels within the nursery with unknown use (Dossier Section 3.0).

The whitefly within the nursery can spread by adult flight, wind or by scions from infested mother plants. Spread within the nursery through equipment and clothing is less relevant as the distance walked is very limited and of a short duration.

Uncertainties:

- Possibility of the whitefly to survive the UK winter/summer in outdoor conditions.
- Whether the other companies present at the same location trade plant hosts.
- Possibility that poly tunnels are used in a way that allows the pest to overwinter.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nursery is possible either by wind, active flight, equipment and clothing.

A.1.3. Information from interceptions

In the EUROPHYT/TRACES-NT database there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Bemisia tabaci* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online).

There were four interceptions of *B. tabaci* from the UK in 2007 and 2015 on other plants already planted likely produced under protected conditions (EUROPHYT, online).

A.1.4. Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *Bemisia tabaci* (European populations) is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 7.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	As the plant passport is very similar to the EU one, the living sculptures shall be free from quarantine and RNQP pests. No uncertainties.
2	Certification of propagation material and substrates	No	Not relevant to the pest.
3	Physical separation	No	Physical separation is not a barrier for *B. tabaci* because the adults can fly. Barrier to the soil is not relevant. No uncertainties.
4	Surveillance, monitoring and sampling	Yes, partially.	Although the plants are thoroughly checked during the production and the creation of the living sculptures, later infestation by *B. tabaci* can go undetected, because it is difficult to check the internal parts of the living sculpture and no traps are reported to be used.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
			Curative measures adopted when the pest is found, may have limited effect on the whole living sculpture, especially in the hidden parts. Uncertainties: – Capacity of detection of the pest inside the living sculptures. – The effect of curative measures to the inner parts of the living sculptures. – The continuous clipping of leaves and twigs may reduce the potential establishment of *B. tabaci*.
5	Hygiene measures	Yes, partially	Weeding can have some effect on the reduction of *Bemisia* populations. The other measures are not relevant. No uncertainties
6	Irrigation water	No	Not applicable.
7	Application of pest control products	Yes	SB Plant Invigorator is moderately effective on the suppression of *B. tabaci* because it has some effect only on nymphs (Gómez et al., 2007). Other chemical measures adopted when the pest is found may have limited effect on the hidden plant parts. Uncertainties: – The active ingredients of chemical treatments and their level of efficacy against the pest. – The effect of chemical measures to the inner parts of the living sculptures.
8	Inspections and management of plants before export	Yes, partially	Although the living sculptures are thoroughly checked two weeks before the export, infestation by *B. tabaci* can go undetected, because it is difficult to check the internal parts. Moreover, the reinfestation can occur during the two-week period as long as living sculptures are sold all year long. Uncertainties: – Capacity of detection of the pest inside the living sculptures.
9	Separation during transport to the destination	No	Living sculptures are not individually separated during transportation. The pest can infest other living sculptures. No uncertainties.

A.1.5. Overall likelihood of pest freedom for living sculptures

A.1.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested living sculptures

Although there are few occurrences of the pest in the UK, the pressure of the pest in the surroundings of the nursery is very low because it is very unlikely to survive outdoors. The scenario assumes that nursery is not an intensive plant nursery. The scenario also assumes that inspection should be effective because the presence of honeydew is easily detectable.

A.1.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested living sculptures

There are few occurrences of the pest and it is continuously intercepted in the UK. The scenario assumes that, although it is unlikely that the pest can survive or develop outdoors, polytunnels present in the nursery could host some plants that could be hosts of the pest. The scenario also assumes that,

although inspections are conducted very often, they will fail detection of the pest inside the commodity.

A.1.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested living sculptures

Median is very shifted to the left side (lower infestation rate) because of the low likelihood of pressure of the pest from outside. The commodity is produced outdoors and the pest is unlikely to perform out of the greenhouses. In addition, inspections will be successful because of the presence of honeydew and adults flying around when disturbed.

A.1.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The low probability of performing of the pest outdoors results in high level of uncertainties for infestation rates below the median. Otherwise, low pest pressure from the surroundings and easy detection of honeydew gives less uncertainties for rates above the median.

A.1.5.5. Elicitation outcomes of the assessment of the pest freedom for *Bemisia tabaci* (European populations) on living sculptures

The following Tables show the elicited and fitted values for pest infestation (Table A.1) and pest freedom (Table A.2).

Table A.1: Elicited and fitted values of the uncertainty distribution of pest infestation by *Bemisia tabaci* (European populations) per 10,000 sculptures

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	1					6		12		25					100
EKE	1.06	1.56	2.17	3.17	4.41	5.99	7.72	12.1	19.0	24.5	33.2	46.2	67.6	94.0	138

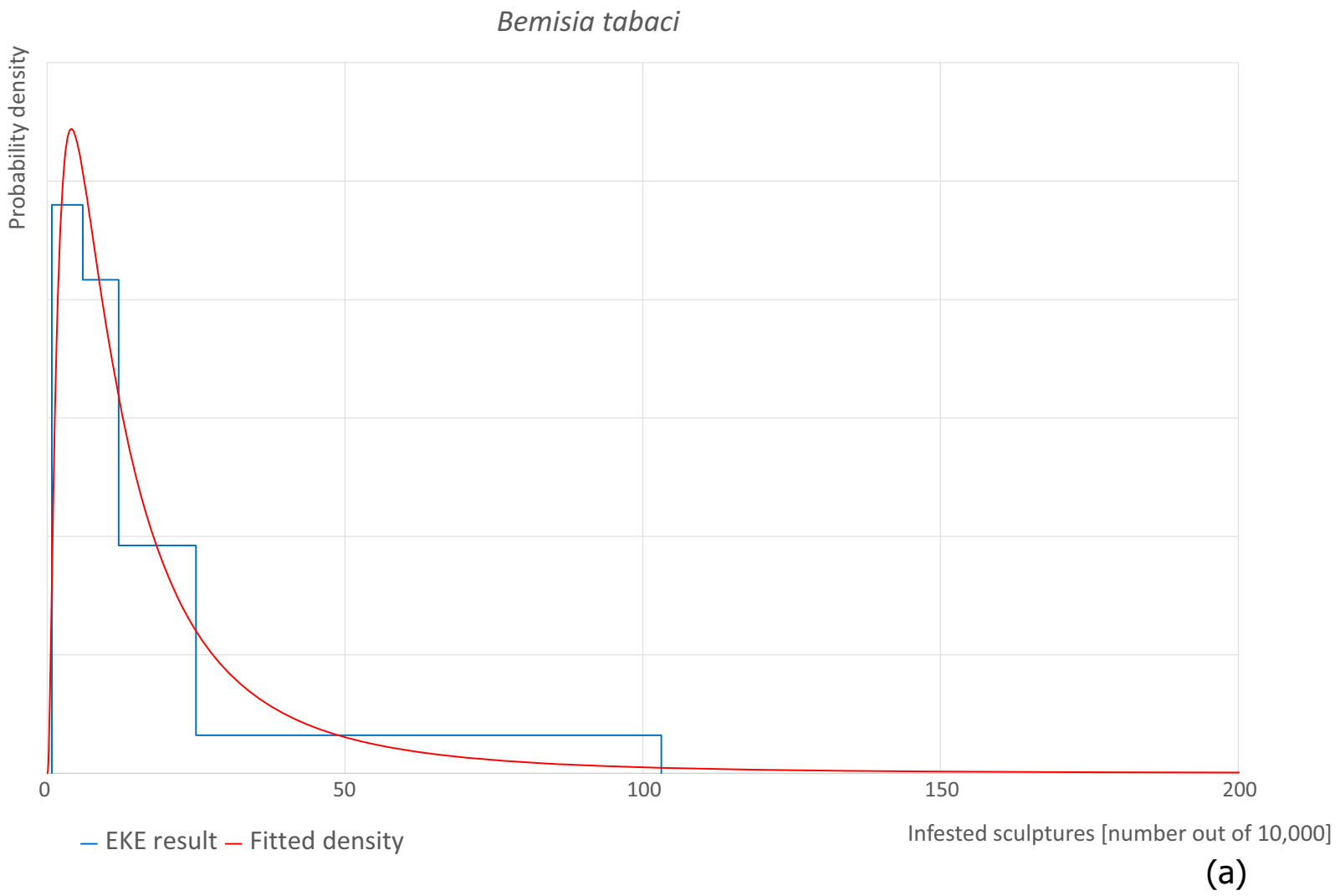
The EKE results are the Lognorm(20.916,29.441) distribution fitted with @Risk version 7.6.

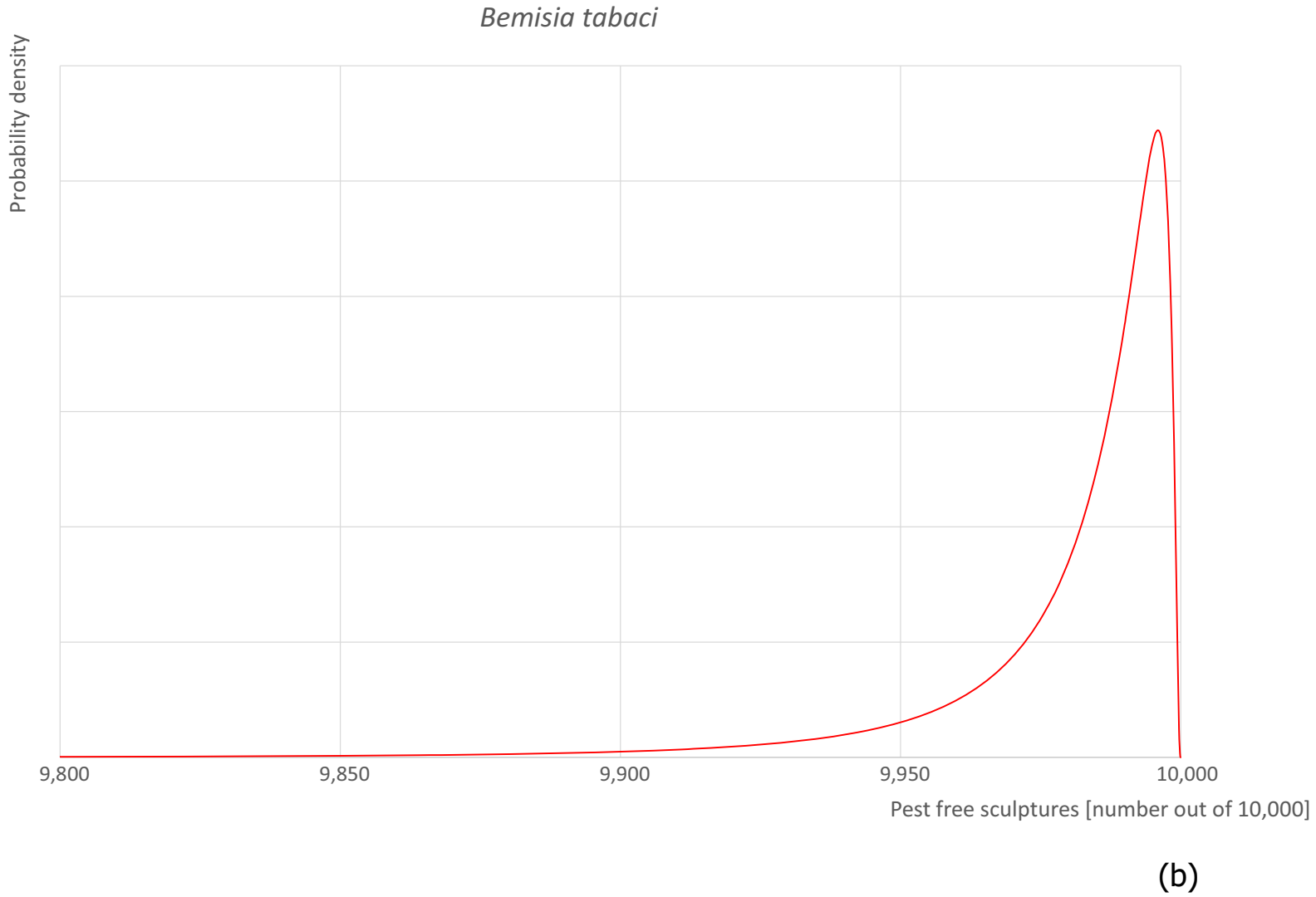
Based on the numbers of estimated infested sculptures the pest freedom was calculated (i.e. = 10,000 – number of infested sculptures per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.2.

Table A.2: The uncertainty distribution of plants free of *Bemisia tabaci* (European populations) per 10,000 sculptures calculated by Table A.1

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9,900					9,975		9,988		9,994					9,999
EKE results	9,862	9,906	9,932	9,954	9,967	9,975	9,981	9,988	9,992	9,994	9,996	9,997	9,998	9,998.4	9,998.9

The EKE results are the fitted values.





(b)

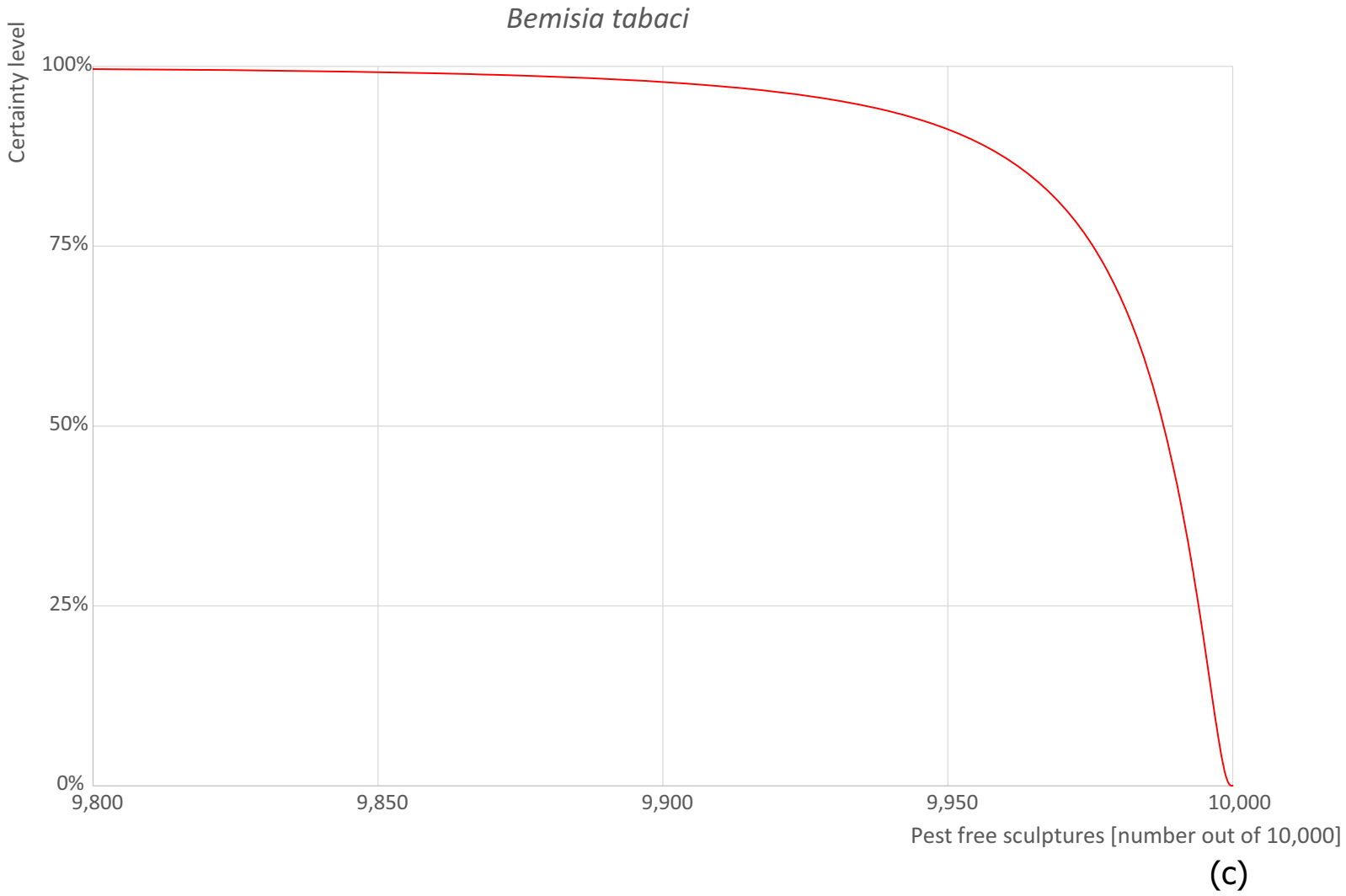


Figure A.1: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue– vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest free sculptures per 10,000 (i.e.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

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A.2. *Diaprepes abbreviatus*

A.2.1. Organism information

Taxonomic information	Current valid scientific name: *Diaprepes abbreviatus* Synonyms: *Diaprepes spengleri, Exophthalmus abbreviatus* Name used in the EU legislation: – Order: Coleoptera Family: Curculionidae Common name: citrus root weevil, sugarcane root and stalk borer weevil, sugarcane root-boring weevil, West Indian sugarcane root and stalk borer, West Indian sugarcane stalk borer, West Indian weevil Name used in the Dossier: *Diaprepes abbreviatus*
Group	Insects
EPPO code	DPREAB
Regulated status	*Diaprepes abbreviatus* is not regulated in the EU; it is quarantine pest in the USA, Mexico and Australia (EPPO, online_a; USDA-APHIS, online; Australian Department of Agriculture and Water Resources, 2021) and included in the A1 list in Chile, Jordan, Turkey, the APPPC (Asia and Pacific Plant Protection Commission) and the PPPO (Pacific Plant Protection Organization) (EPPO, online_a).
Pest status in the UK	According to the Dossier Section 3.0, the record of *D. abbreviatus* in the UK pertains to findings in a tropical glasshouse in SW England, and there are no other records. According to CABI (online) and Smith et al. (2007), the presence in Great Britain is reported as introduced species established indoors on palm plants. According to the Dossier Section 3.0, the last recorded finding in the glasshouse was in 2014, and the pest may no longer be present. However, without further evidence, the status in the UK is considered by the applicant country as 'Present: transient'. According to EPPO (online_b), *D. abbreviatus* is absent from the European territory of the UK, and only present in the UK Overseas Territories, with restricted presence to British Virgin Islands (Caribbean), where is native.
Pest status in the EU	According to EPPO (online_b), EPPO (2016) and Alonso-Zarazaga et al. (2017), *D. abbreviatus* is absent from the EU. Nevertheless, beside the records from Great Britain, it was intercepted also in 1994 in the Netherlands on *Areca* palms imported from Dominican Republic (EPPO, online_c). The reported presence for Sweden in 1993 (CABI, online_a) probably refers to introduction, but no details are available.
Host status on *Ligustrum*	*Ligustrum* sp. is host of *D. abbreviatus* (CABI, online_b; Mannion et al., 2003). There is no information on whether *D. abbreviatus* can also attack *Ligustrum delavayanum* and *L. japonicum*.
PRA information	Available Pest Risk Assessment: – Risk and pathway assessment for the introduction of exotic insects and pathogens that could affect Hawai'i's native forests (DeNitto et al., 2015); – Importation of irradiated Mango from Grenada into the United States and Territories. A qualitative, pathway-initiated Pest Risk Assessment (USDA-APHIS, 2019); – Final Pest Risk Analysis for Cut Flower and Foliage Imports-Part 2 (Australian Government Department of Agriculture and Water Resources, 2021).
Other relevant information for the assessment	
Biology	*Diaprepes abbreviatus* is a large tropical root weevil (10–19 mm adult in length) native to the Caribbean region, where it is present in all the main islands except Cuba and Bahamas. It was introduced in 1964 in Florida (USA) and is currently invading also California, Louisiana and Texas (CABI, online_a; EPPO, online_b).

