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SCIENTIFIC OPINION

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Commodity risk assessment of *Corylus avellana* plants 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 plants of *Corylus avellana* imported from the United Kingdom (UK) as: (a) bundles of 1- to 2-year old whips or transplants, (b) bundles of 1- to 2-year old cell grown plants, (c) 1- to 7-year old bare root single plants and (d) up to 15-year old single plants in pots, 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 opinion. Two EU quarantine pests, *Phytophthora ramorum* (non-EU isolates) and *Thaumetopoea processionea* fulfilled all relevant criteria and were selected for further evaluation. For the selected pests, the risk mitigation measures implemented 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. In the assessment of risk, the age of the plants was considered, reasoning that older trees are more likely to be infested mainly due to longer exposure time and larger size. The degree of pest freedom varies among the pests evaluated, with *P. ramorum* being the pest most frequently expected on the imported plants. The expert knowledge elicitation indicated with 95% certainty that between 9939 and 10,000 of the single plants in pots up to 15-year old will be free from *P. ramorum* (non-EU isolates).

KEYWORDS

commodity risk assessment, European Union, hazelnut, 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 on-going, with a regular flow of dossiers being sent by the applicant required for the risk assessment.

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

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

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002, the Commission asks EFSA to provide scientific opinion in the field of plant health for *Corylus avellana* from the United Kingdom (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 *Corylus avellana* 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.

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 UK do not include Northern Ireland.

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),

[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.

[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, p. 1–279.

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, Türkiye, 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., pest which were listed as quarantine pests in the Council Directive 2000/29/EC 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 a 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 (the UK, 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.

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 April 2023 including the additional information provided by DEFRA of the UK in September 2023, 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	Corylus avellana commodity information final
2.0	Pest list	Corylus Pest List_for_submission
3.0	Producers sample product list	Corylus_avellana_producers_sample_product_list
4.0	Distribution of *Corylus avellana* plants	Corylus_avellana_distribution_map
5.1	Additional information: answers	Corylus avellana additional information 6 July 2023
5.2	Additional information: answers on pests and pathogens	Responses_EFSA_Queries_final (1)

[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.

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, 2.0, 3.0, 4.0, 5.1 and 5.2).

TABLE 2 Databases used in the literature searches by DEFRA of the UK.

Database	Platform/link
Agromyzidae of Great Britain & Ireland	https://agromyzidae.myspecies.info/
Auchenorrhyncha Recording Scheme for Britain and Ireland	https://www.ledra.co.uk/index.html
Bark and Ambrosia Beetles of the Americas	https://www.barkbeetles.info/index.php
British Bugs	https://www.britishbugs.org.uk/index.html
British Fungi	https://basidiochecklist.science.kew.org/BritishFungi/FRDBI/FRDBIrecord.asp?intGBNum=17725
British Lepidoptera	https://britishlepidoptera.weebly.com/
Catalogue of life	https://www.catalogueoflife.org/
Catalogue of the Lepidoptera of Belgium	https://projects.biodiversity.be/lepidoptera/
Centre for Agriculture and Biosciences International (CABI)	https://www.cabi.org/
Database of Insects and their Food Plants	https://dbif.brc.ac.uk/homepage.aspx
Department for Environment Food & Rural Affairs	https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
Diaspididae of the World	https://diaspididae.linnaeus.naturalis.nl/linnaeus_ng/app/views/introduction/topic.php?id=3422
Encyclopedia of Life	https://eol.org/
European and Mediterranean Plant Protection Organization Global Database (EPPO GD)	https://gd.eppo.int/
EU-nomen	https://www.eu-nomen.eu/portal/index.php
Food and Agriculture Organisation of the United Nations (FAO)	https://agris.fao.org/
Fauna Europaea	https://fauna-eu.org/
Forest Research	https://www.forestresearch.gov.uk/
Fulgoromorpha Lists On the Web (FLOW)	https://flow.hemiptera-databases.org/flow/
Fungi of Great Britain and Ireland	https://fungi.myspecies.info/
Global Biodiversity Information Facility (GBIF)	https://www.gbif.org/
Global Fungi Database	https://globalfungi.com/
Grasshoppers of Europe	https://www.grasshoppersofeurope.com/
HANTSMOTHS - The Lepidoptera (Moths and Butterflies) of Hampshire and Isle of Wight	https://www.hantsmoths.org.uk/index.htm
HOSTS - a Database of the World's Lepidopteran Hostplants	https://data.nhm.ac.uk/dataset/hosts
Index Fungorum	https://www.speciesfungorum.org/Names/Names.asp
Influential Points	https://influentialpoints.com/
Insects (Insecta) of the World	https://insecta.pro/
Interactive Agricultural Ecological Atlas of Russia and Neighbouring Countries	https://agroatlas.ru/en/
Lepidoptera and some other life forms	https://ftp.funet.fi/pub/sci/bio/life/intro.html
Lepidoptera and their ecology	https://www.pyrgus.de/
Lepiforum e.V.	https://lepiforum.org/
L'Inventaire national du patrimoine naturel (INPN)	https://inpn.mnhn.fr/accueil/index
Nature Spot	https://www.naturespot.org.uk/
NBN atlas	https://nbnatlas.org/
Nederlands Soortenregister	https://www.nederlandsesoorten.nl/
Norfolk moths	https://www.norfolkmoths.co.uk/index.php
On-line Systematic Catalog of Plant Bugs (Insecta: Heteroptera: Miridae)	https://research.amnh.org/pbi/catalog/index.php
Plant Parasites of Europe	https://bladmineerders.nl/
Russell IPM	https://russellipm.com/
Scalenet	https://scalenet.info/associates/
Spider Mites Web	https://www1.montpellier.inra.fr/CBGP/spmweb/

TABLE 2 (Continued)

Database	Platform/link
The British Mycological Society	https://www.britmycolsoc.org.uk/
The Food and Environment Research Agency (FERA): Nematode Checklist UK	https://nemlist.fera.co.uk/searchListResult.cfm
The Fungal Records Database of Britain and Ireland	https://www.frdbi.info/
The Leaf and Stem miners of British flies and other insects	https://www.ukflymines.co.uk/index.php
The Sawflies (Symphyta) of Britain and Ireland	https://www.sawflies.org.uk/
Thrips of the British Isles	https://keys.lucidcentral.org/keys/v3/british_thrips/operating.html
Tortricids of Agricultural Importance (TortAI)	https://idtools.org/id/leps/tortai/information.html
True hoppers WP	https://truehopperswp.com/
UK Beetles	https://www.ukbeetles.co.uk/
UK Beetle Recording	https://www.coleoptera.org.uk/home
UK moths	https://www.ukmoths.org.uk/
UK Plant Health Information Portal	https://planthealthportal.defra.gov.uk/
USDA Fungal Database	https://data.nal.usda.gov/dataset/united-states-national-fungus-collections-fungus-host-dataset
Worcestershire Record	https://www.wbrc.org.uk/WORCRECD/index.html
3I Interactive Keys and Taxonomic Databases	https://dmitriev.speciesfile.org/

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 *C. avellana*. The following searches were combined: (i) a general search to identify pests reported on *C. avellana* in the databases, (ii) a search to identify any EU quarantine pest reported on *Corylus* as genus and subsequently (iii) a tailored search to identify whether the above pests are present or not in the UK. The searches were run between May and June 2023. 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 *C. avellana*. 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 *Corylus avellana*

Database	Platform/link
Aphids on World Plants	https://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm
BIOTA of New Zealand	https://biotanz.landcareresearch.co.nz/
CABI Crop Protection Compendium	https://www.cabi.org/cpc/
Database of Insects and their Food Plants	https://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://food.ec.europa.eu/plants/plant-health-and-biosecurity/europhyt_en
Leaf-miners	https://www.leafmines.co.uk/html/plants.htm
Nemaplex	https://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx
Plant Pest Information Network	https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/
Scalenet	https://scalenet.info/associates/
Spider Mites Web	https://www1.montpellier.inra.fr/CBGP/spmweb/
USDA ARS Fungal Database	https://data.nal.usda.gov/dataset/united-states-national-fungus-collections-fungus-host-dataset (last available update 5 November 2021)
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
World Agroforestry	https://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 *C. avellana* based on information provided in the Dossier Sections 1.0, 2.0, 3.0, 4.0, 5.1 and 5.2 and on searches performed by the Panel. The pest list also includes EU quarantine pests reported on *Corylus* as a genus. 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 plant (i.e. *Corylus avellana*) 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 *C. avellana* imported from the whole world from 1995 to May 2020 and TRACES-NT from May 2020 to 31 July 2023, 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 July 2023 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 strings are detailed in Appendix B and they were run on 22 June 2023.

The titles and abstracts of the scientific papers retrieved were screened and the pests associated with *C. avellana* 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 is reported in Appendix F as Microsoft Excel®.

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 E (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 *C. avellana* 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.

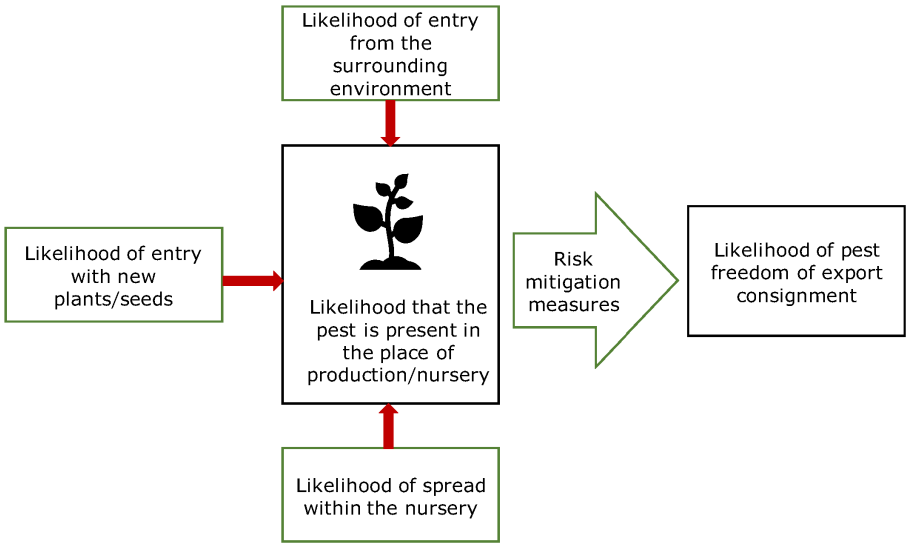

FIGURE 1 Conceptual framework to assess likelihood that plants are exported free from relevant pests. (Source: EFSA PLH Panel, 2019).

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

To estimate the pest freedom of the commodities 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 plants or bundles of plants, depending on the commodity (see below), will be infested with the relevant pest when arriving in the EU?

The risk assessment considers (a) bundles of 5, 10 or 15 bare root whips and bundles of 25 or 50 bare root transplants, (b) bundles of 5 to 15 plants for cell grown plants, (c) 1- to 7-year old bare root single plants and (d) up to 15-year old single plants in pots.

The following reasoning is given for considering bundles of whips and transplants, and for cell grown plants:

(i) There is no quantitative information available regarding clustering of plants during production;
(ii) Plants are grouped in bundles after sorting;
(iii) For the pests under consideration, a cross-contamination during transport is possible.

The following reasoning is given for considering single plants (bare root or in pots):

(i) The inspections before export are targeted on individual plants.
(ii) It is assumed that the product will be distributed in the EU as individual plants to the consumer.

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 commodities of *C. avellana* (common name: European hazel; family: Corylaceae) to be imported from the UK to the EU are whips or transplants, bare root plants, cell grown plants and rooted plants in pots. None of the nurseries expected to export to the EU are using grafting in the production of *C. avellana*. There are various varieties of *C. avellana* (Dossier Section 1.0).

The commodities are as follows:

- Bundles of bare root whips and transplants: the age of plants is between 1 and 2 years. The diameter is between 4 and 10 mm and height between 40 and 80 cm. Whips are slender, unbranched trees and are bare root. Bare root whips may have some leaves at the time of export, particularly when exported in October (Dossier Section 1.0). Transplants are plants which have been transplanted usually from seedlings less than 1 year old. They can be anything from circa 20 to 90 cm tall. Transplants have stronger and more developed root systems compared to whips (Dossier Section 5.1).
- Bundles of cell grown plants: the age of plants is between 1 and 2 years. The diameter is between 4 and 10 mm and height between 20 and 60 cm. Cell grown plants may have some leaves at the time of export (Dossier Section 1.0).
- Bare root single plants: the age of plants is between 1 and 7 years. The diameter is between 4 and 40 mm and height between 20 and 100 cm. Bare root plants may have some leaves at the time of export, particularly when exported in October (Dossier Section 1.0).
- Single plants in pots: the age of plants is from less than 1 year to 15 years. The diameter range at the base of single stems is between 0.6 and 20 cm and the height is between 20 and 600 cm. The plants in pots may be exported with leaves, depending on the timing of the export (Dossier Sections 1.0 and 5.1).

The growing media is virgin peat or peat-free compost (a mixture of coir, tree bark, wood fibre, etc.) (Dossier Section 1.0 and 5.1) 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, 2019), the commodities can be classified as 'bare root plants' and 'rooted plants in pots'.

According to the Dossier Section 1.0, the trade volume is up to 25,000 bare root plants and 10,000 rooted plants in pots per year. The trade of these plants will mainly be to Northern Ireland and the Republic of Ireland.

According to the Dossier Section 1.0, the intended use of the commodities is as follows. Plants are supplied directly to professional operators and traders. Uses may include propagation, growing-on, onward trading or onward sales to final consumers but will generally fall into two categories:

- Tree production and further growing-on by professional operators;
- Onward sales to final users as ornamentals and to landscapers and garden centres, mainly for hedging but also some woodland and ornamental/landscape planting.

3.2 | Description of the production areas

There are six known nurseries in the UK that are producing *C. avellana* plants for the export to the EU (Dossier Section 1.0). The locations of these nurseries are shown in Figure 2.

FIGURE 2 Location of the nurseries in the UK producing *Corylus avellana* plants for export to the EU (Source: Dossier Section 1.0).

Corylus species are grown in Great Britain in line with the Plant Health (Amendment etc.) (EU Exit) Regulations 2020[6] and the Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020.[7] These regulations are broadly similar to the EU phytosanitary regulations. All plants within the UK nurseries are grown under the same phytosanitary measures, meeting the requirements of the UK Plant Passporting regime (Dossier Section 1.0).

The size of the nurseries is between 8 and 150 ha for container stock (plants in pots) and up to 325 ha for field grown stock (Dossier Section 1.0).

The nurseries also grow other plant species as shown in the Appendix C. The minimum and maximum proportion of *C. avellana* compared to the other plant species grown in the nurseries is between 1% and 5%. Most of the nurseries also produce plants for the local market, and there is no distancing between production areas for the export and the local market (Dossier Section 1.0).

Approximately 20% of the nurseries likely to export to the EU also sell plants within the UK to final users as ornamental plants, e.g. to the local authorities/landscape architects (Dossier Section 1.0).

The nurseries are 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 nursery area. The predominant species is rye grass (*Lolium* spp.). 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 1.0).

There are hedges surrounding the export nurseries made up of a range of species including hazel (*C. avellana*), yew (*Taxus baccata*), holly (*Ilex* spp.), ivy (*Hedera* spp.), alder (*Alnus glutinosa*), cherry laurel (*Prunus laurocerasus*), hawthorn (*Crataegus* spp.), blackthorn (*Prunus spinosa*) and leylandii (*Cupressus* × *leylandii*) (Dossier Sections 1.0 and 5.1).

The minimum distance in a straight line, between the growing area in the nurseries and the closest *C. avellana* plants in the local surroundings is 3 metres (Dossier Section 1.0).

Nurseries are predominately situated in the rural areas. The surrounding land would tend to be arable farmland with some pasture for animals and small areas of woodland. Hedges are often used to define field boundaries and grown along roadsides (Dossier Section 1.0).

Arable crops present around the nurseries are rotated in line with good farming practice and could include oilseed rape (*Brassica napus*), wheat (*Triticum* spp.), barley (*Hordeum vulgare*), turnips (*Brassica rapa* subsp. *rapa*), potatoes (*Solanum tuberosum*) and maize (*Zea mays*) (Dossier Sections 1.0 and 5.1).

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

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

Pastures present around the nurseries are predominantly ryegrass (*Lolium* spp.) (Dossier Sections 1.0 and 5.1).

Woodland is present around the nurseries. Woodlands tend to be a standard UK mixed woodland, with a range of the UK native trees such as oak (*Quercus robur*), pine (*Pinus* spp.), poplar (*Populus* spp.), ash (*Fraxinus* spp.), sycamore (*Acer pseudoplatanus*), holly (*Ilex* spp.), Norway maple (*Acer platanoides*) and field maple (*Acer campestre*). The nearest woodland to one of the nurseries borders the boundary fence (Dossier Sections 1.0 and 5.1).

It is not possible to identify the plant species growing within the gardens of private dwellings around the nurseries (Dossier Section 1.0). The following plant species may be grown in some of the nurseries and may also be grown within a 2 km zone surrounding the nurseries: *Castanea* spp., *Larix* spp., *Quercus* spp., *Syringa* spp., *Vaccinium myrtillus*, *Viburnum* spp. In addition, the following plants may be grown within a 2 km zone surrounding the nurseries in private gardens: *Camellia* sp., *Lithocarpus densiflorus*, *Pieris* spp., *Rhododendron* spp., *Vaccinium vitis-idea* (Dossier section 5.1).

Based on the global Köppen–Geiger climate zone classification (Kottek et al., 2006), the climate of the production areas of *C. avellana* 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 starting material of the commodities is a mix of seeds and seedlings depending on the nursery (Dossier Section 3.0).

Seeds purchased in the UK are certified under the Forestry Commission's Voluntary Scheme for the Certification of Native Trees and Shrubs. Seedlings sourced in the UK are certified with the UK Plant Passports. Seedlings from the EU countries (the Netherlands, Italy, Germany) are certified with phytosanitary certificates. Most plants are grown from the UK sourced material. (Dossier Section 1.0).

None of the nurseries expected to export to the EU produce plants from grafting. They use only seed and seedlings, therefore there are no mother plants of *C. avellana* present in the nurseries (Dossier Section 1.0).

3.3.2 | Production cycle

Plants are either grown in containers (cells, pots, tubes, etc.) or in field. Cell grown plants can be grown in greenhouses; however, most plants will be field grown or field grown in containers (Dossier Section 1.0).

As the plants are intended for outdoor cultivation it is normally only early growth stages that are maintained under protection, such as young plants where there is an increased vulnerability due to climatic conditions including frost. The commodity to be exported should therefore be regarded as outdoor grown. Growth under protection is primarily to protect against external climatic conditions rather than protection from pests. The early stages of plants grown under protection are maintained in plastic polytunnels, or in glasshouses which typically consist of a metal or wood frame construction and glass panels (Dossier Section 1.0).

Rooted plants in pots may be either grown in EU-compliant growing media in pots for their whole life, or initially grown in the field before being lifted, root-washed to remove any soil, and then potted in EU-compliant growing media. Trees will be lifted from the field and transplanted into pots at least one growing season before export. Whilst some trees may be up to 15 years old, they are removed from the soil and root-washed at no more than 6 years old and subsequently grown on from that point in EU-compliant growing media. (Dossier Section 5.1).

Plants for bare root plant production are planted from autumn until early spring (October to March); rooted plants in pots can be planted at any time of year, though winter is most common (Dossier Section 1.0).

According to the Dossier Section 1.0, bare root plants are harvested in winter to be able to lift plants from the field, and because this is the best time to move dormant plants. Rooted plants in pots can be moved at any point in the year to fulfil customer demand.

The growing media is virgin peat or peat-free compost. This compost is heat-treated by commercial suppliers during production to eliminate pests and diseases. It is supplied in sealed bulk bags or shrink-wrapped bales and stored off the ground on pallets, these are free from contamination. Where delivered in bulk, compost is kept in a dedicated bunker, either indoors, or covered by tarpaulin outdoors, and with no risk of contamination with soil or other material (Dossier Section 1.0).

The irrigation is done on the need basis and could be overhead, sub irrigation or drip irrigation. Water used for irrigation can be drawn from several sources, the mains supply, bore holes or from rainwater collection or watercourses (Dossier Section 1.0). Additional information on water used for irrigation is provided in Appendix D. Regardless of the source of the water used to irrigate, none of the nurseries have experienced the introduction of a pest/disease because of contamination of the water supply (Dossier Section 1.0).

Growers are required to assess water sources, irrigation and drainage systems used in the plant production for the potential to harbour and transmit plant pests. Water is routinely sampled and sent for analysis (Dossier Section 1.0).

Growers must have an appropriate programme of weed management in place on the nursery (Dossier Section 1.0).

General hygiene measures are undertaken as part of routine nursery production, including disinfection of tools and equipment between batches/lots and different plant species. The tools are dipped in a disinfectant solution and wiped with a clean cloth between trees to reduce the risk of virus and bacterial transfer between subjects. There are various disinfectants available, with Virkon S (active substance: potassium peroxymonosulfate and sodium chloride) being a common example (Dossier Section 1.0).

Growers keep records to allow traceability for all plant material handled. These records must allow a consignment or consignment in transit to be traced back to the original source, as well as forward to identify all trade customers to which those plants have been supplied (Dossier Section 1.0).

3.3.3 | Pest monitoring during production

All producers are registered as professional operators with the UK Competent Authority via the Animal and Plant Health Agency (APHA) for England and Wales, or with the Science and Advice for Scottish Agriculture (SASA) for Scotland, and are authorised to issue the UK plant passports, verifying they meet the required national sanitary standards. 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).

The sanitary status of production areas is controlled by the producers as part of these schemes, as well as via official inspections by APHA Plant Health and Seeds Inspectors (PHSI; England and Wales) or with SASA (Scotland) (Dossier Section 1.0).

In the last 3 years there has been a substantial level of inspection of registered *C. avellana* producers, both in support of the Plant Passporting scheme (checks are consistent with EU legislation, with a minimum of one a year for authorised operators) and as part of the Quarantine Surveillance programme (Great Britain uses the same framework for its surveillance programme as the EU) (Dossier Section 1.0).

Plant material is regularly monitored for plant health issues. Pest monitoring is carried out by trained nursery staff via crop walking and records kept of this monitoring. Qualified agronomists also undertake crop walks to verify the producer's assessments. Curative or preventative actions are implemented together with an assessment of phytosanitary risk. Unless a pest can be immediately and definitively identified as non-quarantine, growers are required to treat it as a suspect quarantine pest and notify the competent authority (Dossier Section 1.0).

The crops are inspected visually on a regular basis by competent nursery staff as part of the growing process. All plants are also carefully inspected by nurseries on arrival and dispatch for any plant health issues (Dossier Section 1.0).

It is a legal requirement under the UK Plant Health law for any person in charge of a premise to notify the Competent Authority of the presence, or suspected presence, of a plant pest. The requirement is not limited to those organisms listed in the UK legislation but is also required for any organism not normally present in the UK which is likely to be injurious to plants (Dossier Section 1.0).

The nurseries follow the Plant Health Management Standard issued by the Plant Healthy Certification Scheme of which DEFRA, the Royal Horticultural Society, and others contribute to via The Plant Health Alliance Steering Group (Dossier Section 1.0).

The UK surveillance is based on visual inspection with samples taken from symptomatic material, and where appropriate, samples are also taken from asymptomatic material (e.g. plants, tubers, soil, watercourses). For sites with the likelihood of multiple pest and host combinations (e.g. ornamental and retail sites) standard methods are used for site selection and visit frequency, whereby clients are assessed taking into account business activity, size of business and source material, so for example a large propagator using third country material receives 10 visits per year whilst a small retailer selling locally sourced material is visited once every second year. Where pest specific guidelines are absent inspectors select sufficient plants to give a 95% probability of detecting symptoms randomly distributed on 1.5% of plants in a batch/consignment. For inspections of single hosts, possibly with multiple pests, survey site selection is often directed to specific locations identified by survey planners, for example 0.5% of ware production land is annually sampled for potato cyst nematode with farms randomly selected and sampled at a rate of 50 cores per hectare (Dossier Section 1.0).

During production, in addition to the general health monitoring of the plants by the nurseries, official growing season inspections are undertaken by the UK Plant Health Service at an appropriate time, taking into consideration factors such as the likelihood of pest presence and growth stage of the crop. Where appropriate this could include sampling and laboratory analysis. Official sampling and analysis could also be undertaken nearer to the point of export depending on the type of analysis and the import requirements of the country being exported to. Samples are generally taken on a representative sample of plants, in some cases however where the consignment size is quite small all plants are sampled. Magnification equipment is provided to all inspectors as part of their standard equipment and is used during inspections when appropriate (Dossier Section 1.0).

All residues or waste materials shall be assessed for the potential to host, harbour and transmit pests (Dossier Section 1.0).

Incoming plant material and other goods such as packaging material and growing media, that have the potential to be infected or harbour pests, are checked on arrival. Growers have procedures in place to quarantine any suspect plant material and to report findings to the authorities (Dossier Section 1.0).

3.3.4 | Pest management during production

Crop protection is achieved using a combination of measures including approved plant protection products, biological control or physical measures. Plant protection products are only used when necessary and records of all plant protection treatments are kept (Dossier Section 1.0).

Pest and disease pressure varies from season to season. Product application takes place only when required and depends on situation (disease pressure, growth stage etc and environmental factors) at that time. Subject to this variation in pest pressure, in some seasons few, if any, pesticides are applied; in others it is sometimes necessary to apply preventative and/or control applications of pesticides. In many circumstances also, biological control is used to control outbreaks, rather than using chemical treatments (Dossier Section 1.0).

According to Dossier Section 1.0, *C. avellana* tends to be particularly unaffected by many of the common pests or diseases that affect other species and so the list of chemical treatments routinely used on this species is short. The only problem encountered on a regular basis is aphids against which Aphox (active substance pirimicarb) is applied at the manufacturer's recommended rate and intervals (Dossier Section 5.1).

There are no specific measures/treatments against the soil pests. However, containerised plants are grown in trays on top of protective plastic membranes to prevent contact with soil. Membranes are regularly refreshed when needed. Alternatively, plants may be grown on raised galvanised steel benches stood on gravel as a barrier between the soil and bench feet and/or concreted surfaces (Dossier Section 1.0).

Post-harvest and through the autumn and winter, nursery management is centred on pest and disease prevention and maintaining good levels of nursery hygiene. Leaves, pruning residues and weeds are all removed from the nursery to reduce the number of overwintering sites for pests (Dossier Section 1.0).

3.3.5 | Inspections before export

The UK NPPO carries out inspections and testing where required by the country of destination's plant health legislation, to ensure all requirements are fulfilled and a valid phytosanitary certificate with the correct additional declarations is issued (Dossier Section 1.0).

Separate to any official inspection, plant material is checked by growers for plant health issues prior to dispatch (Dossier Section 1.0).

A final pre-export inspection is undertaken as part of the process of issuing a phytosanitary certificate. These inspections are generally undertaken as near to the time of export as possible, usually within 1–2 days, and not more than 2 weeks before export. Phytosanitary certificates are only issued if the commodity meets the required plant health standards after inspection and/or testing according to appropriate official procedures (Dossier Section 1.0).

The protocol for plants infested by pests during inspections before export is to treat the plants, if they are on site for a sufficient period of time, or to destroy any plants infested by pests otherwise. All other host plants in the nursery would be treated. The phytosanitary certificate for export will not be issued until the UK Plant Health inspectors confirm that the plants are free from pests (Dossier Section 1.0).

3.3.6 | Export procedure

Bare root plants are harvested in autumn-winter (November to March) to be able to lift plants from the field and because this is the best time to move dormant plants. Bare root plants are lifted and washed free from soil with a low-pressure washer in the outdoors nursery area away from packing/cold store area. In some cases, the plants may be kept in a cold store stored for up to 5 months after harvesting prior to export (Dossier Section 1.0).

Rooted plants in pots can be moved at any point in the year to fulfil customer demand, but more usually September to May. These will likely be destined for amenity or garden centre trade rather than nurseries (Dossier Section 1.0).

Prior to export bare root plants can be placed in bundles, depending on the size of the plants. They are then wrapped in polythene and packed and distributed on ISPM 15 certified wooden pallets or metal pallets. Alternatively, they may be placed in pallets which are then wrapped in polythene. Small volume orders may be packed in waxed cardboard cartons or polythene bags and dispatched via courier (Dossier Section 1.0).

Rooted plants in pots are transported on Danish trolleys for smaller containers, or ISPM 15 certified pallets, or individually in pots for larger containers (Dossier Section 1.0).

The preparation of the commodities for export is carried out inside the nurseries in a closed environment, e.g. packing shed, except for the specimen trees, which are prepared outside in an open field due to their dimensions (Dossier Section 1.0).

Plants are transported by lorry (size dependant on load quantity). Sensitive plants are occasionally transported by temperature-controlled lorry if weather conditions during transit are potentially harmful to plants (Dossier Section 1.0).

4 | IDENTIFICATION OF PESTS POTENTIALLY ASSOCIATED WITH THE COMMODITY

The search for potential pests associated with the commodity rendered 1083 species (see Microsoft Excel® file in Appendix F).

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.

23 EU-quarantine species that are reported to use the commodity as a host plant were evaluated (Table 4) 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 4 presents an overview of the evaluation of the 23 EU-quarantine pest species that are reported as associated with the commodity.

Of these 23 EU-quarantine pest species evaluated, 2 (*Phytophthora ramorum* (non-EU isolates) and *Thaumetopoea processionea*) are present in the UK and can be associated with the commodity and hence were selected for further evaluation.

TABLE 4 Overview of the evaluation of the 23 EU-quarantine pest species for which information was found in the Dossier, databases and literature searches that use *Corylus* as a host plant for their relevance for this opinion.

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in the UK	*Corylus* confirmed as a host (reference)	Pest can be associated with the commodity	Pest relevant for the opinion
1	*Anisandrus maiche* as Scolytinae spp. (non-European)	ANIDMA	Insects	No	*Corylus avellana* (Kovalenko, 2012)	Not assessed	No
2	*Anisogramma anomala*	CRSPAN	Fungi	No	*Corylus avellana* (Farr & Rossman, online)	Not assessed	No
3	*Anoplophora chinensis*	ANOLCN	Insects	No	*Corylus avellana* (EPPO, online)	Not assessed	No
4	*Anoplophora glabripennis*	ANOLGL	Insects	No	*Corylus colurna* (EPPO, online)	Not assessed	No
5	*Choristoneura conflictana*	ARCHCO	Insects	No	*Corylus* (Robinson et al., online)	Not assessed	No
6	*Choristoneura rosaceana*	CHONRO	Insects	No	*Corylus avellana* (CABI, online; EPPO, online)	Not assessed	No
7	*Corthylus punctatissimus* as Scolytinae spp. (non-European)	CORHPU	Insects	No	*Corylus americana* (Atkinson, online)	Not assessed	No
8	*Euwallacea fornicatus sensu lato* (including: *Euwallacea fornicatus sensu stricto*, *Euwallacea fornicatior*, *Euwallacea kuroshio* and *Euwallacea perbrevis*)	XYLBFO EUWAWH EUWAFO EUWAKU EUWAPE	Insects	No	*Corylus colurna* (EPPO, online)	Not assessed	No
9	Grapevine flavescence dorée phytoplasma	PHYP64	Phytoplasmas	No	*Corylus avellana* (EPPO, online)	Not assessed	No
10	*Hypothenemus crudiae* as Scolytinae spp. (non-European)	HYOTHI	Insects	No	*Corylus avellana* (Beaver et al., 2016)	Not assessed	No
11	*Lopholeucaspis japonica*	LOPLJA	Insects	No	*Corylus avellana* (EPPO, online; García Morales et al., online)	Not assessed	No
12	*Lycorma delicatula*	LYCMDE	Insects	No	*Corylus americana* (EPPO, online)	Not assessed	No
13	*Naupactus leucoloma*	GRAGLE	Insects	No	*Corylus avellana* (Snare, 2006)	Not assessed	No
14	*Oemona hirta*	OEMOHI	Insects	No	*Corylus maxima* (EPPO, online)	Not assessed	No
15	*Phymatotrichopsis omnivora*	PHMPOM	Fungi	No	*Corylus avellana* (Snare, 2006)	Not assessed	No
16	*Phytophthora ramorum* (non-EU isolates)	PHYTRA	Oomycetes	Yes[b]	*Corylus avellana* (Denman et al., 2005)	Yes	Yes
17	*Popillia japonica*	POPIJA	Insects	No	*Corylus avellana* (EPPO, online)	Not assessed	No
18	*Thaumetopoea processionea*	THAUPR	Insects	Yes	*Corylus* (CABI, online)	Yes	Yes
19	*Trirachys sartus*	AELSSA	Insects	No	*Corylus colurna* (EPPO, online)	Not assessed	No
20	*Xiphinema rivesi* (non-EU populations)	XIPHRI	Nematodes	No	*Corylus americana* (Xu & Zhao, 2019)	Not assessed	No
21	*Xyleborus ferrugineus* as Scolytinae spp. (non-European)	XYLBFE	Insects	No	*Corylus* (Barnouin et al., 2020)	Not assessed	No
22	*Xyleborus xylographus* as Scolytinae spp. (non-European)	XYLBXY	Insects	No	*Corylus avellana* (Snare, 2006)	Not assessed	No
23	*Xylosandrus compactus* as Scolytinae spp. (non-European)	XYLSCO	Insects	No	*Corylus avellana* (Faccoli, 2021)	Not assessed	No

[a]Commission Implementing Regulation (EU) 2019/2072.