	Diaprepes abbreviatus adults are usually found throughout the year in its native range; the complete life cycle lasts from 5 to 18 months depending on temperature and soil moisture (Grafton-Cardwell et al., 2004; Stansly 2011). *Diaprepes abbreviatus* has one generation per year in central Florida (Beavers, 1982; Stansly, 2011), although overlapping generations with two emergence peaks (May-June and August-September) have been also observed (Mannion et al., 2003). The weevil has four life stages: egg, larva (11 instars), pupa and adult. Adult weevils feed on young leaves, opening small semicircular erosions, only occasionally feeding also on fruits of papaya and citrus. They are long-lived (147 days – females; 135 days – males) and sometimes live aggregated in great number in a few trees. After mating, females lay eggs (1 mm in length) in clusters of 30–260 in a single layer between two leaves. A single female can deposit from 5,000 to 29,000 eggs in its lifespan (Mannion et al., 2003). The egg stage lasts 7–10 days and hatch rate is 89% at 25°C and 80% relative humidity (Beavers, 1982). The newly hatched larvae drop to the ground and burrow into the soil to find roots for feeding. Young larvae initially feed on small roots; larger structural roots are only attacked by developed larvae after 3rd or 4th instar. Girdled roots may result in extensive damage to root system causing plant weakness and mortality, often also due to secondary infections by root rot oomycete *Phytophthora* spp. (Grafton-Cardwell et al., 2004). Complete larval development lasts 8–15 months. Larvae mostly grow up to 6th instar; then a diapause period can last from 2 to 13 months (Stansly, 2011). Mature large larvae (up to 25 mm long) enter a prepupal quiescent stage feeding very little, and then form a pupal chamber in the soil. Pupal stage lasts 15–30 days. Newly formed adults emerge with suitable moisture soil conditions, as after extensive rainfall or irrigation. When no suitable conditions occur, larvae and adults stay longer in the soil, so that the total life cycle may last more than 2 years (Griffith, 1975). Adults usually move by walking and are considered strong flyers only on short duration and distances (maximum 228–236 m); when they find a host plant, they stay sedentary if not disturbed. The dispersal of *D. abbreviatus* probably occurs by a sequence of short flights or even by hitch-hiking of adults on transport trucks, machinery, but mostly by live plants with soil as a pathway (Beavers and Selhime, 1978). The long subterranean surviving period of *D. abbreviatus* highly increases the spreading probability of the pest by shipping of plants in pots with soil (Beavers, 1982). As *D. abbreviatus* is a warm climate species, temperature is a very important factor in determining its geographical range and establishment possibilities. Thermal threshold for eggs is a crucial factor, with 95% egg mortality between 4 and 12°C (Lapointe et al., 2007). For oviposition and starting development of newly hatched larvae of *D. abbreviatus* a minimum threshold of 15°C is needed (Lapointe et al., 2007) but more aged larvae require at least 26°C to develop in the soil, whereas pupae have a thermal lower limit of 15°C like the neo-hatched larvae (Lapointe, 2000). Also soil moisture is relevant: 60% is optimal for development, whereas 20–40% and 80% rates both result in increased mortality of larvae (Lapointe and Shapiro, 1999). However, low soil moisture can be tolerated when balanced with adequate moisture of root tissues feeding substrate (Stansly, 2011).
Symptoms	**Main type of symptoms**	The main symptom on leaves is the damage caused by feeding adults, consisting in semicircular erosions mostly found along leaf edges. Adults and excrements may also be seen on foliage in spring and summer. Discolouring, wilting and dieback of whole plants may be observed when significant damage occurs on roots following larval feeding. All these symptoms are easy to detect. Symptoms on the roots (girdling, channelling of outer bark and cambium), however, may be only observed after soil removal. There is no information on specific symptoms to *Ligustrum* spp.

	Presence of asymptomatic plants	Plants may be asymptomatic or showing no significant signs if roots are not yet severely damaged by larval feeding. Considering the potential long survival of subterranean stages of the pest it is not possible to indicate a precise warning period for detection.
	Confusion with other pests	Feeding symptoms on leaves and roots are not specific. Other defoliating insects and weevil species similar to *D. abbreviatus* show symptoms which may be confused. In the Caribbean native range of the pest, many other species of *Diaprepes* are also present, sometimes showing similar shape/colour and feeding habits. In Europe, *Otiorhynchus* adults are producing a similar damage.
Host plant range	*Diaprepes abbreviatus* is a very polyphagous pest, feeding on the roots and foliage of more than 300 host species, in 59 plant families including fruit trees, ornamental and wild trees and shrubs, sugarcane and vegetables (Ascunce et al., 2008). More common and economically important hosts are all varieties of citrus (*Citrus* spp.), peanut (*Arachis hypogaea*) *Sorghum* sp., Surinam cherry (*Eugenia uniflora*), dragon tree (*Dracaena draco*), sweet potato (*Ipomaea batatas*), sugarcane (*Saccharum officinarum*), coffee weed (*Sesbania erbacea*) and Brazilian pepper (*Schinus terebinthiofilia*) (Grafton-Cardwell et al., 2004). Other hosts are: *Acacia* sp., *Acer rubrum, Albizzia* sp., *Brassica* sp., *Capsicum annuum, Carya* sp., *Coffea arabica, Cupressus sempervirens, Diospyros* sp., *Eriobotrya japonica, Ficus* sp., *Gossypium* sp., *Ilex* sp., *Juniperus* sp., *Lagerstroemia indica, Mangifera indica, Melia azedarach, Mimosa ceratonia, Musa* sp., *Nicotiana tabacum, Persea americana, Phaseolus* sp., *Phoenix dactylifera, Piper* sp., *Pittosporum tobira, Prunus* sp., *Quercus laurifolia, Rosa* sp., *Rubus argutus*, *Salix humboldtiana, Solanum melongea, S. tuberosum, Theobroma cacao, Ulmus parviflora, Zea mays* (Simpson et al, 1996); *Aloe barbadiensis, Ardisia crenata, Codiaeum variegatum, Hoya carnosa, Maranta leuconeura* (Schroeder et al., 1979); *Bauhinia* sp., *Bucida buseras, Cassia* sp., *Chrysobalanus icaco, Conocarpus erectus, Ligustrum* sp. and *Quercus virginiana* (Mannion et al., 2003). For a more detailed list of hosts, see Simpson et al. (1996).	
Reported evidence of impact	Adult weevils can cause moderate to severe defoliation. Young trees may be rapidly killed by larval girdling, while larger trees decline slowly and finally die for severe root system damage, often also due to root diseases (Jetter and Godfrey, 2009). *Diaprepes abbreviatus* is a primary pest in the Caribbean islands, severely damaging wide range of economically important crops, mostly *Citrus* and sugarcane (Mauleon and Mademba-Sy, 1988; EPPO, 2016). In the USA, it was estimated that *D. abbreviatus* infests more than 100,000 acres of citrus in Florida, causing damage of 70 million dollars annually (Weissling et al., 2019). No damage information on *Ligustrum* is available. *Ligustrum* is only listed as host plant of *D. abbreviatus* in the USA with negligible significance (Mannion et al., 2003). According to Schroeder et al. (1979), *L. lucidum* is not supporting larval development of *D. abbreviatus*.	
Pathways and evidence that the commodity is a pathway	Live plants with soil are pathways for all life stages of *D. abbreviatus*; cut branches or flowers can only carry eggs or adults. The pest has a broad host range and may be easily transported with plants; the frequent overlapping of life stages enhances the likelihood of introduction (DeNitto et al., 2015). *Diaprepes abbreviatus* is frequently intercepted in the USA on both live plants and nursery containers, where adults may be also found as hitchhikers (Grafton-Cardwell, 2004; Jetter and Godfrey, 2009).	
Surveillance information	Surveillance in the nursery did not result in the detection of the pest during the last five years (Dossier Section 3.0).	

A.2.2. Possibility of pest presence in the nursery

A.2.2.1. Possibility of entry from the surrounding environment

Diaprepes abbreviatus is listed as present in the UK (CABI, online_a) as introduced species on palm plants indoors (Smith et al., 2007). The pest was only found in a tropical glasshouse in SW England (location not specified) and the last reported finding dates back to 2014 (Dossier Section 3.0). There is no information about the possibility that *D. abbreviatus*, if still present, may exit from the glasshouse and survive in outdoor conditions.

Diaprepes abbreviatus is very polyphagous and some host plants of the pest, like *Ilex aquifolium, Prunus spinosa, Rosa arvensis* and *R. canina* are present in hedges surrounding the nursery. Other nurseries where *Ligustrum* plants are cultivated are about 7.5 km in a straight line from the nursery (Dossier Section 3.0), but other plant producing/trading companies are on the same address as Agrumi nursery (identified with Google Earth using the GIS coordinates provided in the Dossier). These companies are trading more plant species including *Citrus* spp. and palm species.

Adults can fly up to 236 m, but usually spread slowly with short flights (Beavers and Selhime, 1978). However, *D. abbreviatus* has never been found anywhere in natural environment in the UK, which climate conditions could not be suitable for its life cycle requirements (Lapointe et al., 2007).

Uncertainties:

- No information about the tropical glasshouse in SW England where the pest was recorded (name, location, aim of cultivation, cultivated species, pest surveillance protocols).
- The current status of the pest in the tropical glasshouse.
- The possibility of survival and spread of the pest outside the tropical greenhouse.
- If the plant species traded by the other companies are grown and/or stored close to the production site.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is very unlikely for the pest to enter the nursery from surrounding environment, since it was found only in a tropical glasshouse in SW England and is currently classified as present-transient (Dossier Section 3.0). Although in the surrounding area suitable hosts are present and the pest can actively spread, *D. abbreviatus* has never been found in natural environment of the UK, where the climate conditions are most likely not suitable for its survival outdoors.

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

The scions of *L. delavayanum* are either grown from seeds in pots or they come from mother plants originating from other nurseries in Pistoia, Italy. The rootstocks of *L. japonicum* are grown in pots, from seeds, in the nursery. Therefore, no new plants (except for mother plants of *L. delavayanum*) enter the nursery from outside and seeds are not a pathway for *D. abbreviatus* (Dossier Section 3.0).

In the nursery, other plants for living sculptures are cultivated (Dossier Section 3.0). Out of them, *Ilex crenata* is a potential suitable host of the weevil. However, there is no information about from where the plants are coming and how they are produced.

Except eggs, all the living stages of *D. abbreviatus* may be found in the soil of host plants infested by the weevil. The nursery is using peat compost (Petersfield Potting Supreme – medium grade sphagnum peat), which is weed and pest free. Plants are regularly re-potted, during which the old peat compost is shaken free, roots trimmed and the plants potted up using fresh peat (Dossier Sections 1.0 and 3.0).

Uncertainties:

- There is no information available on the provenance of new plants of *Ilex crenata* used for plant production in the area of the nursery.
- There is no precise information on the time between the final repotting of the living sculptures and the delivery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery with new plants (*Ilex crenata*) used for plant production in the area and that new potting soil can be colonised before delivery.

A.2.2.3. Possibility of spread within the nursery

Ligustrum plants are grown in containers outdoors in the open air. The weevil can attack other suitable living sculptures (such as *Ilex crenata*), mother trees present within the nursery and shrubs growing in the hedges surrounding the nursery (*Ilex aquifolium, Prunus spinosa* and *Rosa* spp.).

There are five poly tunnels within the nursery with unknown use (Dossier Section 3.0).

The weevil can spread within the nursery both by adult walking and flight or by infested soil.

Uncertainties:

- Possibility of survival of the pest outdoors in the climate conditions of the UK.
- Possibility of different plant host species for trade in the surroundings.
- Possibility that polytunnels are used in a way that allows the pest to overwinter.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nursery is possible either by active walking/flight or infested soil.

A.2.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Diaprepes abbreviatus* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online).

A.2.4. Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *Diaprepes abbreviatus* is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 7.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	As the plant passport is very similar to the EU one, the living sculptures shall be free from quarantine pests. No uncertainties.
2	Certification of propagation material and substrates	Yes	The plants are grown in peat growing medium free from pests and the peat growing medium is changed with a new one, roots shaken at each transplant. No uncertainties.
3	Physical separation	Yes, partly	The plants are isolated from larvae that could potentially move from soil to pots. Physical separation is not a barrier for adults as they can walk and fly. No uncertainties.
4	Surveillance, monitoring and sampling	Yes, partly	Although the plants are thoroughly checked during the production and the creation of the living sculptures, later infestation by *D. abbreviatus* can go undetected, because it is difficult to check the internal parts of the living sculpture and find the eggs laid in the leaves. Adults, however, are large and easily detectable. Curative measures adopted when the pest is found, may have limited effect on the whole living sculpture, especially in the hidden parts. Uncertainties: – Capacity of detection of the pest inside the living sculptures. – The effect of curative measures to the inner parts of the living sculptures. – The continuous clipping of leaves and twigs may reduce the potential establishment of *D. abbreviatus*.
5	Hygiene measures	Yes	Removal of leaf clipping and pruning may reduce the risk that larvae are dropping in the pot. Uncertainties: – The level at which all the potential leaves carrying eggs are removed.
6	Irrigation water	No	Not relevant to the pest.
7	Application of pest control products	Yes, partly	SB Plant Invigorator is not known to affect the oviposition and egg development of *D. abbreviatus*. Nematodes used for the biological control of the vine weevil may potentially affect also *D. abbreviatus* larvae as other *Steinernema* spp. are known to be effective. Uncertainties: – The effect of *S. kraussei* against the weevil larvae.
8	Inspections and management of plants before export	Yes, partly	While adult weevils are easy to detect, eggs laid on the leaves are much more difficult, especially inside the living sculptures. Young larvae are difficult to detect in the soil/growing medium.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
			Uncertainties: – The capacity to inspect the whole living sculpture. – The capacity to detect young larvae in the soil/growing medium.
9	Separation during transport to the destination	No	Living sculptures are not individually separated during transportation. The pest can infest other living sculptures. No uncertainties.

A.2.5. Overall likelihood of pest freedom for living sculptures

A.2.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested living sculptures

The scenario assumes that the pest was only established indoors in a tropical glasshouse in SW England and it has not been found again since 2014. It also assumes that the pest is very unlikely to survive outdoors. Therefore, the presence of the pest in the surroundings is very unlikely. The scenario also assumes that the repotting with clean peat growing medium after shaking roots and the application of entomopathogenic nematodes, even if not addressed to this pest, could have an effect against the pest. Finally, the scenario also assumes that inspections should be effective as the adult and main symptoms are easily detectable.

A.2.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested living sculptures

The scenario assumes that, although it is unlikely that the pest can survive or develop outdoors, other traded plants present in the surroundings of the nursery could be a source of the pest. Polytunnels present in the nursery could also host some plants that could be hosts of the pest. The scenario also assumes that, although inspections are conducted very often, they will fail detection of eggs and signs of the pest inside the commodity. Few individuals in the nursery could be overlooked and cause late infection without showing symptoms.