[b]*Phytophthora ramorum* isolates present in the UK are defined as non-EU isolates.

4.2 | Selection of other relevant pests (non-regulated 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 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 in the EU.

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 justified reason (e.g. recent evidence of presence).

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

Based on the information collected, 1056 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 the Appendix F (Microsoft Excel® file). Of the evaluated EU non-quarantine pests, no pest was selected for further evaluation.

4.3 | Overview of interceptions

Data on the interception of harmful organisms on plants of *C. avellana* can provide information on some of the organisms that can be present on *C. avellana* despite the current measures taken. According to EUROPHYT, online (accessed on 14 August 2023) and TRACES-NT, online (accessed on 14 August 2023), there were no interceptions of plants for planting of *C. avellana* from the UK destined to the EU Member States due to the presence of harmful organisms between the years 1995 and 31 July 2023. It should be noted that the UK was previously part of the EU and at that time *C. avellana* was not subjected to plant passport, and that since Brexit the movement of *C. avellana* to the EU has been banned according to the current plant health legislation.

There were no interceptions of plants for planting of *C. avellana* from the whole world destined to the EU Member States due to the presence of harmful organisms (EUROPHYT, online; TRACES-NT, online).

4.4 | List of potential pests not further assessed

The Panel highlighted three potentially relevant pests (see Appendix E) for which, however, the association with the commodity and/or impact are uncertain.

A specific justification of the inclusion in this list is provided for each species in Appendix E.

4.5 | Summary of pests selected for further evaluation

Two pests satisfying all the relevant criteria listed above in the Sections 4.1 and 4.2 are included in Table 5. The effectiveness of the risk mitigation measures applied to the commodity was evaluated for these selected pests.

TABLE 5 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	*Phytophthora ramorum* (non-EU isolates)	PHYTRA	*Phytophthora ramorum* (non-EU isolates) Werres, De Cock & Man in't Veld	Peronosporales Peronosporaceae	Oomycetes	EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072
2	*Thaumetopoea processionea*	THAUPR	*Thaumetopoea processionea* L.	Lepidoptera Notodontidae	Insects	Protected Zone Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072

5 | RISK MITIGATION MEASURES

For the selected pests (Table 5), the Panel evaluated the likelihood that it could be present in the *C. avellana* nurseries 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, 4.0, 5.1 and 5.2), the Panel summarised the risk mitigation measures (see Table 6) that are implemented in the production nursery.

TABLE 6 Overview of implemented risk mitigation measures for *Corylus avellana* plants designated for export to the EU from the UK

Number	Risk mitigation measure	Implementation in the UK
1	Registration of production sites	All producers are registered as professional operators with the UK Competent Authority via APHA for England and Wales, or SASA for Scotland, and are authorised to issue the UK plant passports, verifying they meet the required national sanitary standards (Dossier Section 1.0).
2	Physical separation	Most of the nurseries also produce plants for the local UK market, and there is no distancing between production areas for the export and the local market. All plants within the UK nurseries are grown under the same phytosanitary measures, meeting the requirements of the UK Plant Passporting regime (Dossier Section 1.0).
3	Certified plant material	Seeds purchased in the UK are certified under the Forestry Commission's Voluntary Scheme for the Certification of Native Trees and Shrubs. Seedlings sourced in the UK are certified with the UK Plant Passports. Seedlings from the EU countries are certified with phytosanitary certificates. The majority of plants are grown from the UK sourced material. Some plants are obtained from the EU (the Netherlands, Italy, Germany) (Dossier Section 1.0).
4	Growing media	The growing media is virgin peat or peat-free compost. This compost is heat-treated by commercial suppliers during production to eliminate pests and diseases. It is supplied in sealed bulk bags or shrink-wrapped bales and stored off the ground on pallets, these are free from contamination. Where delivered in bulk, compost is kept in a dedicated bunker, either indoors, or covered by tarpaulin outdoors, and with no risk of contamination with soil or other material (Dossier Section 1.0).
5	Surveillance, monitoring and sampling	For additional information see Section 3.3.3 Pest monitoring during production.
6	Hygiene measures	Growers must have an appropriate programme of weed management in place on the nursery (Dossier Section 1.0). General hygiene measures are undertaken as part of routine nursery production, including disinfection of tools and equipment between batches/lots and different plant species. The tools are dipped in a disinfectant solution and wiped with a clean cloth between trees to reduce the risk of virus and bacterial transfer between subjects. There are various disinfectants available, with Virkon S (active substance: potassium peroxymonosulfate and sodium chloride) being a common example (Dossier Section 1.0).

TABLE 6 (Continued)

Number	Risk mitigation measure	Implementation in the UK
7	Removal of infested plant material	Post-harvest and through the autumn and winter, nursery management is centred on pest and disease prevention and maintaining good levels of nursery hygiene. Leaves, pruning residues and weeds are all removed from the nursery to reduce the number of over wintering sites for pests and diseases (Dossier Section 1.0).
8	Irrigation water	Water for irrigation is routinely sampled and sent for analysis (Dossier Section 1.0).
9	Application of pest control products	Crop protection is achieved using a combination of measures including approved plant protection products, biological control or physical measures. Plant protection products are only used when necessary and records of all plant protection treatments are kept (Dossier Section 1.0). Pest and disease pressure varies from season to season. Product application takes place only when required and depends on situation (disease pressure, growth stage etc and environmental factors) at that time. Subject to this variation in pest pressure, in some seasons few, if any, pesticides are applied; in others it is sometimes necessary to apply preventative and/or control applications of pesticides. In many circumstances also, biological control is used to control outbreaks, rather than using chemical treatments (Dossier Section 1.0). According to Dossier Section 1.0, *C. avellana* tends to be particularly unaffected by many of the common pests or diseases that affect other species and so the list of chemical treatments routinely used on this species is short. The only problem encountered on a regular basis is aphids against which Aphox (active substance pirimicarb) is applied at the manufacturer's recommended rate and intervals.
10	Measures against soil pests	There are no specific measures/treatments against the soil pests. However, containerised plants are grown in trays on top of protective plastic membranes to prevent contact with soil. Membranes are regularly refreshed when needed. Alternatively, plants may be grown on raised galvanised steel benches stood on gravel as a barrier between the soil and bench feet and/or concreted surfaces (Dossier Section 1.0).
11	Inspections and management of plants before export	The UK NPPO carries out inspections and testing where required by the country of destination's plant health legislation, to ensure all requirements are fulfilled and a valid phytosanitary certificate with the correct additional declarations is issued (Dossier Section 1.0). Separate to any official inspection, plant material is checked by growers for plant health issues prior to dispatch (Dossier Section 1.0). A final pre-export inspection is undertaken as part of the process of issuing a phytosanitary certificate. These inspections are generally undertaken as near to the time of export as possible, usually within 1–2 days, and not more than 2 weeks before export. Phytosanitary certificates are only issued if the commodity meets the required plant health standards after inspection and/or testing according to appropriate official procedures (Dossier Section 1.0). The protocol for plants infested by pests during inspections before export is to treat the plants, if they are on site for a sufficient period of time, or to destroy any plants infested by pests otherwise. All other host plants in the nursery would be treated. The phytosanitary certificate for export will not be issued until the UK Plant Health inspectors confirm that the plants are free from pests (Dossier Section 1.0).
12	Separation during transport to the destination	According to the Dossier Section 1.0, the commodities are dispatched as single bare root trees or in bundles as follows: – 25 or 50 for transplants; – 5, 10 or 15 for whips. Bare root plants are then wrapped in polythene and packed and distributed on ISPM 15 certified wooden pallets or metal pallets. Alternatively, they may be placed in pallets which are then wrapped in polythene. Small volume orders may be packed in waxed cardboard cartons or polythene bags and dispatched via courier (Dossier Section 1.0). Rooted plants in pots are transported on Danish trolleys for smaller containers, or ISPM 15 certified pallets, or individually in pots for larger containers (Dossier Section 1.0). Plants are transported by lorry (size dependant on load quantity). Sensitive plants are occasionally transported by temperature-controlled lorry if weather conditions during transit are likely to be very cold (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 5.2.1–5.2.2). The outcome of the EKE regarding pest freedom after the evaluation of the currently proposed risk mitigation measures is summarised in Section 5.2.3.

5.2.1 | Overview of the evaluation of *Phytophthora ramorum* (non-EU isolates) (Peronosporales; Peronosporaceae)

Overview of the evaluation of *Phytophthora ramorum* (non-EU isolates) for bundles of whips and transplants 1–2 years old					
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 bundles	**9959** out of 10,000 bundles	**9976** out of 10,000 bundles	**9986** out of 10,000 bundles	**9994** out of 10,000 bundles	**9998.7** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infected bundles	**1.3** out of 10,000 bundles	**6** out of 10,000 bundles	**14** out of 10,000 bundles	**24** out of 10,000 bundles	**41** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** *Phytophthora ramorum* is present in the UK with a restricted distribution. The pathogen has a wide host range including one species of *Corylus* (*C. cornuta* var. *californica*) and in addition *C. avellana* is reported as an experimental host. The main hosts (e.g. *Rhododendron* spp., *Larix* spp. etc.) can be present either inside or in the surroundings of the nurseries. Aerial inoculum could be produced on these host plants and cause bark and leaf infections on the commodity. **Measures taken against the pest and their efficacy** *Phytophthora ramorum* is a quarantine pest in the UK and under official control. General measures taken by the nurseries are effective against the pathogen. These measures include (a) the use of certified plant material and growing media; (b) inspections, surveillance, monitoring, sampling and laboratory testing; (c) hygiene measures and (d) application of pest control products. **Interception records** In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting neither from the UK nor from other countries due to the presence of *P. ramorum* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** None observed. **Main uncertainties** – The level of susceptibility of *C. avellana* to the pathogen. – Whether symptoms may be promptly detected. – The presence/abundance of the pathogen in the area where the nurseries are located. – Effect of fungicide treatments against the pathogen.				

Overview of the evaluation of *P. ramorum* (non-EU isolates) for bundles of cell grown plants 1–2 years old					
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 bundles	**9970** out of 10,000 bundles	**9981** out of 10,000 bundles	**9989** out of 10,000 bundles	**9995** out of 10,000 bundles	**9999.3** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infected bundles	**0.7** out of 10,000 bundles	**5** out of 10,000 bundles	**11** out of 10,000 bundles	**19** out of 10,000 bundles	**30** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** *Phytophthora ramorum* is present in the UK with a restricted distribution. The pathogen has a wide host range including one species of *Corylus* (*C. cornuta* var. *californica*) and in addition *C. avellana* is reported as an experimental host. The main hosts (e.g. *Rhododendron* spp., *Larix* spp. etc.) can be present either inside or in the surroundings of the nurseries. Aerial inoculum could be produced on these host plants and cause bark and leaf infections on the commodity. **Measures taken against the pest and their efficacy** *Phytophthora ramorum* is a quarantine pest in the UK and under official control. General measures taken by the nurseries are effective against the pathogen. These measures include (a) the use of certified plant material and growing media; (b) inspections, surveillance, monitoring, sampling and laboratory testing; (c) hygiene measures and (d) application of pest control products. **Interception records** In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting neither from the UK nor from other countries due to the presence of *P. ramorum* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** None observed. **Main uncertainties** – The level of susceptibility of *C. avellana* to the pathogen. – Whether symptoms may be promptly detected. – The presence/abundance of the pathogen in the area where the nurseries are located. – Effect of fungicide treatments against the pathogen.				

Overview of the evaluation of *P. ramorum* (non-EU isolates) for bare root plants 1–7 years old					
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	**9950** out of 10,000 plants	**9971** out of 10,000 plants	**9984** out of 10,000 plants	**9993** out of 10,000 plants	**9999** out of 10,000 plants
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infected plants	**1** out of 10,000 plants	**7** out of 10,000 plants	**16** out of 10,000 plants	**29** out of 10,000 plants	**50** out of 10,000 plants
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** *Phytophthora ramorum* is present in the UK with a restricted distribution. The pathogen has a wide host range including one species of *Corylus* (*C. cornuta* var. *californica*) and in addition *C. avellana* is reported as an experimental host. The main hosts (e.g. *Rhododendron* spp., *Larix* spp. etc.) can be present either inside or in the surroundings of the nurseries. Aerial inoculum could be produced on these host plants and cause bark and leaf infections on the commodity. **Measures taken against the pest and their efficacy** *Phytophthora ramorum* is a quarantine pest in the UK and under official control. General measures taken by the nurseries are effective against the pathogen. These measures include (a) the use of certified plant material and growing media; (b) inspections, surveillance, monitoring, sampling and laboratory testing (c) hygiene measures and (d) application of pest control products. **Interception records** In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting neither from the UK nor from other countries due to the presence of *P. ramorum* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** None observed. **Main uncertainties** – The level of susceptibility of *C. avellana* to the pathogen. – Whether symptoms may be promptly detected. – The practicability of inspections of older trees. – The presence/abundance of the pathogen in the area where the nurseries are located. – Effect of fungicide treatments against the pathogen.				

Overview of the evaluation of *P. ramorum* (non-EU isolates) for plants in pots up to 15 years old					
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	**9939** out of 10,000 plants	**9965** out of 10,000 plants	**9980** out of 10,000 plants	**9990** out of 10,000 plants	**9997.6** out of 10,000 plants
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infected plants	**2.4** out of 10,000 plants	**10** out of 10,000 plants	**20** out of 10,000 plants	**35** out of 10,000 plants	**61** out of 10,000 plants
Summary of the information used for the evaluation	**Possibility that the pest could become associated with the commodity** *Phytophthora ramorum* is present in the UK with a restricted distribution. The pathogen has a wide host range including one species of *Corylus* (*C. cornuta* var. *californica*) and in addition *C. avellana* is reported as an experimental host. The main hosts (e.g. *Rhododendron* spp., *Larix* spp. etc.) can be present either inside or in the surroundings of the nurseries. Aerial inoculum could be produced on these host plants and cause bark and leaf infections on the commodity. **Measures taken against the pest and their efficacy** *Phytophthora ramorum* is a quarantine pest in the UK and under official control. General measures taken by the nurseries are effective against the pathogen. These measures include (a) the use of certified plant material and growing media; (b) inspections, surveillance, monitoring, sampling and laboratory testing (c) hygiene measures and (d) application of pest control products. **Interception records** In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting neither from the UK nor from other countries due to the presence of *P. ramorum* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** None observed. **Main uncertainties** – The level of susceptibility of *C. avellana* to the pathogen. – Whether symptoms may be promptly detected. – The practicability of inspections of older trees. – The presence/abundance of the pathogen in the area where the nurseries are located. – Effect of fungicide treatments against the pathogen.				

For more details, see relevant pest data sheet on *Phytophthora ramorum* (non-EU isolates) (Section A.1 in Appendix A).

5.2.2 | Overview of the evaluation of *Thaumetopoea processionea* (Lepidoptera; Notodontidae)

Overview of the evaluation of *Thaumetopoea processionea* for bundles of whips and transplants 1–2 years old					
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 bundles	**9991** out of 10,000 bundles	**9995** out of 10,000 bundles	**9997** out of 10,000 bundles	**9999** out of 10,000 bundles	**9999.86** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested bundles	**0.14** out of 10,000 bundles	**1** out of 10,000 bundles	**3** out of 10,000 bundles	**5** out of 10,000 bundles	**9** out of 10,000 bundles
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 territory because of an introduction from the EU with infested plants in early 2000. The species is established in the Greater London area and a buffer zone is delimited each year around the infestation points that are going through eradication. Several eradications of newly found spots were carried out successfully in the whole country while eradication is no longer considered possible in the establishment area. One of the production nurseries is included in the 2022 buffer zone. *Corylus* is considered secondary, occasional host, only attacked during outbreaks. The pest cannot complete the development from mature larva to moth on *Corylus*. Egg masses were never found on *Corylus* neither in the EU nor in the UK. Major hosts of *T. processionea* (*Quercus* spp.) are present both in the nurseries and in the surroundings of the nurseries. Therefore, a spillover of larvae may be possible in case of an outbreak and it cannot be ruled out that the pest is associated with the commodity. **Measures taken against the pest and their efficacy** Nursery staff is trained to identify the development stages of the pest and regular inspections are carried out in the nurseries. The pest was never detected so no specific measures were adopted. **Interception records** The pest was intercepted frequently on plants for planting of *Quercus* from the EU to the UK, never on *Corylus* (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** Although the nursery staff is trained, the frequent interceptions of the pest on nursery material indicates that the pest is very difficult to detect, especially at the egg stage because the egg masses have the same colour of the twigs on which they are laid. Presence of eggs masses on *Corylus* is highly unlikely, but, in that case, the detection of the pest at the egg stage would be difficult on large plants because of the high number of twigs to check, and especially when they are carrying leaves. **Main uncertainties** – The possibility for the moth to lay egg masses on *Corylus*. – The possibility for the young larvae to feed on *Corylus* leaves. – The level of awareness of nursery staff that *Corylus* may be considered a host of the pest.				

Overview of the evaluation of *T. processionea* for cell grown plants 1–2 years old					
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 bundles	**9993** out of 10,000 bundles	**9996** out of 10,000 bundles	**9998** out of 10,000 bundles	**9999** out of 10,000 bundles	**9999.7** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested bundles	**0.3** out of 10,000 bundles	**1** out of 10,000 bundles	**2** out of 10,000 bundles	**4** out of 10,000 bundles	**7** out of 10,000 bundles
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 territory because of an introduction from the EU with infested plants in early 2000. The species is established in the Greater London area and a buffer zone is delimited each year around the infestation points that are going through eradication. Several eradications of newly found spots were carried out successfully in the whole country while eradication is no longer considered possible in the establishment area. One of the production nurseries is included in the 2022 buffer zone. *Corylus* is considered secondary, occasional host, only attacked during outbreaks. The pest cannot complete the development from mature larva to moth on *Corylus*. Egg masses were never found on *Corylus* neither in the EU nor in the UK. Major hosts of *T. processionea* (*Quercus* spp.) are present both in the nurseries and in the surroundings of the nurseries. Therefore, a spillover of larvae may be possible in case of an outbreak and it cannot be ruled out that the pest is associated with the commodity. **Measures taken against the pest and their efficacy** Nursery staff is trained to identify the development stages of the pest and regular inspections are carried out in the nurseries. The pest was never detected so no specific measures were adopted. **Interception records** The pest was intercepted frequently on plants for planting of *Quercus* from the EU to the UK, never on *Corylus* (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** Although the nursery staff is trained, the frequent interceptions of the pest on nursery material indicates that the pest is very difficult to detect, especially at the egg stage because the egg masses have the same colour of the twigs on which they are laid. Presence of eggs masses on *Corylus* is highly unlikely, but, in that case, the detection of the pest at the egg stage would be difficult on large plants because of the high number of twigs to check, and especially when they are carrying leaves. **Main uncertainties** – The possibility for the young larvae to feed on *Corylus* leaves. – The level of awareness of nursery staff that *Corylus* may be considered a host of the pest.				

Overview of the evaluation of *T. processionea* for bare root plants 1–7 years old					
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	**9991** out of 10,000 plants	**9995** out of 10,000 plants	**9997** out of 10,000 plants	**9999** out of 10,000 plants	**9999.86** out of 10,000 plants
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**0.14** out of 10,000 plants	**1** out of 10,000 plants	**3** out of 10,000 plants	**5** out of 10,000 plants	**9** out of 10,000 plants
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 territory because of an introduction from the EU with infested plants in early 2000. The species is established in the Greater London area and a buffer zone is delimited each year around the infestation points that are going through eradication. Several eradications of newly found spots were carried out successfully in the whole country while eradication is no longer considered possible in the establishment area. One of the production nurseries is included in the 2022 buffer zone. *Corylus* is considered secondary, occasional host, only attacked during outbreaks. The pest cannot complete the development from mature larva to moth on *Corylus*. Egg masses were never found on *Corylus* neither in the EU nor in the UK. Major hosts of *T. processionea* (*Quercus* spp.) are present both in the nurseries and in the surroundings of the nurseries. Therefore, a spillover of larvae may be possible in case of an outbreak and it cannot be ruled out that the pest is associated with the commodity. **Measures taken against the pest and their efficacy** Nursery staff is trained to identify the development stages of the pest and regular inspections are carried out in the nurseries. The pest was never detected so no specific measures were adopted. **Interception records** The pest was intercepted frequently on plants for planting of *Quercus* from the EU to the UK, never on *Corylus* (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** Although the nursery staff is trained, the frequent interceptions of the pest on nursery material indicates that the pest is very difficult to detect, especially at the egg stage because the egg masses have the same colour of the twigs on which they are laid. Presence of eggs masses on *Corylus* is highly unlikely, but, in that case, the detection of the pest at the egg stage would be difficult on large plants because of the high number of twigs to check, and especially when they are carrying leaves. **Main uncertainties** – The possibility for the moth to lay egg masses on *Corylus*. – The possibility for the young larvae to feed on *Corylus* leaves. – The level of awareness of nursery staff that *Corylus* may be considered a host of the pest.				

Overview of the evaluation of *T. processionea* for plants in pots up to 15 years old					
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	**9985** out of 10,000 plants	**9992** out of 10,000 plants	**9995** out of 10,000 plants	**9997.4** out of 10,000 plants	**9999.2** out of 10,000 plants
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested plants	**0.8** out of 10,000 plants	**2.6** out of 10,000 plants	**5** out of 10,000 plants	**8** out of 10,000 plants	**15** out of 10,000 plants
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 territory because of an introduction from the EU with infested plants in early 2000. The species is established in the Greater London area and a buffer zone is delimited each year around the infestation points that are going through eradication. Several eradications of newly found spots were carried out successfully in the whole country while eradication is no longer considered possible in the establishment area. One of the production nurseries is included in the 2022 buffer zone. *Corylus* is considered secondary, occasional host, only attacked during outbreaks. The pest cannot complete the development from mature larva to moth on *Corylus*. Egg masses were never found on *Corylus* neither in the EU nor in the UK. Major hosts of *T. processionea* (*Quercus* spp.) are present both in the nurseries and in the surroundings of the nurseries. Therefore, a spillover of larvae may be possible in case of an outbreak and it cannot be ruled out that the pest is associated with the commodity. **Measures taken against the pest and their efficacy** Nursery staff is trained to identify the development stages of the pest and regular inspections are carried out in the nurseries. The pest was never detected so no specific measures were adopted. **Interception records** The pest was intercepted frequently on plants for planting of *Quercus* from the EU to the UK, never on *Corylus* (EUROPHYT, online; TRACES-NT, online). **Shortcomings of current measures/procedures** Although the nursery staff is trained, the frequent interceptions of the pest on nursery material indicates that the pest is very difficult to detect, especially at the egg stage because the egg masses have the same colour of the twigs on which they are laid. Presence of eggs masses on *Corylus* is highly unlikely, but, in that case, the detection of the pest at the egg stage would be difficult on large plants because of the high number of twigs to check, and especially when they are carrying leaves. **Main uncertainties** – The possibility for the moth to lay egg masses on *Corylus*. – The possibility for the young larvae to feed on *Corylus* leaves. – The level of awareness of nursery staff that *Corylus* may be considered a host of the pest.				

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

5.2.3 | Outcome of expert knowledge elicitation

Table 7 and Figures 3 show the outcome of the EKE regarding pest freedom after the evaluation of the implemented risk mitigation measures for all the evaluated pests.

Figure 4 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the implemented risk mitigation measures for *Corylus avellana* plants in pots up to 15 years old designated for export to the EU for *Phytophthora ramorum* (non-EU isolates).

TABLE 7 Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against pests on *Corylus avellana* plants designated for export to the EU. In panel A, the median value for the assessed level of pest freedom for each pest is indicated by 'M', the 5% percentile is indicated by 'L', and the 95% percentile is indicated by 'U'. The percentiles together span the 90% uncertainty range regarding pest freedom. The pest freedom categories are defined in panel B of the table.

Group	Pest species	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
Commodity 1: bundles of whips and transplants									
Oomycetes	*Phytophthora ramorum* (non-EU isolates)						LM		U
Insects	*Thaumetopoea processionea*							L	MU
Commodity 2: cell grown plants									
Oomycetes	*Phytophthora ramorum* (non-EU isolates						LM		U
Insects	*Thaumetopoea processionea*							L	MU
Commodity 3: bare root plants									
Oomycetes	*Phytophthora ramorum* (non-EU isolates)						LM		U
Insects	*Thaumetopoea processionea*							L	MU
Commodity 4: plants in pots									
Oomycetes	*Phytophthora ramorum* (non-EU isolates)					L	M		U
Insects	*Thaumetopoea processionea*							L	MU

PANEL A

	Pest freedom category	Pest-free plants out of 10,000
	Sometimes pest free	≤ 5000
	More often than not pest free	5000–≤ 9000
	Frequently pest free	9000–≤ 9500
	Very frequently pest free	9500–≤ 9900
	Extremely frequently pest free	9900–≤ 9950
	Pest free with some exceptional cases	9950–≤ 9990
	Pest free with few exceptional cases	9990–≤ 9995
	Almost always pest free	9995–≤ 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

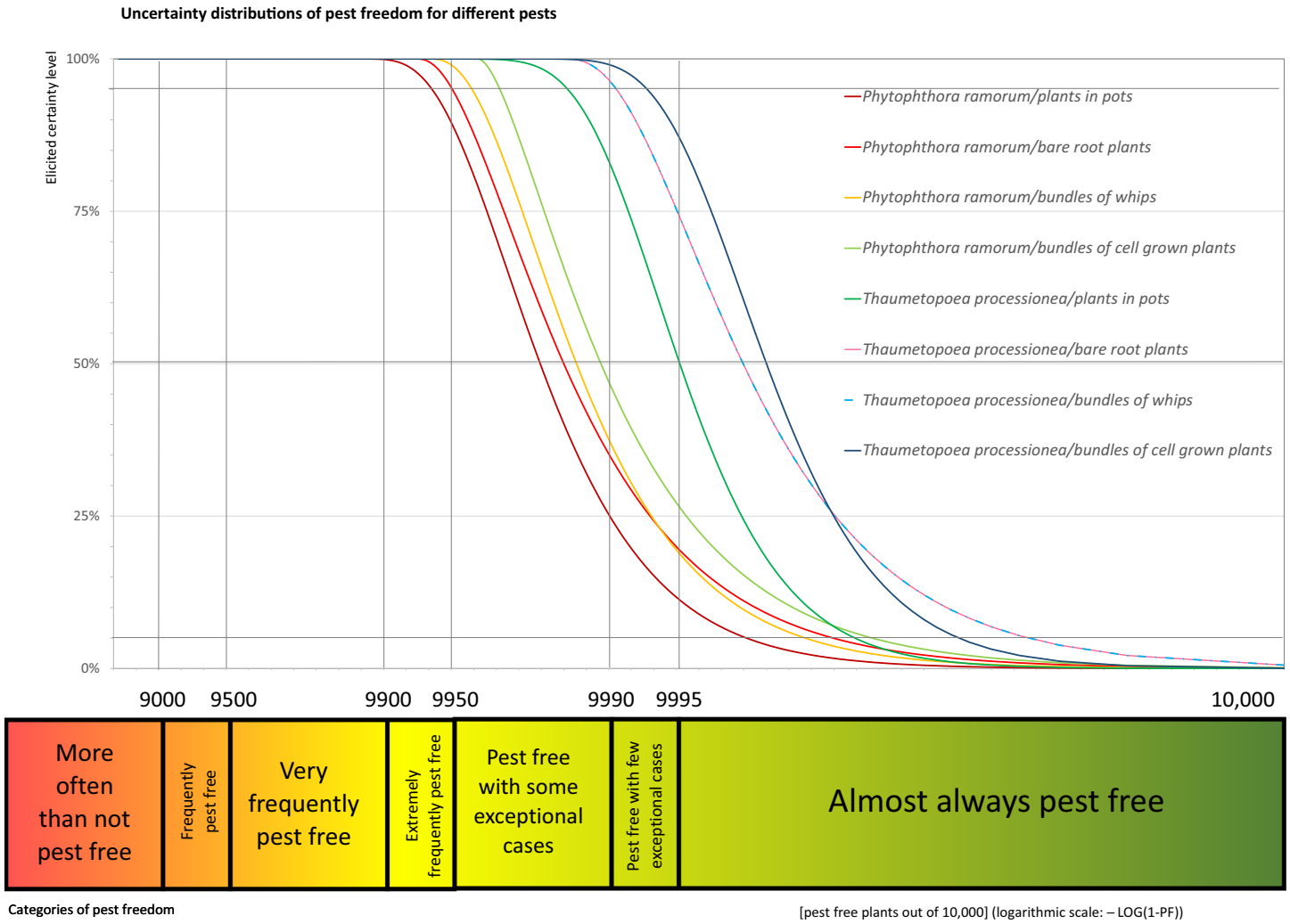

FIGURE 3 Elicited certainty (y-axis) of the number of pest-free plants/bundles of *Corylus avellana* (x-axis; log-scaled) out of 10,000 plants/bundles designated for export to the EU from the UK for all evaluated pests visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%).

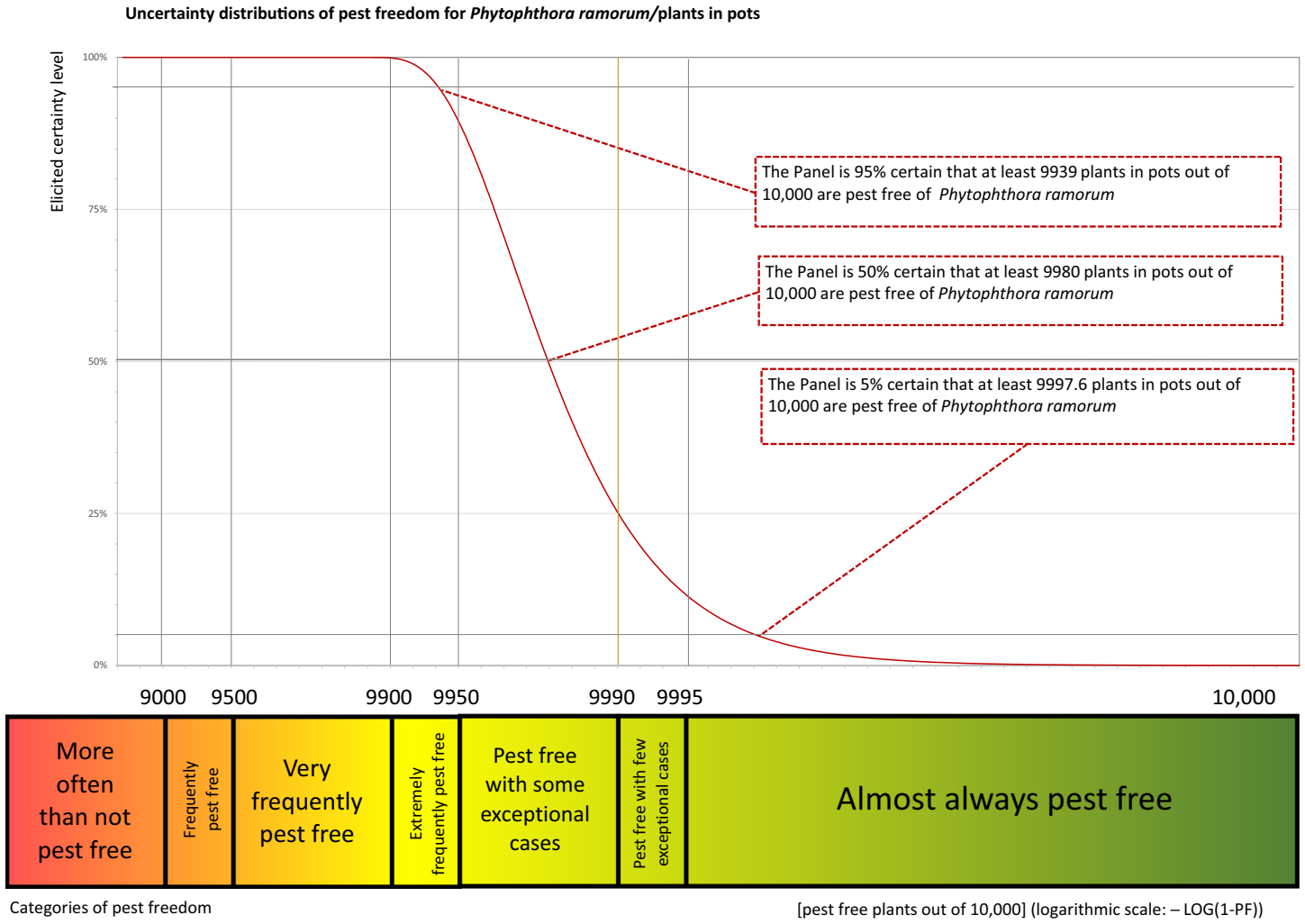

FIGURE 4 Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the implemented risk mitigation measures for plants designated for export to the EU based on the example of *Phytophthora ranorum* (non-EU isolates) on *Corylus avellana* plants in pots up to 15 years old.