A.2.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested living sculptures (Median)

Median is very shifted to the left side (lower infestation rate) because of the unlikely presence of the pest in the surroundings of the nursery. The commodity is produced outdoors and the pest is also unlikely to perform out of the greenhouses. The probability of being introduced is very low. Repotting after shaking roots and the entomopathogenic nematodes treatment could have an effect against the pest. Finally, inspections will be successful because adults and signs of its present are easily visible.

A.2.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The low probability of performing of the pest outdoors results in high level of uncertainties for infestation rates below the median. Otherwise, this low probability of the presence of the pest in the surroundings gives less uncertainties for rates above the median. Potential effectivity of applied measures and inspections also results in a lower level of uncertainties for infestation rates above the median.

A.2.5.5. Elicitation outcomes of the assessment of the pest freedom for *Diaprepes abbreviatus* on living sculptures

The following Tables show the elicited and fitted values for pest infestation (Table A.3) and pest freedom (Table A.4).

Table A.3: Elicited and fitted values of the uncertainty distribution of pest infestation by *Diaprepes abbreviatus* per 10,000 sculptures

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					1		2		4					10
EKE	0.042	0.099	0.190	0.372	0.620	0.944	1.29	2.11	3.18	3.89	4.84	5.95	7.33	8.56	10.0

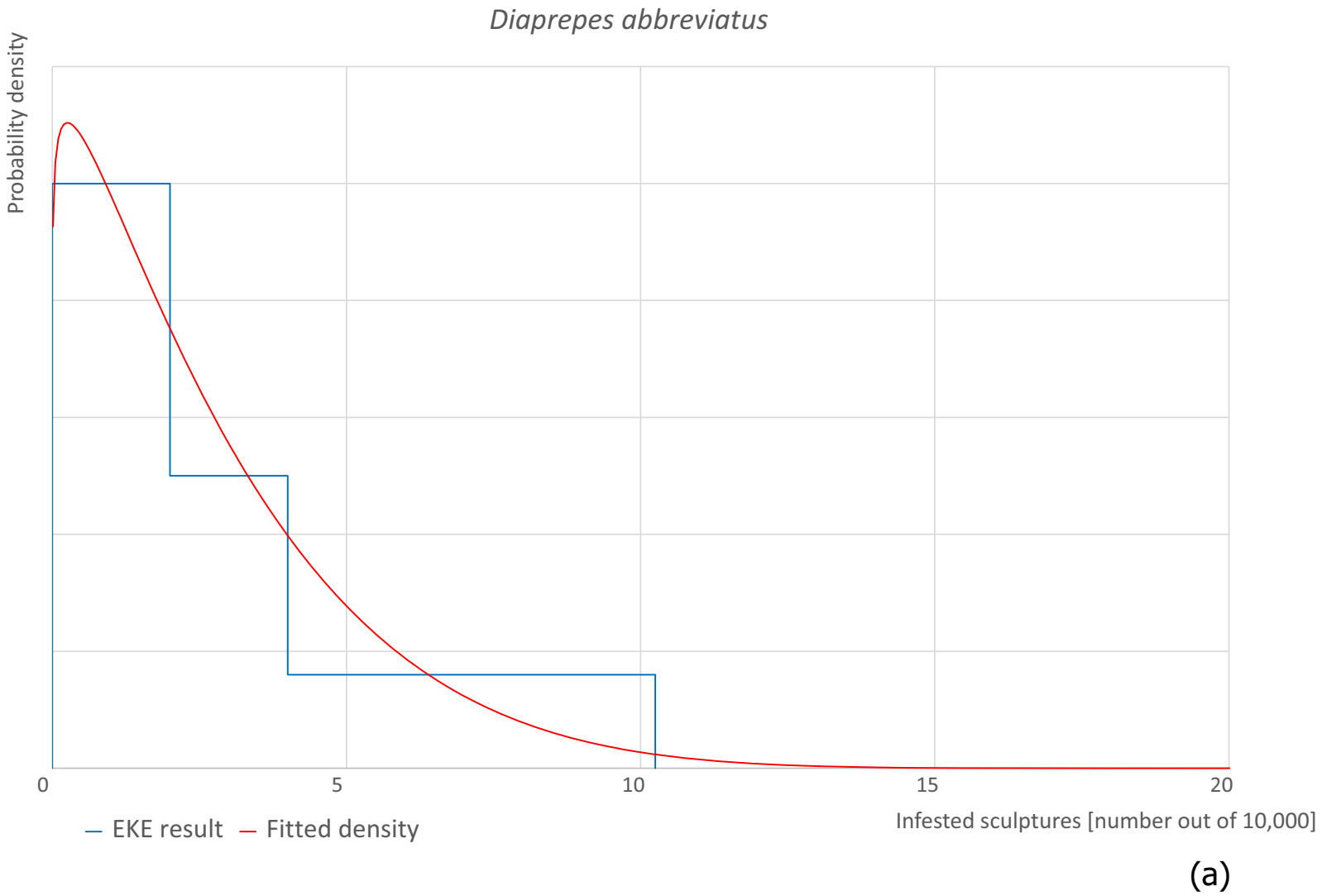
The EKE results are the BetaGeneral(1.0764,6.8505,0,20) distribution fitted with @Risk version 7.6.

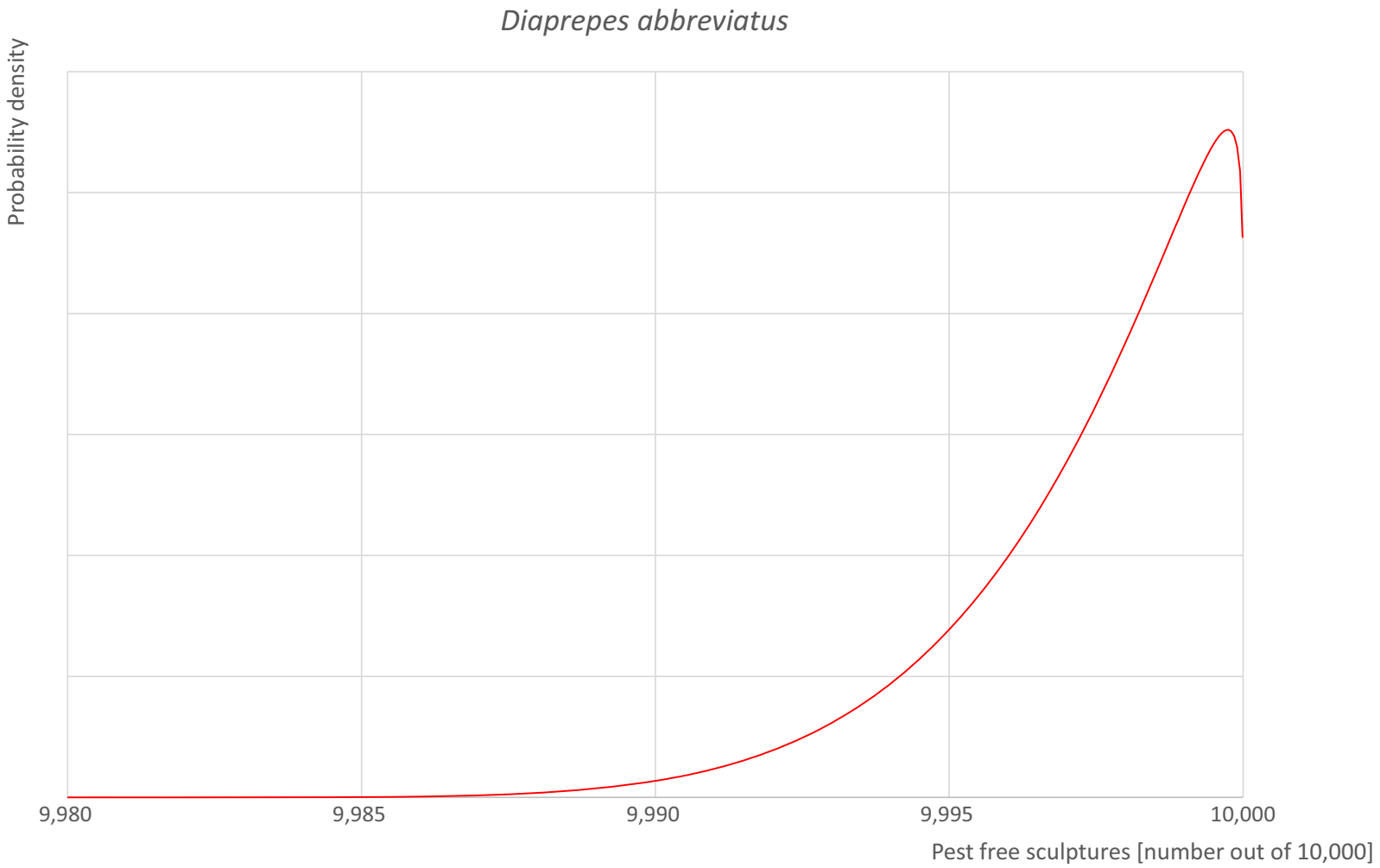
Based on the numbers of estimated infested sculptures, the pest freedom was calculated (i.e. = 10,000 – number of infested sculptures per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.4.

Table A.4: The uncertainty distribution of plants free of *Diaprepes abbreviatus* per 10,000 sculptures calculated by Table A.3

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9,990					9,996		9,998		9,999					10,000
EKE results	9,990	9,991	9,993	9,994	9,995	9,996	9,997	9,998	9,998.7	9,999.1	9,999.4	9,999.6	9,999.8	9,999.9	10,000

The EKE results are the fitted values.





(b)

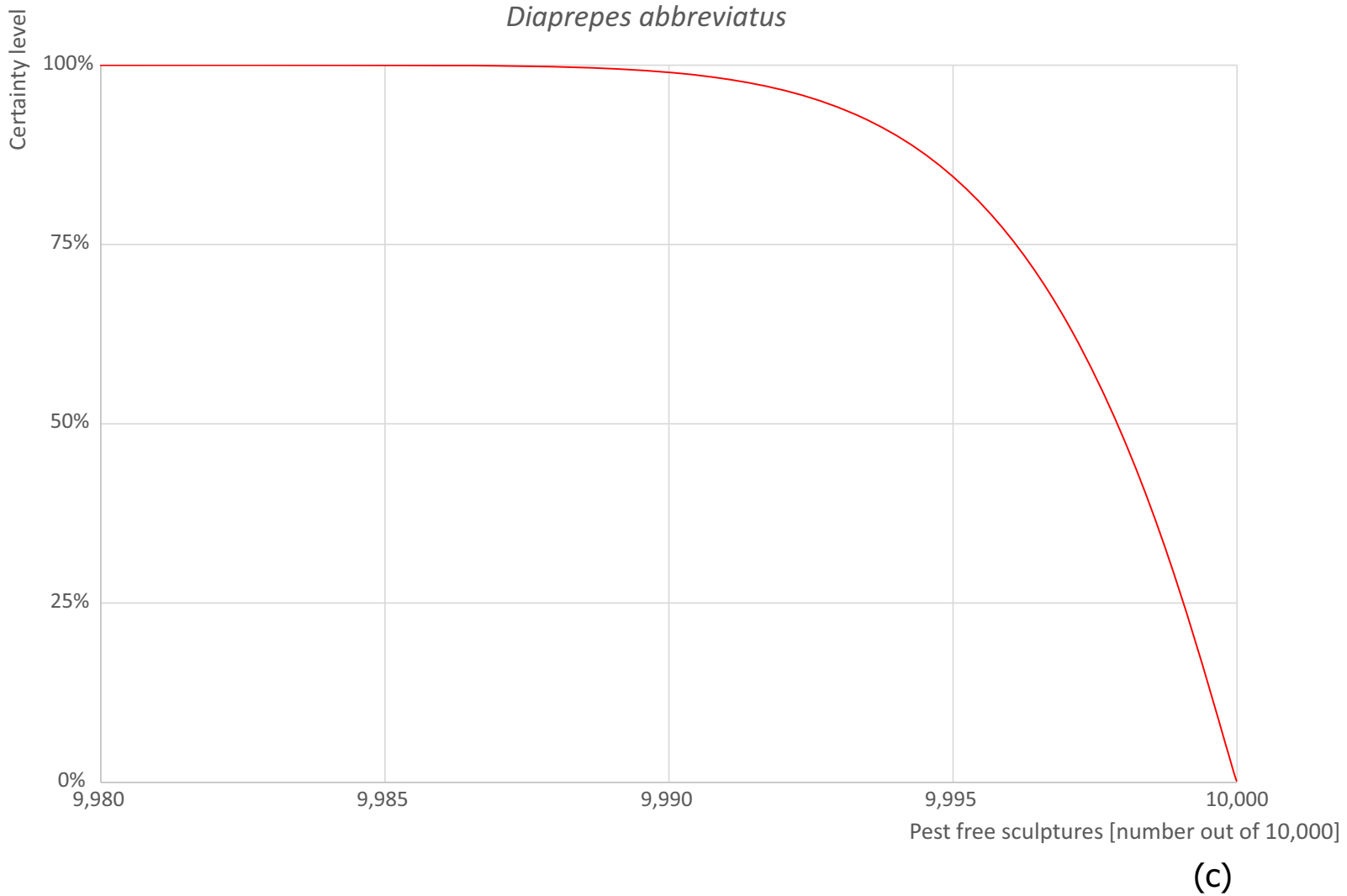


Figure A.2: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue– vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest free sculptures per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 sculptures

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A.3. *Epiphyas postvittana*

A.3.1. Organism information

Taxonomic information	Current valid scientific name: *Epiphyas postvittana* Synonyms: *Archips postvittanus*, *Austrotortrix postvittana*, *Cacoecia postvittana*, *Dichelia foedana*, *Dichelia retractana*, *Dichelia reversana*, *Dichelia vicariana*, *Pandemis consociana*, *Teras basialbana*, *Teras postvittana*, *Teras scitulana*, *Teras secretana*, *Tortrix dissipata*, *Tortrix oenopa*, *Tortrix phaeosticha, Tortrix postvittana*, *Tortrix pyrrhula*, *Tortrix stipularis* Name used in the EU legislation: – Order: Lepidoptera Family: Tortricidae Common name: apple leaf roller, Australian leaf roller, light-brown apple moth Name used in the Dossier: *Epiphyas postvittana*
Group	Insects
EPPO code	TORTPO
Regulated status	*Epiphyas postvittana* is neither regulated in the EU nor listed by EPPO. *Epiphyas postvittana* is a quarantine species in Canada, Mexico, Morocco and United States of America. It is on A1 list of Argentina, Brazil, Chile, Egypt and Jordan (EPPO, online_a).
Pest status in the UK	*Epiphyas postvittana* was introduced to Cornwall in 1936 (Fountain and Cross, 2007). It is currently present in the UK (Agassiz, 2002; CABI, online; de Jong et al., online; EPPO, online_b). According to NBN Atlas (online), *E. postvittana* is widespread in England, Northern Ireland and Wales, and with few occurrences in Scotland. The moth is present in many urban and coastal parts of Britain, it is abundant in the Channel Isles close to France (Agassiz, 2002) and widespread in Hampshire (Wall, online), where the export nursery is located. According to the Dossier Sections 3.0 and 4.0, *E. postvittana* is present and widely distributed in the UK.
Pest status in the EU	*Epiphyas postvittana* is reported to be present in Belgium, France (GBIF, online), Ireland (Bond, 1998; CABI, online; EPPO, online_b), the Netherlands (Wolschrijn and Kuchlein, 2006; de Jong et al., online), Portugal (Azores) (Hummer et al., 2009; CABI, online) and Sweden (Svensson, 2009; CABI, online). Nevertheless, *E. postvittana* is: – present: likely widespread in São Miguel Island (Portugal, Azores) and not under official control (NPPO of Portugal, 2022).

	– present: not widely distributed in Belgium and France and not under official control (NPPO of Belgium, 2022; NPPO of France, 2022). – likely absent from Sweden (NPPO of Sweden, 2022). – absent: historical records not verified, no recent findings in the Netherlands (NPPO of Netherlands, 2022).
Host status on *Ligustrum*	*Epiphyas postvittana* is reported on *Ligustrum japonicum* (Wang et al., 2012; CABI, online), *L. ovalifolium* (Shaw, 1981) and *L. vulgare*, which is a major host (Sullivan, 2014; CABI, online; EPPO, online_c).
PRA information	Available Pest Risk Assessment: – Mini Risk Assessment Light brown apple moth, *Epiphyas postvittana* (Walker) [Lepidoptera: Tortricidae] (Venette et al., 2003). – Economic Analysis: Risk to U.S. Apple, Grape, Orange and Pear Production from the Light Brown Apple Moth, *Epiphyas postvittana* (Walker) (Fowler et al., 2009). – Analizy Zagrożenia Agrofagiem (Ekspres PRA) dla *Epiphyas postvittana* (Institut Ochrony Roslin, 2019).
Other relevant information for the assessment	
Biology	*Epiphyas postvittana* is a moth native to Australia (Danthanarayana, 1975). The moth was accidentally introduced to Europe (Azores, Belgium, France, Ireland, the Netherlands, Sweden, the UK), New Caledonia, New Zealand and the USA (California, Hawaii) (CABI, online; EPPO, online_b; de Jong et al., online). Females and males develop through four life stages: egg, larva (six instars; rarely five or seven instars), pupa and adult (Danthanarayana, 1975). Two or three days after mating, females lay egg masses on the upper surface of smooth leaves (Danthanarayana, 1975). Eggs are flat, oval, pale yellow to white (Brown et al., 2010) and 0.84–0.95 mm in size. Number of eggs per mass ranges from 4–77 and the fecundity may reach 1,492 eggs per female. A range allowing egg development was estimated between 11.5 and 28°C and egg stage lasts approximately 5–32 days. Newly hatched larvae disperse by crawling or by dropping on silken threads (Danthanarayana, 1975) in order to find favoured food sources based on colours and chemical blends (Suckling and Ioriatti, 1996). After the first moult the larva creates leaf roll (nest) by webbing or folding together leaves, leaf to bud and/or to fruit. Larvae feed on leaves, buds, flowers and fruits of its hosts. Larvae measure from 0.2 (1^{st} instar) to 1.3 mm (6^{th} instar) in width (Danthanarayana, 1975) and from 1.6 (1^{st} instar) to 20 mm (6^{th} instar) in length (Sullivan, 2014). Larval stage lasts between 19 and 91 days. The pupation occurs inside the nest and lasts between 7 and 33 days. Pupa is initially green, and with age, it turns brown. It is approximately 2.5–2.9 mm wide and 7.6–9.8 mm long. Adult moth is light brown with variable coloration on the wings (yellowish brown, light brown and dark brown). Females are usually larger than males, 5.2–11.5 mm long and with wingspan of 11.8–27.2 mm. The longevity of females ranges between 1–65 days and 1–44 days of males (Danthanarayana, 1975). Depending on temperature and latitude, *E. postvittana* has from two (Bürgi and Mills, 2010) up to five generations annually (Fountain and Cross, 2007, citing others). In most of Australia it has three generations (Danthanarayana, 1975), however in warmer parts it can have four (Buchanan et al., 1991) or up to five generations annually (Fountain and Cross, 2007, citing others). In Northern California and the UK, the moth has between two and three generations (Fountain and Cross, 2007; Bürgi and Mills, 2010). In Australia, *E. postvittana* does not undergo winter diapause, instead the development is slowed down (Geier and Briese, 1981). In Northern California, overwintering stages are 4^{th} to 6^{th} larval instars. The mean super cooling point for *E. postvittana* ranged from –14.1°C (6^{th} instar) to –16°C (4^{th} instar) (Bürgi and Mills, 2010). Adults can disperse by active flight and by wind. Adults are quiescent during the day and fly at dusk. During a trapping experiment with bait and pheromone traps for a duration of 28 days, the moth was typically caught within 100 m of releasing point. The maximum dispersal distance was 275 m for females and 600 m for males (Suckling et al., 1994). Flight duration is affected by temperature, humidity, feeding

	and mating. Flight occurred only at temperatures between 10–30°C (Danthanarayana and Gu, 1992). *Epiphyas postvittana* was intercepted many times in Japan from Australia and New Zealand on fruits, vegetables and cut flowers of its hosts at egg, larva, pupa and adult stage. The most common pathway was with peppers as larvae (Takahashi, 2002). In the USA, it was intercepted with mainly international airline passengers (96%) and Rosaceae host plants (Venette et al., 2003, citing others). Possible pathways of entry for *E. postvittana* are plants for planting, cut flowers, fruits and vegetables (Takahashi, 2002; Venette et al., 2003, citing others).	
Symptoms	**Main type of symptoms**	Main symptoms caused by larvae are bud feeding; flower feeding; ragging and curling of leaves; leaf rolls (nests created by a larva that rolls or webs together leaves, leaf to bud and/or fruit); nests among fruits; injury on the surface of fruits (scarring/tunnelling of fruits, halo scars to *Citrus* fruits); fruit drop (Brown et al., 2010; Sullivan, 2014); deformation or death of young seedlings (Geier and Briese, 1981). The damaged fruit is than susceptible to infection and rot (Brown et al., 2010), e.g. *Botrytis cinerea* (Bailey, 1997). The information on symptoms caused to *Ligustrum* species by *E. postvittana* is scarce. On *L. japonicum*, fresh growing foliage was infested (Wang et al., 2012).
	Presence of asymptomatic plants	No information on the presence of asymptomatic plants was found.
	Confusion with other pests	Adults of *E. postvittana* can be confused with other *Epiphyas* species (such as *E. pulla* and *E. liadelpha*) (Venette et al., 2003) and many species of tortricids in other genera such as *Choristoneura*, *Argyrotaenia*, *Clepsis* and *Pandemis* (Gilligan et al., 2014). The identity of the species can be confirmed by examination of adult genitalia (Venette et al., 2003; Gilligan et al., 2014). In order to distinguish larvae of *E. postvittana* from other leaf rollers, molecular diagnostics (PCR amplification of ribosomal DNA) can be used (Armstrong et al., 1997).
Host plant range	*Epiphyas postvittana* is one of the most polyphagous insects known with more than 500 host plant species (Brockerhoff et al., 2011; Sullivan, 2014). Main hosts according to CABI (online) are *Actinidia chinensis*, *Chrysanthemum morifolium*, *Citrus* spp., *Cotoneaster* sp., *Crataegus* sp., *Diospyros* sp., *Eucalyptus* sp., *Feijoa sellowiana*, *Humulus lupulus*, *Jasminum*, *Ligustrum vulgare*, *Litchi chinensis*, *Malus domestica*, *Medicago sativa*, *Persea americana*, *Pinus* sp., *Pinus radiata*, *Populus* sp., *Prunus armeniaca*, *Prunus persica*, *Pyrus* sp., *Ribes* sp., *Rosa* sp., *Rubus* sp., *Solanum tuberosum*, *Trifolium* sp., *Vaccinium* sp., *Vicia faba* and *Vitis vinifera*. Other hosts are *Buxus sempervirens*, *Ligustrum japonicum* (Wang et al., 2012; CABI, online) and *L. ovalifolium* (Shaw, 1981). For a full host list, refer to Brockerhoff et al. (2011), Wang et al. (2012), Sullivan (2014), CABI (online) and EPPO (online_c).	
Reported evidence of impact	*Epiphyas postvittana* is a serious pest of fruits (especially apples) and ornamental plants in Australia and New Zealand. The larvae are very damaging to apple, citrus, grape and peach. The losses in Australia were estimated to be AU$ 21 million (~US$ 22.15 million) per year (Sullivan, 2014). The damage caused by larvae includes deformation or death of young seedlings; damage in appearance of ornamental plants and injuries to fruit crops (Geier and Briese, 1981). It is a polyphagous pest of gardens (Agassiz, 2002) and a significant pest in hardy ornamental nursery stock throughout England. In 2005, the moth caused severe damage to cherry orchards in Kent (Fountain and Cross, 2007). Even though *Ligustrum vulgare* is considered a major host, there is no precise information on damage caused by the moth in the literature.	

	In Azores, *E. postvittana* infested blueberry species (Hummer et al., 2009). There is no other information on a damage caused by *E. postvittana* in the EU member states.
Evidence that the commodity is a pathway	*Ligustrum* spp. can be hosts to the moth. *Epiphyas postvittana* was intercepted with Rosaceae host plants (Venette et al., 2003, citing others), demonstrating that the movement of plants can represent a pathway for the moth.
Surveillance information	According to the Dossier Sections 3.0 and 4.0, *E. postvittana* is present and widely distributed in the UK. Surveillance in the nursery did not result in the detection of the pest during the last five years (Dossier Section 3.0).

A.3.2. Possibility of pest presence in the nursery

A.3.2.1. Possibility of entry from the surrounding environment

Epiphyas postvittana is present, widely distributed in the UK (Dossier Sections 3.0 and 4.0), including Hampshire (Wall, online), where the export nursery is located.

The possible entry of *E. postvittana* from surrounding environment to the nursery may occur through adult flight dispersal (approximately 600 m per day) and passively by wind.

Epiphyas postvittana is polyphagous species that can infest a number of different plants (Brockerhoff et al., 2011; Sullivan, 2014). Suitable hosts of *E. postvittana* like *Crataegus monogyna*, *Prunus* spp., *Rosa* spp., *Rosa canina* and *Rubus fruticosus* are present within 2 km from the nursery. Other nurseries where *Ligustrum* plants are cultivated are about 7.5 km in a straight line from the nursery (Dossier Section 3.0), but other plant producing/trading companies are on the same address as Agrumi nursery (identified with Google Earth using the GIS coordinates provided in the Dossier). These companies are trading more plant species including *Citrus* spp. Private gardens with fruit trees are likely to be present in the near vicinity (when checking the Google Earth). However, further details are not known (Dossier Section 3.0).

Uncertainties:

- There is no surveillance information on population pressure of the moth in the area where the nursery is located.
- There is no information about the host plant distribution around the nursery in private gardens.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery. The pest could be present in the surrounding areas because of suitable hosts and the transferring rate could be enhanced by adult flight and by wind.

A.3.2.2. Possibility of entry with new plants/seeds

The scions of *L. delavayanum* are either grown from seeds in pots or they come from mother plants that are located in the nursery. The mother plants originate from other nurseries in Pistoia, Italy, where the pest is not present. The rootstocks of *L. japonicum* are grown in pots, from seeds, in the nursery (Dossier Section 3.0). Therefore, no new plants except for mother plants of *L. delavayanum* enter the nursery from outside and seeds are not a pathway for the moth.

In addition to *Ligustrum* plants, the nursery also produces other plants for living sculptures (Dossier Section 3.0). Out of them, *Buxus sempervirens* is a suitable host of the moth. However, there is no information on how the plants are produced. Therefore, if the plants are first produced in another nursery, the moth could possibly travel with them.

The nursery is using peat compost (Petersfield Potting Supreme – medium grade sphagnum peat), which is weed and pest free. Plants are regularly re-potted, during which the old peat compost is shaken free, roots trimmed and then the plants potted up using fresh peat (Dossier Sections 1.0 and 3.0). However, the soil or growing media is not a pathway for the moth.

Uncertainties:

- No information is available on the provenance of new plants of *Buxus sempervirens* used for plant production in the area of the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery with new plants (*Buxus sempervirens*) used for plant production in the area. The entry of the pest with new plants or seeds of *Ligustrum* the Panel considers as not possible.

A.3.2.3. Possibility of spread within the nursery

Ligustrum plants are grown in containers outdoors in the open air (Dossier Sections 1.0 and 3.0).

The pest can attack other suitable living sculptures (such as *Buxus sempervirens*), mother trees present within the nursery and hedges surrounding the nursery (*Crataegus monogyna*, *Prunus* spp., *Rosa* spp. and *Rosa canina*).

The moth within the nursery can spread by adult flight. Spread within the nursery through equipment and tools is not relevant.

Uncertainties:

- Possibility of different plant host species for trade.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nursery is possible by active flight.

A.3.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Epiphyas postvittana* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online).

A.3.4. Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *Epiphyas postvittana* is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 7.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	As the plant passport is very similar to the EU one, the living sculptures shall be free from quarantine pests. No uncertainties.
2	Certification of propagation material and substrates	No	Not relevant to this pest.
3	Physical separation	No	Not relevant to this pest.
4	Surveillance, monitoring and sampling	Yes	Although the plants are thoroughly checked during the production and the creation of the living sculptures, later infestation by *E. postvittana* can go undetected, because it is difficult to check the internal parts of the living sculpture. Curative measures adopted when the pest is found, may have limited effect on the whole living sculpture, especially in the hidden parts. Uncertainties: – Capacity of detection of the pest inside the living sculptures. – The effect of curative measures to the inner parts of the living sculptures. – The continuous clipping of leaves and twigs may reduce the potential establishment of *E. postvittana*.
5	Hygiene measures	Yes	Removal of leaf clipping and pruning may reduce the risk that eggs are developing into larvae. Uncertainties: – The level at which all the potential leaves carrying eggs are removed.
6	Irrigation water	No	Not relevant to this pest.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
7	Application of pest control products	Yes partly	SB Plant Invigorator is not known to affect the oviposition and egg development of *E. postvittana*. Biological control is not relevant to this pest. Other chemical measures adopted when the pest is found, may have limited effect on the whole living sculpture, especially in the hidden parts. Uncertainties: – The active ingredients of chemical treatments and their level of efficacy against the pest. – The effect of chemical measures to the inner parts of the living sculptures. – The usage of pheromone traps.
8	Inspections and management of plants before export	Yes partly	While larvae, pupae and moths are easy to detect, eggs laid on the leaves are much more difficult, especially inside the living sculptures. Uncertainties: – The capacity to inspect the whole living sculpture. – The capacity to detect eggs on leaves.
9	Separation during transport to the destination	No	Living sculptures are not individually separated during transportation. The pest can infest other living sculptures. No uncertainties.

A.3.5. Overall likelihood of pest freedom for living sculptures

A.3.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested living sculptures

Although the pest is known to be present in the UK, the pest pressure of the pest in the surroundings of the nursery is very low, because of the absence/very limited presence of fruit crops and other hosts in the surroundings, including private gardens. The scenario also assumes that *Ligustrum delavayanum* is not a good host and the pest is promptly detected during inspections.

A.3.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested living sculptures

The pest is known to be present and widespread in the UK and the pest pressure of the pest is assumed to be high as a result of the presence of fruit crops and other hosts in the surroundings including private gardens. The scenario also assumes *Ligustrum delavayanum* to be a good host. Inspections will fail detection of the pest inside the commodity.

A.3.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested living sculptures (Median)

This scenario is slightly closer to the A.3.5.1. scenario in that it assumes *Ligustrum* to be a host with medium suitability. In addition, the pest pressure is moderately high in the surroundings, because some major hosts (fruit crops) are present in some private gardens. Inspections will not be always successful.

A.3.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The assessment highlighted maximum uncertainty, because there is no surveillance of the pest hampering an estimation of the pest pressure. In addition, it is uncertain to which level the pest present inside the commodity could go undetected during inspections.

A.3.5.5. Elicitation outcomes of the assessment of the pest freedom for *Epiphyas postvittana* on living sculptures

The following Tables show the elicited and fitted values for pest infestation (Table A.5) and pest freedom (Table A.6).

Table A.5: Elicited and fitted values of the uncertainty distribution of pest infestation by *Epiphyas postvittana* per 10,000 sculptures

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	10					60		110		200					300
EKE	10.0	12.0	15.8	24.5	37.5	55.3	74.7	118	167	195	225	253	276	290	300

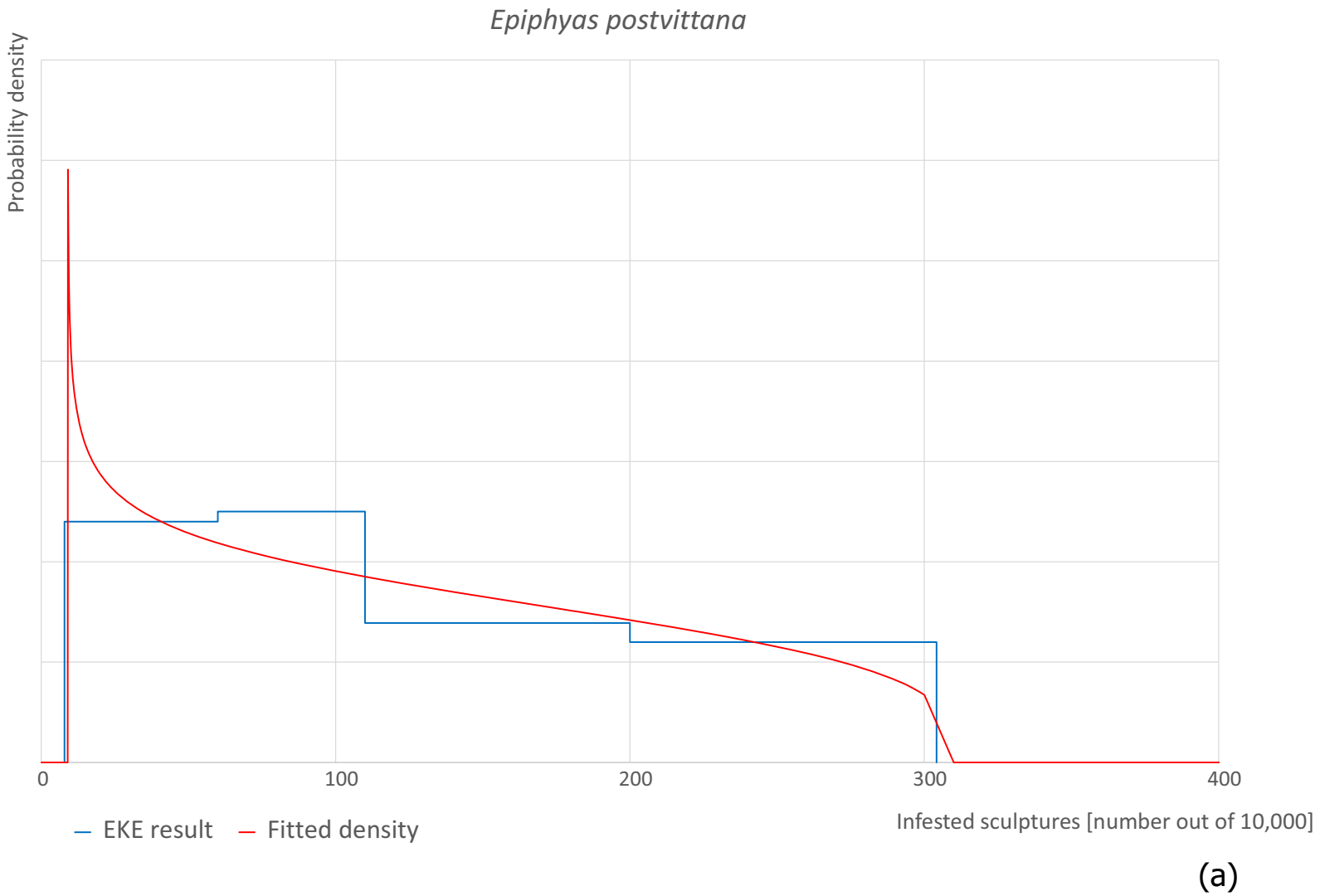
The EKE results are the BetaGeneral (0.84902,1.2841,9,310) distribution fitted with @Risk version 7.6.