6 | CONCLUSIONS

There are two pests identified to be present in the UK and considered to be potentially associated with the plants of *C. avellana* imported from the UK and relevant for the EU.

These pests are *P. ramorum* (non-EU isolates) and *T. processionea*. The likelihood of the pest freedom after the evaluation of the implemented risk mitigation measures for the commodities designated for export to the EU was estimated. In the assessment of risk, the age of the plants was considered, reasoning that older trees are more likely to be infested mainly due to longer exposure time and larger size.

For *P. ramorum* the likelihood of pest freedom for bundles of whips or transplants following evaluation of current risk mitigation measures was estimated as 'pest free with some exceptional cases' with the 90% uncertainty range reaching from 'pest free with some exceptional cases' to 'almost always pest free'. The EKE indicated, with 95% certainty, that between 9959 and 10,000 bundles of whips or transplants per 10,000 will be free from *P. ramorum*. The likelihood of pest freedom for bundles of cell grown plants was estimated as 'pest free with some exceptional cases' with the 90% uncertainty range reaching from 'pest free with some exceptional cases' to 'almost always pest free´. The EKE indicated, with 95% certainty, that between 9970 and 10,000 bundles of cell grown plants per 10,000 will be free from *P. ramorum*. The likelihood of pest freedom for bare root plants up to 7 years old was estimated as 'pest free with some exceptional cases' with the 90% uncertainty range reaching from 'pest free with few exceptional cases' to 'almost always pest free'. The EKE indicated, with 95% certainty, that between 9950 and 10,000 bare root plants up to 7 years old per 10,000 will be free from *P. ramorum*. The likelihood of pest freedom for plants in pots up to 15 years old 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 EKE indicated, with 95% certainty, that between 9939 and 10,000 plants in pots up to 15 years old per 10,000 will be free from *P. ramorum*.

For *T. processionea* the likelihood of pest freedom for bundles of whips or transplants 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 EKE indicated, with 95% certainty, that between 9991 and 10,000 bundles of whips or transplants per 10,000 will be free from *T. processionea*. The likelihood of pest freedom for bundles of cell grown plants 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 EKE indicated, with 95% certainty, that between 9993 and 10,000 bundles of cell grown plants per 10,000 will be free from *T. processionea*. The likelihood of pest freedom for bare root plants up to 7 years old 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 EKE indicated, with 95% certainty, that between 9991 and 10,000 bare root plants up to 7 years old per 10,000 will be free from *T. processionea*. The likelihood of pest freedom for plants in pots up to 15 years old 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 EKE indicated, with 95% certainty, that between 9985 and 10,000 plants in pots up to 15 years old per 10,000 will be free from *T. processionea*.

ABBREVIATIONS

APHA	Animal and Plant Health Agency
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
PHSI	Plant Health and Seeds Inspectorate
PLH	Plant Health
PRA	Pest Risk Assessment
RNQPs	Regulated Non-Quarantine Pests
SASA	Science and Advice for Scottish Agriculture

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).

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CONFLICT OF INTEREST

If you wish to access the declaration of interests of any expert contributing to an EFSA scientific assessment, please contact interestmanagement@efsa.europa.eu.

REQUESTOR

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

Data sheets of pests selected for further evaluation

A.1 | *Phytophthora ramorum* (non-EU isolates)

A.1.1 | Organism information

Taxonomic information	Current valid scientific name: *Phytophthora ramorum* Synonyms: – Name used in the EU legislation: *Phytophthora ramorum* (non-EU isolates) Werres, De Cock & Man in 't Veld [PHYTRA] Order: Peronosporales Family: Peronosporaceae Common name: Sudden oak death (SOD), ramorum bleeding canker, ramorum blight, ramorum leaf blight, twig and leaf blight Name used in the Dossier: *Phytophthora ramorum*
Group	Oomycetes
EPPO code	PHYTRA
Regulated status	The pathogen is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072 as *Phytophthora ramorum* (non-EU isolates) Werres, De Cock & Man in 't Veld [PHYTRA]. The EU isolates of *P. ramorum* are listed as regulated non-quarantine pest (RNQP). The pathogen is included in the EPPO A2 list (EPPO, online_a). *Phytophthora ramorum* is quarantine in Canada, China, Israel, Mexico, Morocco and the United Kingdom. It is on A1 list of Brazil, Chile, Egypt, Kazakhstan, Switzerland, Türkiye and EAEU (=Eurasian Economic Union: Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia) (EPPO, online_b).
Pest status in the UK	*Phytophthora ramorum* is present in the UK (Brown and Brasier, 2007; Dossier Sections 1.0 and 2.0; CABI, online; EPPO, online_c). According to the Dossier Section 2.0, European isolates of *Phytophthora ramorum* are present in the UK: not widely distributed and under official control. It has been found in most regions of the UK, but it is more often reported in wetter, western regions.
Pest status in the EU	*Phytophthora ramorum* is present in the EU and it is currently reported in the following EU Member States: Belgium, Croatia, Denmark, Finland (transient), France, Germany, Ireland, Luxembourg, the Netherlands, Poland, Portugal and Slovenia (EPPO, online_c).
Host status on *Corylus avellana*	No information was found on whether *Corylus avellana* is a natural host for *Phytophthora ramorum*. However, experimental tests of susceptibility have demonstrated that *C. avellana* can be infected by *P. ramorum* (Sansford et al., 2009). In addition, another *Corylus* species *C. cornuta* var. *californica* was found to be naturally infected (Di Leo et al., 2008).
PRA information	Pest Risk Assessments available: • Risk analysis for *Phytophthora ramorum* Werres, de Cock & Man in't Veld, causal agent of sudden oak death, ramorum leaf blight and ramorum dieback (Cave et al., 2008); • Risk analysis of *Phytophthora ramorum*, a newly recognised pathogen threat to Europe and the cause of sudden oak death in the USA (Sansford et al., 2009); • Scientific opinion on the pest risk analysis on *Phytophthora ramorum* prepared by the FP6 project RAPRA (EFSA PLH Panel, 2011); • Pest risk management for *Phytophthora kernoviae* and *Phytophthora ramorum* (EPPO, 2013); • Scientific Opinion on the commodity risk assessment of *Acer campestre* plants from the UK (EFSA PLH Panel, 2023a); • Scientific Opinion on the commodity risk assessment of *Acer palmatum* plants from the UK (EFSA PLH Panel, 2023b); • Scientific Opinion on the commodity risk assessment of *Acer platanoides* plants from the UK (EFSA PLH Panel, 2023c); • Scientific Opinion on the commodity risk assessment of *Acer pseudoplatanus* plants from the UK (EFSA PLH Panel, 2023d); • Scientific Opinion on the commodity risk assessment of *Fagus sylvatica* plants from the UK (EFSA PLH Panel, 2023e); • Scientific Opinion on the commodity risk assessment of *Quercus petraea* plants from the UK (EFSA PLH Panel, 2023f); • Scientific Opinion on the commodity risk assessment of *Quercus robur* plants from the UK (EFSA PLH Panel, 2023g); • Risk of *Phytophthora ramorum* to the United States (USDA, 2023); • Updated pest risk assessment of *Phytophthora ramorum* in Norway (Thomsen et al., 2023); • UK Risk Register Details for *Phytophthora ramorum* (DEFRA, online).
Other relevant information for the assessment	
Biology	*Phytophthora ramorum* is most probably native to East Asia (Jung et al., 2021; Poimala and Lilja, 2013). The pathogen is present in Asia (Japan, Vietnam), Europe (Belgium, Croatia, Denmark, Finland, France, Germany, Guernsey, Ireland, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovenia, the UK), North America (Canada, US) and South America (Argentina) (EPPO, online_c). So far there are 12 known genetic lineages of *P. ramorum*: NA1 and NA2 from North American, EU1 from Europe (including the UK) and North America (Grünwald et al., 2009), EU2 from Northern Ireland and western Scotland (Van Poucke et al., 2012), IC1 to IC5 from Vietnam and NP1 to NP3 from Japan (Jung et al., 2021). *Phytophthora ramorum* is heterothallic oomycete species belonging to clade 8c (Blair et al., 2008) with two mating types: A1 and A2 (Boutet et al., 2010). *Phytophthora* species generally reproduce through (a) dormant (resting) spores which can be either sexual (oospores) or asexual (chlamydospores); and (b) fruiting structures (sporangia) which contain zoospores (Erwin and Ribeiro, 1996).

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		Phytophthora ramorum produces sporangia on the surfaces of infected leaves and twigs of host plants. These sporangia can be splash-dispersed to other close or carried by wind and rain to longer distances. The sporangia germinate to produce zoospores that penetrate and initiate an infection on new hosts. In infected plant material the chlamydospores are produced and can serve as resting structures (Davidson et al., 2005; Grünwald et al., 2008). The pathogen is also able to survive in soil (Shishkoff, 2007). In the west of Scotland, it persisted in soil for at least 2 years after its hosts were removed (Elliot et al., 2013). Oospores were only observed in pairing tests under controlled laboratory conditions (Brasier and Kirk, 2004). Optimal temperatures under laboratory conditions were 16–26°C for growth, 14–26°C for chlamydospore production and 16–22°C for sporangia production (Englander et al., 2006). *Phytophthora ramorum* is mainly a foliar pathogen, however it was also reported to infect shoots, stems and occasionally roots of various host plants (Grünwald et al, 2008, Parke and Lewis, 2007). According to Brown and Brasier (2007), *P. ramorum* commonly occupies xylem beneath phloem lesions and may spread within xylem and possibly recolonize the phloem from the xylem. *Phytophthora ramorum* can remain viable within xylem for two or more years after the overlying phloem had been excised. *Phytophthora ramorum* can disperse by aerial dissemination, water, movement of infested plant material and soil containing propagules on footwear, tires of trucks and mountain bikes, or the feet of animals (Davidson et al., 2002; Brasier, 2008). Infected foliar hosts can be a major source of inoculum, which can lead to secondary infections on nearby host plants. Important foliar hosts in Europe are *Rhododendron* spp. and *Larix kaempferi* (Brasier and Webber, 2010, Grünwald et al., 2008). Possible pathways of entry for *P. ramorum* are plants for planting (excluding seed and fruit) of known susceptible hosts; plants for planting (excluding seed and fruit) of non-host plant species accompanied by contaminated attached growing media; soil/growing medium (with organic matter) as a commodity; soil as a contaminant; foliage or cut branches; seed and fruits; susceptible (isolated) bark and susceptible wood (EFSA PLH Panel, 2011). *Phytophthora ramorum* caused rapid decline of *Lithocarpus densiflorus* and *Quercus agrifolia* in forests of California and Oregon (Rizzo et al., 2005) and *Larix kaempferi* in plantations of southwest England (Brasier and Webber, 2010).
Symptoms	**Main type of symptoms**	*Phytophthora ramorum* causes different types of symptoms depending on the host species and the plant tissue infected. According to DEFRA (2008) *P. ramorum* causes three different types of disease: a. 'Ramorum bleeding canker' – cankers on trunks of trees, which emit a dark ooze. As they increase in size they can lead to tree death. b. 'Ramorum leaf blight' – infection of the foliage, leading to discoloured lesions on the leaves. c. 'Ramorum dieback' – shoot and bud infections which result in wilting, discolouration and dying back of affected parts. Symptoms on *Quercus* species are cankers of red, brown or black colour on trunk, browning of the crown, gradual leaf loss and death of trees (Davidson et al., 2003). Leaf lesions and shoot dieback can be observed on foliar hosts such as *Rhododendron*, *Viburnum*, *Pieris* and *Camellia* (Davidson et al., 2003, EPPO, online_e). On *Larix kaempferi*, *P. ramorum* causes foliage and bark infection that are visible as wilted shoot tips with blackened needles and stem lesions with resin bleeding (Braiser and Webber, 2010). Symptoms on *Lithocarpus densiflorus* are lesions on leaves, cankers on trunk, branches and twigs; shoot tip dieback, leaf flagging and formation of a Shepard's crook. The trees can die within 1 year (Davidson et al., 2003). On *Corylus cornuta*, foliar lesions have been observed, but long-term impact on plants is unknown (Rizzo, 2003). No information is available on symptoms on *Corylus avellana* in natural conditions. However, according to Sansford et al. (2009) in experimental trials of infection (inoculation on wounded wood, zoospore suspension on leaves) *P. ramorum* has shown the following symptoms on *C. avellana*: – On leaves: low proportion of leaves with necrosis, associated with low level of re-isolation; – On stems: inner bark necrosis. The range of susceptibility was between resistance (stem infection) and low-moderate (leaf infection).
	Presence of asymptomatic plants	If roots are infected by *P. ramorum*, the plants can be without aboveground symptoms for months until developmental or environmental factors trigger disease expression (Roubtsova and Bostock, 2009; Thompson et al., 2021). Application of some fungicides may reduce symptoms and therefore mask infection, making it more difficult to determine whether the plant is pathogen-free (DEFRA, 2008).
	Confusion with other pests	No other *Phytophthora* species than *P. ramorum* is known to infect *Corylus*. However, various symptoms can be confused with those of other pathogens, such as leaf lesions caused by rust in early stages; dieback of twigs and leaves caused by *Botryosphaeria dothidea*, as well as leafspots caused by sunburn (Davidson et al., 2003). *Phytophthora ramorum* can be easily distinguished from other pathogens, including *Phytophthora* species based on morphology (Grünwald et al., 2008) and molecular tests.

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Host plant range	*Phytophthora ramorum* has a very wide host range, which is expanding. Main host plants include *Camellia* spp., *Larix decidua*, *L. kaempferi*, *Pieris* spp., *Rhododendron* spp., *Syringa vulgaris*, *Viburnum* spp. and the North American trees species, *Lithocarpus densiflorus* and *Quercus agrifolia* (EPPO online_d). Further proven hosts confirmed by Koch's postulates are *Abies grandis*, *A. magnifica*, *Acer circinatum*, *A. macrophyllum*, *A. pseudoplatanus*, *Adiantum aleuticum*, *A. jordanii*, *Aesculus californica*, *A. hippocastanum*, *Arbutus menziesii*, *A. unedo*, *Arctostaphylos columbiana*, *A. glauca*, *A. hooveri*, *A. manzanita*, *A. montereyensis*, *A. morroensis*, *A. pilosula*, *A. pumila*, *A. silvicola*, *A. viridissima*, *Calluna vulgaris*, *Castanea sativa*, *Ceanothus thyrsiflorus*, *Chamaecyparis lawsoniana*, *Chrysolepis chrysophylla*, *Cinnamomum camphora*, *Corylus cornuta*, *Fagus sylvatica*, *Frangula californica*, *Frangula purshiana*, *Fraxinus excelsior*, *Gaultheria procumbens*, *G. shallon*, *Griselinia littoralis*, *Hamamelis virginiana*, *Heteromeles arbutifolia*, *Kalmia* spp., *Larix* × *eurolepis*, *Laurus nobilis*,, *Lonicera hispidula*, *Lophostemon confertus*, *Loropetalum chinense*, *Magnolia* × *loebneri*, *M. oltsopa*, *M. stellata*, *Mahonia aquifolium*, *Maianthemum racemosum*, *Parrotia persica*, *Photinia fraseri*, *Phoradendron serotinum* subsp. *macrophyllum*, *Photinia* × fraseri, *Prunus laurocerasus*, *Pseudotsuga menziesii* var. *menziesii*, *Quercus cerris*, *Q. chrysolepis*, *Q. falcata Q. ilex*, *Q. kelloggii*, *Q. parvula* var. *shrevei*, *Q. petraea*, *Q. robur*, *Rosa gymnocarpa*, *Salix caprea*, *Sequoia sempervirens*, *Taxus baccata*, *Trientalis latifolia*, *Umbellularia californica*, *Vaccinium myrtillus*, *V. ovatum*, *V. parvifolium* and *Vinca minor* (APHIS USDA, 2022; Cave et al., 2008; EPPO, online_d).
Reported evidence of impact	*Phytophthora ramorum* is EU quarantine pest.
Evidence that the commodity is a pathway	*Phytophthora ramorum* is continuously intercepted in the EU on different plant species intended for planting (EUROPHYT, online; TRACES-NT, online) and according to EFSA PLH Panel (2011), *P. ramorum* can travel with plants for planting. Therefore, plants for planting are possible pathway of entry for *P. ramorum*.
Surveillance information	*Phytophthora ramorum*: at growing sites: infested plants are destroyed, and potentially infested plants are 'held' (prohibited from moving). The UK has a containment policy in the wider environment with official action taken to remove infected trees. As part of an annual survey at ornamental retail and production sites (frequency of visits determined by a decision matrix), *P. ramorum* is inspected for on common hosts plants. An additional inspection, during the growing period, is carried out at plant passport production sites. Inspections are carried out at a survey to 300 non-woodland wider environment sites annually (Dossier Sections 1.0 and 2.0).

A.1.2 | Possibility of pest presence in the nursery

A.1.2.1 | Possibility of entry from the surrounding environment

Phytophthora ramorum is present in the UK, it has been found in most regions of the UK, but it is more often reported in wetter, western regions (Dossier Section 2.0).

The possible entry of *P. ramorum* from surrounding environment to the nurseries may occur through aerial dissemination, water, animals, machinery and footwear (Davidson et al., 2002).

Phytophthora ramorum has wide host range and can infect number of different plants. Main hosts of *P. ramorum* like *Camellia* spp., *Larix* spp., *Lithocarpus densiflorus*, *Rhododendron* spp., *Pieris* spp., *Quercus* spp., *Syringa vulgaris* and *Viburnum* spp. are present within radius of 2 km from the nurseries. Moreover, other suitable plants like *Acer pseudoplatanus, Castanea* spp., *Prunus laurocerasus* and *Taxus baccata* are also present in hedges and woodland in the surrounding areas of nurseries (Dossier Sections 1.0 and 5.1).

Uncertainties

- The dispersal range of *P. ramorum* sporangia.
- No information available on the distance of the nurseries to sources of pathogen in the surrounding environment.
- No information is provided whether machinery from outside the nursery is used inside the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nurseries from surrounding environment. In the surrounding area, suitable hosts are present and the pathogen can spread by wind, rain and infested soil propagules on feet of animals entering the nurseries.

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

The starting materials are either seeds or seedlings. Seeds are certified and coming from the UK. Seedlings are either from the UK or the EU (the Netherlands, Italy, Germany) (Dossier Section 1.0).

In addition to *Corylus avellana* plants, the nurseries also produce other plants (Dossier Section 3.0). Out of them, there are many suitable hosts for the pathogen (such as *Abies* spp., *Acer* spp., *Aesculus* spp., *Arbutus* spp., *Calluna* spp., *Castanea* spp., *Fagus* spp., *Larix* spp., *Quercus* spp., *Viburnum* spp., etc.). However, there is no information on how and where the plants are produced. Therefore, if the plants are first produced in another nursery, the pathogen could possibly travel with them.

The nurseries are using virgin peat or peat-free compost (a mixture of coir, tree bark, wood fibre, etc.) as a growing media (Dossier Section 1.0). *Phytophthora ramorum* is able to survive in soil (Shishkoff, 2007) and therefore could potentially enter with infested soil/growing media. However, the growing media is certified and heat-treated by commercial suppliers during production to eliminate pests and diseases (Dossier Section 1.0).

Uncertainties

– No information is available on the provenance of new plants used for plant production in the area of the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nurseries with new seedlings of *Corylus avellana* and new plants of other species used for plant production in the area. The entry of the pathogen with seeds and the growing media the Panel considers as not possible.

A.1.2.3 | Possibility of spread within the nursery

Corylus avellana plants are either grown in containers (cells, pots, tubes, etc.) or in field. Cell grown trees may be grown in greenhouses, however most plants will be field grown, or field grown in containers (Dossier Section 1.0). There are no mother plants present in the nurseries (Dossier Section 1.0).

The pathogen can infect other suitable plants (such as *Abies* spp., *Aesculus* spp., *Castanea* spp., *Larix* spp., *Fagus* spp., *Quercus* spp., etc.) present within the nurseries and hedges surrounding the nurseries (*Prunus* spp.) (Dossier Sections 1.0 and 3.0).

Phytophthora ramorum can spread within the nurseries by aerial dissemination, soil, water, movement of infested plant material, machinery, footwear and animals (Davidson et al., 2002).

Uncertainties

– None.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pathogen within the nurseries is possible either by aerial dissemination, animals, movement of infested plant material, soil and water.

A.1.3 | Information from interceptions

In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting neither from the UK nor from other countries due to the presence of *P. ramorum* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, 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 *Phytophthora ramorum* is provided. The description of the risk mitigation measures currently applied in the UK is provided in the Table 6.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	*Phytophthora ramorum* is a quarantine organism in the UK and targeted by this measure. Uncertainties – Whether disease symptoms on *C. avellana* and potential other host plants are recognisable, particularly at an early stage of infection.
2	Physical separation	No	Not relevant
3	Certified plant material	Yes	*Phytophthora ramorum* is a quarantine organism in the UK and targeted by this measure. Uncertainties: – Whether disease symptoms on *C. avellana* and other potential host plants are recognisable, particularly at an early stage of infection.
4	Growing media	Yes	This measure should ensure pest-free growing media and is expected to prevent the introduction of the pathogen into the nurseries with growing media. Uncertainties: – None
5	Surveillance, monitoring and sampling	Yes	This measure has an effect as the pathogen would be detected on nursery-grown plants, as well as on incoming plant material and growing media, and suspected plant material quarantined. Uncertainties: – Whether disease symptoms on *C. avellana* and other potential host plants are recognisable, particularly at an early stage of infection.
6	Hygiene measures	Yes	General hygiene measures will reduce the likelihood of the pathogen being spread by tools and equipment, although this is not a major pathway for the pest. Uncertainties: – None

(Continues)

(Continued)

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
7	Removal of infested plant material	Yes	This measure could have some effect by removing potentially infested plant material, thus reducing the spread of the pathogen within the nursery. Uncertainties: – None
8	Irrigation water	Yes	Testing of irrigation water would detect the pathogen, which can spread by water. Overhead irrigation could favour foliar infections and spread of the pathogen by water splash. Uncertainties: – Whether irrigation water is tested for *P. ramorum*.
9	Application of pest control products	Yes	Some fungicides could reduce the likelihood of foliar infection by the pathogen. Uncertainties: – No specific information on the fungicides used. – The level of efficacy of fungicides in reducing infection of *P. ramorum*. – The level to which the application of fungicides could suppress symptoms.
10	Measures against soil pests	Yes	This measure could have some effect by preventing root contact with soil where the pathogen may be present. Uncertainties: – None
11	Inspections and management of plants before export	Yes	*Phytophthora ramorum* is a quarantine organism in the UK and the EU and this measure is expected to reduce the likelihood of infested plants being exported. Uncertainties: – Whether disease symptoms on *C. avellana* are recognisable, particularly at an early stage of infection.
12	Separation during transport to the destination	No	Not relevant

A.1.5 | Overall likelihood of pest freedom for bundles of whips and transplants

A.1.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infected bundles of whips and transplants

The scenario assumes a low pressure of the pathogen in the nurseries and in the surroundings. The plants are exposed to the pathogen for only short period of time and are exported without leaves. The scenario assumes *C. avellana* to be poorly susceptible to the pathogen. The scenario also assumes that symptoms of the disease are visible and promptly detected during inspections.

A.1.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infected bundles of whips and transplants

The scenario assumes a high pressure of the pathogen in the nurseries and in the surroundings as suitable hosts are present. The scenario assumes that the pathogen infects leaves, which may still be present on the plants at the time of export. The scenario also assumes that *C. avellana* exhibit some susceptibility to the pathogen and that symptoms of the disease are not easily recognisable during inspections.

A.1.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infected bundles of whips and transplants (Median)

The scenario assumes a limited presence of the pathogen in the nurseries and the surroundings, and a low susceptibility of *C. avellana*. The pathogen is a regulated quarantine pest in the UK and under official control.

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

The limited information on the susceptibility of *C. avellana* and on the occurrence of the pathogen in the nurseries and the surroundings results in high level of uncertainties for infestation rates below the median. Otherwise, the pest pressure from the surroundings is expected to be low giving less uncertainties for rates above the median.

A.1.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Phytophthora ramorum* on bundles of whips and transplants

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

TABLE A.1 Elicited and fitted values of the uncertainty distribution of pest infection by *Phytophthora ramorum* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					7		13		25					50
EKE	0.297	0.699	1.34	2.60	4.30	6.47	8.76	13.9	20.3	24.2	29.2	34.6	40.5	45.3	50.1

The EKE results is the BetaGeneral(1.0797, 3.1052, 0, 64) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infected bundles the pest freedom was calculated (i.e. = 10,000 – number of infected bundles 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 bundles free of *Phytophthora ramorum* per 10,000 bundles calculated by Table A.1.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9950					9975		9987		9993					10,000
EKE results	9950	9955	9959	9965	9971	9976	9980	9986	9991	9994	9996	9997	9998.7	9999.3	9999.7

The EKE results are the fitted values.

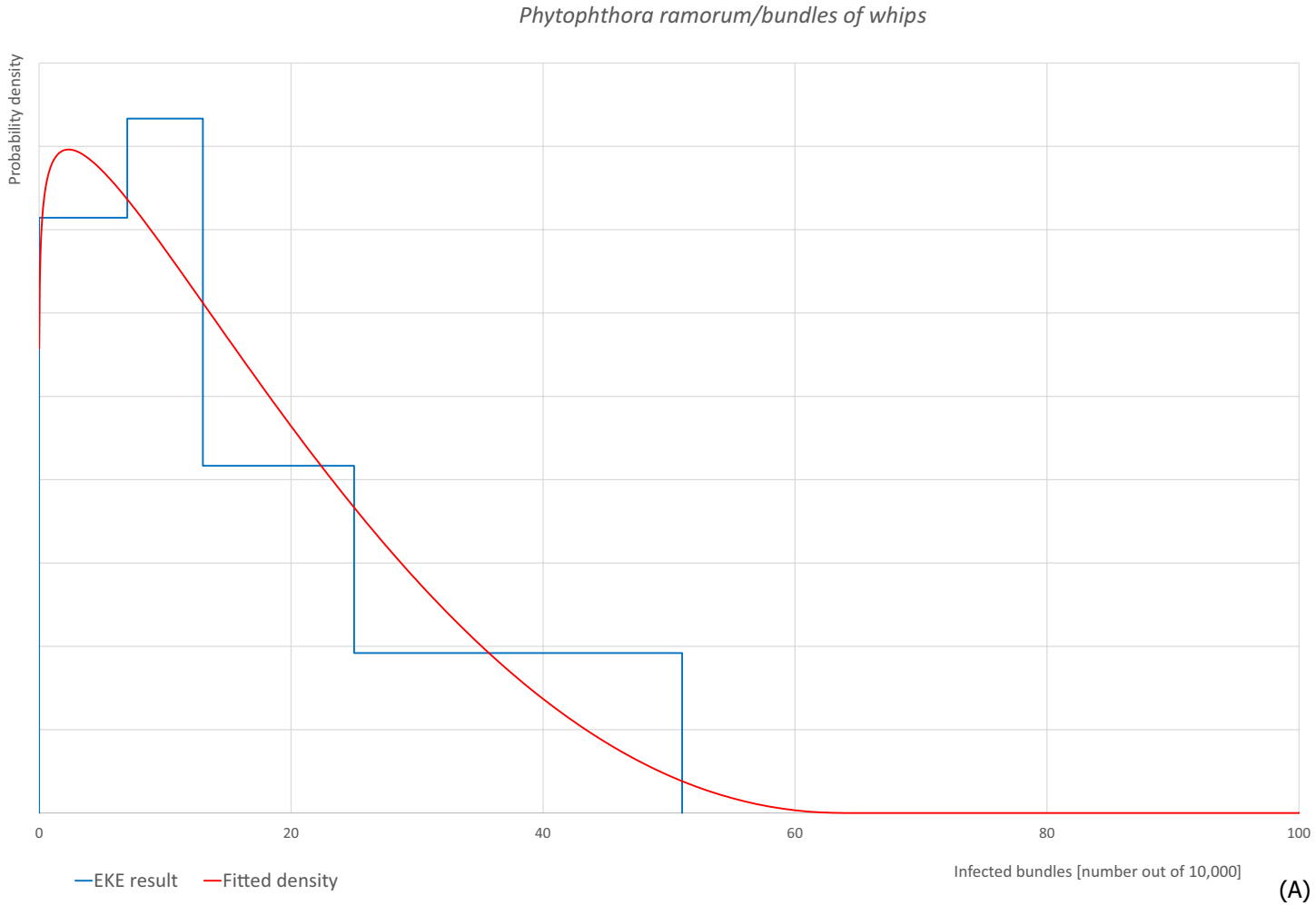

FIGURE A.1 (Continued)

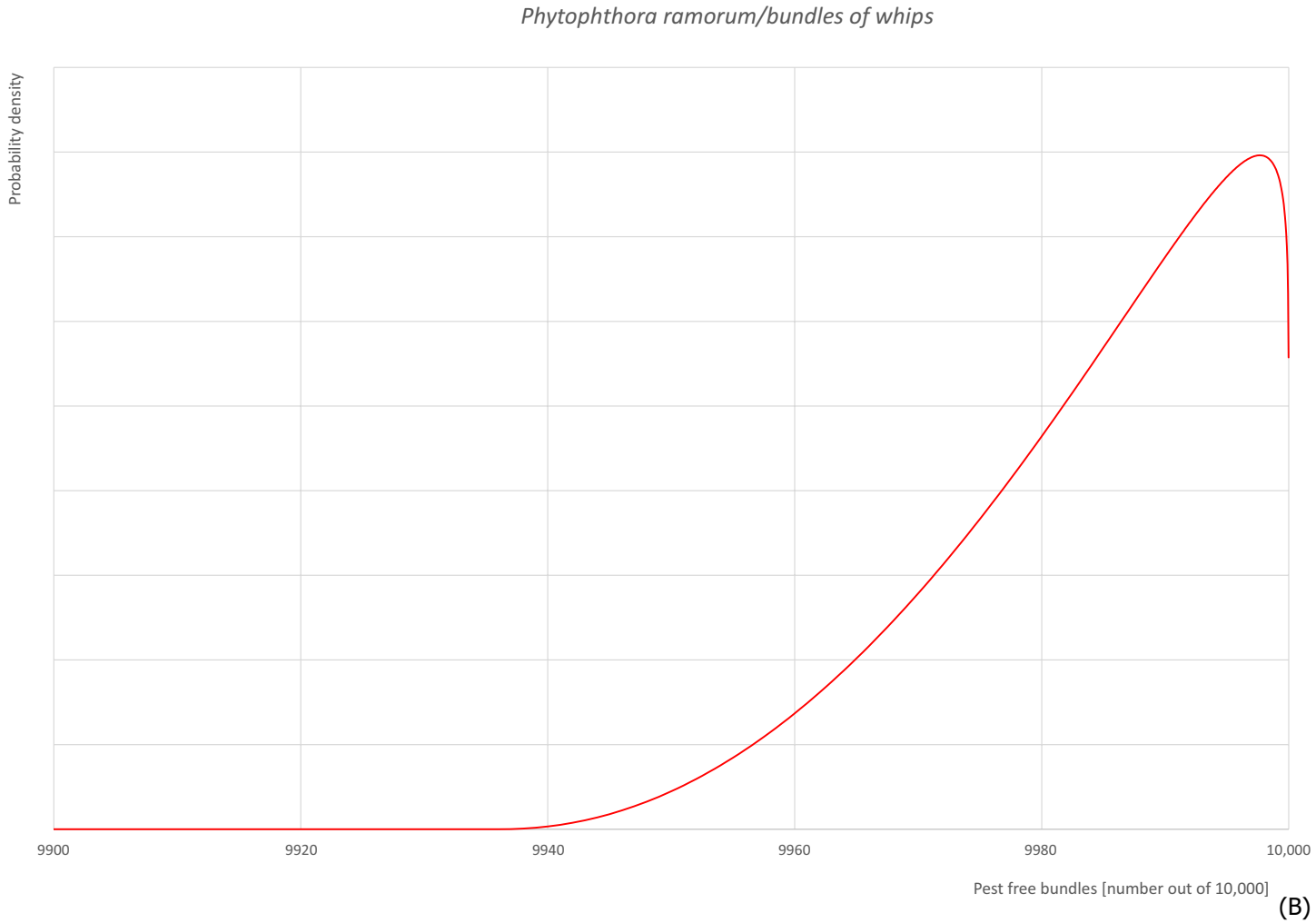

FIGURE A.1 (Continued)

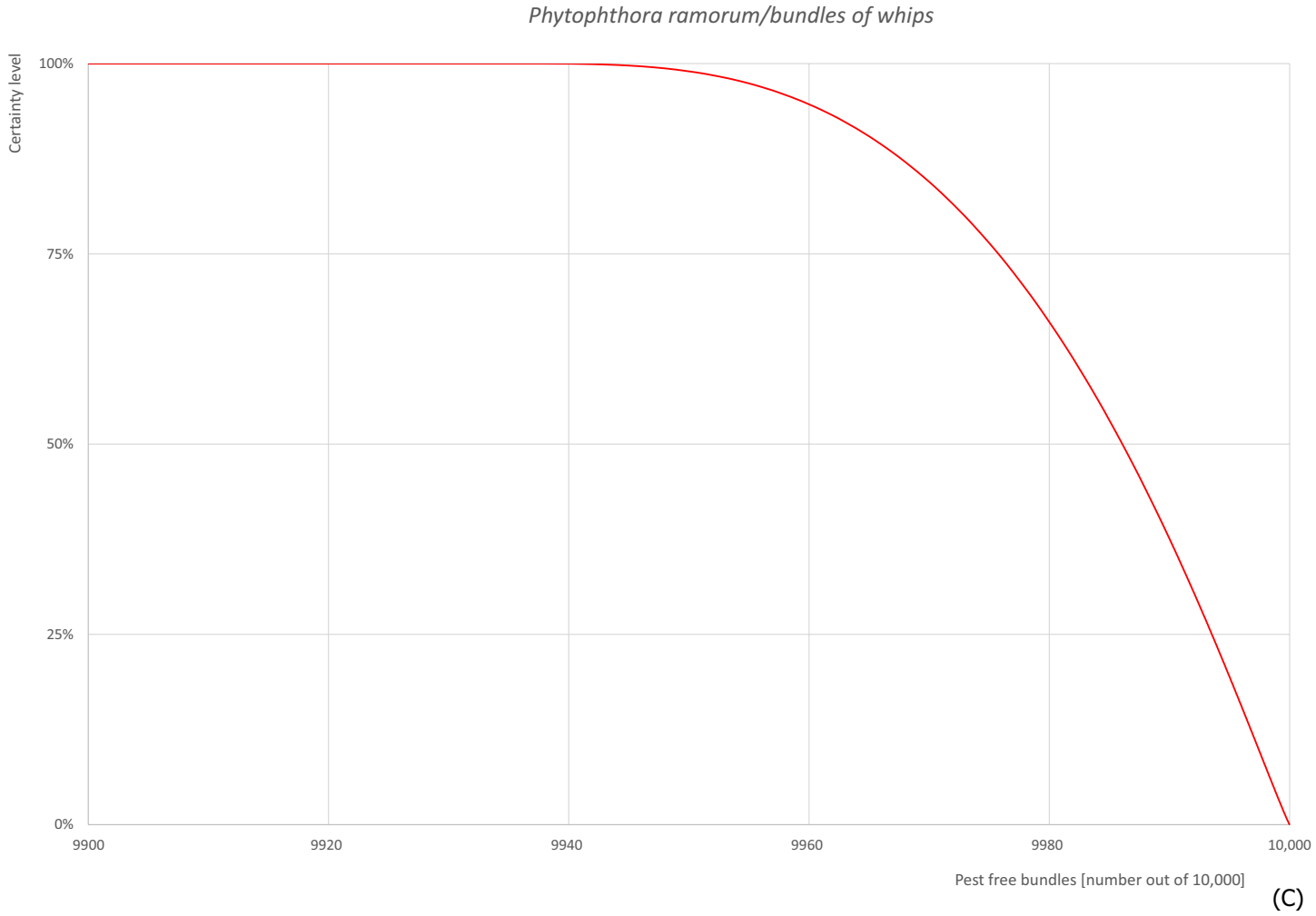

FIGURE A.1 (A) Elicited uncertainty of pest infection per 10,000 bundles (histogram in blfue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free bundles per 10,000 (i.e. = 1 – pest infection proportion expressed as percentage); (C) descending uncertainty distribution function of pest infection per 10,000 bundles.