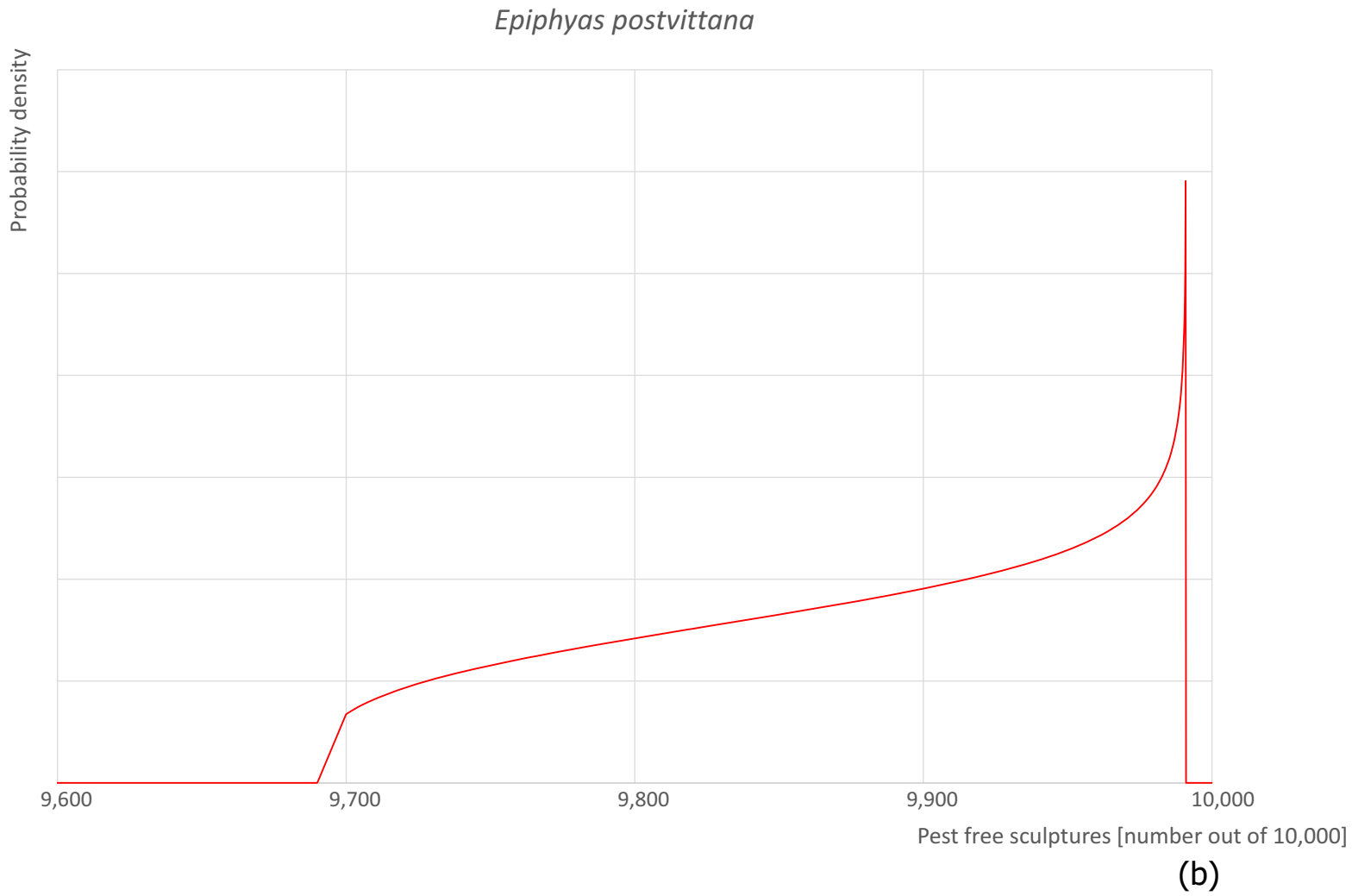
Based on the numbers of estimated infested sculptures, the pest freedom was calculated (i.e. = 10,000 – number of infested sculptures per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.6.

Table A.6: The uncertainty distribution of plants free of *Epiphyas postvittana* per 10,000 sculptures calculated by Table A.5

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9,700					9,800		9,890		9,940					9,990
EKE results	9,700	9,710	9,724	9,747	9,775	9,805	9,833	9,882	9,925	9,945	9,962	9,976	9,984	9,988	9,990

The EKE results are the fitted values.





(b)

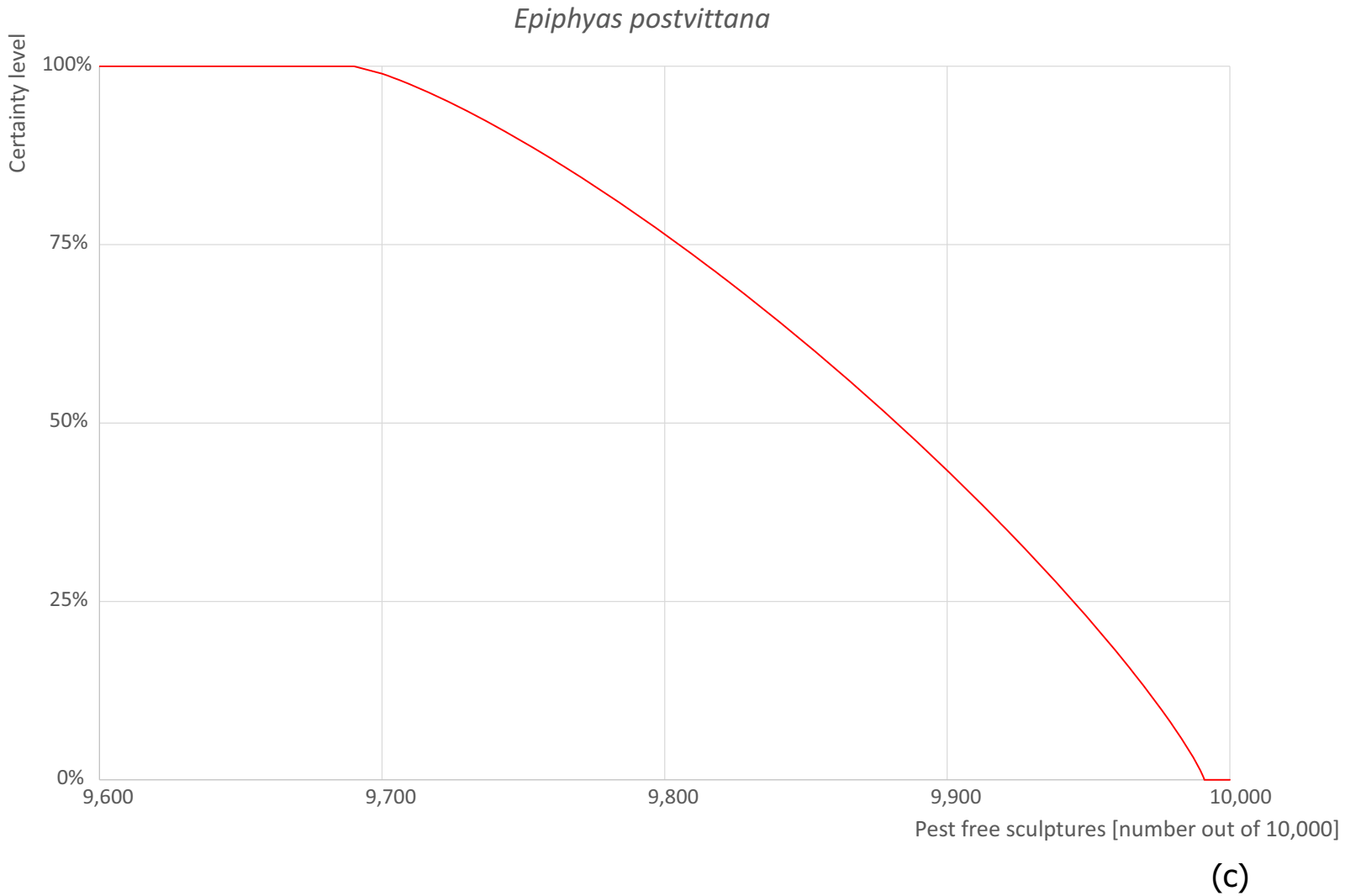


Figure A.3: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue– vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest free sculptures per 10,000 (i.e. =1 – pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 sculptures

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A.4. *Scirtothrips dorsalis*

A.4.1. Organism information

Taxonomic information	Current valid scientific name: *Scirtothrips dorsalis* Synonyms: *Anaphothrips andreae, Anaphothrips dorsalis, Anaphothrips fragariae, Heliothrips minutissimus, Neophysopus fragariae, Scirtothrips andreae, Scirtothrips dorsalis padmae, Scirtothrips fragariae, Scirtothrips minutissimus, Scirtothrips padmae* Name used in the EU legislation: *Scirtothrips dorsalis* Hood [SCITDO] Order: Thysanoptera Family: Thripidae Common name: Assam thrips, chilli thrips, flower thrips, strawberry thrips, yellow tea thrips, castor thrips Name used in the Dossier: *Scirtothrips dorsalis*
Group	Insects
EPPO code	SCITDO

Regulated status	The pest is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072 as *Scirtothrips dorsalis* Hood [SCITDO]. *Scirtothrips dorsalis* is included in the EPPO A2 list (EPPO, online_a). The species is a quarantine pest in Israel, Mexico, Morocco and Tunisia. It is on A1 list of Brazil, Chile, Egypt, Kazakhstan, Russia, Turkey, Ukraine, United Kingdom and EAEU (Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia). It is on A2 list of Bahrain (EPPO, online_b).
Pest status in the UK	*Scirtothrips dorsalis* was found for the first time in the UK in December 2007 in a greenhouse (Palm House) at Royal Botanic Garden Kew in South England (Scott-Brown et al., 2018). Since 2008, the discovered population has been under official control by the plant health authorities with the objective of achieving complete eradication (Collins, 2010). Eradication measures were applied, and since 2019, the pest has no longer been found (EPPO, online_c). In the Dossier Section 3.0, it is stated that: '*Scirtothrips dorsalis* has been found in one tropical glasshouse at Kew, and at no other location. It has been subject to control measures for many years, and there have been no recent records – last official records are from 2012. It is possible that this pest has been eradicated, but we are unable to officially confirm this at this time – ref UK plant health risk register. UK Status: Present, not widely distributed and under official control.'
Pest status in the EU	*Scirtothrips dorsalis* is present under eradication in the Netherlands and Spain (CABI, online; EPPO, online_c). According to Europhyt Oubreaks database (online), there were three outbreaks, which are under eradication: 1) in the Netherlands (2019) on plants for planting of *Podocarpus*; 2) in Spain (2016) on plants of citrus and pomegranate; 3) in Spain (2019) in mango greenhouses. *Scirtothrips dorsalis* is continuously intercepted in the EU points-of-entry on different commodities: plants for planting; cut flowers and branches with foliage; fruits and vegetables (EUROPHYT/TRACES-NT, online).
Host status on *Ligustrum*	*Ligustrum japonicum* is reported host of *Scirtothrips dorsalis* (Ohkubo, 1995; Kumar et al., 2013; CABI, online). There is no information on whether *S. dorsalis* can also attack *L. delavayanum* or other *Ligustrum* species.
PRA information	Available Pest Risk Assessments: – CSL pest risk analysis for *Scirtothrips dorsalis* (MacLeod and Collins, 2006); – Pest Risk Assessment *Scirtothrips dorsalis* (Vierbergen and van der Gaag, 2009); – Scientific Opinion on the pest categorisation of *Scirtothrips dorsalis* (EFSA PLH Panel, 2014); – Scientific opinion on the commodity risk assessment of *Jasminum polyanthum* plants from Israel (EFSA PLH Panel, 2020); – Scientific Opinion on the commodity risk assessment of *Ficus carica* plants from Israel (EFSA PLH Panel, 2021a); – Scientific Opinion on the commodity risk assessment of *Persea americana* from Israel (EFSA PLH Panel, 2021b); – Scientific Opinion on the commodity risk assessment of *Jasminum polyanthum* unrooted cuttings from Uganda (EFSA PLH Panel, 2022); – UK Risk Register Details for *Scirtothrips dorsalis* (DEFRA, online).
Other relevant information for the assessment	
Biology	*Scirtothrips dorsalis* is a thrips present in Africa (Cote d'Ivoire, Kenya, Uganda), Asia (Bangladesh, Brunei Darussalam, China, India, Indonesia, Iran, Israel, Japan, Malaysia, Myanmar, North Korea, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam), Europe (Netherlands, Spain, UK), North America (Caribbean, Florida, Georgia, Hawaii, Mexico, Texas), Oceania (Australia, Papua New Guinea, Solomon Islands) and South America (Brazil, Colombia, French Guiana, Suriname, Venezuela) (CABI, online; EPPO, online_c). In the literature, its

origin is contradictory, it is reported as either native to Asia, Australasia or South Africa. For more details, refer to Mound and Palmer (1981), Seal et al. (2006), Hoddle et al. (2008), Kumar et al. (2013) and CABI (online).

According to Dickey et al. (2015), *S. dorsalis* is a species complex that includes at least nine cryptic species and two morphologically distinguishable species (*S. oligochaetus* and *S. aff. dorsalis*). The information about the UK populations is not available.

Scirtothrips dorsalis develops through five life stages: egg, larva (two instars), prepupa, pupa and adult (Dev, 1964; Kumar et al., 2013). They can be found on all the aboveground plant parts (Kumar et al., 2014), and they damage young leaves, buds, tender stems and fruits by sucking tender tissues with their stylets (Kumar et al., 2013).

Temperature thresholds for development are 9.7°C and 32°C, with 265 degree-days required for development from egg to adult (Tatara, 1994). The adult can live up to 13–15 days (Kumar et al., 2013, citing others). *Scirtothrips dorsalis* can have annually up to 8 generations in Japan (Tatara, 1994). In the USA, it was estimated by a degree-day model that, in some of the southern states, the thrip can potentially have up to 18 generations (Nietschke et al., 2008).

Scirtothrips dorsalis can reproduce both sexually and by haplodiploid parthenogenesis, with females developing from fertilised and males from unfertilised eggs (Dev, 1964). Female can lay between 60 and 200 eggs (Seal and Klassen, 2012), which are inserted into soft plant tissues of buds and young leaves near the mid rib or into the veins. But sometimes they are also laid into older leaves (Dev, 1964). The eggs hatch in 6–8 days (Seal and Klassen, 2012). Eggs are glassy white about 0.25 mm long and 0.1 mm wide. First and second instar larvae are white, yellow to light orange and their length size ranges between 0.29–0.32 and 0.48–0.59 mm, respectively (Dev, 1964). Prepupa is yellowish and pupa dark yellow (CABI, online) with 0.59–0.63 mm in length (Dev, 1964). Adults are pale yellow to greyish white in colour (Seal and Klassen, 2012). Female is approximately 1.05 mm long and 0.19 mm wide. Males are smaller 0.71 mm long and 0.14 mm wide (Dev, 1964). Larvae and adults tend to gather near the mid-vein or near the damaged part of leaf tissue. Pupae are found in the leaf litter, on the axils of the leaves, in curled leaves or under the calyx of flowers and fruits (MacLeod and Collins, 2006; Kumar et al., 2013). Prepupa and pupa stages never feed (Tatara, 1994).

Adults fly actively for short distances – tens of meters (Masui, 2007a) and passively on wind currents, which enables long-distance spread (EFSA PLH Panel, 2014). They overwinter as adults (Okada and Kudo, 1982) in bark, litter, soil and protected in plant parts (Shibao, 1991; Holtz, 2006). The thrips cannot survive if the temperature remains below – 4°C for 5 or more days (Nietschke et al., 2008).

Scirtothrips dorsalis is a vector of plant viruses including capsicum chlorosis virus (CaCV), chilli leaf curl virus (CLC), melon yellow spot virus (MYSV), peanut chlorotic fan virus (PCFV), peanut necrosis virus (PBNV), peanut yellow spot virus (PYSV), tobacco streak virus (TSV) and watermelon silver mottle virus (WsMoV) (Satyanarayana et al., 1996; Rao et al., 2003; Seal et al., 2010; Kumar et al., 2013). However, these viruses are not reported to infect *Ligustrum* species.

Scirtothrips dorsalis causes economic loses to chilli (*Capsicum annuum*) in India with yield loss estimated between 61–74% (Kumar et al., 2013, citing others), mango in Malaysia (Aliakbarpour et al., 2010), vegetables in China and the USA (Reitz et al., 2011), tea, grapevine and citrus in Japan (Tatara, 1994, citing others; Masui, 2007b).

No information is available about damage on *Ligustrum* species.

Possible pathways of entry for *S. dorsalis* are plants for planting, cut flowers, fruits, vegetables, soil and growing media (EFSA PLH Panel, 2014).

Symptoms	**Main type of symptoms**	According to Dev (1964) and Kumar et al. (2013; 2014), main symptoms caused by *S. dorsalis* are: – 'sandy paper lines' on the epidermis of the leaves; – leaf crinkling and upwards leaf curling; – leaf size reduction; – discoloration of buds, flowers and young fruits; – silvering of the leaf surface; – linear thickenings of the leaf lamina; – brown frass markings on the leaves and fruits; – corky tissues on fruits; – grey to black markings on fruits; – fruit distortion; – early senescence of leaves; – defoliation. When the population is high, thrips may feed on the upper surfaces of leaves and cause defoliation and yield loss (Kumar et al., 2013). There is no information on the symptoms caused to *Ligustrum* plants.
	Presence of asymptomatic plants	Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves). The presence of *S. dorsalis* on the plants could hardly be observed.
	Confusion with other pests	Plants infested by *S. dorsalis* appear similar to plants damaged by the feeding of other thrips and broad mites (Kumar et al., 2013). Due to small size and morphological similarities within the genus, the identification of *S. dorsalis*, using traditional taxonomic keys, is difficult. The most precise identification of the pest is combination of molecular and morphological methods (Kumar et al., 2013).
Host plant range	*Scirtothrips dorsalis* is a polyphagous pest with more than 100 reported hosts (Kumar et al., 2013). The pest can infect many more plant species, but they are not considered to be true hosts, since the pest cannot reproduce on all of them (EFSA PLH Panel, 2014). Some of the many hosts of *S. dorsalis* are (alphabetically): *Abelmoschus esculentus*, *Acacia auriculiformis*, *Acacia brownii*, *Actinidia deliciosa*, *Allium cepa*, *Allium sativum*, *Anacardium occidentale*, *Arachis hypogaea*, *Asparagus officinalis*, *Beta vulgaris*, *Camellia sinensis*, *Capsicum annuum*, *Capsicum frutescens*, *Citrus* spp., *Citrus aurantiifolia*, *Citrus sinensis*, *Cucumis melo*, *Cucumis sativus*, *Cucurbita pepo*, *Dahlia pinnata*, *Dimocarpus longan*, *Diospyros kaki*, *Fagopyrum esculentum*, *Ficus* spp., *Ficus carica*, *Fragaria* spp., *Fragaria ananassa*, *Fragaria chiloensis*, *Glycine max*, *Gossypium* spp., *Gossypium hirsutum*, *Hedera helix*, *Helianthus annuus*, *Hevea brasiliensis*, *Hydrangea* spp., *Ipomoea batatas*, *Lablab purpureus*, *Ligustrum japonicum, Litchi chinensis*, *Mangifera indica*, *Melilotus indica*, *Mimosa* spp., *Morus* spp., *Nelumbo* spp., *Nelumbo lutea*, *Nelumbo nucifera*, *Nephelium lappaceum*, *Nicotiana tabacum*, *Passiflora edulis*, *Persea americana*, *Phaseolus vulgaris*, *Populus deltoides*, *Portulaca oleracea*, *Prunus* spp., *Prunus persica*, *Punica granatum*, *Pyrus* spp., *Ricinus communis*, *Rosa* spp., *Rubus* spp., *Saraca* spp., *Solanum* spp., *Solanum lycopersicum*, *Solanum melongena*, *Solanum nigrum*, *Syzygium samarangense*, *Tamarindus indica*, *Viburnum* spp., *Vigna radiata*, *Vitis* spp., *Vitis vinifera*, *Zea mays* subsp. *mays* and *Ziziphus mauritiana* (Ohkubo, 1995; Hodges et al., 2005; Kumar et al., 2014; CABI, online). For a full host list, refer to Ohkubo (1995), Hodges et al. (2005), Kumar et al. (2014), CABI (online).	
Reported evidence of impact	*Scirtothrips dorsalis* is an EU quarantine pest.	

Evidence that the commodity is a pathway	*Scirtothrips dorsalis* is continuously intercepted in the EU on different commodities including plants for planting (EUROPHYT/TRACES-NT, online) and according to EFSA PLH Panel (2014), *S. dorsalis* can travel with plants for planting. Therefore, plants for planting are possible pathways of entry for *S. dorsalis*.
Surveillance information	*Scirtothrips dorsalis* is under official control and was subjected to eradication in the greenhouse of Royal Botanic Garden Kew in the UK (Collins, 2010; Dossier Section 3.0). Surveillance in the nursery did not result in the detection of the pest during the last five years (Dossier Section 3.0).

A.4.2. Possibility of pest presence in the nursery

A.4.2.1. Possibility of entry from the surrounding environment

Scirtothrips dorsalis was found in a greenhouse at Kew Gardens in South England in 2007 (Scott-Brown et al., 2018) and since then it has been under official control (Dossier Section 3.0), although last official records are from 2012. However, there is no information of the thrips being able to spread beyond the greenhouse. The nursery is approximately 150 km away from the infested place.

The possible entry of *S. dorsalis* from surrounding environment to the nursery may occur through adult dispersal and passively on wind currents (EFSA PLH Panel, 2014).

Scirtothrips dorsalis is polyphagous species that can infest a number of different plants. Suitable hosts of *S. dorsalis* like *Prunus* spp., *Rosa* spp. and *Rubus* spp. are present within 2 km from the nursery. Other nurseries where *Ligustrum* plants are cultivated are about 7.5 km in a straight line from the nursery (Dossier Section 3.0), but other plant producing/trading companies are on the same address as Agrumi nursery (identified with Google Earth using the GIS coordinates provided in the Dossier). These companies are trading more plant species including *Citrus* spp. and palm species.

Uncertainties:

- Presence of the thrips in the UK.
- Possibility of spread beyond the infested greenhouse.
- Possibility of the thrips to survive the UK winter and summer in outdoor conditions.
- If the plant species traded by the other companies are grown and/or stored close to the production site.

Taking into consideration the above evidence and uncertainties, the Panel cannot exclude that the pest is present in the surrounding environment and can enter the nursery, even though it was found only in one greenhouse more than 150 km away. In the surrounding area, suitable hosts are present and the pest can spread by wind and adult flight.

A.4.2.2. Possibility of entry with new plants/seeds

The scions of *L. delavayanum* are either grown from seeds in pots or they come from mother plants that are located in the nursery. The mother plants originate from other nurseries in Pistoia, Italy, where the pest is not present. The rootstocks of *L. japonicum* are grown in pots, from seeds, in the nursery. Therefore, no new plants except for mother plants of *L. delavayanum* enter the nursery from outside and seeds are not a pathway for the thrips (Dossier Section 3.0).

In addition to *Ligustrum* plants, the nursery also produces other plants for living sculptures (Dossier Section 3.0). Out of them *Hedera helix* is a suitable host of the thrips. However, there is no information on how and where the plants are produced. Therefore, if the plants are first produced in another nursery, the thrips could possibly travel with them.

According to Shibao (1991) and Holtz (2006), adults overwinter in leaf litter and potting soil. The nursery is using peat compost (Petersfield Potting Supreme – medium grade sphagnum peat), which is weed and pest free. Plants are regularly re-potted, during which the old peat compost is shaken free, roots trimmed and then the plants potted up using fresh peat (Dossier Sections 1.0 and 3.0).

Uncertainties:

- No information is available on the provenance of new plants of *Hedera helix* used for plant production in the area of the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery with new plants (*Hedera helix*) used for plant production in the area. The entry of the pest with new plants or seeds of *Ligustrum* the Panel considers as not possible.

A.4.2.3. Possibility of spread within the nursery

Ligustrum plants are grown in containers outdoors in the open air.

The thrips can attack other suitable living sculptures (such as *Hedera helix*), mother trees present within the nursery and hedges surrounding the nursery (*Prunus* spp. and *Rosa* spp.).

There are five poly tunnels within the nursery with unknown use (Dossier Section 3.0).

The thrips within the nursery can spread by adult flight, wind, infested soil or by scions from infested mother plants. Spread within the nursery through equipment and tools is not relevant.

Uncertainties:

- Possibility of the thrips to survive the UK winter in outdoor conditions.
- Possibility of different plant host species for trade.
- Possibility that polytunnels are used in a way that allows the pest to overwinter.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nursery is possible either by wind, active flight or infested soil.

A.4.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Ligustrum*, *Ligustrum* sp., *L. japonicum* or *L. delavayanum* plants for planting neither from the UK nor from other countries due to the presence of *Scirtothrips dorsalis* between the years 1995 and April 2022 (EUROPHYT/TRACES-NT, online).

A.4.4. Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *Scirtothrips dorsalis* is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 7.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	As the plant passport is very similar to the EU one, the living sculptures shall be free from quarantine pests. No uncertainties.
2	Certification of propagation material and substrates	Yes	The measure is effective against the pest. No uncertainties.
3	Physical separation	No	Physical separation is not a barrier for *Scirtothrips* because the adults can fly. Barrier to the soil in beds is not relevant for the pest. No uncertainties.
4	Surveillance, monitoring and sampling	Yes, partially.	Although the plants are thoroughly checked during the production and the creation of the living sculptures, later infestation by *S. dorsalis* can go undetected, because it is difficult to check the internal parts of the living sculpture. Curative measures adopted when the pest is found may have limited effect on the whole living sculpture, especially in the hidden parts. Uncertainties: – Capacity of detection of the pest inside the living sculptures. – The effect of curative measures to the inner parts of the living sculptures. – The continuous clipping of leaves and twigs may reduce the potential establishment of *Scirtothrips*.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
5	Hygiene measures	Yes, partially.	Weeding can have some effect on the reduction of *Scirtothrips* populations. The other measures are not relevant. No uncertainties.
6	Irrigation water	No	Not applicable.
7	Application of pest control products	Yes	SB Plant Invigorator is moderately effective against *S. dorsalis*, based on evidence of effectiveness against other small insects on the plant surface (Gómez et al., 2007). Other chemical measures adopted when the pest is found, may have limited effect on the hidden plant parts. Uncertainties: – The active ingredients of chemical treatments and their level of efficacy against the pest. – The effect of chemical measures to the inner parts of the living sculptures.
8	Inspections and management of plants before export	Yes, partially.	Although the living sculptures are thoroughly checked 2 weeks before the export, infestation by *S. dorsalis* can go undetected, because it is difficult to check the internal parts. Moreover, the reinfestation can occur during the two-week period as long as living sculptures are sold all year long. Uncertainties: – Capacity of detection of the pest inside the living sculptures.
9	Separation during transport to the destination	No	Living sculptures are not individually separated during transportation. The pest can infest other living sculptures. No uncertainties.

A.4.5. Overall likelihood of pest freedom for living sculptures

A.4.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested living sculptures

There is only one current outbreak of the pest in the UK approximately 150 km away from the nursery. This outbreak might have been currently eradicated. The scenario assumes that it is very unlikely that the pest can survive outdoors. Therefore, it also assumes that the presence of the pest in the surroundings of the nursery is very unlikely. The scenario also assumes that nursery is not an intensive plant nursery. Finally, the scenario assumes that the inspections, insecticide treatments, weeding and the clipping of leaves could have an effect against the pest.

A.4.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested living sculptures

The scenario assumes that, although it is unlikely that the pest can survive or develop outdoors, polytunnels present in the nursery could host some plants that could be hosts of the pest. The scenario also assumes that, although inspections are conducted very often, they will fail detection of the pest on the commodity.

A.4.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested living sculptures (Median)

Median is very shifted to the left side (lower infestation rate) because of the low likelihood of the presence of the pest in the surroundings. The commodity is produced outdoors and the pest is unlikely to develop out of the greenhouses.

A.4.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The low probability of establishment of the pest outdoors results in high level of uncertainties for infestation rates below the median. Otherwise, unlikely presence of the pest in the surroundings gives less uncertainties for rates above the median.

A.4.5.5. Elicitation outcomes of the assessment of the pest freedom for *Scirtothrips dorsalis* on living sculptures

The following Tables show the elicited and fitted values for pest infestation (Table A.7) and pest freedom (Table A.8).

Table A.7: Elicited and fitted values of the uncertainty distribution of pest infestation by *Scirtothrips dorsalis* per 10,000 sculptures

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					2		3		5					15
EKE	0.152	0.281	0.454	0.746	1.10	1.53	1.96	2.94	4.22	5.07	6.24	7.68	9.57	11.4	13.9

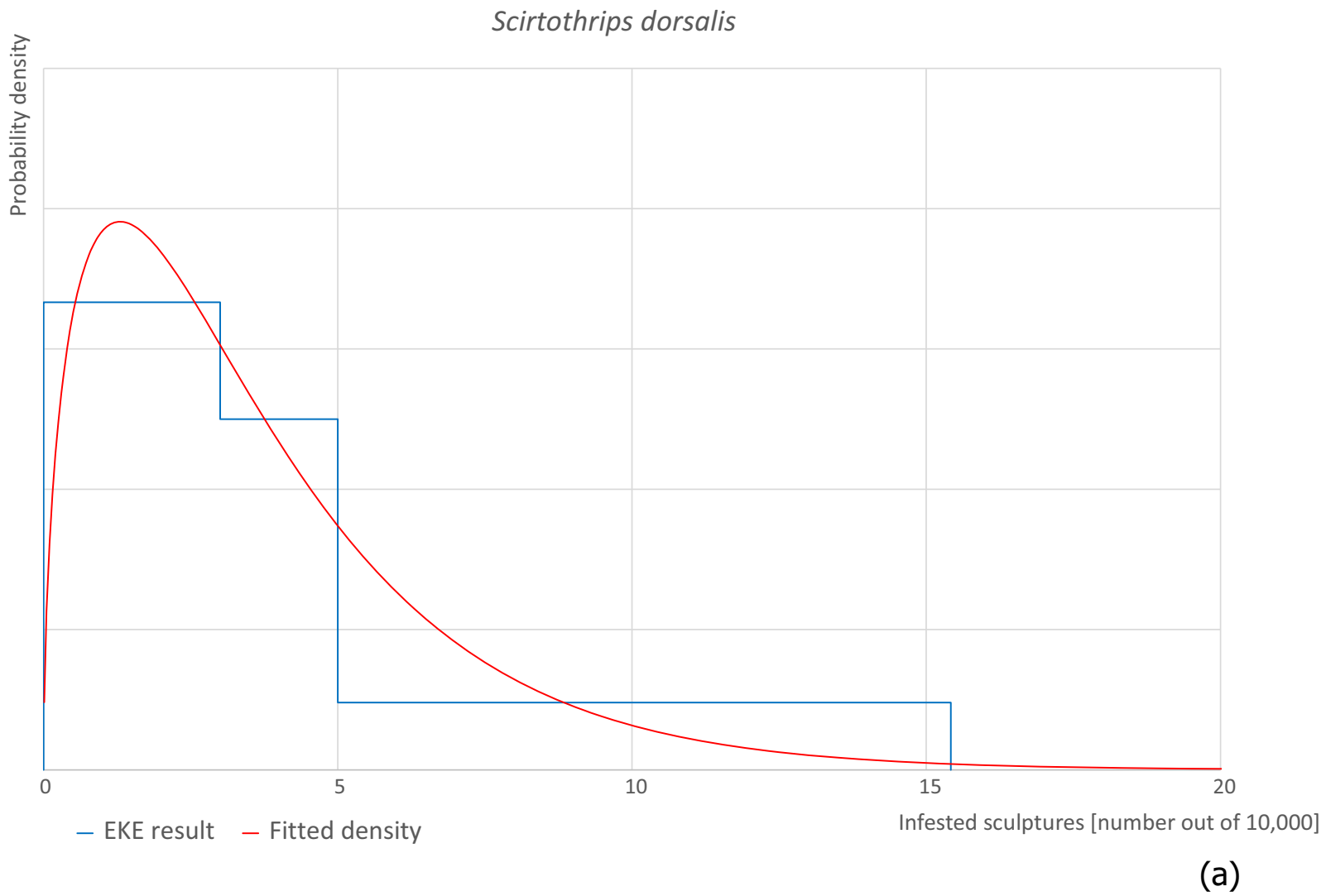
The EKE results are the Gamma (1.5398,2.4079) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested sculptures the pest freedom was calculated (i.e. = 10,000 – number of infested sculptures per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.8.