A.1.6 | Overall likelihood of pest freedom for bundles of cell grown plants

A.1.6.1 | Reasoning for a scenario which would lead to a reasonably low number of infected bundles of cell grown plants

The scenario assumes a low pressure of the pathogen in the nurseries and in the surroundings. The plants are exposed to the pathogen for only short period of time and are exported without leaves. The scenario assumes *C. avellana* to be poorly susceptible to the pathogen. The scenario also assumes that symptoms of the disease are visible and promptly detected during inspections.

A.1.6.2 | Reasoning for a scenario which would lead to a reasonably high number of infected bundles of cell grown plants

The scenario assumes a high pressure of the pathogen in the nurseries and in the surroundings as suitable hosts are present. The scenario assumes that the pathogen infects leaves, which may still be present on the plants at the time of export. The scenario also assumes that *C. avellana* exhibit some susceptibility to the pathogen and that symptoms of the disease are not easily recognisable during inspections.

A.1.6.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infected bundles of cell grown plants (Median)

The scenario assumes a limited presence of the pathogen in the nurseries and the surroundings, and a low susceptibility of *C. avellana*. The pathogen is a regulated quarantine pest in the UK and under official control.

A.1.6.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The limited information on the susceptibility of *C. avellana* and on the occurrence of the pathogen in the nurseries and the surroundings results in high level of uncertainties for infestation rates below the median. Otherwise, the pest pressure from the surroundings is expected to be low giving less uncertainties for rates above the median.

A.1.6.5 | Elicitation outcomes of the assessment of the pest freedom for *Phytophthora ramorum* on bundles of cell grown plants

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

TABLE A.3 Elicited and fitted values of the uncertainty distribution of pest infection by *Phytophthora ramorum* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					5		10		20					35
EKE	0.105	0.303	0.677	1.52	2.79	4.53	6.44	10.8	16.2	19.4	23.1	26.9	30.5	32.9	35.0

The EKE results is the BetaGeneral (0.86632, 1.7393, 0, 38) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infected bundles the pest freedom was calculated (i.e. = 10,000 – number of infected bundles 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 *Phytophthora ramorum* per 10,000 bundles calculated by Table A.3.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9965					9980		9990		9995					10,000
EKE results	9965	9967	9970	9973	9977	9981	9984	9989	9994	9995	9997	9998	9999.3	9999.7	9999.9

The EKE results are the fitted values.

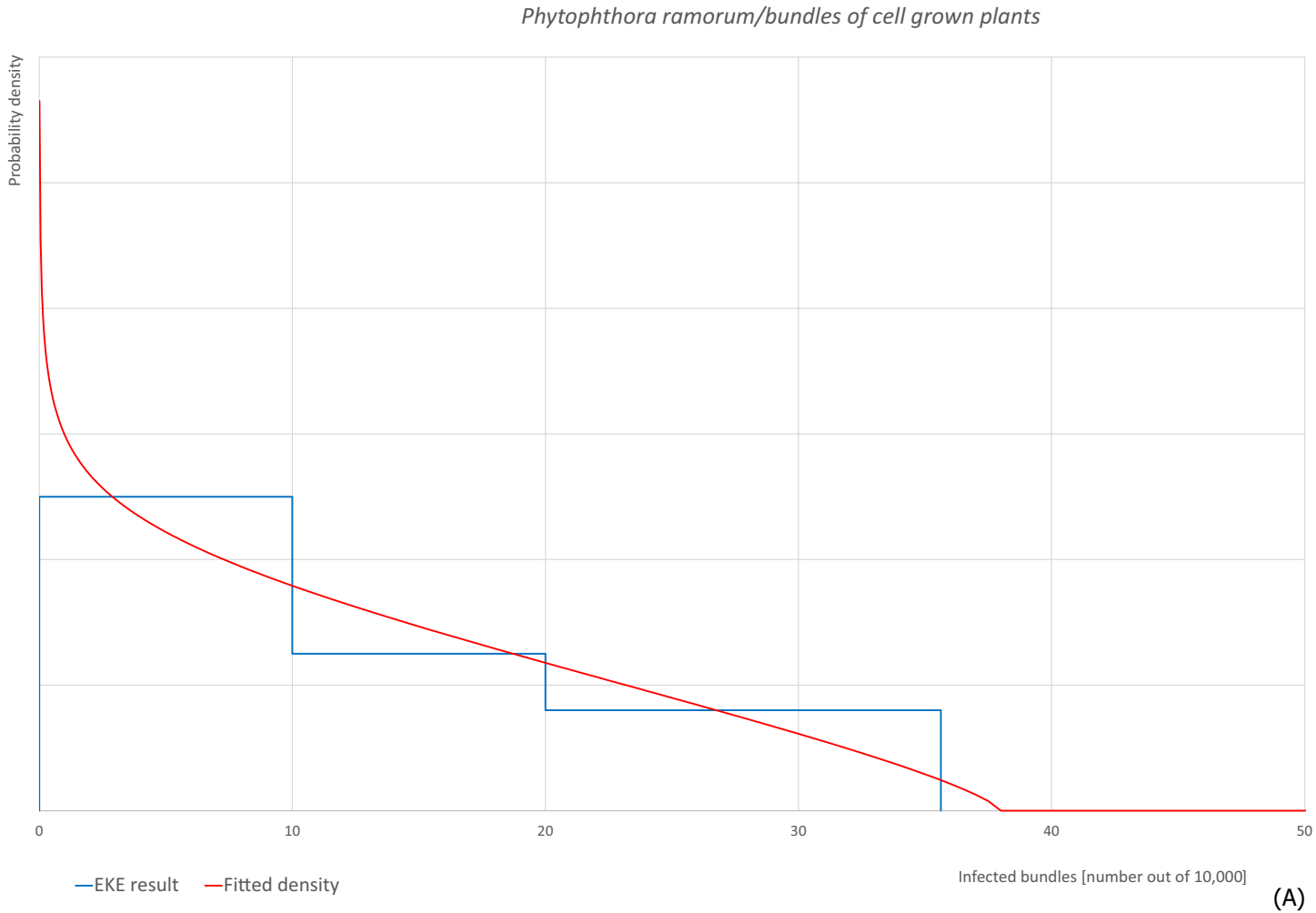

FIGURE A.2 (Continued)

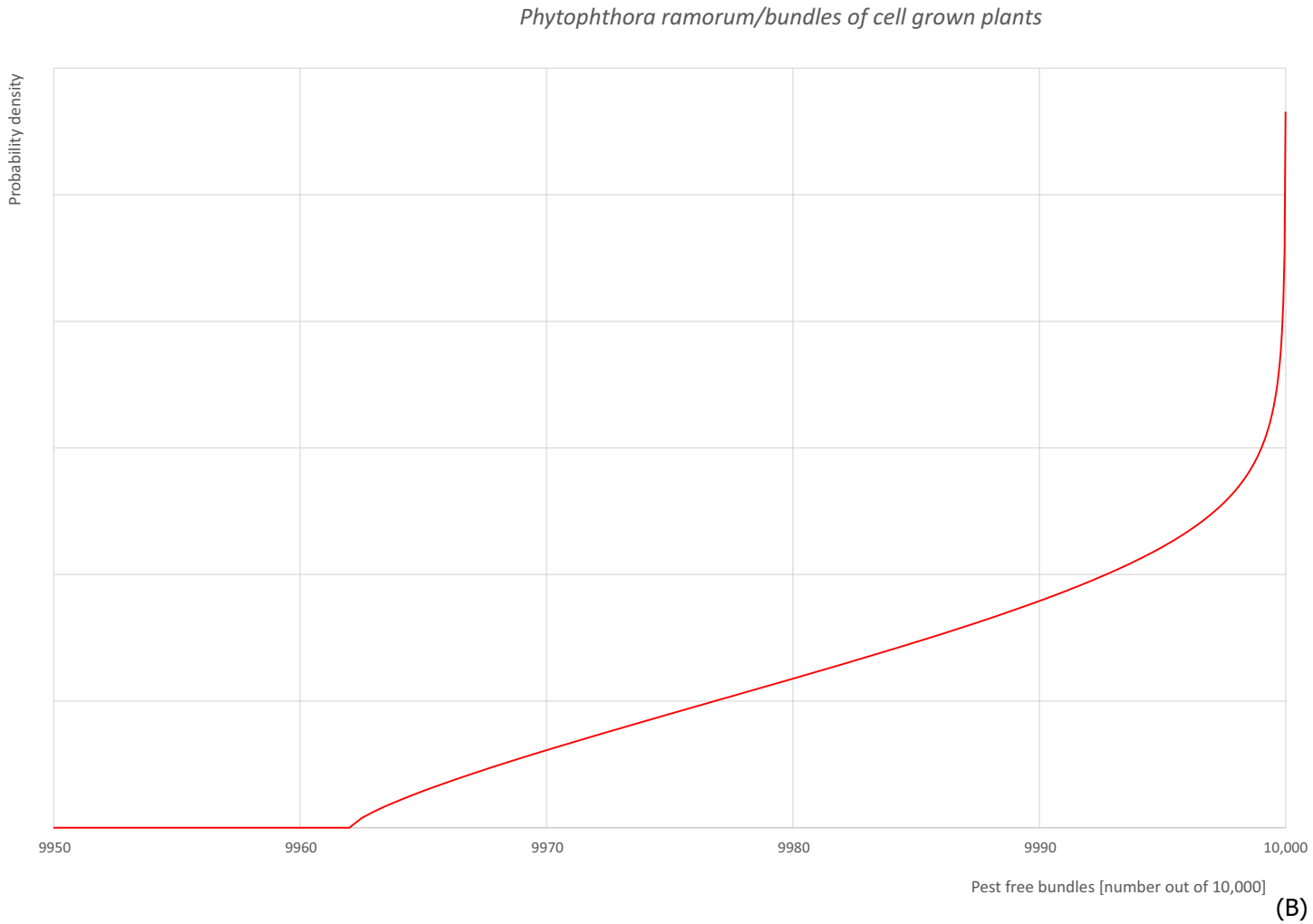

FIGURE A.2 (Continued)

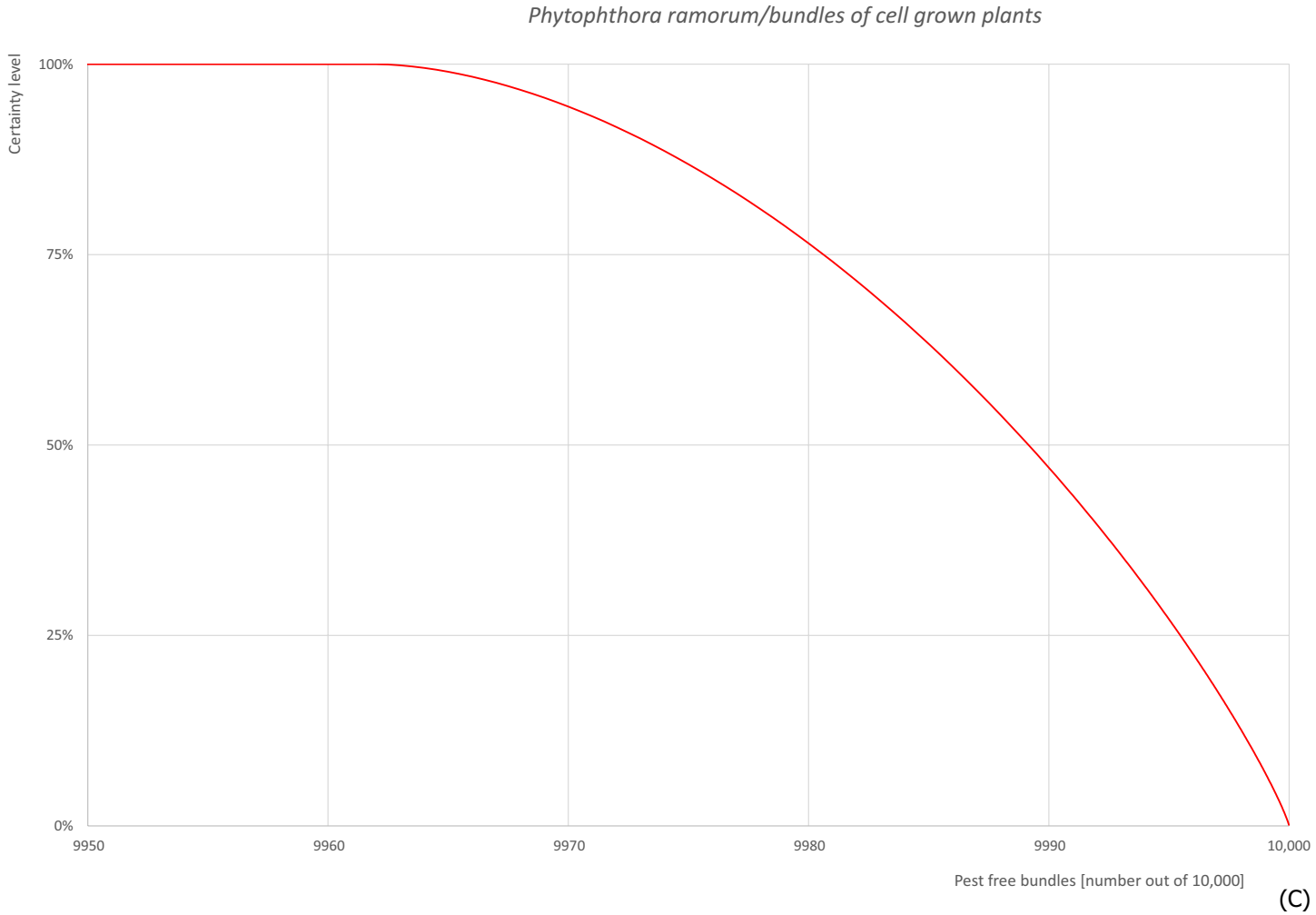

FIGURE A.2 (A) Elicited uncertainty of pest infection per 10,000 bundles (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free bundles per 10,000 (i.e. = 1 – pest infection proportion expressed as percentage); (C) descending uncertainty distribution function of pest infection per 10,000 bundles.

A.1.7 | Overall likelihood of pest freedom for bare root plants

A.1.7.1 | Reasoning for a scenario which would lead to a reasonably low number of infected bare root plants

The scenario assumes a low pressure of the pathogen in the nurseries and in the surroundings. Younger plants are exposed to the pathogen for only short period of time and are exported without leaves. The scenario assumes *C. avellana* to be poorly susceptible to the pathogen. The scenario also assumes that symptoms of the disease are visible and promptly detected during inspections.

A.1.7.2 | Reasoning for a scenario which would lead to a reasonably high number of infected bare root plants

The scenario assumes a high pressure of the pathogen in the nurseries and in the surroundings as suitable hosts are present. The scenario assumes that the pathogen infects leaves, which may still be present on the plants at the time of export. Older trees are more likely to become infected due to longer exposure time and larger size. The scenario also assumes that *C. avellana* exhibit some susceptibility to the pathogen and that symptoms of the disease are not easily recognisable during inspections.

A.1.7.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infected bare root plants (Median)

The scenario assumes a limited presence of the pathogen in the nurseries and the surroundings, and a low susceptibility of *C. avellana*. The pathogen is a regulated quarantine pest in the UK and under official control.

A.1.7.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The limited information on the susceptibility of *C. avellana* and the occurrence of the pathogen in the nurseries and the surroundings results in high level of uncertainties for infestation rates below the median. Otherwise, the pest pressure from the surroundings is expected to be low giving less uncertainties for rates above the median.

A.1.7.5 | Elicitation outcomes of the assessment of the pest freedom for *Phytophthora ramorum* on bare root plants

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

TABLE A.5 Elicited and fitted values of the uncertainty distribution of pest infection by *Phytophthora ramorum* per 10,000 plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					7		15		30					60
EKE	0.163	0.459	1.01	2.23	4.05	6.56	9.33	15.9	24.1	29.3	35.6	42.4	49.6	55.0	60.1

The EKE results is the BetaGeneral(0.88692, 2.3637, 0, 71) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infected plants the pest freedom was calculated (i.e. = 10,000 – number of infected plants 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 *Phytophthora ramorum* per 10,000 plants calculated by Table A.5.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9940					9970		9985		9993					10,000
EKE results	9940	9945	9950	9958	9964	9971	9976	9984	9991	9993	9996	9998	9999.0	9999.5	9999.8

The EKE results are the fitted values.

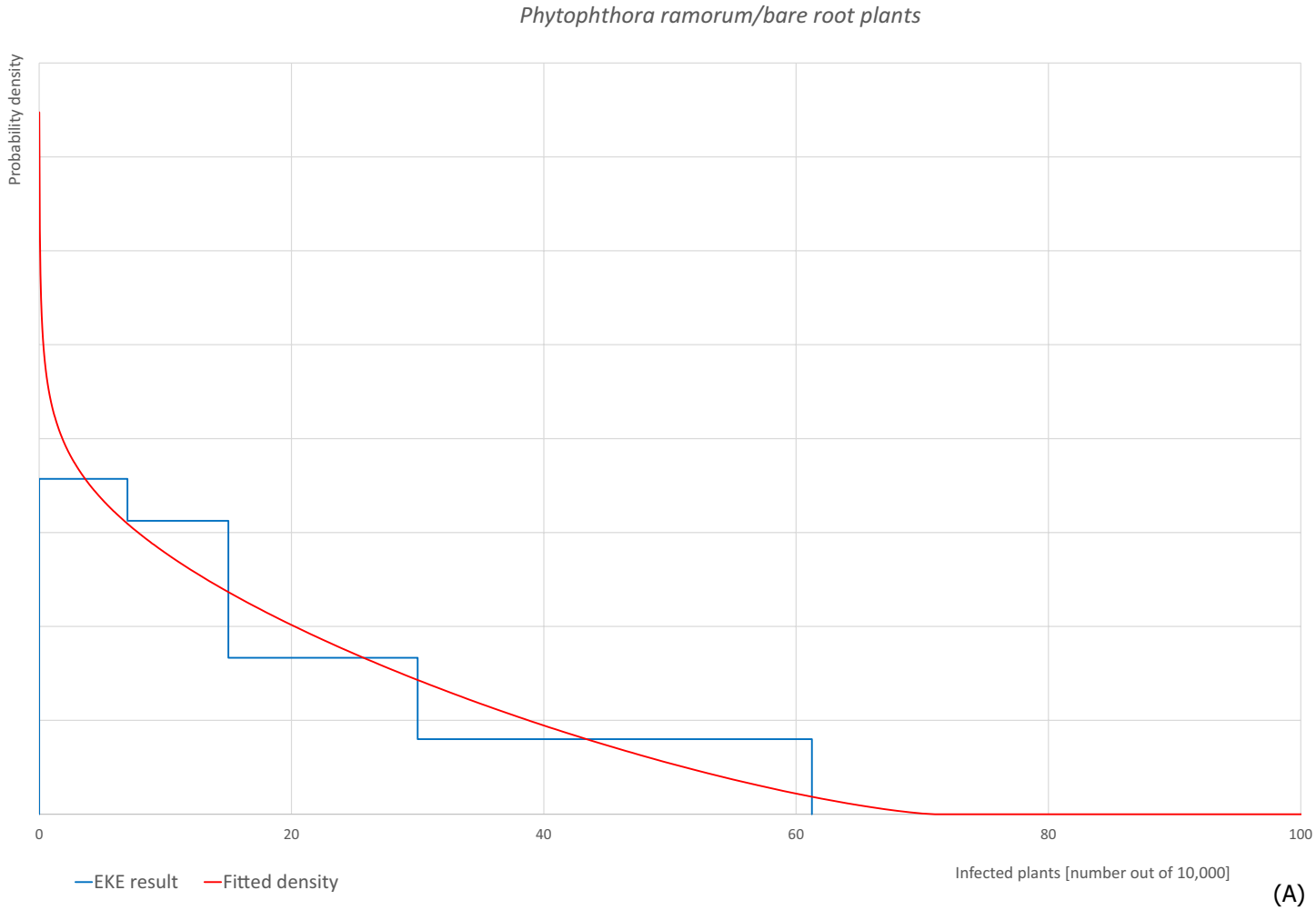

FIGURE A.3 (Continued)

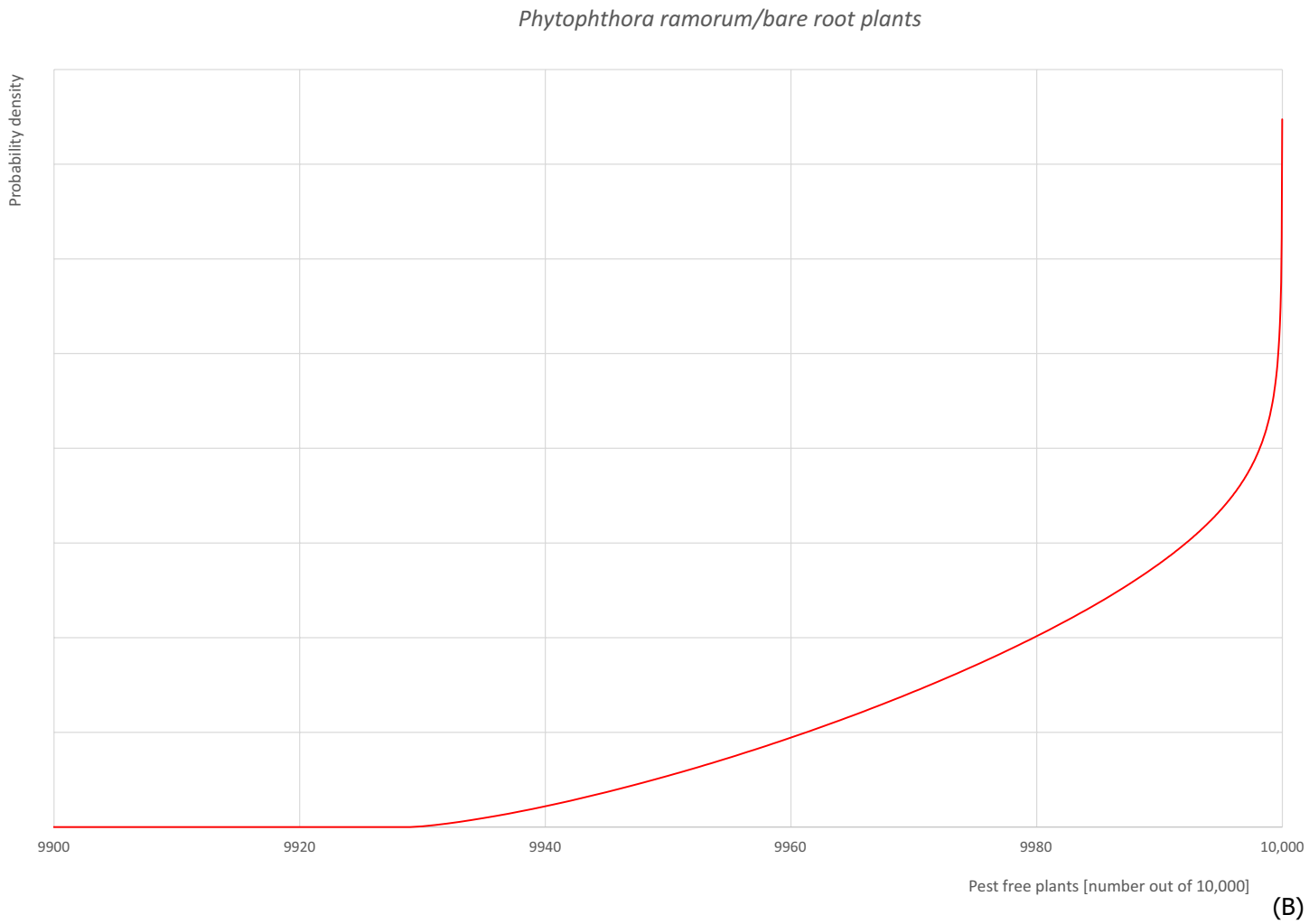

FIGURE A.3 (Continued)

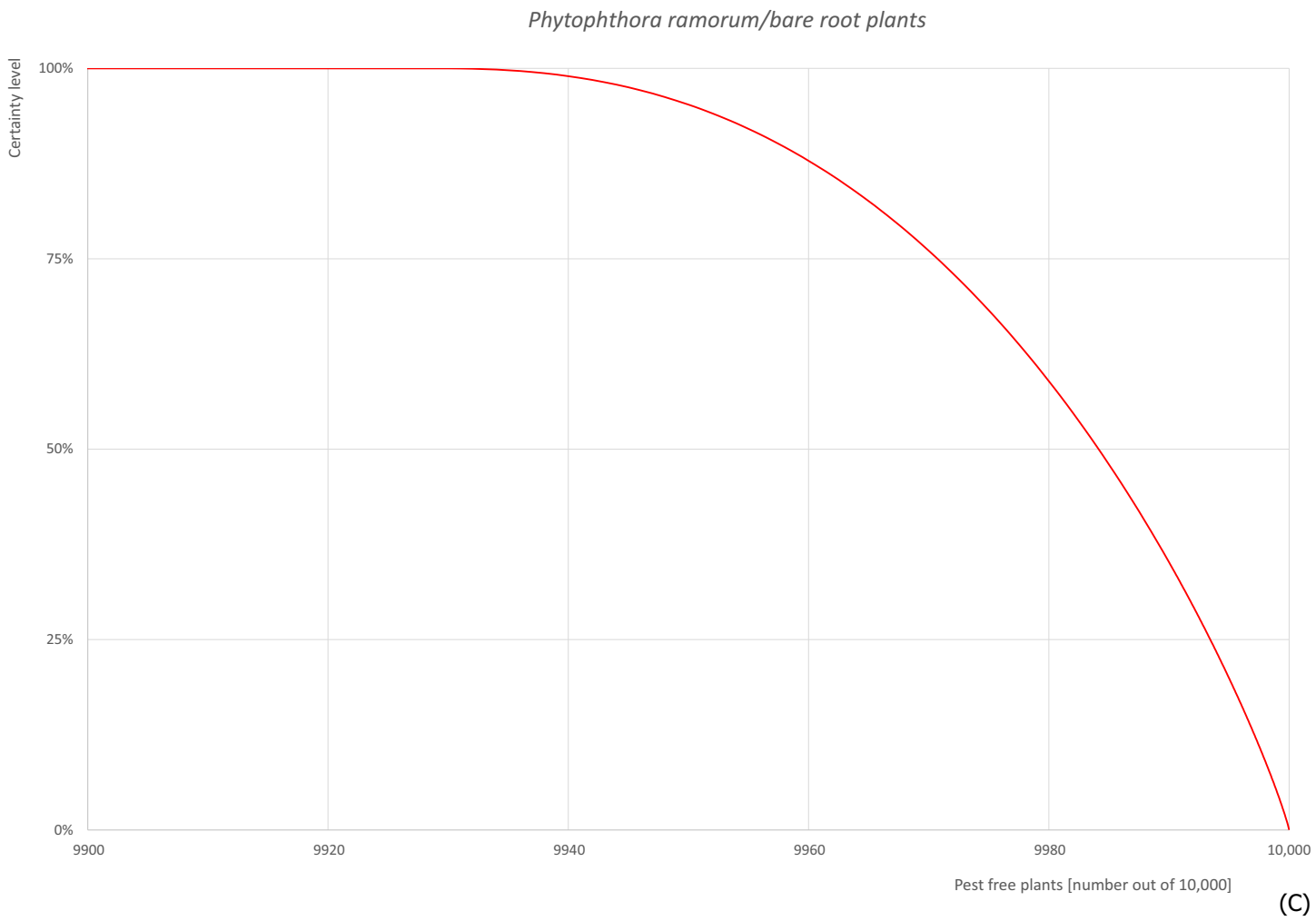

FIGURE A.3 (A) Elicited uncertainty of pest infection per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free plants per 10,000 (i.e. =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

A.1.8 | Overall likelihood of pest freedom for plants in pots

A.1.8.1 | Reasoning for a scenario which would lead to a reasonably low number of infected plants in pots

The scenario assumes a low pressure of the pathogen in the nurseries and in the surroundings. Younger plants are exposed to the pathogen for only short period of time and are exported without leaves. The scenario assumes *C. avellana* to be poorly susceptible to the pathogen. The scenario also assumes that symptoms of the disease are visible and promptly detected during inspections.

A.1.8.2 | Reasoning for a scenario which would lead to a reasonably high number of infected plants in pots

The scenario assumes a high pressure of the pathogen in the nurseries and in the surroundings as suitable hosts are present. The scenario assumes that the pathogen infects leaves, which may still be present on the plants at the time of export. Older trees are more likely to become infected due to longer exposure time and larger size. The scenario also assumes that *C. avellana* exhibit some susceptibility to the pathogen and that symptoms of the disease are not easily recognisable during inspections.