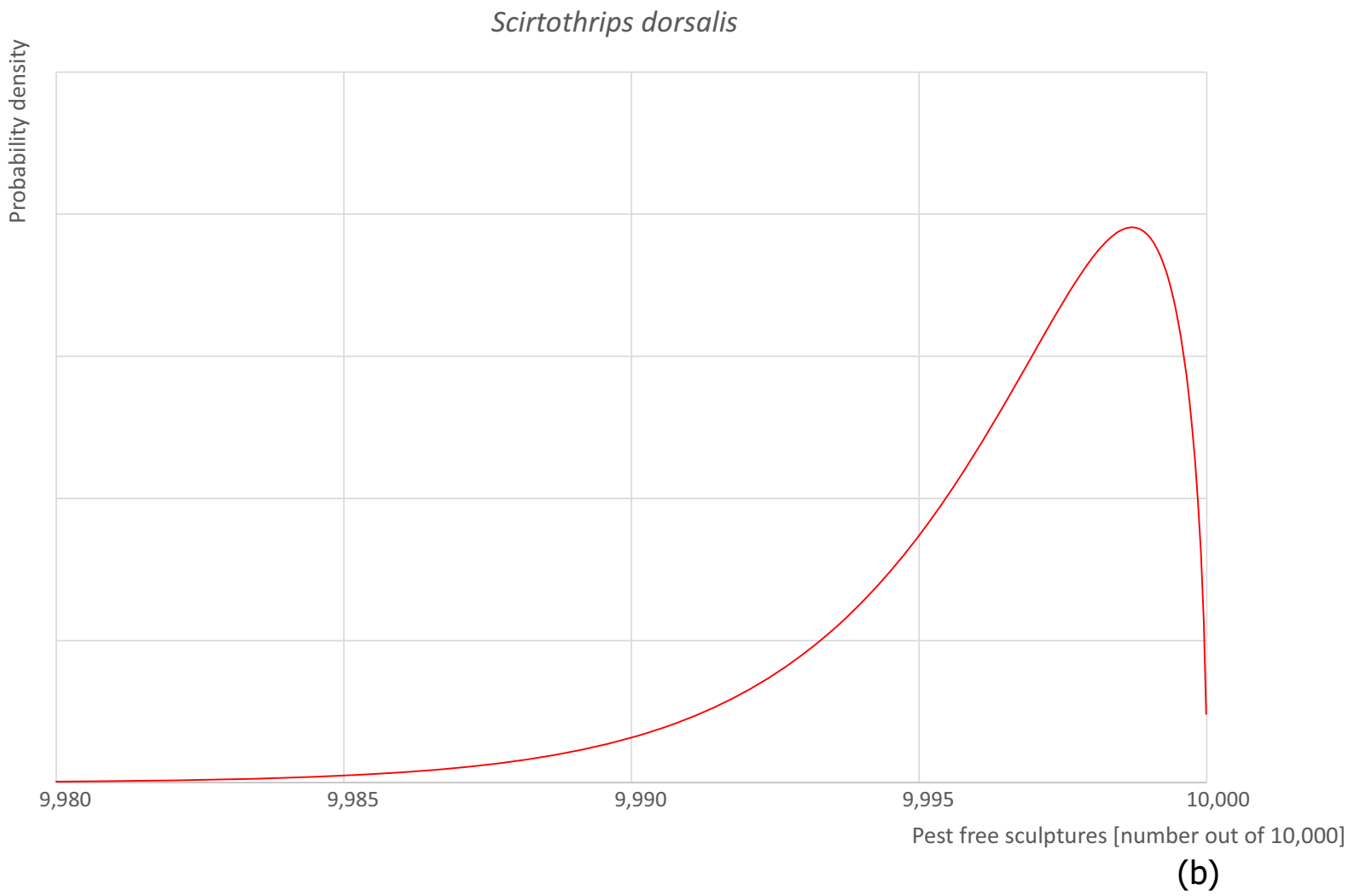
Table A.8: The uncertainty distribution of plants free of *Scirtothrips dorsalis* per 10,000 sculptures calculated by Table A.7

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9,985					9,995		9,997		9,999					10,000
EKE results	9,986	9,989	9,990	9,992	9,994	9,995	9,996	9,997	9,998	9,998.5	9,998.9	9,999.3	9,999.5	9,999.7	9,999.8

The EKE results are the fitted values.



(a)



(b)

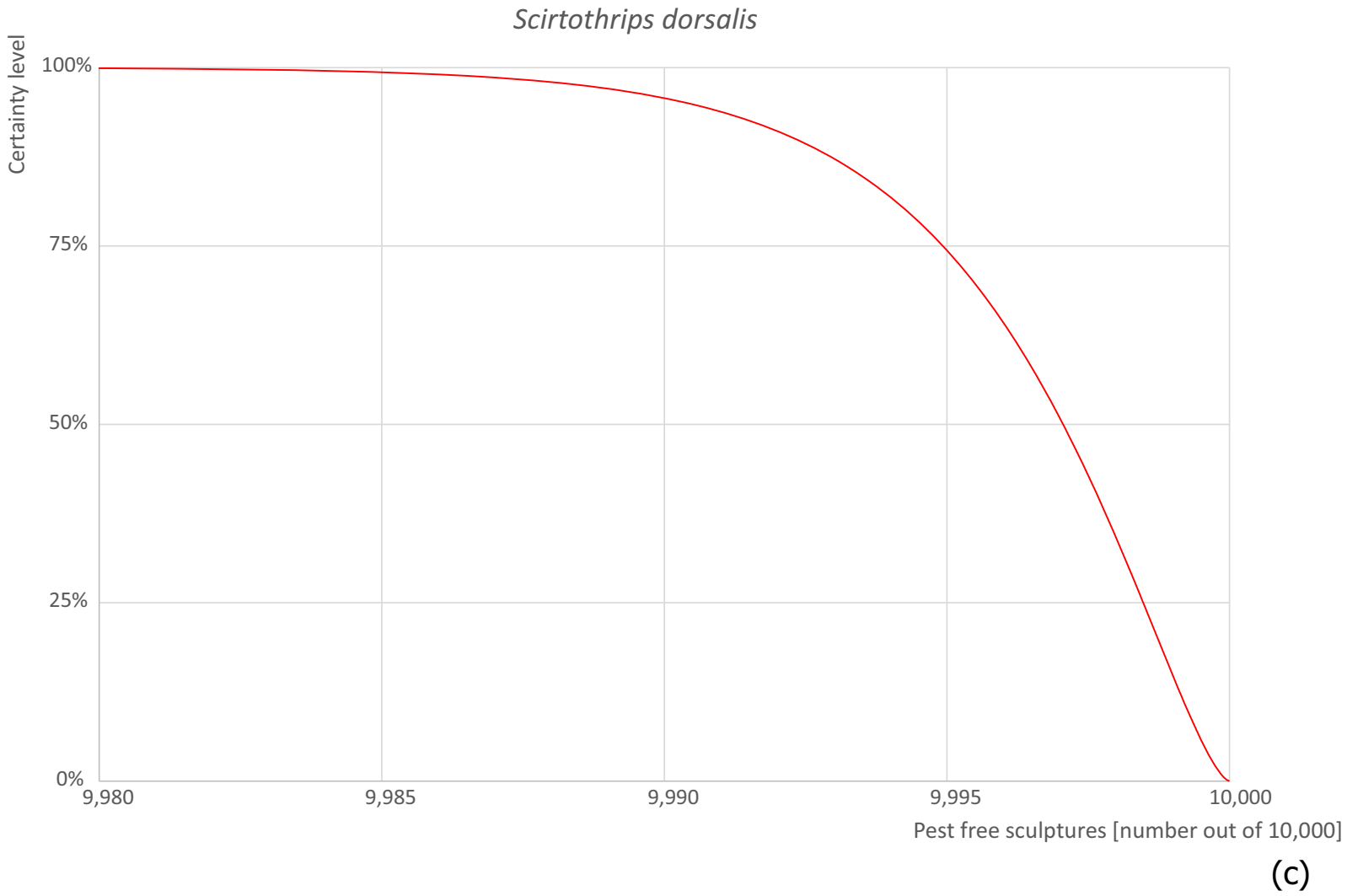


Figure A.4: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue– vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest free sculptures per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 sculptures

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Appendix B – Web of Science All Databases Search String

In Table B.1, the search string for *Ligustrum* used in Web of Science is reported. Totally, 261 papers were retrieved. Titles and abstracts were screened, and 156 pests were added to the list of pests (see Appendix D).

Table B.1: String for *Ligustrum*

Web of Science All databases	**TOPIC:** ("Ligustrum japonicum" OR "Japanese privet" OR "wax-leaf privet" OR "Ligustrum delavayanum" OR "Ligustrum" OR "Ligustrum sp." OR "Ligustrum spp." OR "Ligustrum amamianum" OR "Ligustrum coriaceum" OR "Ligustrum glabrum" OR "Ligustrum kellerianum" OR "Ligustrum latifolium" OR "Ligustrum lucidum var. coriaceum" OR "Ligustrum macrophyllum" OR "Ligustrum ovatum" OR "Ligustrum rotundifolium" OR "Ligustrum sieboldii" OR "Ligustrum syringiflorum" OR "Ligustrum syringifolium" OR "Ligustrum taquetii" OR "Ligustrum ionandrum" OR "Ligustrum prattii") **AND** **TOPIC:** (pathogen* OR pathogenic bacteria OR fung* OR oomycet* OR myce* OR bacteri* OR virus* OR viroid* OR insect$ OR mite$ OR phytoplasm* OR arthropod* OR nematod* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR vector OR hostplant$ OR "host plant$" OR host OR "root lesion$" OR decline$ OR infestation$ OR damage$ OR symptom$ OR dieback* OR "die back*" OR "malaise" OR aphid$ OR curculio OR thrip$ OR cicad$ OR miner$ OR borer$ OR weevil$ OR "plant bug$" OR spittlebug$ OR moth$ OR mealybug$ OR cutworm$ OR pillbug$ OR "root feeder$" OR caterpillar$ OR "foliar feeder$" OR virosis OR viroses OR blight$ OR wilt$ OR wilted OR canker OR scab$ OR rot OR rots OR rotten OR "damping off" OR "damping-off" OR blister$ OR "smut" OR mould OR mold OR "damping syndrome$" OR mildew OR scald$ OR "root knot" OR "root-knot" OR rootknot OR cyst$ OR "dagger" OR "plant parasitic" OR "parasitic plant" OR "plant$parasitic" OR "root feeding" OR "root$feeding") **NOT** **TOPIC:** ("winged seeds" OR metabolites OR *tannins OR climate OR "maple syrup" OR syrup OR mycorrhiz* OR "carbon loss" OR pollut* OR weather OR propert* OR probes OR spectr* OR antioxidant$ OR transformation OR RNA OR DNA OR "Secondary plant metabolite$" OR metabol* OR "Phenolic compounds" OR Quality OR Abiotic OR Storage OR Pollen* OR fertil* OR Mulching OR Nutrient* OR Pruning OR drought OR "human virus" OR "animal disease*" OR "plant extracts" OR immunological OR "purified fraction" OR "traditional medicine" OR medicine OR mammal* OR bird* OR "human disease*" OR biomarker$ OR "health education" OR bat$ OR "seedling$ survival" OR "anthropogenic disturbance" OR "cold resistance" OR "salt stress" OR salinity OR "aCER method" OR "adaptive cognitive emotion regulation" OR nitrogen OR hygien* OR "cognitive function$" OR fossil$ OR *toxicity OR Miocene OR postglacial OR "weed control" OR landscape) **NOT** **TOPIC:** ("Abortiporus biennis" OR "Abraxas grossulariata" OR "Acalymma vittatum" OR "Acanthococcus lagerstroemiae" OR "Acanthostigma scopulorum" OR "Acasis viretata" OR "Acherontia atropos" OR "Acherontia styx" OR "Actias selene" OR "Acutaspis albopicta" OR "Acutaspis paulista" OR "Acutaspis scutiformis" OR "Adela croesella" OR "Adoretus sinicus" OR "Adoxophyes orana" OR "Aecidium klugkistianum" OR "Aecidium ligustricola" OR "Aenetus virescens" OR "Aeolothrips intermedius" OR "Aethalura intertexta" OR "Agrobacterium radiobacter" OR "Agrocybe parasitica" OR "Agrotis clavis" OR "Aiceona sp." OR "Aleurocanthus woglumi" OR "Aleuroclava aucubae" OR "Aleurocorticium griseocanum" OR "Alsophila aescularia" OR "Alternaria alternata" OR "Alternaria destruens" OR "Amphipyra pyramidea" OR "Amphisphaeria viae-malae" OR "Anania coronata" OR "Aneurus avenius" OR "Angerona prunaria" OR "Antherina suraka" OR "Aonidiella aurantii" OR "Aonidiella citrina" OR "Apeira syringaria" OR "Aphelenchoides fragariae" OR "Aphis crinosa" OR "Aphis fabae" OR "Aphis gossypii" OR "Aphis spiraecola" OR "Aposphaeria collabascens" OR "Arabis mosaic virus" OR "Archaeoattacus edwardsii" OR "Archips fuscocupreanus" OR "Archips rosana" OR "Argopistes coccinelliformis" OR "Argyrotaenia velutinana" OR "Armillaria luteobubalina"

OR "Armillaria mellea" OR "Armillaria tabescens" OR "Armillariella tabescens" OR "Artopoetes pryeri" OR "Ascochyta ligustri" OR "Aspidiotus destructor" OR "Aspidiotus nerii" OR "Astala confederata" OR "Asterina ligustri" OR "Athelia rolfsii" OR "Attacus atlas" OR "Attacus lorquinii" OR "Attacus taprobanis" OR "Aulacaspis crawii" OR "Aulacorthum ibotum" OR "Automeris aurantiaca" OR "Automeris coresus" OR "Automeris excreta" OR "Automeris illustris" OR "Automeris io" OR "Automeris leucane" OR "Automeris louisiana" OR "Automeris naranja" OR "Automeris tridens" OR "Bagnisiella jasmini" OR "Bagnisiella jasminii" OR "Barrmaelia macrospora" OR "Barrmaelia oxyacanthae" OR "Bemisia tabaci" OR "Biston betularia" OR "Bonagota cranaodes/salubr." OR "Bonagota cranaodes/salubricol" OR "Botryosphaeria dothidea" OR "Botryosphaeria stevensii" OR "Brachionycha nubeculosa" OR "Brahmaea wallichii" OR "Brevipalpus chilensis" OR "Brevipalpus obovatus" OR "Brevipalpus phoenicis" OR "Byssomerulius corium" OR "Cacoecimorpha pronubana" OR "Callosamia promethea" OR "Caloptilia cuculipennella" OR "Caloptilia fraxinella" OR "Caloptilia japonica" OR "Caloptilia syringella" OR "Celastrina argiolus" OR "Cephaleuros virescens" OR "Ceratomia undulosa" OR "Ceratopemphigus zehntneri" OR "Cercospora adusta" OR "Cercospora ligustri" OR "Cercospora ligustricola" OR "Cercospora ligustrina" OR "Cercospora lilacis" OR "Cercospora oleacearum" OR "Cercosporella howittii" OR "Cerma cerintha" OR "Ceroplastes bergi" OR "Ceroplastes feltyi" OR "Ceroplastes floridensis" OR "Ceroplastes rubens" OR "Cherry leaf roll virus" OR "Chionaspis americana" OR "Chionaspis salicis" OR "Chloroclysta truncata" OR "Chloroclystis v-ata" OR "Choristoneura longicellana" OR "Chromelosporium fulvum" OR "Chrysomphalus aonidum" OR "Chrysomphalus bifasciculatus" OR "Chrysomphalus dictyospermi" OR "Chrysomphalus ficus" OR "Chrysomphalus pinnulifer" OR "Citheronia beledonon" OR "Citheronia brissotii" OR "Citheronia hamifera" OR "Citheronia laocoon" OR "Citheronia regalis" OR "Cladosporium aecidiicola" OR "Cladosporium cladosporioides" OR "Cladosporium fumago" OR "Cladosporium herbarum" OR "Clarkeulia bourquini" OR "Clepsis consimilana" OR "Clitocybe monadelpha" OR "Clitocybe tabescens" OR "Coccus hesperidum" OR "Coccus hesperidum hesperidum" OR "Coccus longulus" OR "Colletotrichum acutatum" OR "Colletotrichum aotearoa" OR "Colletotrichum gloeosporioides" OR "Colletotrichum ligustri" OR "Comostola rubripunctata" OR "Comstockaspis perniciosa" OR "Coniothyrium ligustri" OR "Coriolus hirsutus" OR "Coriolus versicolor" OR "Corticium salmonicolor" OR "Corynespora cassiicola" OR "Corynespora ligustri" OR "Coscinocera hercules" OR "Craniophora ligustri" OR "Craniophora malesiae" OR "Criconema mutabile" OR "Cricula andrei" OR "Crocallis elinguaria" OR "Cryptocephalus nitidulus" OR "Cryptophaeella trematosphaeriicola" OR "Cryptoptila immersana" OR "Cryptovalsa protracta" OR "Cucumber mosaic virus" OR "Cucurbitaria ligustri" OR "Cyclocybe parasitica" OR "Cyclophora puppillaria" OR "Cyclotheca kamatii" OR "Cydalima perspectalis" OR "Cylindrosporium umbelliferarum" OR "Cytospora ceratosperma" OR "Cytospora chrysosperma" OR "Cytospora pruinosa" OR "Cytospora pruinosa var. ligustri" OR "Daphnis nerii" OR "Deltinea bourquini" OR "Dendrophoma pulvis-pyrius" OR "Dendrophora albobadia" OR "Dendrothele griseocana" OR "Dendrothrips ornatus" OR "Dialeurodes citri" OR "Diaporthe brachyceras" OR "Diaporthe eres" OR "Diaporthe ligustri" OR "Diaporthe ligustrina" OR "Diaprepes abbreviatus" OR "Diaspidiotus forbesi" OR "Diaspidiotus perniciosus" OR "Diaspidiotus spiraspinae" OR "Diplodia ligustri" OR "Diplodia mamma" OR "Diplodia natalensis" OR "Diplodia seriata" OR "Diplodina minima" OR "Discohainesia oenotherae" OR "Dogwood Ringspot Strain of Cherry Leafroll Virus" OR "Dolba hyloeus" OR "Dolbina inexacta" OR "Drechslera cynodontis" OR "Duplaspidiotus claviger" OR "Dynaspidiotus britannicus" OR "Dysstroma truncata" OR "Eacles ducalis" OR "Eacles imperialis" OR "Eacles penelope" OR "Echinochaete russiceps" OR "Ectropis bistortata" OR "Ectropis crepuscularia" OR "Endoclita signifer" OR "Endotricha flammealis" OR "Ennomos fuscantaria" OR "Epiphyas postvittana" OR "Ericerus pela" OR "Erthesina fullo" OR "Erysiphe katumotoi" OR "Erysiphe ligustri" OR "Erysiphe penicillata" OR "Erysiphe syringae" OR "Erysiphe syringae-japonicae" OR "Eupackardia calleta" OR "Euplexia lucipara" OR "Eupoecilia ambiguella" OR "Euschistus heros" OR "Eutypa lata" OR "Eutypa leptoplaca" OR "Eutypa ludibunda" OR "Eutypa spinosa" OR "Euwallacea fornicatus sensu lato" OR "Exapate congelatella" OR "Exosporium concentricum" OR "Fiorinia fioriniae" OR "Fiorinia phantasma" OR "Fomes applanatus" OR "Fomitiporia mediterranea" OR "Fomitiporia punctata" OR "Frankliniella tenuicornis" OR "Funalia gallica" OR "Fusarium humuli" OR "Fusarium oxysporum" OR "Fuscoporia gilva" OR "Ganoderma applanatum" OR "Ganoderma australe" OR "Ganoderma resinaceum" OR