A.1.8.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infected plants in pots (Median)

The scenario assumes a limited presence of the pathogen in the nurseries and the surroundings, and a low susceptibility of *C. avellana*. The pathogen is a regulated quarantine pest in the UK and under official control.

A.1.8.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The limited information on the susceptibility of *C. avellana* and the occurrence of the pathogen in the nurseries and the surroundings results in high level of uncertainties for infestation rates below the median. Otherwise, the pest pressure from the surroundings is expected to be low giving less uncertainties for rates above the median.

A.1.8.5 | Elicitation outcomes of the assessment of the pest freedom for *Phytophthora ramorum* on plants in pots

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

TABLE A.7 Elicited and fitted values of the uncertainty distribution of pest infection by *Phytophthora ramorum* per 10,000 plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					10		20		35					80
EKE	0.660	1.38	2.45	4.38	6.85	9.91	13.1	20.2	29.1	34.8	42.2	50.8	61.0	69.9	80.1

The EKE results is the BetaGeneral (1.2545, 5.8329, 0, 138) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infected plants the pest freedom was calculated (i.e. = 10,000 – number of infected plants 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 *Phytophthora ramorum* per 10,000 plants calculated by Table A.7.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9920					9965		9980		9990					10,000
EKE results	9920	9930	9939	9949	9958	9965	9971	9980	9987	9990	9993	9996	9997.6	9998.6	9999.3

The EKE results are the fitted values.

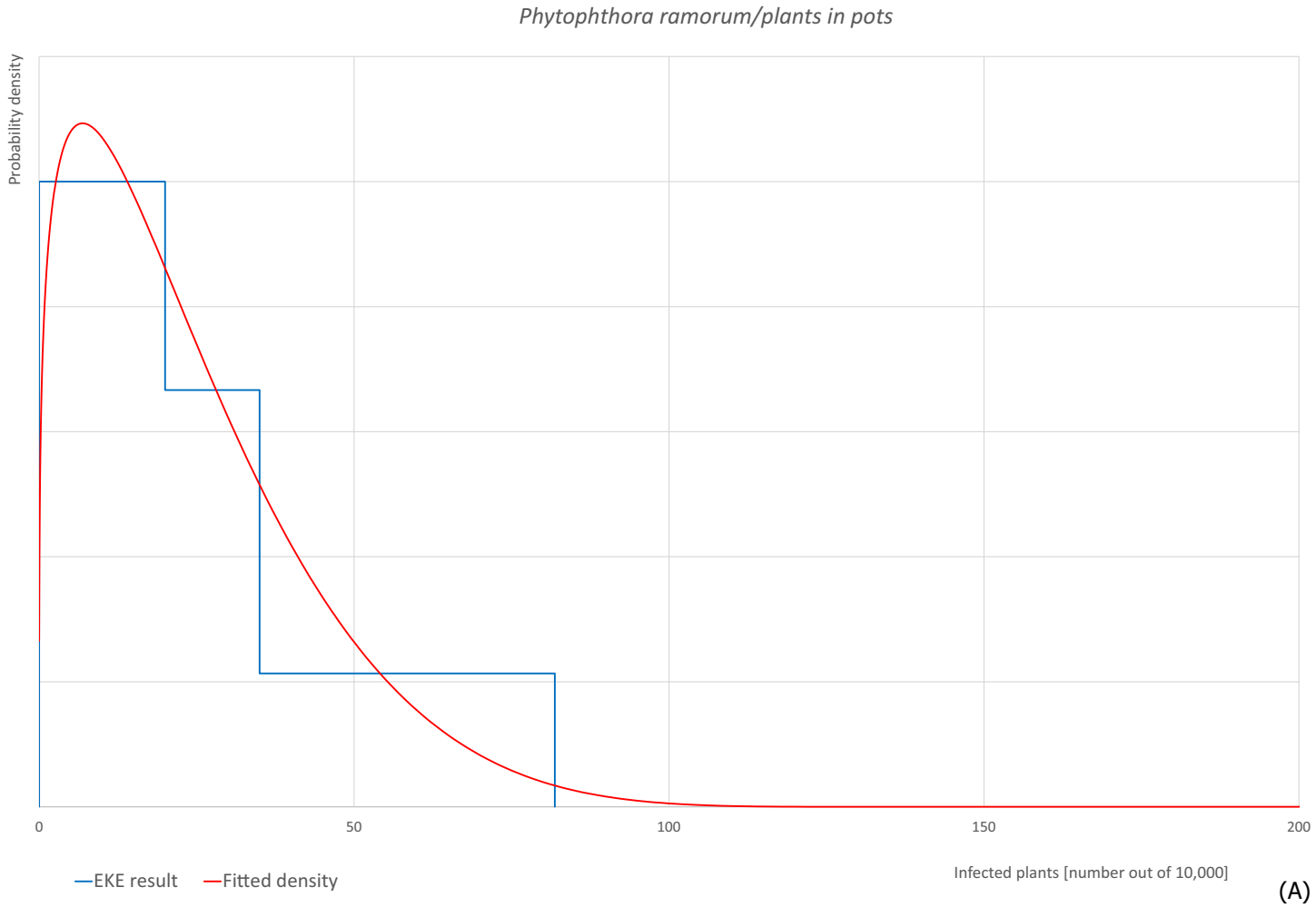

FIGURE A.4 (Continued)

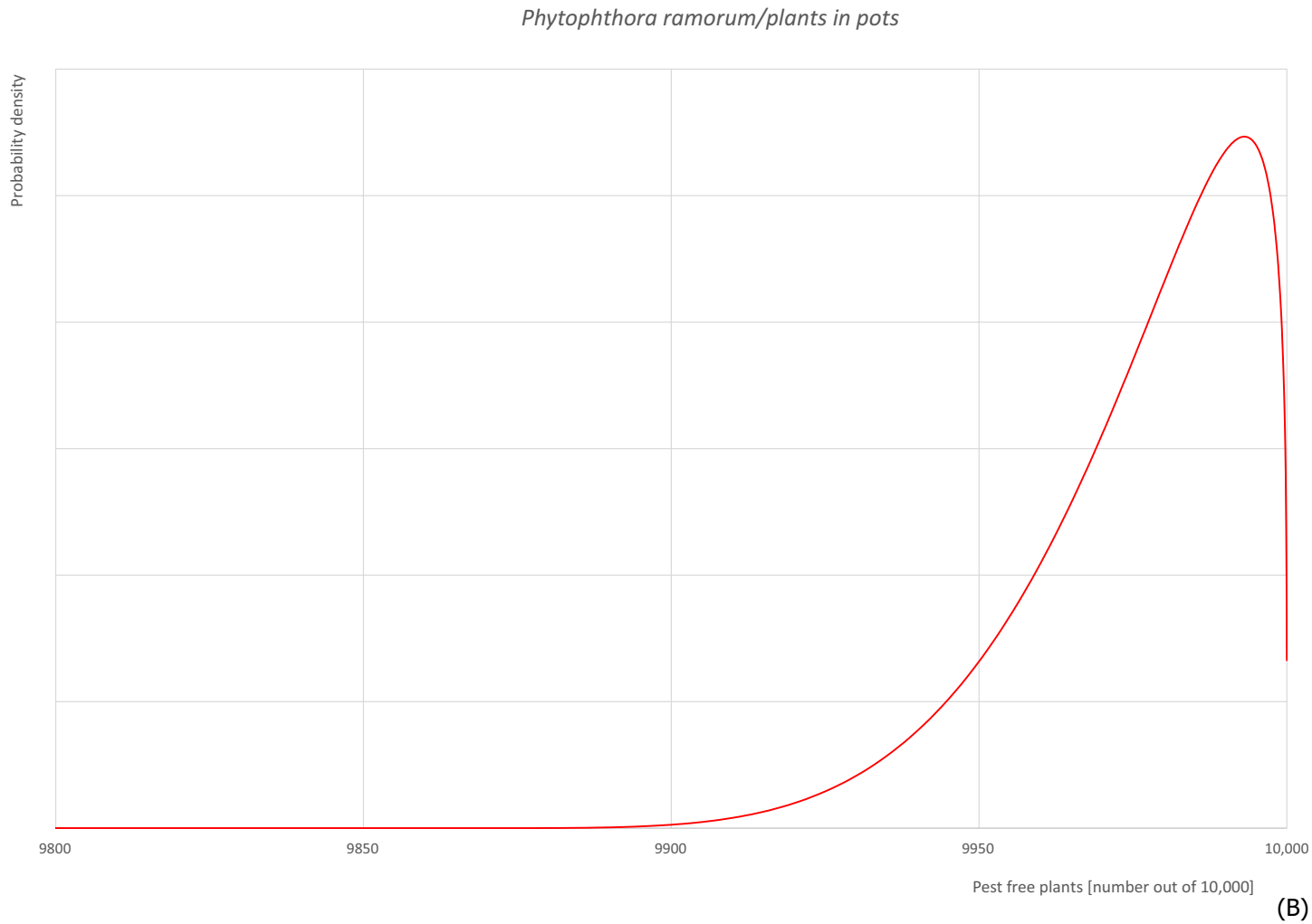

FIGURE A.4 (Continued)

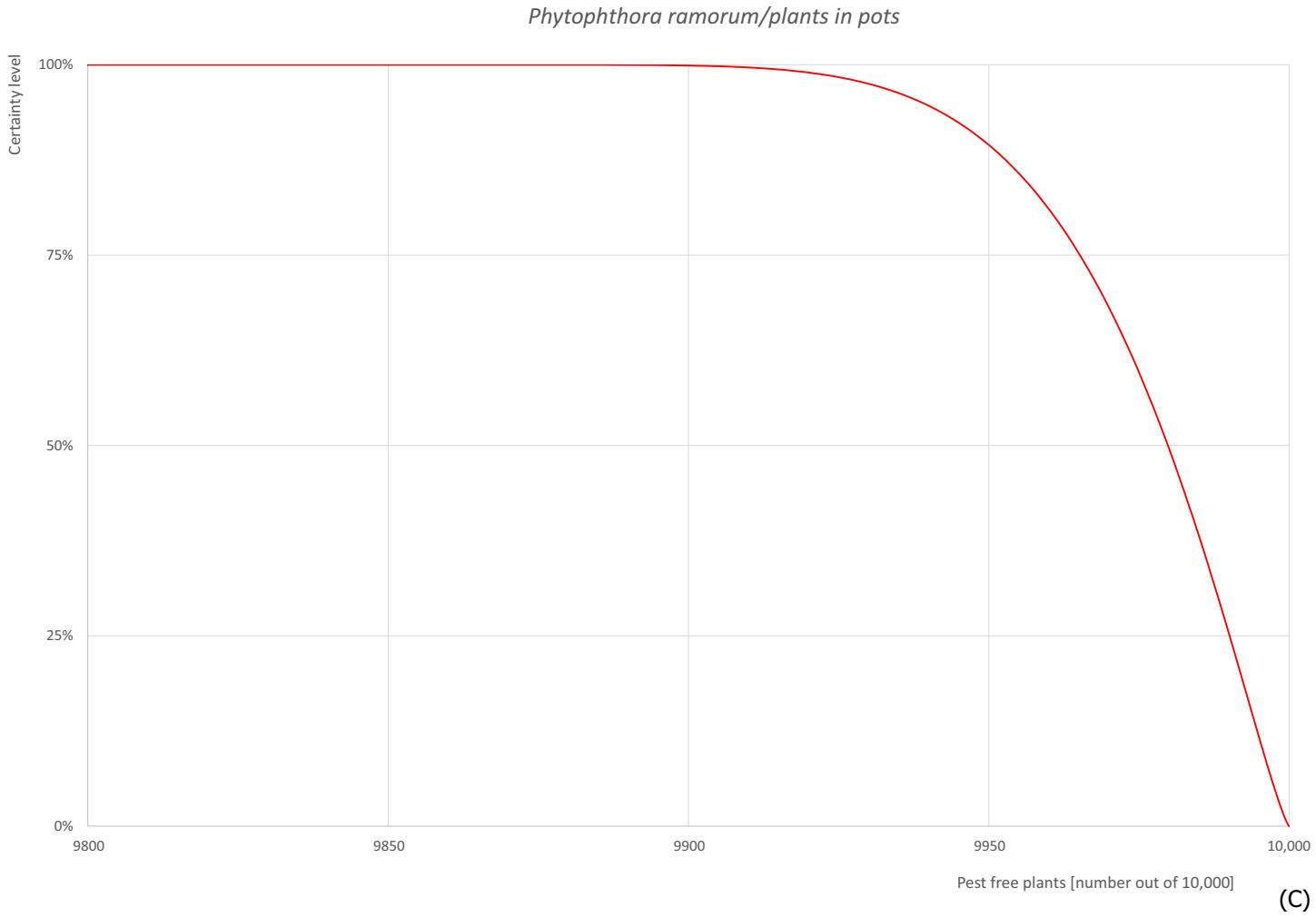

FIGURE A.4 (A) Elicited uncertainty of pest infection per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free plants per 10,000 (i.e. =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

A.1.9 | Reference list

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A.2 | *Thaumetopoea processionea*

A.2.1 | Organism information

Taxonomic information	Current valid scientific name: *Thaumetopoea processionea* Synonyms: *Cnethocampa processionea, Traumatocampa processionea* Name used in the EU legislation: *Thaumetopoea processionea* Order: Lepidoptera Family: Notodontidae Common name: Oak processionary moth (OPM), oak processionary caterpillar Name used in the Dossier: *Thaumetopoea processionea*
Group	Insects
EPPO code	THAUPR
Regulated status	*Thaumetopoea processionea* is listed in the Annex III of Regulation (EU) 2019/2072 as protected zone quarantine pest for Ireland. It is protected zone quarantine pest in the UK, and included in A1 lists for Argentina and Türkiye (EPPO, online_a). The Panel noted that the species is native to Türkiye (Groenen and Meurisse, 2012).
Pest status in the UK	*Thaumetopoea processionea* is established in the UK since 2006. It is a species under official control, currently found in the London area and in the Southeast of England (EPPO, online_b). According to the Dossier Section 5.2 *T. processionea* is present in Great Britain, except in specified pest-free areas. In North Ireland the pest is under eradication after a recent outbreak in 2023. In 2022, the *T. processionea* was found in Jersey (Channel Islands) where it is currently under eradication (EPPO, online_c). According to Suprunenko et al. (2022) the eradication of *T. processionea* from the UK territory is 'no longer considered a feasible option'.
Pest status in the EU	*Thaumetopoea processionea* is a native European species reported to be present in 22 EU member states; it is absent from Estonia, Finland, Latvia, Lithuania and Malta (EPPO, online_b; GBIF, online; de Jong et al., online). It was introduced in Ireland in 2020 and eradicated in 2021. In June 2023 the NPPO of Ireland has newly detected the pest in the municipality of Castleknock and eradication measures have been immediately applied. The current pest status for Ireland declared by NPPO is 'under determination' whereas the current pest situation evaluated by EPPO is transient (EPPO, online_b). According to Groenen and Meurisse (2012) the discontinuous occurrence of *T. processionea* in central-northern Europe in the last two centuries, and its recent massive reappearance in north-western Europe, are due to long-term population fluctuations rather than range expansion.
Host status on *Corylus avellana*	No information was found on whether *Corylus avellana* is a host for *T. processionea*. Only '*Corylus'* is reported as host by Evans (2008) and CABI (online); however, no references are given to support this information (Baker, 2009; Mirchev et al., 2011). Stigter et al. (1997) do not mention *Corylus* in the list of secondary hosts (*Acacia, Betula, Crataegus, Fagus* and *Sorbus)* of *T. processionea* in the Netherlands.
PRA information	Available Pest Risk Assessment: – Oak processionary moth Pest Risk Analysis (Evans, 2008); – Evaluation of a pest risk analysis on *Thaumetopoea processionea* L., the oak processionary moth, prepared by the UK and extension of its scope to the EU territory (Baker et al., 2009); – Scientific opinion on commodity risk assessment of *Fagus sylvatica* plants from the UK (EFSA PLH Panel, 2023a); – Scientific Opinion on the commodity risk assessment of *Quercus petraea* plants from the UK (EFSA PLH Panel, 2023b); – Scientific Opinion on the commodity risk assessment of *Quercus robur* plants from the UK (EFSA PLH Panel, 2023c); – UK Risk Register Details for *Thaumetopoea processionea* (DEFRA, online).
Other relevant information for the assessment	
Biology	*Thaumetopoea processionea* is native to southern and central Europe, where it is more abundant and widespread in warm and sunny sites; in central and western Europe its presence is mainly dependent on population fluctuations which can be determined by aridity and climate change (Csoka et al., 2018; Groenen and Meurisse, 2012). The moth is also present in Türkiye and in the Middle East (Syria, Lebanon, Jordan, Israel) (Battisti et al., 2015; Basso et al., 2017; CABI, online; Groenen and Meurisse, 2012). *Thaumetopoea processionea* has four life stages: egg, larva (six instars), pupa and adult; it is a univoltine species, overwintering as 1st instar larva, but at egg stage too (CABI, online; Forestry Commission, online; Zielonka, 2020). Adults, 25–35 mm wingspan, fly from July to September and can survive 4–10 days. Females lay 30–200 eggs, occasionally up to 300 (CABI Compendium, online), which are 2 mm long. The eggs are laid in batches on small branches of oaks (3.5–10 mm diameter), more rarely on other hosts (Battisti et al., 2014). In autumn 1st instar larvae are found within the eggs; eggs and larvae are known to withstand up to −30°C, and a 90% rate of survival of overwintering eggs is observed after severe winters (Baker et al., 2009; Battisti et al., 2014). Egg hatching in April–May is usually well synchronised with oak bud flushing. The larval stage can last 60–70 days. Larvae feed on foliage gregariously from April to July and build a silky nest for each of the instars (CABI, online); however, a large bag-shaped nest weaved with hairs, frass and silk, is built only at 5th–6th larval stage in the medium-lower part of the trunk. The 35–40 mm mature caterpillars rest in the nest during the day and move in nose-to-tail processions during the night in search of food. Larvae from 3rd instar onwards develop urticating hairs on the dorsal part of abdomen (CABI, online; EPPO, online_e; Zielonka, 2020). In the UK, the mature larvae pupate inside the nests from June to early September and adult flight can be normally observed from end July to late September (Forestry Commission, online).

(Continued)

	Natural dispersal of *T. processionea* is through larval processions and adult flight. Larvae can move in processions only to very short distances, but adults are good flyers (50–100 km/year for males and 5–20 km/year for females); windborne spread of adults is also likely (Baker et al., 2009; EPPO, online_d). Males are known to be able to fly over the Channel from France to southern England; this is considered unlikely for females, which are too heavy (Battisti et al., 2014; Evans, 2008; EPPO, online_e). In the UK, *T. processionea* has recently increased its expansion rate, passing from 1.66 km/year in 2006–2014 to 6.17 km/year in 2015–2019 (Suprunenko et al., 2022). The spread of *T. processionea* can also be human supported, mostly via trading of plants for planting carrying eggs, larvae and pupae. Cut branches and round wood with bark are considered pathways of lesser importance (Baker et al., 2009; EPPO, online_e; Evans, 2008).	
Symptoms	**Main type of symptoms**	Main symptoms caused by larvae of *T. processionea* on oaks are skeletonisation of leaves and defoliation; presence of silken nests mainly on the lower branches and the lower part of the trunk; processions of caterpillars on the branches and trunks; egg batches in rows covered by scales, mostly on 1–2 years old twigs. No specific symptoms on *Corylus avellana* are known. Symptoms on humans and animals due to urticating hairs are skin rash, eye irritation, sore throat and breathing difficulty.
	Presence of asymptomatic plants	No information on the presence of asymptomatic plants was found.
	Confusion with other pests	*Thaumetopoea processionea* is one of 15 species belonging to the genus *Thaumetopoea* worldwide, recently revised by Basso et al. (2017). The species is easily identified by both morphological features of adults, and features and host plants of larvae (it is the sole *Thaumetopoea* feeding on *Quercus* sp.) so that no confusion with other similar species is possible.
Host plant range	*Thaumetopoea processionea* is a specialist herbivore feeding on oaks in Europe (Damestoy, 2019). *Quercus* species known to be hosts of *T. processionea* are *Quercus boissieri, Q. calliprinos, Q. cerris, Q. frainetto, Q. infectoria, Q. ilex, Q. palustris, Q. petraea, Q. pubescens, Q. pyrenaica, Q. robur, Q.* × *turneri* (Baker et al., 2009; DEFRA, online; EPPO, online_f; EUROPHYT, online). Secondary, occasional hosts, only attacked during outbreaks are *Acacia, Betula, Carpinus, Castanea, Corylus, Crataegus, Juglans, Fagus, Pistacia, Pinus, Robinia* and *Sorbus* (Stigter et al., 1997; Evans, 2008; Baker et al., 2009; CABI, online; EPPO, online_f). However, beside *Quercus*, the development of larvae to adults is known only for *Fagus* (Stigter et al., 1997; EPPO online_e, f).	
Reported evidence of impact	*Thaumetopoea processionea* is both an important defoliating insect for oak species and a threat to human and domestic animal health. Marzano et al. (2020) provide a useful summary of how the multi-face OPM problem is currently felt by people and managers in the UK. The impact of *T. processionea* on forest health is variable: it is considered a minor pest for oak forests in Ukraine, Romania, Hungary, Slovenia; severe damage was instead reported from Germany, Italy, France, Belgium and Spain (Baker et al., 2009). In western Europe (Belgium, the Netherlands) and in the UK, the pest is mainly harmful to urban and road trees, as well as to amenity oak trees in parks, forest edges and countryside hedgerows (Battisti et al., 2014). Both in canopied stands and open forests, oaks weakened after severe defoliation by the *T. processionea* become more susceptible to secondary pests as buprestid beetles, bark and ambrosia beetles or root rot fungi. *T. processionea* may be hence considered a contributing factor in the oak decline, also resulting in loss of biodiversity (Baker et al., 2009; CABI, online). No information was found about the impact of *T. processionea* on *C. avellana*. Impact on human health may be relevant mostly in urban areas, due to the severe pseudo-allergenic reactions caused by the contact of urticating hairs released by the larvae with skin, eyes and respiratory system (lepidopterism). A good synthesis on health effects of *T. processionea* is provided by Rhalenbeck and Utikal (2015). Urticating hairs released by larvae spread by air currents also from nests, exuviae, pupal cases and may remain active in the soil or in the litter for several years lengthening the social impact of the species (Baker et al., 2009).	
Evidence that the commodity is a pathway	Although there are no reports of *C. avellana* infested by *T. processionea*, *Corylus* is reported as a secondary, occasional host, attacked during outbreaks on major hosts. Major hosts of *T. processionea* (*Quercus* spp.) are present both in the nurseries and in the surroundings of the nurseries. Therefore a spillover of larvae may occur making the association with the commodity possible particularly if plants are exported with leaves.	
Surveillance information	*Thaumetopoea processionea* is a quarantine pest under official control in the UK. As part of an annual survey at ornamental retail and production sites (frequency of visits determined by a decision matrix), *T. processionea* is inspected for on *Quercus*. No specific surveillance of *T. processionea* is implemented in the UK for *Corylus avellana*. An additional inspection, during the growing period, is carried out at plant passport production sites. Nursery staff is aware of *T. processionea* and check all *Quercus* products for signs, even where the pest is not present in the area. Movement restrictions for growing sites are enforced in the infested area and buffer zone. There is an eradication policy for the buffer zone and pest-free area (Dossier Section 5.1).	

A.2.2 | Possibility of pest presence in the nursery

A.2.2.1 | Possibility of entry from the surrounding environment

Thaumetopoea processionea is present in the UK territory with distribution restricted to a boundary including 86 local authorities in the London area and South East of England; recently (2022) the pest has also extended its presence to the previous pest-free area of Hampshire (EFSA PLH Panel, 2023).

Adult moths have considerable spreading capacities (50–100 km/year for males and 5–20 km/year for females); in the UK, the pest has strongly increased its expansion rate, passing from 1.66 km/year in 2006–2014 to 6.17 km/year in 2015–2019 (Suprunenko et al., 2022).

Thaumetopoea processionea breeds on *Quercus* species. On *Fagus* the mature larvae can complete the development according to Stigter et al. (1997) but oviposition and young larvae were never observed. Other secondary hosts are *Betula* spp., *Carpinus* spp., *Castanea* spp., *Corylus* spp., *Crataegus* spp., *Juglans* spp., *Pinus* spp., *Robinia* spp. and *Sorbus* spp. All these species, mostly *Quercus* spp. and *Fagus* spp., are widely present within 2 km from the nurseries (Dossier Section 1.0 and 5.1). According to the Dossier Section 1.0, the minimum distance in a straight line, between the growing area in the nurseries and the closest *C. avellana* plants in the local surrounding is 3 metres.

Uncertainties

– The possibility of presence of the pest in the surrounding area of nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for *T. processionea* to enter the nurseries from surrounding environment. In the surrounding area, suitable hosts are present and flying adult moths can easily reach the nurseries.

A.2.2.2 | Possibility of entry with new plants/seed

The plants of *C. avellana* are grown both in containers (cells, pots, tubes) and in the field. The starting materials are seeds and seedlings. Seeds are not a pathway for the pest. Seedlings are mostly from the UK, but some plants may come from the EU (the Netherlands, Italy, Germany). None of the nurseries expected to export to the EU are using grafting in the production of *C. avellana* (Dossier Section 1.0).

In addition to *C. avellana* plants, the nurseries also produce other plants (Dossier Section 3.0). Out of them, *Quercus ilex, Q. palustris, Q. petraea*, *Q. robur*, *Fagus sylvatica* and *Fagus* spp. are hosts on which the pest can complete the life cycle. There is no information on how and where the *Quercus* spp., *Fagus* spp. and *Fagus sylvatica* plants are produced; therefore, if the plants are first produced in another nursery, the pest could possibly travel with them.

In the nurseries, virgin peat or peat-free compost (a mixture of coir, tree bark, wood fibre, etc.) is used as a growing media (Dossier Section 1.0). The growing media is certified and heat-treated by commercial suppliers during production to eliminate pests and diseases (Dossier Section 1.0). Soil and growing media are not pathways for *T. processionea*.

Uncertainties

– No information is available on the origin of plants (*Quercus* spp. *Fagus* spp. and *F. sylvatica* and other plants included in the host range of *T. processionea*) used for plant production in the area of the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nurseries via new seedlings of *Quercus* spp., *Fagus* spp., *F. sylvatica* (and other plants that are hosts for the pest) used for plant production in the area. The entry of the pest with seeds and the growing media the Panel considers as not possible.

A.2.2.3. | Possibility of spread within the nursery

Corylus avellana plants are either grown in containers (cells, pots, tubes, etc.) outdoors/ in the open air or in field. Cell grown trees may be grown in greenhouses, however most plants will be field grown, or field grown in containers (Dossier Section 1.0). There are no mother plants present in the nurseries (Dossier Section 1.0).

The pest can infest other suitable plants (such as the major hosts *Quercus* spp., *Fagus* spp. and *F. sylvatica*) present within the nurseries (Dossier Sections 1.0 and 3.0).

Thaumetopoea processionea can spread within the nurseries by movement of larvae, adult flight and infested plant material.

Uncertainties

– None.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nurseries is possible both by movement of infested plant material and larvae, and flight of adult moths.

A.2.3 | Information from interceptions

In the EUROPHYT/TRACES-NT database there are no records of notification of *C. avellana* plants for planting due to the presence of *T. processionea* between the years 1995 and July 2023 (EUROPHYT, online; TRACES-NT, online).

In the same period, there are 88 records of notification of *Quercus* plants for planting (*Quercus cerris*, *Q. frainetto, Q. petraea, Q. robur, Q.* × *turneri*) from the Netherlands, Germany and Belgium, all for plants intended for planting, already planted (EUROPHYT, online; 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 *T. processionea* is provided. The description of the risk mitigation measures currently applied in the UK is provided in the Table 6.

N	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	The registration and the release of the UK plant passport should be enough to warrant pest-free plant material for a quarantine pest in the UK. Uncertainties: – Level of awareness of the nursery staff regarding the possibility of hazelnut being a host of *T. processionea*.
2	Physical separation	No	Not relevant, as the production is not carried out in separate areas, the possibility that the pest can move from the outside to the nurseries and from one tree species to another within the nurseries is concrete.
3	Certified plant material	Yes	The use of certified material should be enough to warrant pest-free status. Uncertainties: – None
4	Growing media	No	Not relevant. The pest is not affected by the growing medium as in the nurseries all the stages develop above ground.
5	Surveillance, monitoring and sampling	Yes	Regular surveys are carried out during the production by visual inspection of the plants. Any report of a quarantine pest is provided. Uncertainties: – Level of awareness of the nursery staff regarding the possibility of hazelnut being a host of *T. processionea*.
6	Hygiene measures	No	Weeding and disinfection are not relevant for this pest.
7	Removal of infested plant material	Yes	The removal of infested plants at the larval stage will have a positive effect. Egg masses are not expected on *Corylus*. Uncertainties: – None
8	Irrigation water	No	Water is not relevant for this pest
9	Application of pest control products	Yes	The pest is easy to control at the larval stage and being a quarantine pest, its presence must be reported and measures taken. However, with the exception of egg parasitoids and other generalist enemies feeding on eggs, the egg masses are not susceptible to any crop protection method. No treatments available against the moths. Uncertainties: – Whether biological control using *B. thuringensis* against larvae or other biocontrol agents against eggs are used. – Whether appropriate chemical insecticides are used.
10	Measures against soil pests	No	Soil is not relevant for this pest.
11	Inspections and management of plants before export	Yes	Inspections carried out before export will be visual and would be enough to warrant that commodities are free of larvae. Uncertainties: – Level of awareness of the nursery staff regarding the possibility of hazelnut being a host of *T. processionea*.
12	Separation during transport to the destination	Yes	The separation of the plants during the transport would reduce the possibility that larvae are moving among plants if the transport happens when green leaves are occurring between April and August. Uncertainties: – The period when the plants are moved. – The presence of green leaves at the time of transport.

A.2.5 | Overall likelihood of pest freedom for bundles of whips and transplants

A.2.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infested bundles of whips and transplants

Corylus is not expected to be a host. The nurseries are located in a pest-free area for the whole period of plant development and the plant material taken to the nurseries originate only from pest-free areas within the UK.

A.2.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infested bundles of whips and transplants

The nurseries are not in a pest-free area and the pest is present in the surroundings. *Corylus* is considered an occasional host, possibly attacked during outbreaks. There can be spillover of mature larvae from infested *Quercus* trees in the nurseries and the nearby *Corylus* trees.

A.2.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested bundles of whips and transplants (Median)

The median is very skewed to the left (lower values) because *Corylus* is considered a very occasional host, and because only one nursery seems to be included in the buffer zone (2022). Moreover, nursery staff is trained to identify the pest.

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

The first quartile shows a very high uncertainty while the third quartile shows less uncertainty. This is based on the fact the *Corylus* was never observed as a host for the eggs and the young larvae, and that nursery staff is trained to identify the development stages of the pest, and regular inspections are carried out in the nurseries. So, it is very unlikely that the pest is present on *Corylus*, and if present it should be detected at the inspections. However, the species is very mobile, and nurseries could get close to areas of establishment or to the buffer zone, and the potential oviposition and successful early larval development on *Corylus* cannot be fully excluded as it has been not tested under experimental conditions. In addition, a possible bundle effect increases the uncertainty on the third quartile.

A.2.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Thaumetopoea processionea* on bundles of whips and transplants

The following Tables show the elicited and fitted values for pest infestation (Table A.9) and pest freedom (Table A.10).

TABLE A.9 Elicited and fitted values of the uncertainty distribution of pest infestation by *Thaumetopoea processionea* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.0					1.0		2.5		5.0					12.0
EKE	0.020	0.060	0.137	0.316	0.593	0.986	1.43	2.53	4.00	4.97	6.22	7.63	9.25	10.6	12.0

The EKE results is the BetaGeneral (0.84342, 3.3318, 0, 16.5) distribution fitted with @Risk version 7.6.

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

TABLE A.10 The uncertainty distribution of bundles free of *Thaumetopoea processionea* per 10,000 bundles calculated by Table A.9.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9988					9995		9997.5		9999.0					10,000
EKE results	9988	9989	9991	9992	9994	9995	9996	9997	9998.6	9999.0	9999.4	9999.7	9999.86	9999.94	9999.98

The EKE results are the fitted values.