	"Garaeus specularis" OR "Globisporangium debaryanum" OR "Globisporangium irregulare" OR "Globisporangium splendens" OR "Glomerella cingulata" OR "Gnomonia cingulata" OR "Gracillaria syringella" OR "Gymnopilus junonius" OR "Halyomorpha halys" OR "Haplothrips aculeatus" OR "Harrisimemna trisignata" OR "Helicobasidium mompa" OR "Helicotylenchus digonicus" OR "Helicotylenchus dihystera" OR "Helicotylenchus erythrinae" OR "Helminthosporium ligustri" OR "Hemiberlesia cyanophylli" OR "Hemiberlesia lataniae" OR "Hemiberlesia rapax" OR "Hemicriconemoides parasinensis" OR "Hemistola dijuncta" OR "Hemithea aestivaria" OR "Heterobasidion annosum" OR "Heterobasidion annosum sensu lato" OR "Heterodera zeae" OR "Holocerina smilax" OR "Homalodisca vitripennis" OR "Homona magnanima" OR "Howardia biclavis" OR "Hyalophora cecropia" OR "Hyalophora columbia" OR "Hydnopolyporus fimbriatus" OR "Hyperapeira parva" OR "Hyphantria cunea" OR "Hyphodontia lanata" OR "Hypodryas maturna" OR "Hyponectria sceptri" OR "Hypoxylon citrinum" OR "Hypoxylon hughesii" OR "Hypoxylon perforatum" OR "Hypoxylon rubiginosum" OR "Igutettix oculatus" OR "Imbrasia alcinoe" OR "Imbrasia cleoris" OR "Inocybe caespitosella" OR "Insignorthezia insignis" OR "Irenopsis ligustri" OR "Ischnaspis longirostris" OR "Isthmospora trichophila" OR "Kellermania alpina" OR "Kerria chinensis chinensis" OR "Lachnum virgineum" OR "Laeosopis roboris" OR "Lasiocampa quercus" OR "Latoia intermissa" OR "Lecanodiaspis prosopidis" OR "Lecanodiaspis rufescens" OR "Lepidosaphes beckii" OR "Lepidosaphes camelliae" OR "Lepidosaphes flava" OR "Lepidosaphes kuwacola" OR "Lepidosaphes malicola" OR "Lepidosaphes tubulorum" OR "Lepidosaphes ulmi" OR "Leptococcus eugeniae" OR "Leptophyes punctatissima" OR "Leptosphaeria purpurea" OR "Leucanella aspera" OR "Leucanella contempta" OR "Leucanella leucane" OR "Leucanella maasseni" OR "Leucanella memusae" OR "Leucanella viridescens" OR "Ligustrum necrotic ringspot virus" OR "Ligustrum ringspot virus" OR "Ligustrum Virus A" OR "Lindingaspis rossi" OR "Lithophane hepatica" OR "Lithophane semibrunnea" OR "Lithophane socia" OR "Lobesia botrana" OR "Longidorus" OR "Longidorus elongatus" OR "Lonomia electra" OR "Lopadostoma turgidum" OR "Lopholeucaspis japonica" OR "Lozotaenia forsterana" OR "Luperomorpha xanthodera" OR "Lycia hirtaria" OR "Lycorma delicatula" OR "Lymantria dispar" OR "Lytta vesicatoria" OR "Macrophomina phaseolina" OR "Macrophya parvula" OR "Macrophya punctumalbum" OR "Macrophyllosticta ligustri" OR "Macrosiphum euphorbiae" OR "Manduca rustica" OR "Megachile centuncularis" OR "Megalopyge lanata" OR "Megaplatypus mutatus" OR "Melanaspis elaeagni" OR "Melanaspis nigropunctata" OR "Meliola ligustri" OR "Meliola mayepeae" OR "Meliola mayepeicola" OR "Meliola osmanthi" OR "Meloidogyne ardenensis" OR "Meloidogyne arenaria" OR "Meloidogyne enterolobii" OR "Meloidogyne enterolobii mayaguensis" OR "Meloidogyne hapla" OR "Meloidogyne incognita" OR "Meloidogyne javanica" OR "Meloidogyne litoralis" OR "Meloidogyne sp." OR "Menophra abruptaria" OR "Merlinius brevidens" OR "Meruliopsis corium" OR "Merulius confluens" OR "Merulius corium" OR "Microdiplodia mamma" OR "Microsphaera alni" OR "Microsphaera katumotoi" OR "Microsphaera ligustri" OR "Microsphaera penicillata" OR "Microsphaera syringae" OR "Microsphaera syringae-japonicae" OR "Milviscutulus mangiferae" OR "Minutargyrotoza calvicaput" OR "Monodictys capensis" OR "Morganella conspicua" OR "Morganella longispina" OR "Mycetaspis personata" OR "Mycosphaerella ligustri" OR "Mythimna conigera" OR "Myzus ascalonicus" OR "Myzus ligustri" OR "Myzus persicae" OR "Naenia typica" OR "Naupactus xanthographus" OR "Naxa seriaria" OR "Nectria cinnabarina" OR "Nectriella pironii" OR "Neofusicoccum parvum" OR "Neopestalotiopsis clavispora" OR "Neopinnaspis harperi" OR "Neoselenaspidus silvaticus" OR "Nezara viridula" OR "Nipaecoccus viridis" OR "Noctua fimbriata" OR "Nyssopsora echinata" OR "Oceanaspidiotus spinosus" OR "Odontopera bidentata" OR "Oemona hirta" OR "Oiketicus townsendi" OR "Orgyia leucostigma" OR "Orsodacne cerasi" OR "Orthezia urticae" OR "Otiorhynchus armadillo" OR "Otiorhynchus clavipes" OR "Otiorhynchus rugosostriatus" OR "Otiorhynchus rugosotriatus" OR "Otiorhynchus salicicola" OR "Otiorhynchus sulcatus" OR "Ourapteryx sambucaria" OR "Pachetra sagittigera ssp. Britannica" OR "Paleacrita vernata" OR "Palpita gracilalis" OR "Palpita quadristigmalis" OR "Palpita vitrealis" OR "Pandemis heparana" OR "Pangrapta grisangula" OR "Paonias myops" OR "Papilio multicaudatus" OR "Paracoccus burnerae" OR "Paracoccus marginatus" OR "Paralongidorus maximus" OR "Parasaissetia nigra" OR "Paratrichodorus porosus" OR "Paratylenchus projectus" OR "Paratylenchus sp." OR "Parlatoreopsis chinensis" OR "Parlatoreopsis pyri" OR "Parlatoria oleae" OR "Parlatoria pittospori" OR "Parlatoria proteus" OR "Parlatoria ziziphi" OR "Parthenolecanium corni"

	OR "Parthenolecanium corni corni" OR "Passalora ligustricola" OR "Passalora oleacearum" OR "Patellariopsis clavispora" OR "Pellicularia koleroga" OR "Peniophora bonariensis" OR "Peniophora lycii" OR "Peniophora nuda" OR "Peniophora obscura" OR "Peniophora roumeguerii" OR "Peribatodes ilicaria" OR "Peribatodes rhomboidaria" OR "Pero occidentalis" OR "Perrotia flammea" OR "Petunia asteroid mosaic tombusvirus" OR "Pezizella oenotherae" OR "Phaeobotryon negundinis" OR "Phaeodothis ligustri" OR "Phaeosaccardinula javanica" OR "Phalacrococcus howertoni" OR "Phellinus noxius" OR "Phenacoccus madeirensis" OR "Philtraea elegantaria" OR "Phlogophora meticulosa" OR "Phlyctaenia coronata" OR "Phoma friesii" OR "Phoma ligustrina" OR "Phomopsis jasmini" OR "Phomopsis ligustri-vulgaris" OR "Phthonosema invenustaria" OR "Phyllactinia alnicola" OR "Phyllactinia fraxini" OR "Phyllactinia guttata" OR "Phyllactinia suffulta" OR "Phyllosticta capitalensis" OR "Phyllosticta ibotae" OR "Phyllosticta ligulariicola" OR "Phyllosticta ligustri" OR "Phyllosticta ligustricola" OR "Phyllosticta ligustrina" OR "Phyllosticta ovalifolii" OR "Phyllosticta spinarum" OR "Phyllosticta thumeniana" OR "Phymatotrichopsis omnivora" OR "Phymatotrichum omnivorum" OR "Physalospora obtusa" OR "Phytophthora cactorum" OR "Phytophthora citrophthora" OR "Phytophthora hibernalis" OR "Phytophthora plurivora" OR "Placochela ligustri" OR "Placochela nigripes" OR "Planchonia arabidis" OR "Pleonectria aurigera" OR "Pleonectria coryli" OR "Pleospora ligustri" OR "Pleospora pellita" OR "Plum pox virus" OR "Pochazia shantungensis" OR "Podosesia syringae" OR "Polia nebulosa" OR "Polyphaenis sericata" OR "Polyporus pinsitus" OR "Polystictus velutinus" OR "Pratylenchus crenatus" OR "Pratylenchus penetrans" OR "Pratylenchus thornei" OR "Pratylenchus vulnus" OR "Prays citri" OR "Prays oleae" OR "Privet leaf blotch-associated virus" OR "Privet ringspot virus" OR "Privet yellow mosaic agent" OR "Prociphilus bumeliae" OR "Prociphilus cheni" OR "Prociphilus ligustrifoliae" OR "Prociphilus oriens" OR "Prociphilus osmanthae" OR "Prunus necrotic ringspot virus" OR "Pseudaonidia duplex" OR "Pseudargyrotoza conwagana" OR "Pseudaulacaspis biformis" OR "Pseudaulacaspis centreesa" OR "Pseudaulacaspis cockerelli" OR "Pseudaulacaspis pentagona" OR "Pseudaulacaspis prunicola prunicola" OR "Pseudautomeris latus" OR "Pseudocercospora ligustri" OR "Pseudocercospora lilacis" OR "Pseudochermes fraxini" OR "Pseudococcus calceolariae" OR "Pseudococcus comstocki" OR "Pseudococcus gilbertensis" OR "Pseudococcus ogasawarensis" OR "Pseudomonas savastanoi pv. savastanoi" OR "Pseudomonas syringae" OR "Pseudomonas syringae pv. syringae" OR "Pseudoparlatoria parlatorioides" OR "Psilogramma increta" OR "Psilogramma menephron" OR "Puccinia isiacae" OR "Puccinia klugkistiana" OR "Puccinia ligustici" OR "Puccinia obtusata" OR "Pulcherricium caeruleum" OR "Pycnoporus coccineus" OR "Pythium debaryanum" OR "Pythium irregulare" OR "Pythium myriotylum" OR "Pythium splendens" OR "Questieriella pulchra" OR "Ramularia ligustrina" OR "Raspberry ring spot virus" OR "Raspberry ringspot virus" OR "Rhescyntis hippodamia" OR "Rhizobium radiobacter" OR "Rhizobium rhizogenes" OR "Rhizoctonia ramicola" OR "Rhizoctonia solani" OR "Rhizoecus falcifer" OR "Rhizoecus hibisci" OR "Ripersiella hibisci" OR "Ripersiella kondonis" OR "Rosellinia arcuata" OR "Rosellinia necatrix" OR "Rosellinia radiciperda" OR "Rothschildia arethusa" OR "Rothschildia aricia" OR "Rothschildia aurota" OR "Rothschildia cincta" OR "Rothschildia cinctus" OR "Rothschildia erycina" OR "Rothschildia hesperus" OR "Rothschildia jacobaeae" OR "Rothschildia jorulla" OR "Rothschildia lebeau" OR "Rothschildia orizaba" OR "Rothschildia roxana" OR "Rothschildia schreiteriana" OR "Rothschildia splendidus" OR "Rotylenchus buxophilus" OR "Rotylenchus robustus" OR "Sabulodes caberata" OR "Saissetia coffeae" OR "Samia cynthia" OR "Saturnia galbina" OR "Saturnia pyri" OR "Saturnia thibeta" OR "Schiffnerula pulchra" OR "Schizophyllum commune" OR "Schizoxylon ligustri" OR "Scirtothrips citri" OR "Scirtothrips dorsalis" OR "Sclerotium rolfsii" OR "Scopula imitaria" OR "Selenaspidus celastri" OR "Senecio vulgaris" OR "Septobasidium bogoriense" OR "Septobasidium tanakae" OR "Septoria aromatica" OR "Septoria japonica" OR "Septoria ligustri" OR "Septoria protearum" OR "Smerinthus ocellata" OR "Smerinthus planus" OR "Solicorynespora ligustri" OR "Sphinx chersis" OR "Sphinx franckii" OR "Sphinx gordius" OR "Sphinx kalmiae" OR "Sphinx libocedrus" OR "Sphinx ligustri" OR "Sphinx perelegans" OR "Spilosoma lutescens" OR "Stachybotrys eucylindrospora" OR "Stereum albobadium" OR "Stereum hirsutum" OR "Stictis radiata" OR "Strickeria pistaciae" OR "Strymonidia pruni" OR "Strymonidia w-album" OR "Synchytrium ligustri" OR "Syssphinx bicolor" OR "Teichospora winteriana" OR "Tenthredo vespa" OR "Tetranychus merganser" OR "Tetranychus turkestani" OR "Tetranychus urticae" OR "Thedgonia ligustrina" OR "Thrips obscuratus" OR "Togninia

	minima" OR "Tomato black ring virus" OR "Tomato spotted wilt virus" OR "Trametes coccinea" OR "Trametes hirsuta" OR "Trametes versicolor" OR "Trematosphaeria circinans" OR "Trematosphaeria communis" OR "Trichopteryx polycommata" OR "Trichothyrium yoshinagai" OR "Trigonophora flammea" OR "Trotteria ligustri" OR "Turkish Ligustrum witches' broom phytoplasma" OR "Tylenchorhynchus claytoni" OR "Tylenchulus semipenetrans" OR "Tympanis ligustri" OR "Tympanis ligustri var. japonica" OR "Unaspis euonymi" OR "Uredo amami-oshimaensis" OR "Valsa ceratosperma" OR "Valsa cypri" OR "Vanessa annabella" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Witches broom phytoplasma" OR "Xanthia ocellaris" OR "Xenosporella berkeleyi" OR "Xiphinema americanum" OR "Xiphinema brevicolle" OR "Xylella fastidiosa" OR "Zelleria hepariella" OR "Zelleria japonicella" OR "Zeuzera pyrina" OR "Zygophiala jamaicensis" OR "Zygotylenchus guevarai")

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

Table C.1: List of potential pests not further assessed

N	Pest name	EPPO Code	Group	Pest present in the UK	Present in the EU	*Ligustrum* confirmed as a host (reference)	Pest can be associated with the commodity	Impact	Justification for inclusion in this list
1	*Caeoma ligustri*	–	Fungi	Uncertain	Restricted (Germany)	*Ligustrum vulgare* (Shaw et al., 2018)	Yes	No data	Uncertainty about distribution/ presence in the UK, uncertainty about impact.
2	*Cytospora pruinosa* var. *ligustri*	–	Fungi	Yes	Restricted (only single report from Austria in 1910)	*Ligustrum vulgare* (Farr and Rossman, online)	Yes	No data	Doubtful taxonomic identity(1) and uncertainty about impact.
3	*Leucostoma auerswaldi* f. *ligustrina*	–	Fungi	Uncertain	Restricted (Germany)	*Ligustrum vulgare* (Shaw et al., 2018)	Yes	No data	Uncertainty about distribution/ presence in the UK, uncertainty about impact.
4	*Phomopsis brachyceras*	–	Fungi	Yes	Restricted (Belgium, Denmark, Romania)	*Ligustrum vulgare* (Shaw et al., 2018)	Yes	No data	Uncertainty about impact.
5	*Tubercularia ligustri*	–	Fungi	Yes	Uncertain	*Ligustrum* sp. (Shaw et al., 2018)	Yes	No data	Uncertainty about presence in the EU, uncertainty about impact.

(1): The taxonomic identity of the variety is already doubted in Grove (1923): 'Strasser places this variety under '*Dendrophoma pruinosa*', which is what Tulasne states to be the spermogone of his *Valsa cypri* on *Ligustrum*. *Valsa cypri* also occurs on *Fraxinus*, but the British specimens on *Ligustrum* may not belong to that species'. No further information is available to assess this taxonomic issue. The 1923 text does not include a bibliography to help trace back these assessments, probably refers to Tulasne and Tulasne (1863) and the Strasser's (1910) description of the variety.

Appendix D – Excel file with the pest list of *Ligustrum* species

Appendix D is available in the online version of this output (in the 'Supporting information section').