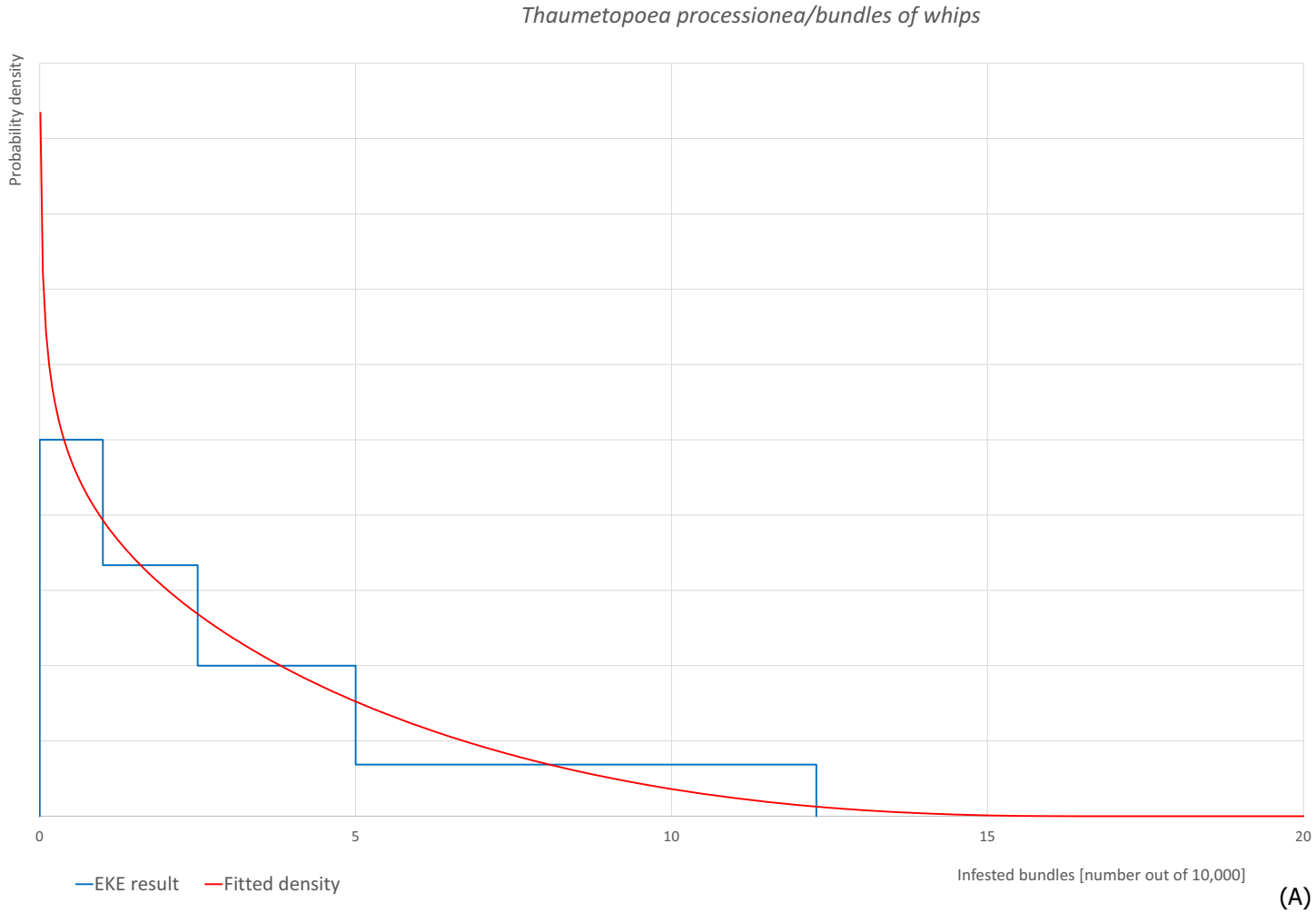

FIGURE A.5 (Continued)

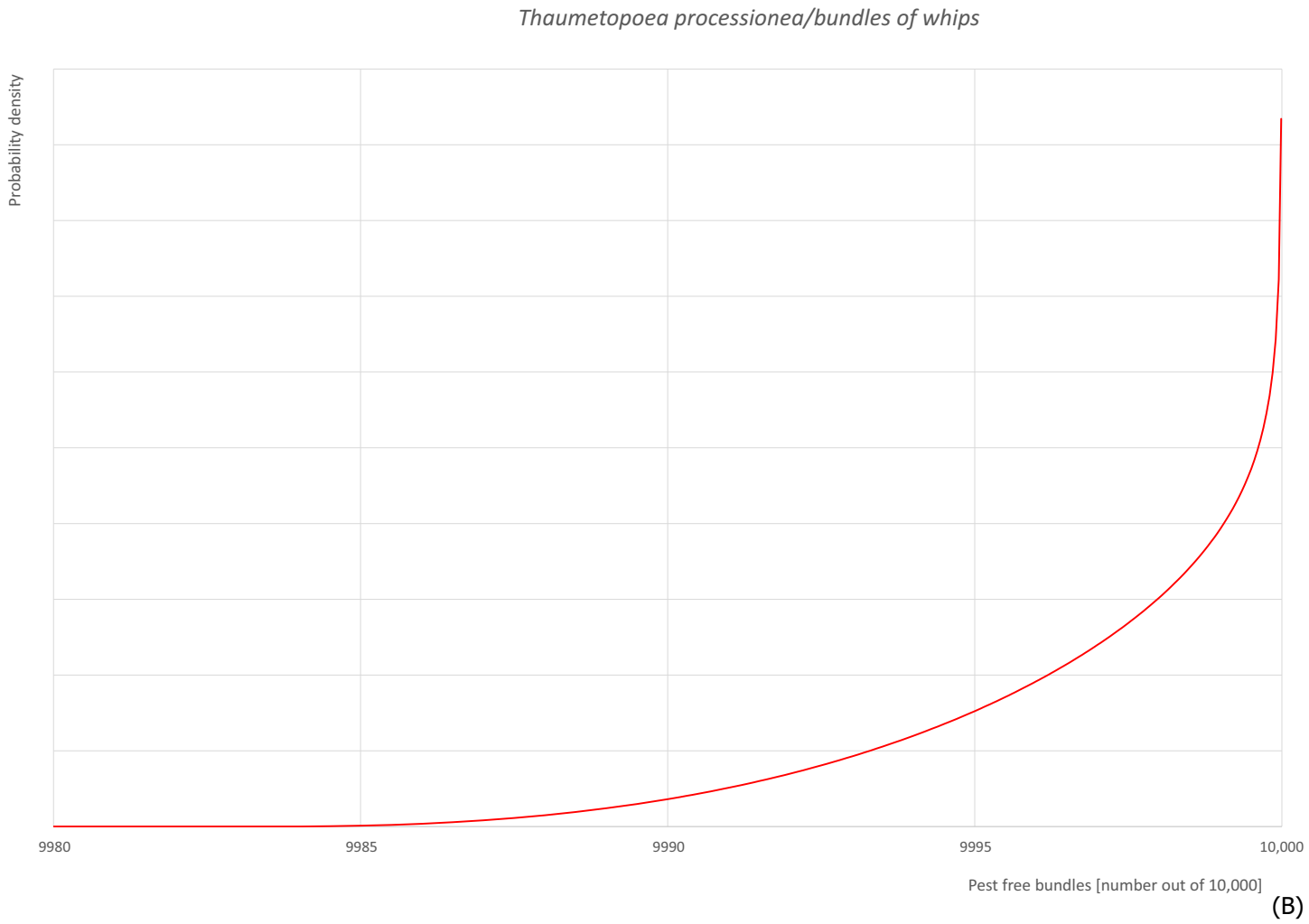

FIGURE A.5 (Continued)

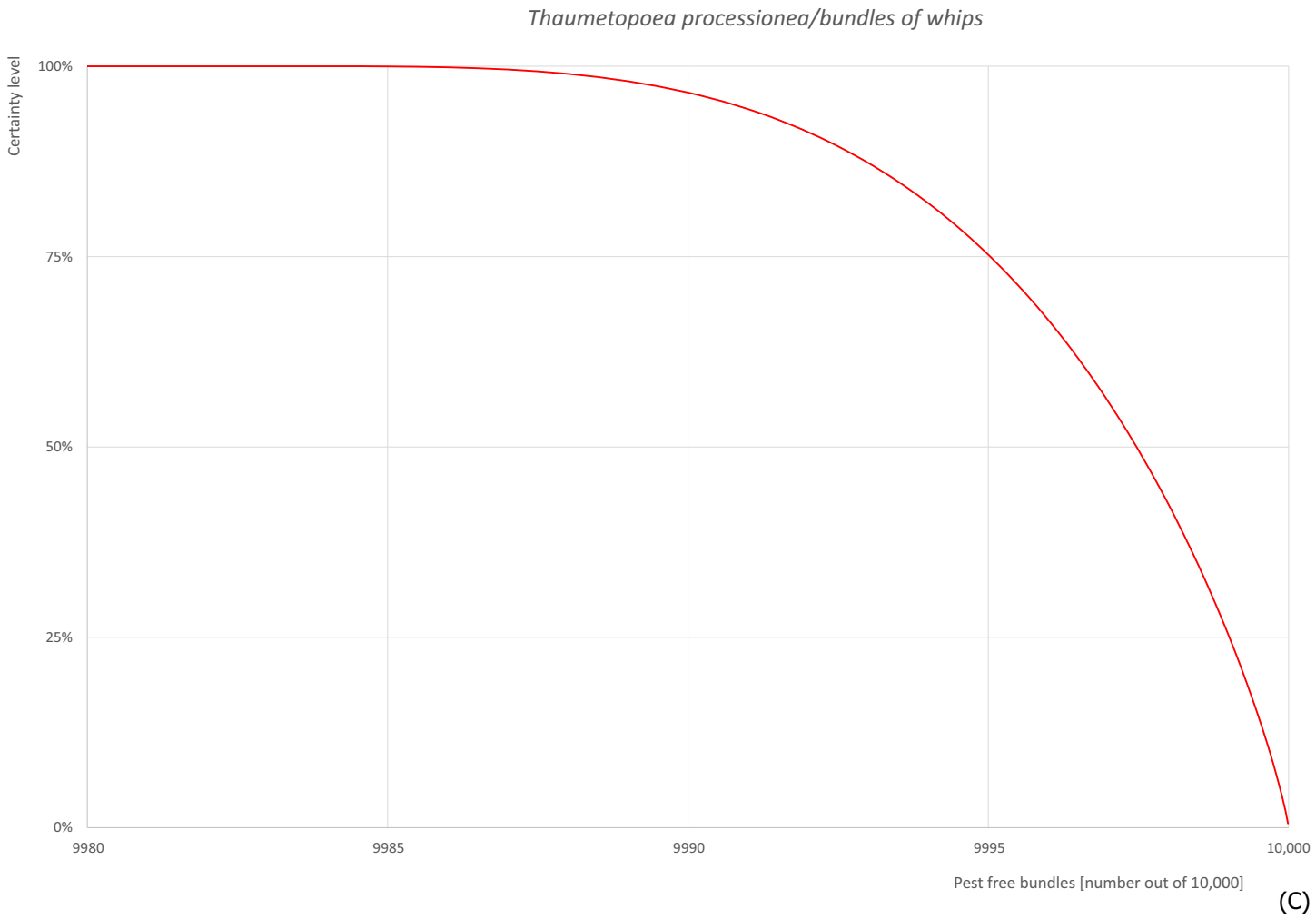

FIGURE A.5 (A) Elicited uncertainty of pest infestation per 10,000 bundles (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free bundles per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 bundles.

A.2.6 | Overall likelihood of pest freedom for bundles of cell grown plants

A.2.6.1 | Reasoning for a scenario which would lead to a reasonably low number of infested bundles of cell grown plants

Corylus is not expected to be a host. The nurseries are located in a pest-free area for the whole period of plant development and the plant material taken to the nurseries originate only from pest-free areas within the UK.

A.2.6.2 | Reasoning for a scenario which would lead to a reasonably high number of infested bundles of cell grown plants

The nurseries are not in a pest-free area and the pest is present in the surroundings. *Corylus* is considered an occasional host, possibly attacked during outbreaks. There can be spill over of mature larvae from infested *Quercus* trees in the nurseries and the nearby *Corylus* trees. *Corylus* can receive some egg masses and some young larvae can feed on *Corylus* leaves.

A.2.6.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested bundles of cell grown plants (Median)

The median is very skewed to the left (lower values) because *Corylus* is considered a very occasional host, and because only one nursery seems to be included in the buffer zone (2022). Moreover, nursery staff is trained to identify the pest.

A.2.6.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The first quartile shows a very high uncertainty while the third quartile shows less uncertainty. This is based on the fact the *Corylus* was never observed as a host for the eggs and the young larvae, and that nursery staff is trained to identify the development stages of the pest, and regular inspections are carried out in the nurseries. So, it is very unlikely that the pest is present on *Corylus*, and if present it should be detected at the inspections. However, the species is very mobile, and nurseries could get close to areas of establishment or to the buffer zone, and the potential oviposition and successful early larval development on *Corylus* cannot be fully excluded as it has been not tested under experimental conditions.

A.2.6.5 | Elicitation outcomes of the assessment of the pest freedom for *Thaumetopoea processionea* on bundles of cell grown plants

The following Tables show the elicited and fitted values for pest infestation (Table A.11) and pest freedom (Table A.12).

TABLE A.11 Elicited and fitted values of the uncertainty distribution of pest infestation by *Thaumetopoea processionea* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.0					1.0		2.0		3.5					10.0
EKE	0.0871	0.168	0.279	0.472	0.711	1.00	1.31	1.99	2.90	3.51	4.34	5.38	6.75	8.10	9.86

The EKE results is the BetaGeneral (1.4368, 5619.6, 0, 10,000) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.12.

TABLE A.12 The uncertainty distribution of plants free of *Thaumetopoea processionea* per 10,000 bundles calculated by Table A.11.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9990.0					9996.5		9998.0		9999.0					10,000.0
EKE results	9990	9992	9993	9995	9996	9996	9997	9998.0	9998.7	9999.0	9999.3	9999.5	9999.7	9999.8	9999.9

The EKE results are the fitted values.

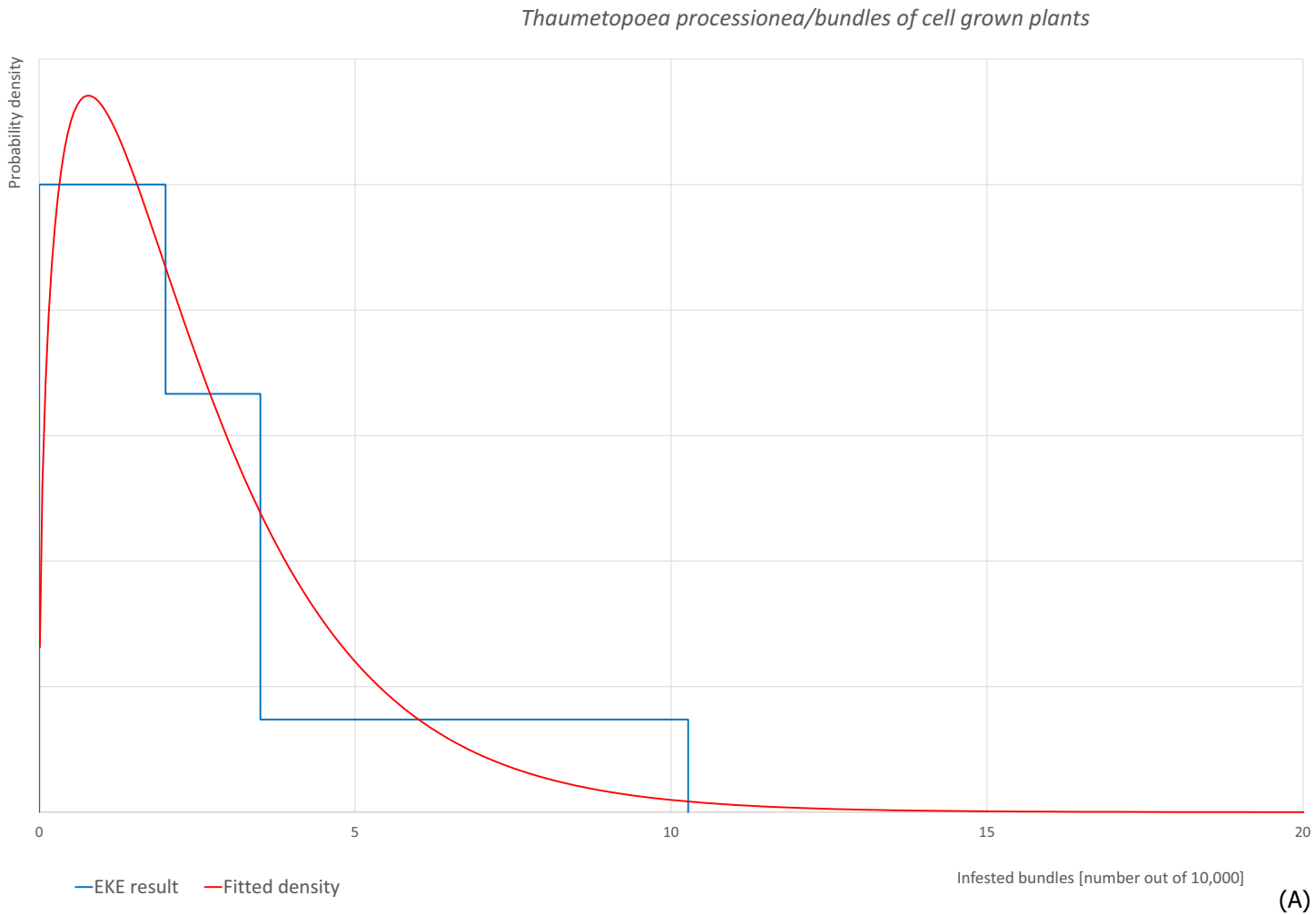

FIGURE A.6 (Continued)

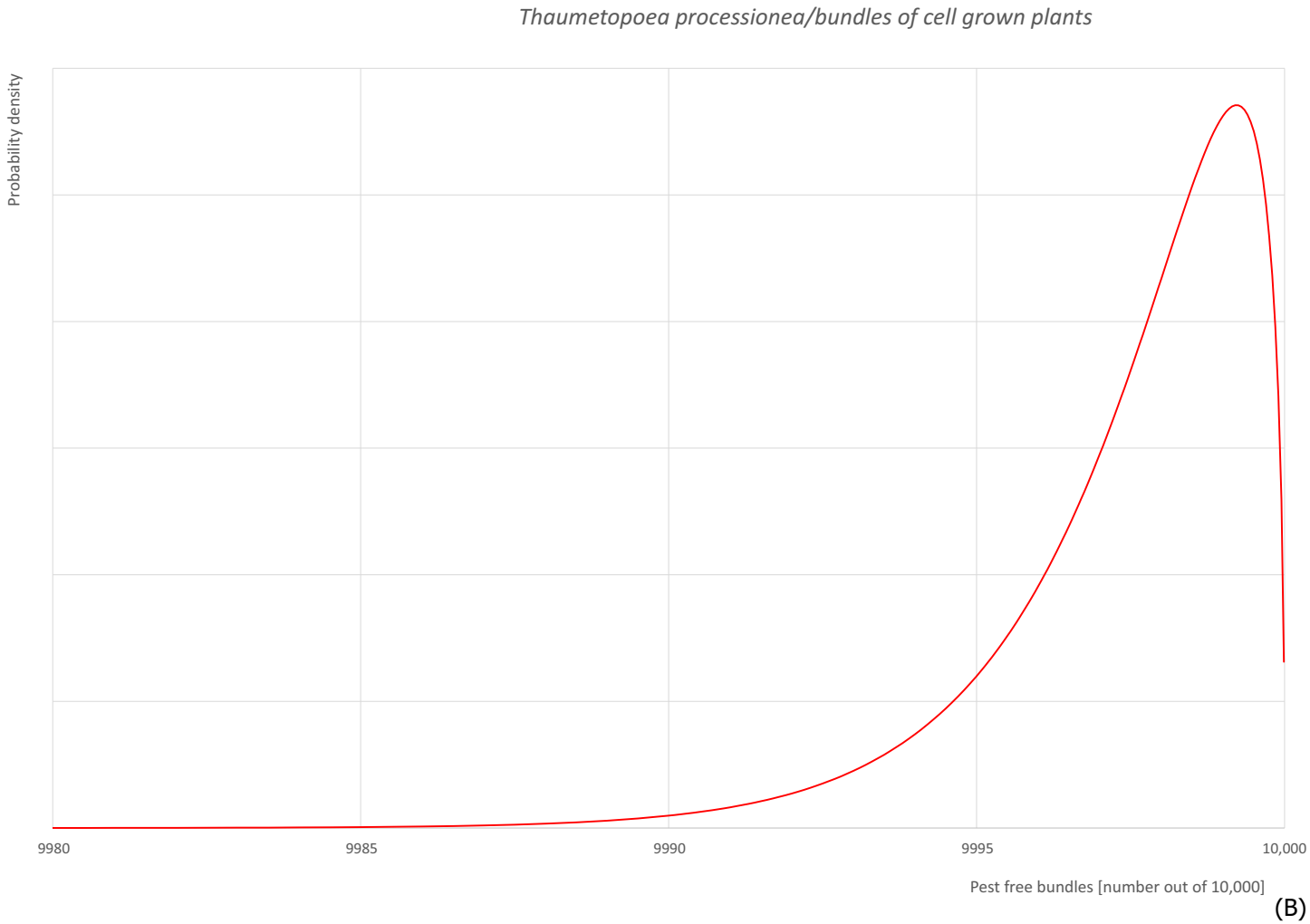

FIGURE A.6 (Continued)

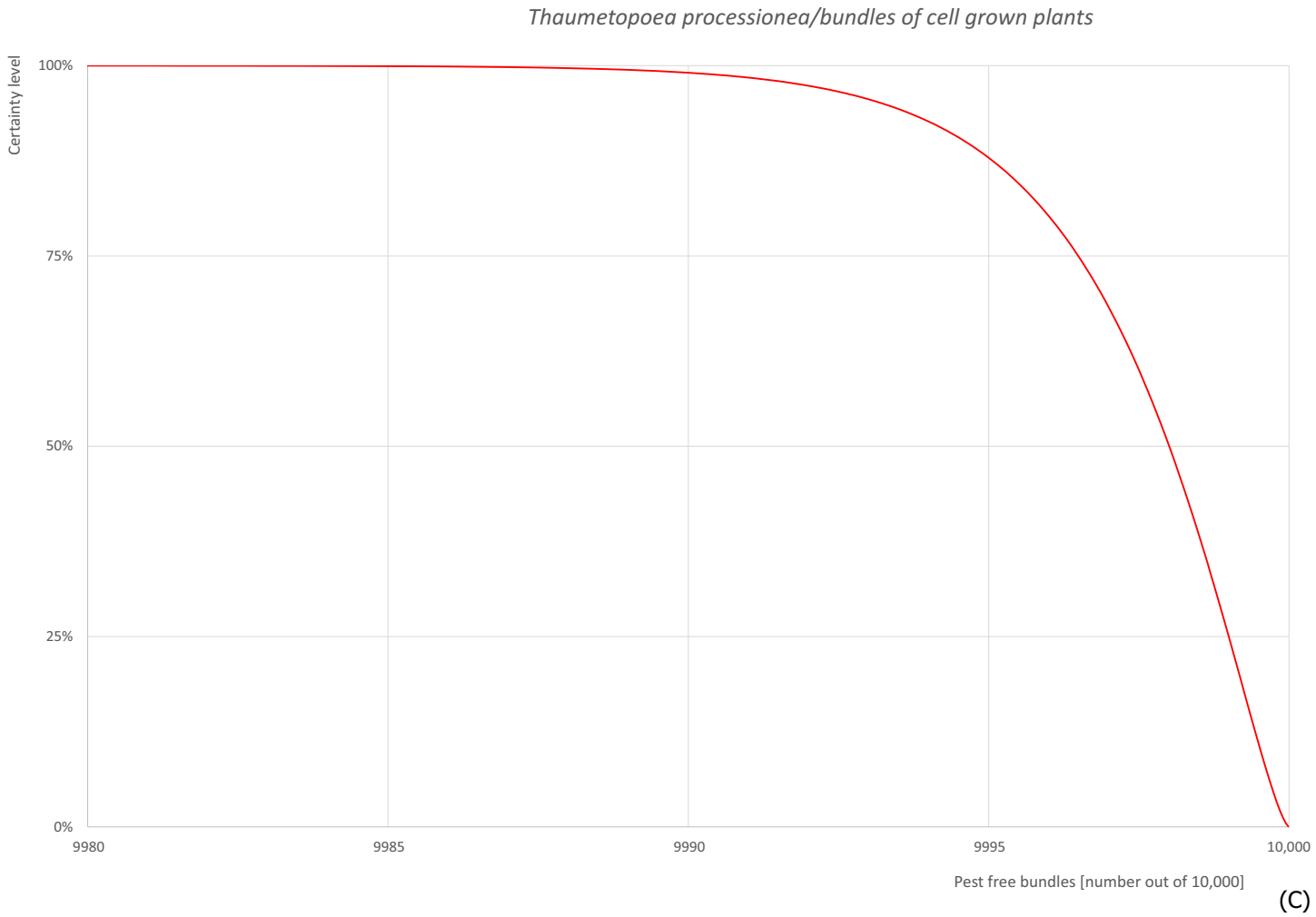

FIGURE A.6 (A) Elicited uncertainty of pest infestation per 10,000 bundles (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free bundles per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 bundles.

A.2.7 | Overall likelihood of pest freedom for bare root plants

A.2.7.1 | Reasoning for a scenario which would lead to a reasonably low number of infested bare root plants

Corylus is not expected to be a host. The nurseries are located in a pest-free area for the whole period of plant development and the plant material taken to the nurseries originate only from pest-free areas within the UK.

A.2.7.2 | Reasoning for a scenario which would lead to a reasonably high number of infested bare root plants

The nurseries are not in a pest-free area and the pest is present in the surroundings. *Corylus* is considered an occasional host, possibly attacked during outbreaks. There can be spillover of mature larvae from infested *Quercus* trees in the nurseries and the nearby *Corylus* trees. *Corylus* can receive some egg masses and some young larvae can feed on *Corylus* leaves.

A.2.7.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested bare root plants (Median)

The median is very skewed to the left (lower values) because *Corylus* is considered a very occasional host, and because only one nursery seems to be included in the buffer zone (2022). Moreover, nursery staff is trained to identify the pest.

A.2.7.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The first quartile shows a very high uncertainty while the third quartile shows less uncertainty. This is based on the fact the *Corylus* was never observed as a host for the eggs and the young larvae, and that nursery staff is trained to identify the development stages of the pest, and regular inspections are carried out in the nurseries. So, it is very unlikely that the pest is present on *Corylus*, and if present it should be detected at the inspections. However, the species is very mobile, and nurseries could get close to areas of establishment or to the buffer zone, and the potential oviposition and successful early larval development on *Corylus* cannot be fully excluded as it has been not tested under experimental conditions. In addition, the older age of the plants (between 1 and 7 years old) increases the uncertainty on the third quartile.

A.2.7.5 | Elicitation outcomes of the assessment of the pest freedom for *Thaumetopoea processionea* on bare root plants

The following Tables show the elicited and fitted values for pest infestation (Table A.13) and pest freedom (Table A.14).

TABLE A.13 Elicited and fitted values of the uncertainty distribution of pest infestation by *Thaumetopoea processionea* per 10,000 plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.0					1.0		2.5		5.0					12.0
EKE	0.0201	0.0599	0.137	0.316	0.593	0.986	1.43	2.53	4.00	4.97	6.22	7.63	9.25	10.6	12.0

The EKE results is the BetaGeneral (0.84342, 3.3318, 0, 16.5) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants the pest freedom was calculated (i.e. = 10,000 – number of infested plants per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.14.

TABLE A.14 The uncertainty distribution of plants free of *Thaumetopoea processionea* per 10,000 plants calculated by Table A.13.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9988.0					9995.0		9997.5		9999.0					10,000.0
EKE results	9988	9989	9991	9992	9994	9995	9996	9997	9998.6	9999.0	9999.4	9999.7	9999.86	9999.94	9999.98

The EKE results are the fitted values.

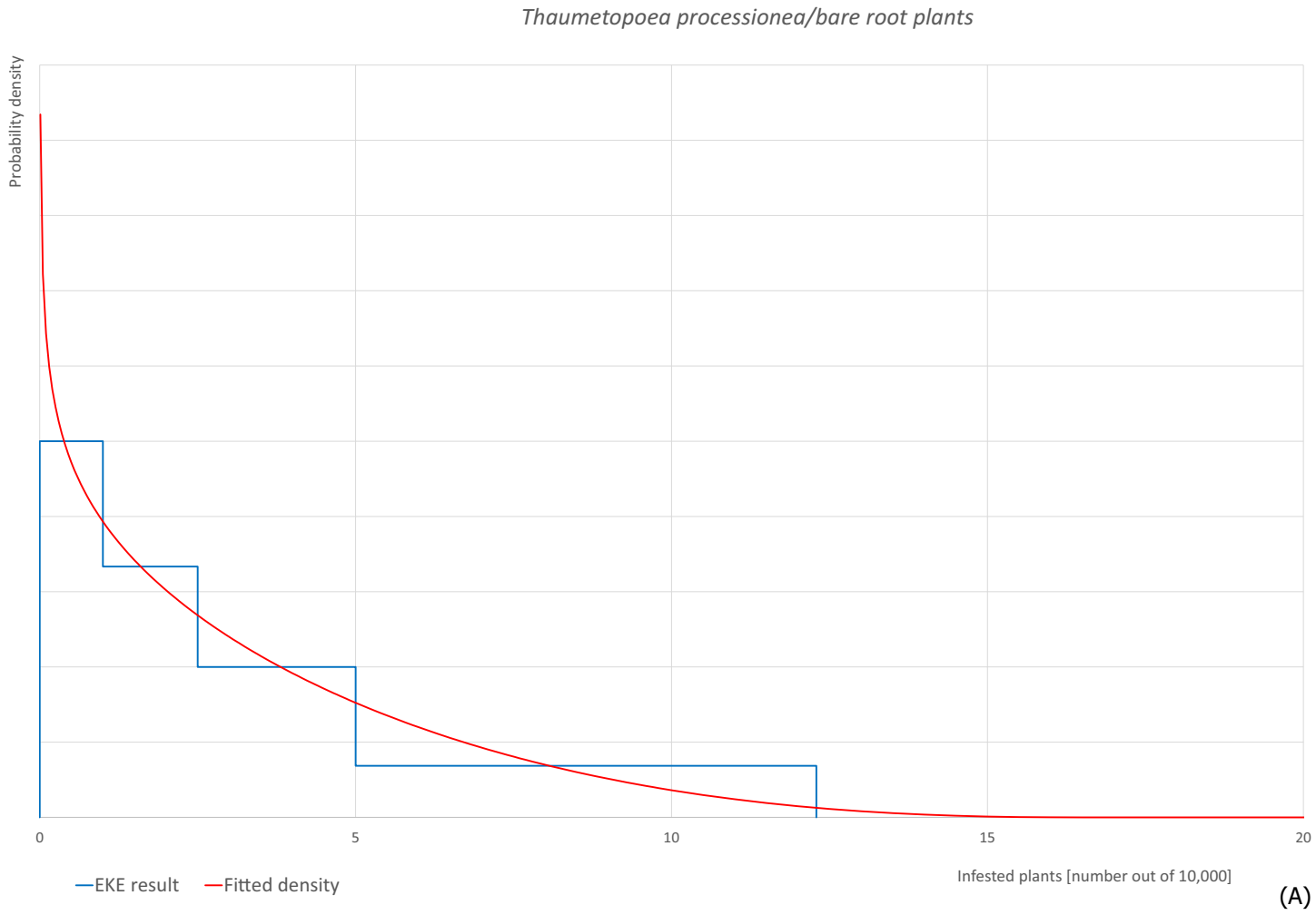

FIGURE A.7 (Continued)

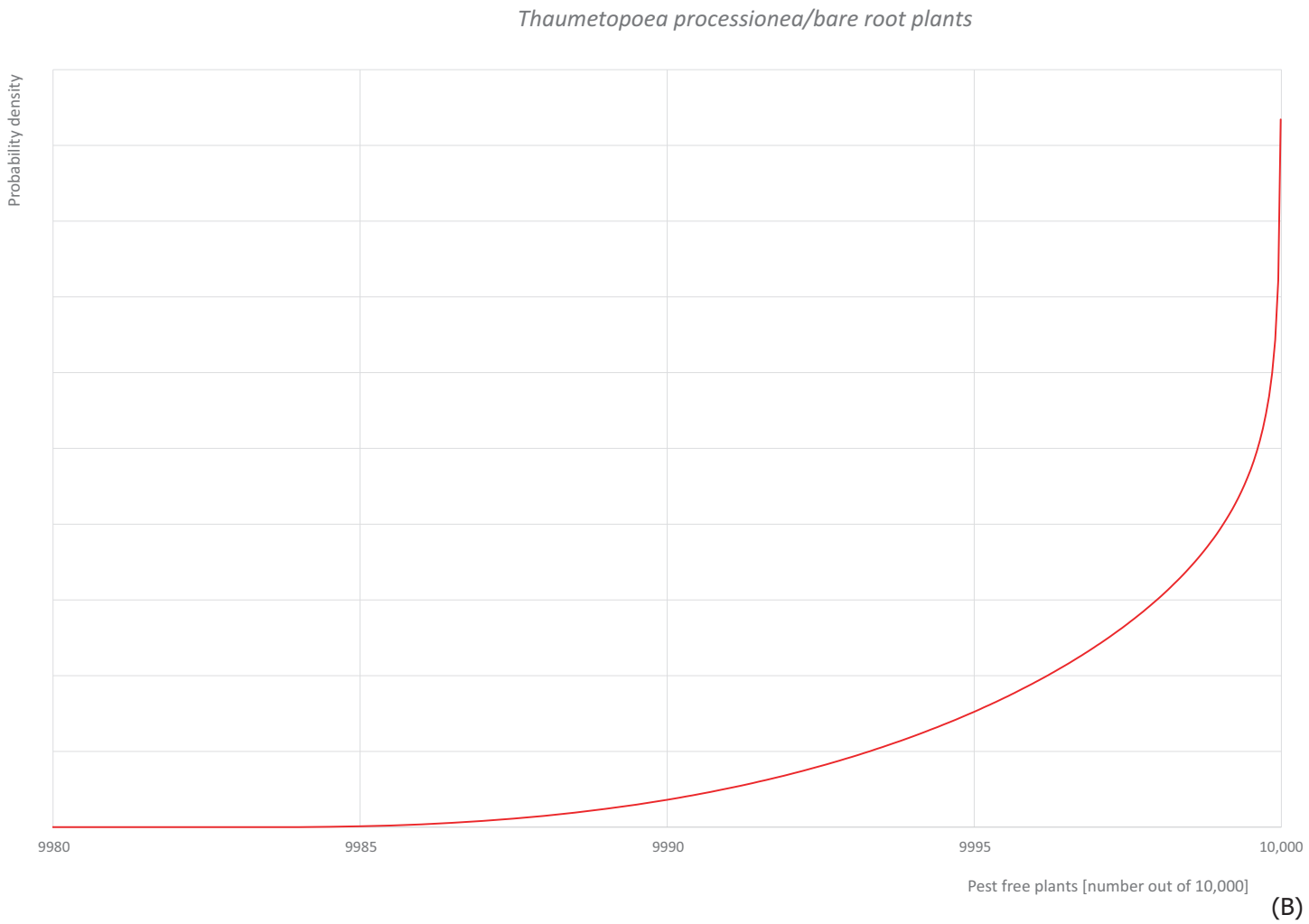

FIGURE A.7 (Continued)

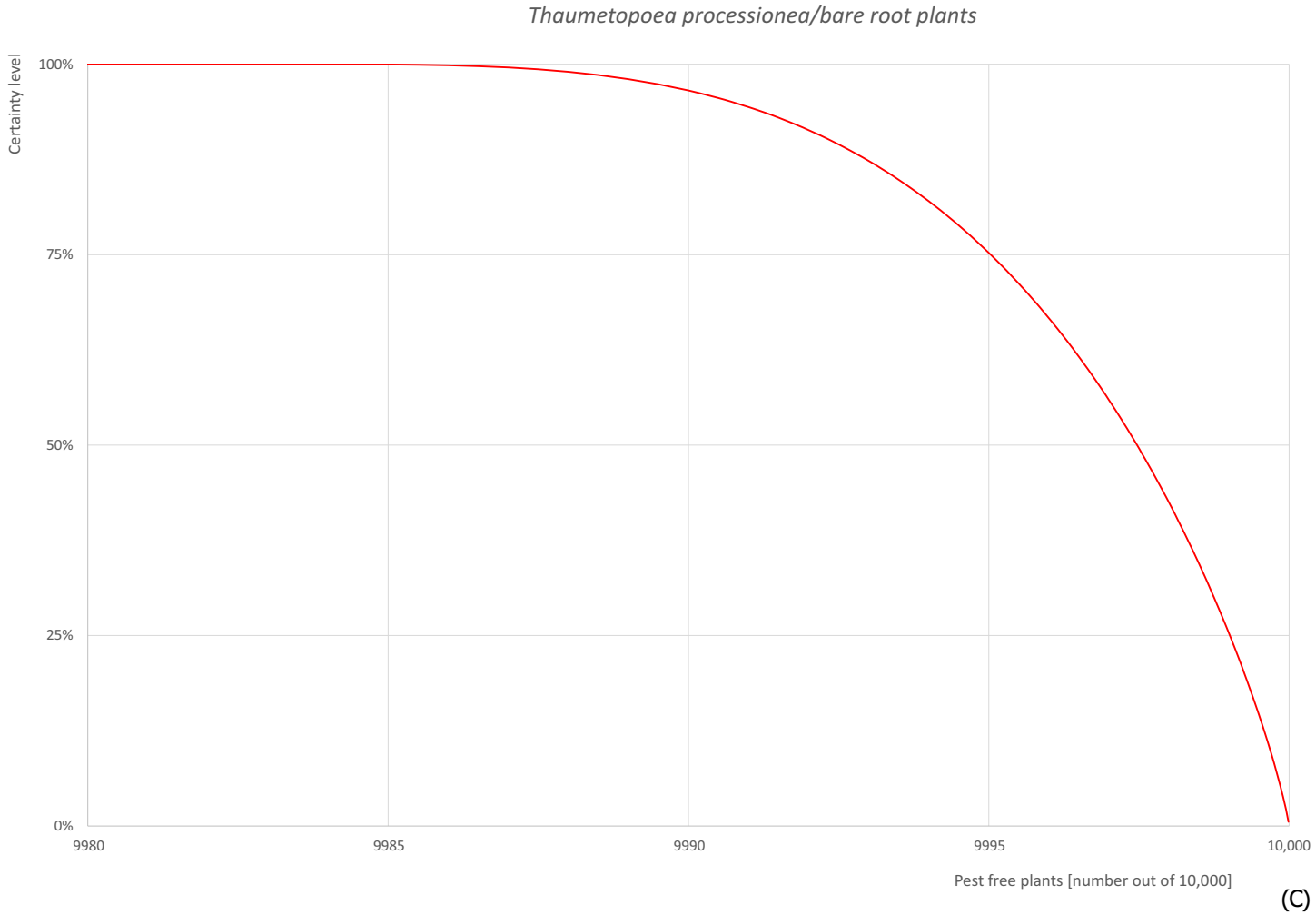

FIGURE A.7 (A) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free plants per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 plants.

A.2.8. | Overall likelihood of pest freedom for plants in pots

A.2.8.1 | Reasoning for a scenario which would lead to a reasonably low number of infested plants in pots

Corylus is not expected to be a host. The nurseries are located in a pest-free area for the whole period of plant development and the plant material taken to the nurseries originate only from pest-free areas within the UK.

A.2.8.2 | Reasoning for a scenario which would lead to a reasonably high number of infested plants in pots

The nurseries are not in a pest-free area and the pest is present in the surroundings. *Corylus* is considered an occasional host, possibly attacked during outbreaks. There can be spill over of mature larvae from infested *Quercus* trees in the nurseries and the nearby *Corylus* trees. *Corylus* can receive some egg masses and some young larvae can feed on *Corylus* leaves. The bigger size of the trees and the presence of leaves may lead to a higher number of infested plants than the rest of commodities.

A.2.8.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested plants in pots (Median)

The median is very skewed to the left (lower values) because *Corylus* is considered a very occasional host, and because only one nursery seems to be included in the buffer zone (2022). Moreover, nursery staff is trained to identify the pest.

A.2.8.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/ interquartile range)

The first quartile shows a very high uncertainty while the third quartile shows less uncertainty. This is based on the fact the *Corylus* was never observed as a host for the eggs and the young larvae, and that nursery staff is trained to identify the development stages of the pest, and regular inspections are carried out in the nurseries. So, it is very unlikely that the pest is present on *Corylus*, and if present it should be detected at the inspections. However, the species is very mobile, and nurseries could get close to areas of establishment or to the buffer zone, and the potential oviposition and successful early larval development on *Corylus* cannot be fully excluded as it has been not tested under experimental conditions.

A.2.8.5 | Elicitation outcomes of the assessment of the pest freedom for *Thaumetopoea processionea* on plants in pots

The following Tables show the elicited and fitted values for pest infestation (Table A.15) and pest freedom (Table A.16).

TABLE A.15 Elicited and fitted values of the uncertainty distribution of pest infestation by *Thaumetopoea processionea* per 10,000 plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.0					2.5		5.0		8.0					25.0
EKE	0.286	0.513	0.807	1.30	1.88	2.57	3.27	4.84	6.85	8.19	10.0	12.3	15.2	18.1	21.8

The EKE results is the BetaGeneral (1.6334, 2715.9, 0, 10,000) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants the pest freedom was calculated (i.e. = 10,000 – number of infested plants per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.16.

TABLE A.16 The uncertainty distribution of plants free of *Thaumetopoea processionea* per 10,000 plants calculated by Table A.15.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9975.0					9992.0		9995.0		9997.5					10,000.0
EKE results	9978	9982	9985	9988	9990	9992	9993	9995	9996.7	9997.4	9998.1	9998.7	9999.2	9999.5	9999.7

The EKE results are the fitted values.

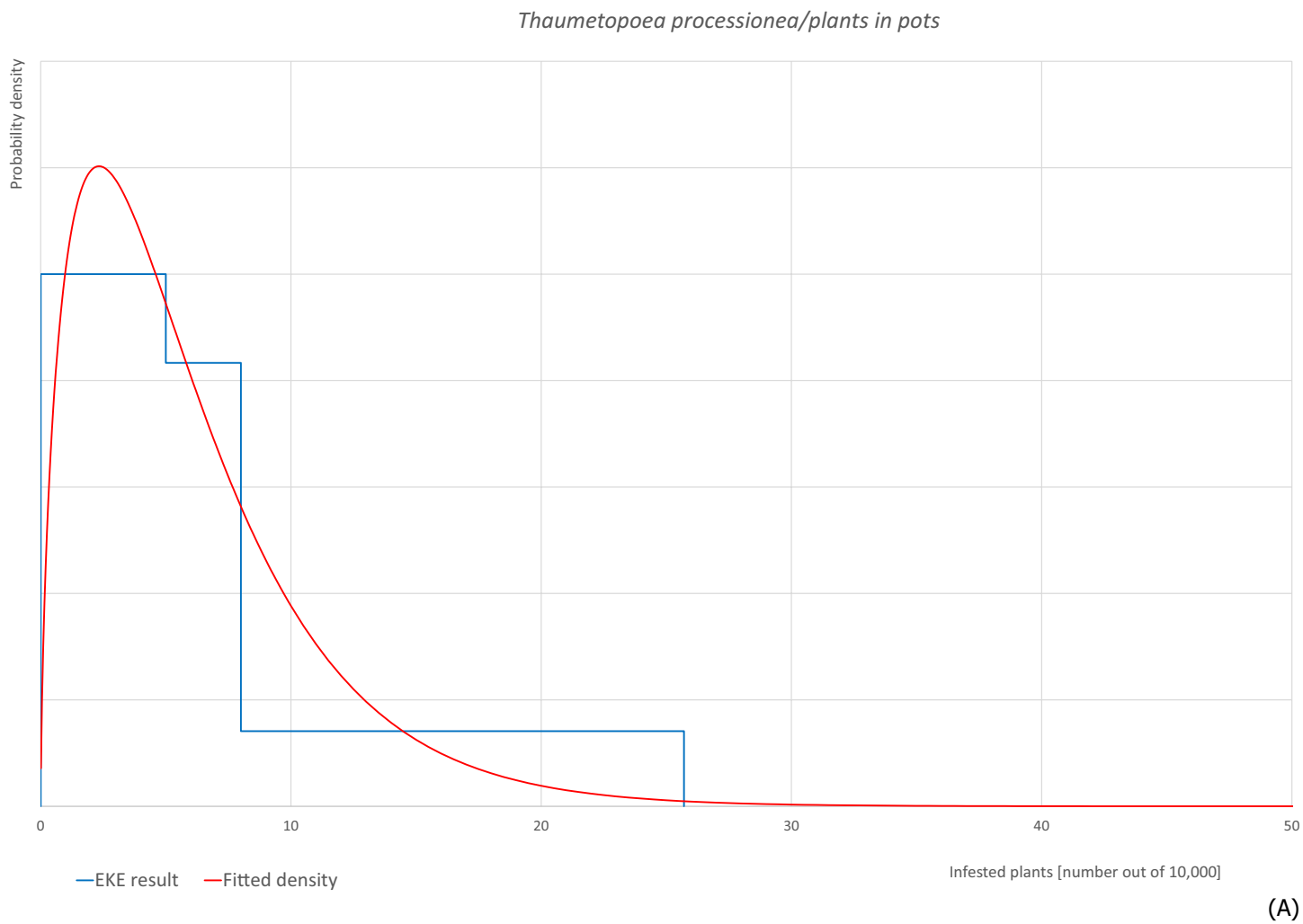

FIGURE A.8 (Continued)

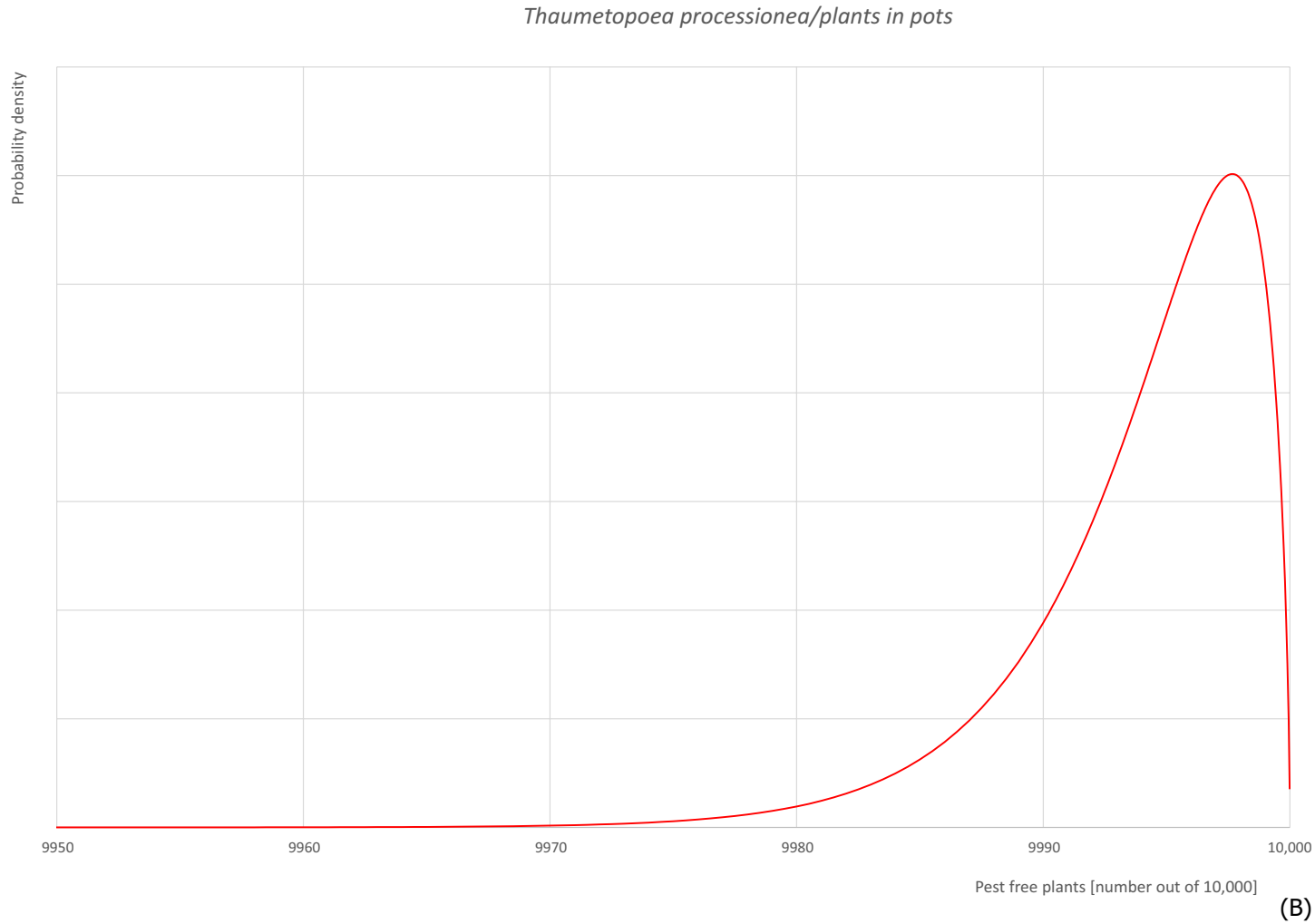

FIGURE A.8 (Continued)

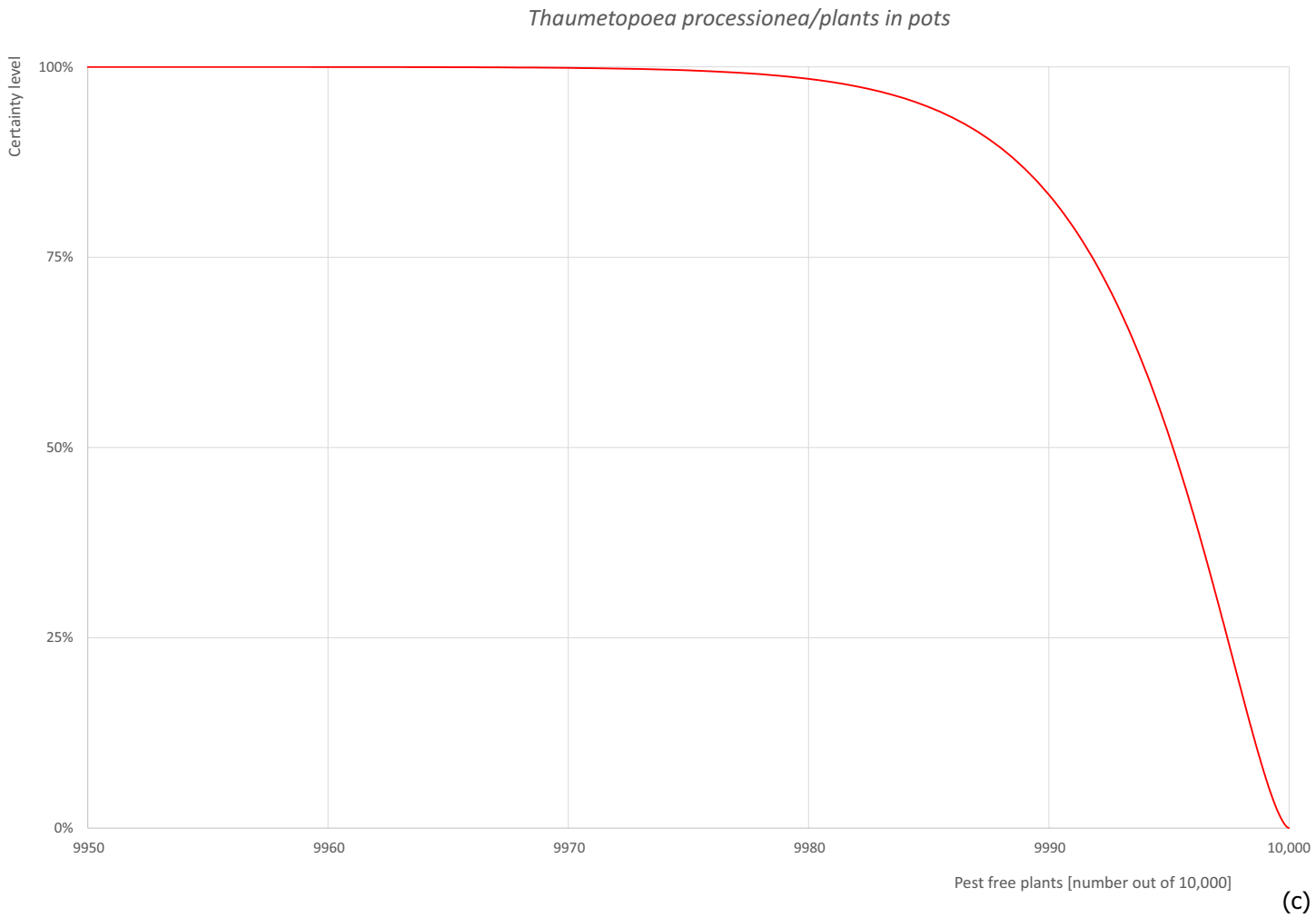

FIGURE A.8 (A) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest-free plants per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 plants.

A.2.9 | Reference list

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APPENDIX B

Web of science all databases search string

In the Table B.1, the search string for *Corylus avellana* used in Web of Science is reported. Totally, 784 papers were retrieved. Titles and abstracts were screened, and 115 pests were added to the list of pests (see Appendix D).

TABLE B.1 String for *Corylus avellana*.

Web of Science All databases	**TOPIC:** "Corylus avellana" OR "Corylus arborea" OR "Corylus filicifolia" OR "Corylus grandis" OR "Corylus hispanica" OR "Corylus laciniata" OR "Corylus ovata" OR "Corylus pontica" OR "Corylus quercifolia" OR "Corylus sylvestris" OR "cobnut" OR "common hazelnut" OR "European hazel" OR "hazelnut" OR "common hazel" OR "European filbert" OR "European hazelnut" **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:** "Abraxas sylvata" OR "Acanalonia conica" OR "Acanthonitschkea tristis" OR "Acanthosoma haemorrhoidale" OR "Aceria tristriata" OR "Eriophyes tristriatus" OR "Aades cultratus" OR "Abraxas grossulariata" OR "Acleris cristana" OR "Acleris emargana" OR "Acleris rhombana" OR "Acleris variegana" OR "Acronicta alni" OR "Acronicta leporina" OR "Acronicta psi" OR "Acronicta rumicis" OR "Actias selene" OR "Actinocladium rhodosporum" OR "Adoxophyes orana" OR "Adrastus limbatus" OR "Adrastus turcicus" OR "Aethalura punctulata" OR "Agaricus arvensis" OR "Agelastica alni" OR "Aglia tau" OR "Agrilus angustulus" OR "Agrilus hastilifer" OR "Agrilus laticornis" OR "Agrilus viridis" OR "Agriopis aurantiaria" OR "Agriopis marginaria" OR "Agriotes pilosellus" OR "Agrobacterium radiobacter" OR "Agrobacterium tumefaciens" OR "Rhizobium radiobacter" OR "Agrochola helvola" OR "Ahasverus advena" OR "Alabonia geoffrella" OR "Alcis repandata" OR "Alebra coryli" OR "Alebra wahlbergi" OR "Allantus coryli" OR "Alnetoidea alneti" OR "Alnetoidia alneti" OR "Alosterna tabacicolor" OR "Alsophila aescularia" OR "Alternaria arborescens" OR "Alternaria scrophulariae" OR "Pleospora vulgaris var. putaminum" OR "Alternaria alternata" OR "Alternaria tenuis" OR "Alternaria tenuissima" OR "Altica brevicollis" OR "Ampagia rudis" OR "Ampedus elongatus" OR "Amphipyra pyramidea" OR "Amphitetranychus viennensis" OR "Tetranychus viennensis" OR "Anguillosporella vermiformis" OR "Angustimassarina coryli" OR "Anisandrus dispar" OR "Xyleborus dispar" OR "Anisogramma anomala" OR "Apioporthe anomala" OR "Cryptosporella anomala" OR "Anisota stigma" OR "Anisota virginiensis" OR "Annulohypoxylon multiforme var. multiforme" OR "Anomala osmanlis" OR "Anoplognathus concolor" OR "Anoplophora chinensis" OR "Anoplophora glabripennis" OR "Anoplus plantaris" OR "Anoplus roboris" OR "Anoplus setulosus" OR "Anthaxia smaragdifrons" OR "Anthocoptes loricatus" OR "Anthostoma decipiens" OR "Aphodius fimetarius" OR "Aphodius tasmaniae" OR "Aphthona melancholica" OR "Apiognomonia errabunda" OR "Apion flavipes" OR "Apion nigritarse" OR "Apion semivittatum" OR "Apion vorax" OR "Apiosporium persoonii" OR "Aplosporella coryli" OR "Sphaeropsis coryli" OR "Apocheima hispidaria" OR "Apoderus coryli" OR "Apple mosaic virus" OR "Arboridia ribauti" OR "Archips betulana" OR "Archips crataegana" OR "Archips rosana" OR "Archips xylosteana" OR "Archips xylosteanus" OR "Argyresthia ivella" OR "Armillaria gallica" OR "Armillaria mellea" OR "Armillaria novae-zelandiae" OR "Armillaria ostoyae" OR "Artemisia vulgaris" OR "Arthrobotrys irregularis" OR "Arthrobotrys superba" OR "Ascochyta coryli" OR "Aspergillus flavus" OR "Aspergillus glaucus" OR "Aspergillus brasiliensis" OR "Aspergillus niger" OR "Asterobemisia avellanae" OR "Asterobemisia carpini" OR "Asteroma coryli" OR "Septoria avellanae" OR "Asteromella gorholtii" OR "Asthena albulata" OR "Attelabus nitens" OR "Aureobasidium pullulans var. pullulans" OR "Automeris io" OR "Bangasternus orientalis" OR "Bertia moriformis" OR "Bimichaelia grandis" OR "Bionectria ochroleuca" OR "Nectria ochroleuca" OR "Bipolaris oryzae" OR "Helminthosporium macrocarpum" OR "Biscirus silvaticus" OR "Biscogniauxia anceps" OR "Biscogniauxia mediterranea" OR "Biston strataria" OR "Bjerkandera adusta" OR "Boeremia exigua" OR "Phoma exigua" OR "Botryobasidium pruinatum" OR "Botrytis cinerea" OR "Brachionycha sphinx" OR "Brachysporium fusiforme" OR "Cryptadelphia fusiformis" OR "Brachysporium nigrum" OR "Brevipalpus obovoides" OR "Brunnipila calycioides" OR "Brunnipila calyculiformis" OR "Dasyscyphus calyculiformis" OR "Bryobia angustisetis" OR "Bryobia rubrioculus" OR "Bryobia ulmophila" OR "Bucculatrix demaryella" OR "Bulgaria inquinans" OR "Byctiscus betulae" OR "Cabera exanthemata" OR "Cabera pusaria"

(Continues)

TABLE B.1 (Continued)

OR "Cacoecimorpha pronubana" OR "Cacopaurus pestis" OR "Caedicia simplex" OR "Caenorhinus mannerheimii" OR "Calliteara pudibunda" OR "Calosphaeria corylina" OR "Calycina claroflava" OR "Helotium sulphurinum" OR "Camaropella lutea" OR "Camarops lutea" OR "Campaea margaritata" OR "Candelabrum spinulosum" OR "Candidatus Phytoplasma asteris" OR "Candidatus phytoplasma fragariae" OR "Phytoplasma fragariae" OR "Candidatus phytoplasma mali" OR "Phytoplasma mali" OR "Candidatus phytoplasma prunorum" OR "Phytoplasma prunorum" OR "Candidatus Phytoplasma pyri" OR "Phytoplasma pyri" OR "Capua vulgana" OR "Carpocoris purpureipennis" OR "Cecidophyopsis vermiformis" OR "Eriophyes betulae" OR "Cenangium dolosum" OR "Ceratostoma venetum" OR "Cercospora coryli" OR "Cercospora corylina" OR "Cerioporus leptocephalus" OR "Polyporus leptocephalus" OR "Cerioporus varius" OR "Polyporus varius" OR "Cerrena unicolor" OR "Chaetosphaerella phaeostroma" OR "Chaetosphaeria callimorpha" OR "Chaetosphaeria myriocarpa" OR "Chloridium clavaeforme" OR "Chalara affinis" OR "Chalara insignis" OR "Chinavia hilaris" OR "Chionaspis lintneri" OR "Chionaspis salicis" OR "Chlorociboria aeruginascens" OR "Chloroclysta siterata" OR "Chondrostereum purpureum" OR "Choristoneura conflictana" OR "Choristoneura hebenstreitella" OR "Choristoneura rosaceana" OR "Chrysobothris mali" OR "Chrysolina chalcites" OR "Chrysolina polita" OR "Ciboria amentacea" OR "Ciboria coryli" OR "Cicadetta montana" OR "Citheronia regalis" OR "Cladobotryum fungicola" OR "Cladosporium aphidis" OR "Cladosporium exile" OR "Cladosporium fumago" OR "Cladosporium fumago f. coryli" OR "Cladosporium fusiforme" OR "Cladosporium herbarum" OR "Cladosporium inversicolor" OR "Cladosporium lycoperdinum" OR "Cladosporium perangustum" OR "Cladosporium phyllactiniicola" OR "Cladosporium psychrotolerans" OR "Clania ignobilis" OR "Clematis vitalba" OR "Clonostachys rosea" OR "Clover yellow edge phytoplasma" OR "Clover yellow-edge phytoplasma" OR "Clytra nigrocincta" OR "Clytus arietis" OR "Cnephasia longana" OR "Coeliodes ruber" OR "Coleophora anatipennella" OR "Coleophora badiipennella" OR "Coleophora badipenella" OR "Coleophora binderella" OR "Coleophora currucipennella" OR "Coleophora fuscocuprella" OR "Coleophora fuscopretella" OR "Coleophora milvipennis" OR "Coleophora orbitella" OR "Coleophora serratella" OR "Coleophora violacea" OR "Colletotrichum acutatum" OR "Glomerella acutata" OR "Colletotrichum fioriniae" OR "Colocasia coryli" OR "Colotois pennaria" OR "Comstockaspis perniciosa" OR "Coniortodes salicellus" OR "Coniothecium complanatum" OR "Conoplea olivacea" OR "Contarinia coryli" OR "Contarinia cybelae" OR "Coptophylla lamimani" OR "Coreus marginatus" OR "Coronophora angustata" OR "Coronophora ovipara" OR "Corticium confine" OR "Corticium roseum" OR "Laeticorticium roseum" OR "Corylobium avellanae" OR "Corynesporopsis quercicola" OR "Corythucha arcuata" OR "Coslenchus diversus" OR "Cosmia trapezina" OR "Cosmospora nothepisphaeria" OR "Fusisporium episphaericum" OR "Craniophora ligustri" OR "Crepidodera aurata" OR "Crepidodera aurea" OR "Criconemella xenoplax" OR "Cristinia eichleri" OR "Cristinia gallica" OR "Cristulariella depraedans" OR "Crocallis elinguaria" OR "Croesus brischkei" OR "Nematus brischkei" OR "Cryphonectria radicalis" OR "Endothia gyrosa" OR "Cryptocephalus bipunctatus" OR "Cryptocephalus coryli" OR "Cryptocephalus nitidulus" OR "Cryptocephalus parvulus" OR "Cryptocephalus primarius" OR "Cryptocephalus punctiger" OR "Cryptocephalus pusillus" OR "Cryptocephalus sexpunctatus" OR "Cryptocoryneum condensatum" OR "Cryptodiaporthe pyrrhocystis" OR "Cryptospora corylina" OR "Cryptosporella corylina" OR "Ophiovalsa corylina" OR "Winterella corylina" OR "Cryptosporiopsis coryli" OR "Cryptosporiopsis grisea" OR "Myxosporium griseum" OR "Cryptosporiopsis tarraconensis" OR "Cucurbitaria coryli" OR "Cunaxoides biscutum" OR "Cunaxoides parvus" OR "Curculio nucum" OR "Curculio uniformis" OR "Cyanosporus subcaesius" OR "Cydia latiferreana" OR "Cylindrocarpon rhodospermum" OR "Fusidium rhodospermum" OR "Cylindrosporium coryli" OR "Cyrtidula quercus" OR "Mycoporum quercus var. ilicis" OR "Cyta grandjeani" OR "Cytospora ceratosperma" OR "Cytospora fuckelii" OR "Valsa ceratosperma" OR "Valsa fuckelii" OR "Cytospora corylicola" OR "Cytospora fugax" OR "Cytospora phlyctaenoides" OR "Cytospora ambiens" OR "Cytospora populina" OR "Valsa ambiens" OR "Valsa rhodophila" OR "Daedaleopsis confragosa" OR "Daldinia decipiens" OR "Daldinia fissa" OR "Daldinia lloydii" OR "Daldinia vernicosa" OR "Dasineura corylina" OR "Perrisia corylina" OR "Datana ministra" OR "Dematophora necatrix" OR "Rosellinia necatrix" OR "Dendrothrips degeeri" OR "Deporaus betulae" OR "Deporaus mannerheimi" OR "Deraeocoris scutellaris" OR "Diaporthe amygdali" OR "Fusicoccum amygdali" OR "Diaporthe australafricana" OR "Diaporthe conjuncta" OR "Phomopsis decedens var. conjuncta" OR "Allantoporthe decedens" OR "Diaporthe decedens" OR "Diaporthe eres" OR "Phomopsis velata" OR "Diaporthe foeniculina" OR "Diaporthe revellens" OR "Phomopsis revellens" OR "Diaporthella cryptica" OR "Diarsia mendica" OR "Diaspidiotus distinctus" OR "Diaspidiotus ostreaeformis" OR "Diatrype bullata" OR "Diatrype decorticata" OR "Diatrype disciformis" OR "Diatrype rappazii" OR "Diatrype subaffixa var. rappazii" OR "Diatrype stigma" OR "Diatrype undulata" OR "Diatrypella favacea" OR "Diatrypella verrucaeformis" OR "Diatrypella verruciformis" OR "Diatrypella guceviczii" OR "Diatrypella pulvinata" OR "Dicallomera fascelina" OR "Dichomeris ustalella" OR "Codinaea fertilis" OR "Dictyochaeta fertilis" OR "Didymella corylicola" OR "Didymella pomorum" OR "Phoma pomorum" OR "Diphucephala smaragdula" OR "Diplococcium lawrencei" OR "Diplodia coryli" OR "Diplodia corylina" OR "Diplodia herbarum" OR "Diplodia seriata" OR "Discosia artocreas" OR "Diurnea fagella" OR "Dolycoris baccarum" OR "Dothichiza turgida" OR "Dothiorella iberica" OR "Dothiorella omnivora" OR "Dothiorella parva" OR "Diplodia sarmentorum" OR "Dothiorella sarmentorum" OR "Dothiorella symphoricarposicola" OR "Dothiorella vidmadera" OR "Drepana curvatula" OR "Drepanothrips reuteri" OR "Dryobotodes eremita" OR "Dryocoetinus alni" OR "Ectoedemia minimella" OR "Ectropis bistortata" OR "Ectropis crepuscularia" OR "Edwardsiana avellanae" OR "Edwardsiana frustrator" OR "Edwardsiana ishidai" OR "Edwardsiana hippocastani" OR "Edwardsiana lethierryi" OR "Edwardsiana plebeja" OR "Edwardsiana rosae" OR "Edwardsiana spinigera" OR "Efibula tuberculata" OR "Phanerochaete tuberculata" OR "Elaphomyces citrinus" OR "Elasmopalpus lignosellus" OR "Elasmostethus interstinctus" OR "Elasmucha grisea" OR "Elsinoe coryli" OR "Empoasca vitis" OR "Encoelia furfuracea" OR "Endophragmiella boothii" OR "Endophragmiella uniseptata" OR "Endothia radicalis" OR "Endotricha flammealis" OR "Endromis versicolora" OR "Ennomos autumnaria" OR "Eotetranychus carpini" OR "Eotetranychus colurnae" OR "Eotetranychus coryli" OR "Eotetranychus pruni" OR "Eotetranychus tiliarium" OR "Eotetranychus tiliarum" OR "Ephestia cautella" OR "Epicoccum nigrum" OR "Epinotia brunnichana" OR "Epinotia solandriana" OR "Epinotia tenerana" OR "Epione repandaria" OR "Epiptera europaea" OR "Epirrita autumnata" OR "Epirrita christyi" OR "Epirrita dilutata" OR "Erannis defoliaria" OR "Eremothecium coryli" OR "Nematospora coryli" OR "Eremothecium cymbalariae" OR "Eriogaster lanestris" OR "Eriophyes erineus" OR "Erysiphe corylacearum" OR "Erysiphe corylicola" OR "Erysiphe ellisii" OR "Erysiphe verruculosa" OR "Erythroneura angusta" OR "Esperia oliviella" OR "Eulecanium ciliatum" OR "Eulecanium douglasi" OR "Eulecanium rugulosum" OR "Eulecanium tiliae" OR "Eulia ministrana" OR "Eulithis testata" OR "Euproctis chrysorrhoea" OR "Euproctis similis" OR "Eupsilia transversa" OR "Eurydema oleraceum" OR "Diatrype flavovirens" OR "Eutypa flavovirens" OR "Eutypa lata" OR "Eutypa lejoplaca" OR

TABLE B.1 (Continued)

"Eutypella leprosa" OR "Eutypella sorbi" OR "Euura melanocephalus" OR "Euzophera osseatella" OR "Exomias pellucidus" OR "Eysarcoris ventralis" OR "Fagocyba cruenta" OR "Fenestella macrospora" OR "Flagelloscypha merxmuelleri" OR "Flavescence dorée phytoplasma" OR "Fomes fomentarius" OR "Fomitiporia mediterranea" OR "Fomitiporia punctata" OR "Fomes ungulatus" OR "Fomitopsis pinicola" OR "Frutioidia bisignata" OR "Fusarium avenaceum" OR "Fusarium lateritium" OR "Gibberella baccata" OR "Gibberella gordonia" OR "Gloeocystidiellum porosum" OR "Gloeosporium corylinum" OR "Gloeosporium perexiguum" OR "Fusarium poae" OR "Fusarium sporotrichioides" OR "Fuscoporia contigua" OR "Phellinus contiguus" OR "Fuscoporia ferrea" OR "Fuscoporia ferruginosa" OR "Phellinus ferruginosus" OR "Galerucella lineola" OR "Ganoderma lucidum" OR "Genea hispidula" OR "Genea sphaerica" OR "Genea verrucosa" OR "Geometra papilionaria" OR "Gloeosporium rostratum" OR "Gloeosporium vogelianum" OR "Gnomonia amoena" OR "Gnomonia gnomon" OR "Gnomonia vulgaris" OR "Gnomoniella vulgaris" OR "Gnomonia incrassata" OR "Gnomonia monodii" OR "Gnomonia nervisequa" OR "Gnomonia pseudoamoena" OR "Gnomoniella avellanae" OR "Gnomonia tubiformis" OR "Gnomoniella tubaeformis" OR "Gnomoniopsis smithogilvyi" OR "Gonioctena decemnotata" OR "Gonioctena pallida" OR "Phytodecta pallida" OR "Gonioctena viminalis" OR "Gonocerus acuteangulatus" OR "Gonodera luperus" OR "Gracilacus audriellus" OR "Gracilacus straeleni" OR "Gracilia minuta" OR "Grapevine flavescence dorée phytoplasma" OR "Grifola frondosa" OR "Gymnopus fusipes" OR "Gynandrophtalma xanthapes" OR "Gypsonoma dealbana" OR "Habrosyne pyritoides" OR "Haltica bicarinata" OR "Haltica nemorum" OR "Halyomorpha halys" OR "Haplothrips victoriensis" OR "Harmonia axyridis" OR "Hedya pruniana" OR "Helicotylenchus crenicauda" OR "Heliothis armigera" OR "Helminthosporium rhopaloides" OR "Helminthosporium velutinum" OR "Helvella elastica" OR "Leptopodia elastica" OR "Hemiberlesia rapax" OR "Hemichroa crocea" OR "Hemicycliophora punensis" OR "Hemicycliophora sturhani" OR "Hemithea aestivaria" OR "Herminia grisealis" OR "Fomes annosus" OR "Heterobasidion annosum" OR "Heterobasidion annosum sensu lato" OR "Heterobasidion araucariae" OR "Heteroconium tetracoilum" OR "Lylea tetracoila" OR "Heterogenea asella" OR "Eichleriella deglubens" OR "Heteroradulum deglubens" OR "Hilberina caudata" OR "Lasiosphaeria caudata" OR "Hilberina punctata" OR "Lasiosphaeria punctata" OR "Holcostethus vernalis" OR "Homeopronematus staerki" OR "Hoplia pollinosa" OR "Hyalophora cecropia" OR "Hydnobolites cerebriformis" OR "Hydnoporia corrugata" OR "Hymenochaete corrugata" OR "Hydnoporia tabacina" OR "Hymenochaete tabacina" OR "Hydrelia sylvata" OR "Hydriomena furcata" OR "Hymenochaete cinnamomea" OR "Hymenoscyphus fructigenus" OR "Hypatima rhomboidella" OR "Hyphantria cunea" OR "Hyphoderma setigerum" OR "Hyphodontia sambuci" OR "Xylodon sambuci" OR "Creopus gelatinosus" OR "Hypocrea gelatinosa" OR "Hypocrea strictipilosa" OR "Hypomecis punctinalis" OR "Hypomyces rosellus" OR "Hypoxylon fragiforme" OR "Hypoxylon fuscum" OR "Hypoxylon howeanum" OR "Hypoxylon pulcherrimum" OR "Hypoxylon perforatum" OR "Hysterographium flexuosum" OR "Hysterographium fraxini" OR "Ileostylus micranthus" OR "Incurvaria intermediella" OR "Incurvaria pectinea" OR "Clitocybe geotropa" OR "Infundibulicybe geotropa" OR "Isophyia tenuicerca" OR "Issus coleoptratus" OR "Hypoxylon cohaerens" OR "Jackrogersella cohaerens" OR "Hypoxylon multiforme" OR "Jackrogersella multiformis" OR "Jodis lactearia" OR "Kerria lacca lacca" OR "Kirschsteiniothelia aethiops" OR "Kirschsteiniothelia atra" OR "Labidostomis propinqua" OR "Lacanobia contigua" OR "Lacanobia oleracea" OR "Lacanobia suasa" OR "Lachnum brevipilosum" OR "Lachnum virgineum" OR "Lactarius pyrogalus" OR "Lasiocampa quercus" OR "Lasiorhynchites comatus" OR "Lasiosphaeria vestita" OR "Leiopus nebulosus" OR "Lentinus brumalis" OR "Polyporus brumalis" OR "Lentinus substrictus" OR "Polyporus ciliatus" OR "Lentomita hirsutula" OR "Endoxyla cirrhosa" OR "Lentomitella cirrhosa" OR "Leotia lubrica" OR "Lepidosaphes conchiformis" OR "Lepidosaphes conchyformis" OR "Lepidosaphes ulmi" OR "Leptosphaeria avellanae" OR "Leptosphaeria vagabunda" OR "Lestodiplosis aprimiki" OR "Letendraea helminthicola" OR "Leucoptera scitella" OR "Leucostoma auerswaldii" OR "Valsa auerswaldii" OR "Lindbergina aurovittata" OR "Lindtneria trachyspora" OR "Liothula omnivora" OR "Lomaspilis marginata" OR "Longidorus barsii" OR "Anthostoma dubium" OR "Lopadostoma dubium" OR "Lophiostoma compressum" OR "Lopholeucaspis japonica" OR "Lorryia livshitzi" OR "Lorryia obnoxia" OR "Lorryia paraobliqua" OR "Luperus flavipes" OR "Luperus longicornis" OR "Lygocoris pabulinus" OR "Dryocoetes coryli" OR "Lymantor coryli" OR "Triotemnus coryli" OR "Lymantria dispar" OR "Lymantria monacha" OR "Macrophoma corylina" OR "Macrosiphum corylicola" OR "Macrosiphum euphorbiae" OR "Malacocoris chlorizans" OR "Malacosoma americanum" OR "Malacosoma disstria" OR "Malacosoma neustria" OR "Gnomonia coryli" OR "Gnomoniella coryli" OR "Mamiania coryli" OR "Mamianiella coryli" OR "Massarina microcarpa" OR "Megaplatypus mutatus" OR "Melampsoridium carpini" OR "Melanchra persicariae" OR "Melanconiella flavovirens" OR "Melanconis flavovirens" OR "Melanogaster broomeanus" OR "Melanomma pulvis-pyrius" OR "Melogramma campylosporum" OR "Melolontha albida" OR "Melolontha melolontha" OR "Melolontha pectoralis" OR "Chaetosphaeria ovoidea" OR "Menispora glauca" OR "Zignoella ovoidea" OR "Merophyas divulsana" OR "Mesocallis corylicola" OR "Mesoleuca albicillata" OR "Metcalfa pruinosa" OR "Microdiplodia coryli" OR "Microdiplodia microsporella" OR "Microtydeus beltrani" OR "Mikomya coryli" OR "Oligotrophus coryli" OR "Oligotrophus tympanifex" OR "Mimas tiliae" OR "Miris striatus" OR "Monilia coryli" OR "Monilia fructigena" OR "Monilinia fructigena" OR "Sclerotinia fructigena" OR "Monilia laxa" OR "Monilinia laxa" OR "Moniliopsis foliicola" OR "Monochaetia concentrica" OR "Monochaetia coryli" OR "Monodictys putredinis" OR "Mordella aculeata" OR "Mordellistana pumila" OR "Morganella longispina" OR "Mycena alcalina" OR "Mycena haematopoda" OR "Mycena pseudocorticola" OR "Arthopyrenia antecellens" OR "Mycoporum antecellens" OR "Mycosphaerella corylaria" OR "Mycosphaerella punctiformis" OR "Myxosporium roumeguerei" OR "Myzocallis coryli" OR "Myzus persicae" OR "Naupactus leucoloma" OR "Nectria cinnabarina" OR "Tubercularia vulgaris" OR "Hypoxylon confluens" OR "Nemania confluens" OR "Nemania serpens" OR "Nematinus acuminatus" OR "Nematinus luteus" OR "Nematinus willigkiae" OR "Nematus leucotrochus" OR "Nematus septentrionalis" OR "Nematus umbratus" OR "Neochromaphis coryli" OR "Lygocoris viridis" OR "Neolygus viridis" OR "Nectria ditissima" OR "Neonectria ditissima" OR "Nectria punicea" OR "Neonectria punicea" OR "Neopestalotiopsis asiatica" OR "Neumichtis saliaris" OR "Nezara viridula" OR "Nitschkia cupularis" OR "Noctua fimbriata" OR "Noctua janthina" OR "Notodonta dromedaria" OR "Notodonta dromedarius" OR "Oberea linearis" OR "Ochropacha duplaris" OR "Odontopera bidentata" OR "Oecanthus pellucens" OR "Oecophora bractella" OR "Oedemera lurida" OR "Oemona hirta" OR "Oligonychus caucasicus" OR "Oligonychus kobachidzei" OR "Oncopsis avellanae" OR "Operophtera brumata" OR "Gnomonia ischnostyla" OR "Ophiognomonia ischnostyla" OR "Gnomonia setacea" OR "Ophiognomonia setacea" OR "Opisthograptis luteolata" OR "Orchestes hortorum" OR "Orchestes signifer" OR "Orchestes stigma" OR "Orgyia antiqua" OR "Orgyia leucostigma" OR "Orgyia recens" OR "Orientus ishidae" OR "Orthosia cerasi" OR "Orthosia cruda" OR "Orthosia gothica" OR "Orthosia incerta" OR "Orthosia miniosa" OR "Orthotylus marginalis" OR "Orthotylus prasinus" OR "Orthotylus tenellus" OR "Osbornellus auronitens" OR "Otiorhynchus armadillo" OR "Otiorhynchus brachialis" OR "Otiorhynchus scaber" OR "Otiorhynchus

(Continues)

TABLE B.1 (Continued)

singularis" OR "Otthia corylina" OR "Otthia spiraeae" OR "Oxycarenus lavaterae" OR "Pachyprotasis rapae" OR "Palomena prasina" OR "Pamphilius fumipennis" OR "Pandemis cerasana" OR "Pandemis corylana" OR "Panonychus ulmi" OR "Pantilius tunicatus" OR "Parachronistis albiceps" OR "Paracolax tristalis" OR "Eriocrania chrysolepidella" OR "Paracrania chrysolepidella" OR "Paradarisa extersaria" OR "Parectropis similaria" OR "Paralipsa gularis" OR "Paralongidorus maximus" OR "Paratylenchus straeleni" OR "Parornix avellanella" OR "Parornix devoniella" OR "Parthenolecanium corni" OR "Parthenolecanium corni corni" OR "Parthenolecanium persicae" OR "Parthenolecanium rufulum" OR "Paxillus involutus" OR "Pealius quercus" OR "Pechipogo strigilata" OR "Peliococcus serratus" OR "Penicillium aurantiogriseum" OR "Penicillium chrysogenum" OR "Penicillium notatum" OR "Penicillium digitatum" OR "Penicillium expansum" OR "Penicillium glaucum" OR "Peniophora cinerea" OR "Hyphoderma praetermissum" OR "Peniophorella praetermissa" OR "Pentatoma rufipes" OR "Peritelus sphaeroides" OR "Peroneutypa heteracantha" OR "Peroneutypa scoparia" OR "Pestalotia coryli" OR "Pestalotia guepinii" OR "Pestalotiopsis guepinii" OR "Pestalotiopsis ixorae" OR "Pestalotiopsis mangiferae" OR "Pestalotiopsis oxyanthi" OR "Pestalotiopsis virgatula" OR "Botryosphaeria obtusa" OR "Peyronellaea obtusa" OR "Physalospora obtusa" OR "Pezicula aesculea" OR "Pezicula corylina" OR "Phaeoacremonium vibratile" OR "Pleurostoma vibratile" OR "Phaeoblastophora peckii" OR "Phaeodothis winteri" OR "Phalera bucephala" OR "Peniophora cremea" OR "Phanerochaete sordida" OR "Phaneroptera nana nana" OR "Fomes igniarius" OR "Phellinus alni" OR "Phellinus igniarius" OR "Phenacoccus aceris" OR "Phigalia pilosaria" OR "Phlogophora meticulosa" OR "Phlogotettix cyclops" OR "Phoma exigua var. exigua" OR "Phomatospora leptasca" OR "Phomopsis avellana" OR "Microsphaera alni" OR "Phyllactinia alnicola" OR "Phyllactinia corylea" OR "Phyllactinia guttata" OR "Phyllactinia suffulta" OR "Phyllactinia suffulta f. coryli-avellanae" OR "Phyllobius argentatus" OR "Phyllobius calcaratus" OR "Phyllobius glaucus" OR "Phyllobius maculicornis" OR "Phyllobius oblongus" OR "Phyllobius pyri" OR "Phyllobius roboretanus" OR "Phyllobius schneideri" OR "Phyllobius viridiaeris" OR "Phyllocoptes coryli" OR "Lithocolletis corylifoliella" OR "Phyllonorycter corylifoliella" OR "Phyllonorycter coryli" OR "Phyllonorycter danica" OR "Phyllonoryceter nicelli" OR "Phyllonoryceter nicellii" OR "Phyllonorycter nicellii" OR "Phyllopertha lineolata" OR "Phyllosticta corylaria" OR "Phyllosticta coryli" OR "Phylus coryli" OR "Phymatotrichopsis omnivora" OR "Physarum cinereum" OR "Phytobia cambii" OR "Phytocoris longipennis" OR "Phytoecia cylindrica" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora citricola" OR "Phytophthora gonapodyides" OR "Phytophthora plurivora" OR "Phytophthora ramorum" OR "Phytophthora syringae" OR "Phytocoptella avellanae" OR "Phytoptus avellanae" OR "Phytoptus coryli" OR "Phytoptus coryligallorum" OR "Phytoptus pseudogallarum" OR "Picipes tubaeformis" OR "Polyporus tubaeformis" OR "Piezedorus lituratus" OR "Gloeosporium coryli" OR "Labrella coryli" OR "Monostichella coryli" OR "Piggotia coryli" OR "Orthops cervinus" OR "Pinalitus cervinus" OR "Plagodis pulveraria" OR "Pleospora henningsiana" OR "Plodia interpunctella" OR "Poecilocampa populi" OR "Poecilometis strigatus" OR "Pogonocherus hispidulus" OR "Polia nebulosa" OR "Polydesmia pruinosa" OR "Polydrosus alaiensis" OR "Polydrosus rufulus" OR "Polydrosus sparsus" OR "Polydrosus urali" OR "Polydrusus cervinus" OR "Polydrusus corruscus" OR "Polydrusus formosus" OR "Polydrusus sericeus" OR "Polydrusus marginatus" OR "Polydrosus micans" OR "Polydrusus mollis" OR "Polydrusus pterygomalis" OR "Polydrusus tereticollis" OR "Polydrusus undatus" OR "Polygonia c-album" OR "Polyphylla fullo" OR "Polyporus lepideus" OR "Polyporus melanopus" OR "Polyporus tuberaster" OR "Polyscytalum fecundissimum" OR "Popillia japonica" OR "Pratylenchoides hispaniensi" OR "Pratylenchus crenatus" OR "Pratylenchus neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus pratensisobrinus" OR "Pratylenchus thornei" OR "Pratylenchus vulnus" OR "Prunus necrotic ringspot virus" OR "Psallus perrisi" OR "Psallus variabilis" OR "Camarosporium propinquum" OR "Pseudocamarosporium propinquum" OR "Pseudoips fagana" OR "Pseudoips prasinana" OR "Pseudoips fagana ssp. Brittanica" OR "Pseudoips praninana" OR "Pseudomassaria necans" OR "Pseudophacidium necans" OR "Pseudomonas avellanae" OR "Pseudomonas syringae pv. avellanae" OR "Pseudomonas syringae" OR "Pseudomonas syringae pv. coryli" OR "Pseudomonas syringae pv. syringae" OR "Pseudospiropes obclavatus" OR "Psylliodes picina" OR "Pterocallis affinis" OR "Ptilodon capucina" OR "Pucciniastrum coryli" OR "Pulvinaria kuwacola" OR "Pulvinaria vitis" OR "Pylus coryli" OR "Pyramidospora herculiformis" OR "Mollisia benesuada" OR "Pyrenopeziza benesuada" OR "Pyrenula coryli" OR "Pyrrhia umbra" OR "Ramularia coryli" OR "Ramularia endophylla" OR "Ramularia inaequalis" OR "Recurvaria nanella" OR "Repsimus manicatus" OR "Ramphus pulicarius" OR "Rhamphus pulicarius" OR "Rhaphigaster nebulosa" OR "Rhinocladiella coryli" OR "Rhizobium rhizogenes" OR "Rhizoctonia anceps" OR "Rhodococcus turanicus" OR "Rhogogaster punctulata" OR "Rhynchaenus avellanae" OR "Rhynchites sericeus" OR "Ribautiana cruciata" OR "Ribautiana debilis" OR "Ribautiana tenerrima" OR "Ribautiana ulmi" OR "Rosellinia corticium" OR "Rosellinia helvetica" OR "Rosellinia subsimilis" OR "Rubus canescens" OR "Saccosoma farinaceum" OR "Safianema anchilosposomus" OR "Salebriopsis albicilla" OR "Salvia verbenaca" OR "Saperda carcharias" OR "Saperda populnea" OR "Saperda scalaris" OR "Sarcoscypha coccinea" OR "Saturnia lindia" OR "Saturnia pavonia" OR "Saturnia pyri" OR "Schizophyllum commune" OR "Schizopora paradoxa" OR "Encoelia fascicularis" OR "Sclerencoelia fascicularis" OR "Scleroderma bovista" OR "Scolytus mali" OR "Scutylenchus leonorus" OR "Scytinostromella heterogenea" OR "Selenia dentaria" OR "Selenia tetralunaria" OR "Septomyxa fagicola" OR "Septoria coryli" OR "Septoria ostryae" OR "Sermylassa halensis" OR "Sillia ferruginea" OR "Sillia karstenii" OR "Sistotremastrum niveocremeum" OR "Skeletocutis nivea" OR "Skeletocutis semipileata" OR "Tyromyces semipileatus" OR "Diplodia sapinea" OR "Sphaeropsis sapinea" OR "Spilonota ocellana" OR "Splanchnonema loricatum" OR "Sporidesmium coronatum" OR "Sporidesmium ehrenbergii" OR "Sporormiella pulchella" OR "Mycosphaerella caricae" OR "Stagonosporopsis caricae" OR "Stauropus fagi" OR "Steccherinum ochraceum" OR "Stereum hirsutum" OR "Stereum rugosum" OR "Stictis confusum" OR "Nepticula floslactella" OR "Stigmella floslactella" OR "Nepticula malella" OR "Stigmella malella" OR "Stigmella microtheriella" OR "Strigula lateralis" OR "Strigula tagananae" OR "Strophosoma melanogrammum" OR "Strophosomus melanogrammus" OR "Pseudospiropes nodosus" OR "Strossmayeria atriseda" OR "Stylonectria applanata" OR "Synanthedon codeti" OR "Synanthedon spuleri" OR "Synanthedon tipuliformis" OR "Synaptospora olandica" OR "Synaptus filiformis" OR "Syneta albida" OR "Tachyerges pseudostigma" OR "Rhynchaenus stigma" OR "Tachyerges stigma" OR "Taeniolella scripta" OR "Taeniolina scripta" OR "Tapesia lividofusca" OR "Taphrina coryli" OR "Tarsonemus karli" OR "Tarsonemus lobosus" OR "Tegonotus depressus" OR "Teia anartoides" OR "Telechrysis tripuncta" OR "Teleiodes wagae" OR "Tenthredo fagi" OR "Tenthredo livida" OR "Tetranychopsis horridus" OR "Tetranycopsis horridus" OR "Tetranychus canadensis" OR "Tetranychus turkestani" OR "Tetranychus urticae" OR "Tetranycopsis iranensis" OR "Thaumetopoea processionea" OR "Thecla betulae" OR "Nectria mammoidea" OR "Thelonectria mammoidea" OR "Thrips australis" OR "Nectria coryli" OR "Pleonectria coryli" OR "Thyronectria coryli" OR "Thyronectria rhodochlora" OR "Tomasellia gelatinosa" OR "Tortricodes alternella" OR "Tortrix viridana" OR "Trabutia quercina" OR "Trachys minuta" OR "Trachys minutus" OR "Trametes hirsuta" OR "Trametes multicolor" OR "Trametes ochracea" OR "Trametes pubescens" OR

TABLE B.1 (Continued)

	"Polystictus versicolor" OR "Trametes versicolor" OR "Trematosphaeria pertusa" OR "Trichiosoma vitellinae" OR "Trichiura crataegi" OR "Hypocrea aureoviridis" OR "Trichoderma aureoviride" OR "Hypocrea crystalligena" OR "Trichoderma crystalligenum" OR "Hypocrea estonica" OR "Trichoderma estonicum" OR "Hypocrea lixii" OR "Trichoderma lixii" OR "Hypocrea longipilosa" OR "Trichoderma longipilis" OR "Hypocrea parestonica" OR "Trichoderma parestonicum" OR "Hypocrea rufa" OR "Trichoderma lignorum" OR "Trichoderma viride" OR "Trichodorus pseudobursatus" OR "Trichosphaeria melanostigmoides" OR "Trichosphaeria notabilis" OR "Trichothecium roseum" OR "Trimmatostroma salicis" OR "Triophtydeus immanis" OR "Triophtydeus triophthalmus" OR "Trirachys sartus" OR "Tropicoporus linteus" OR "Tuber borchii" OR "Tuber maculatum" OR "Tulare apple mosaic virus" OR "Tydeus kochi" OR "Tydeus linarocatus" OR "Tydeus parainflatus" OR "Tylenchorhynchus cylindricus" OR "Typhlocyba quercus" OR "Tyromyces chioneus" OR "Valdensia heterodoxa" OR "Aculus comatus" OR "Vasates comatus" OR "Vasates comatus var. betuli" OR "Velutarina rufo-olivacea" OR "Veronaea botryosa" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Vuilleminia comedens" OR "Vuilleminia coryli" OR "Wettsteinina coryli" OR "Xanthomonas arboricola" OR "Xanthomonas arboricola pv. corylina" OR "Xanthomonas campestris pv. corylina" OR "Xanthomonas campestris" OR "Xestia ditrapezium" OR "Xestia triangulum" OR "Xiphinema diversicaudatum" OR "Xiphinema italiae" OR "Xiphinema mediterraneum" OR "Xiphinema pachtaicum" OR "Xiphinema pyrenaicum" OR "Xylaria hypoxylon" OR "Xyleborinus attenuatus" OR "Xyleborinus saxesenii" OR "Xyleborus xylographus" OR "Xylena exsoleta" OR "Hyphodontia breviseta" OR "Xylodon brevisetus" OR "Hyphoderma radula" OR "Xylodon radula" OR "Xylosandrus compactus" OR "Xylosandrus germanus" OR "Ypsolopha parenthesella" OR "Zeugophora subspinosa" OR "Zeuzera pyrina" OR "Zygina flammigera" OR "Zygina tiliae"

APPENDIX C

Plant taxa reported to be present in the nurseries of *Corylus avellana*

TABLE C.1 Plant taxa reported in the Dossier Sections 3.0 to be present in the nurseries of *C. avellana*.

Number	Plant taxa	Number	Plant taxa
1	*Abelia*	639	*Malus* 'Red Jonaprince'
2	*Abies alba*	640	*Malus* 'Red Obelisk'
3	*Abies concolor*	641	*Malus* 'Red Topaz'
4	*Abies concolor* 'Violacea'	642	*Malus* 'Red Windsor'
5	*Abies fraseri*	643	*Malus* 'Reverend W. Wilks'
6	*Abies grandis*	644	*Malus* 'Ribston Pippin'
7	*Abies koreana*	645	*Malus* 'Rosehip'
8	*Abies nobilis*	646	*Malus* 'Rosemary Russet'
9	*Abies nordmanniana*	647	*Malus* 'Rosette'
10	*Abies procera*	648	*Malus* 'Royal Beauty'
11	*Acacia*	649	*Malus* 'Royalty'
12	*Acanthus*	650	*Malus* 'Rudolph'
13	*Acer*	651	*Malus* 'Santana'
14	*Acer campestre*	652	*Malus sargentii* 'Tina'
15	*Acer campestre* 'William Caldwell'	653	*Malus* 'Saturn'
16	*Acer capillipes*	654	*Malus* 'Scarlet Brandywine'
17	*Acer cappadocicum* 'Aureum'	655	*Malus* 'Scarlett'
18	*Acer cappadocicum* 'Rubrum'	656	*Malus* 'Scotch Bridget'
19	*Acer davidii*	657	*Malus* 'Scotch Dumpling'
20	*Acer davidii* 'Viper Mindavi'	658	*Malus* 'Scrumptious'
21	*Acer* 'Esk Flamingo'	659	*Malus* 'Somerset Redstreak'
22	*Acer griseum*	660	*Malus* 'Spartan'
23	*Acer macrocarpa*	661	*Malus* 'St Edmund's Russet'
24	*Acer negundo* 'Flamingo'	662	*Malus* 'Stirling Castle'
25	*Acer negundo* 'Kelly's Gold'	663	*Malus* 'Stoke Red'
26	*Acer negundo* 'Winter Lightning'	664	*Malus* 'Sun Rival'
27	*Acer orientalia*	665	*Malus* 'Sunset'
28	*Acer palmatum*	666	*Malus* 'Surprize'
29	*Acer palmatum* 'Atropurpureum'	667	*Malus sylvestris*
30	*Acer palmatum* 'Crimson Queen'	668	*Malus* 'Three Counties'
31	*Acer palmatum* 'Dissectum'	669	*Malus* 'Tom Putt'
32	*Acer palmatum* 'Enkan'	670	*Malus transitoria*
33	*Acer palmatum* 'Garnet'	671	*Malus transitoria* 'Thornhayes Tansy'
34	*Acer palmatum* 'Katsura'	672	*Malus* 'Tremlett's Bitter'
35	*Acer palmatum* 'Kinshi'	673	*Malus trilobata* 'Guardsman'
36	*Acer palmatum* 'Linearilobum'	674	*Malus* 'Trinity'
37	*Acer palmatum* 'Orange Dream'	675	*Malus tschonoskii*
38	*Acer palmatum* 'Osakazuki'	676	*Malus tschonoskii* 'Belmonte'
39	*Acer palmatum* 'Pixie'	677	*Malus* 'Van Eseltine'
40	*Acer palmatum* 'Sango kaku'	678	*Malus* 'Vicky'
41	*Acer palmatum* 'Seiryu'	679	*Malus* 'Warner's King'
42	*Acer palmatum* 'Shaina'	680	*Malus* 'William Crump'
43	*Acer palmatum* 'Suminagashi'	681	*Malus* 'Winter Gem'
44	*Acer palmatum* 'Tamukeyama'	682	*Malus* 'Worcester Pearmain'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
45	*Acer palmatum* 'Trompenburg'	683	*Malus* × *moerlandsii* 'Profusion Improved'
46	*Acer palmatum* 'Villa Taranto'	684	*Malus* × *robusta* 'Red Sentinel'
47	*Acer pensylvanicum*	685	*Malus* 'Yarlington Mill'
48	*Acer platanoides*	686	*Matteuccia*
49	*Acer platanoides* 'Crimson King'	687	*Meconopsis*
50	*Acer platanoides* 'Crimson Sentry'	688	*Mespilus* 'Nottingham'
51	*Acer platanoides* 'Drummondii'	689	*Metasequoia glyptostroboides*
52	*Acer platanoides* 'Princeton Gold'	690	*Miscanthus*
53	*Acer pseudoplatanus*	691	*Molinia*
54	*Acer pseudoplatanus* 'Brilliantissimum'	692	*Monarda*
55	*Acer pseudoplatanus* 'Esk Sunset'	693	*Morus* 'Carman'
56	*Acer pseudoplatanus* 'Leopoldii'	694	*Morus* 'Chelsea'
57	*Acer pseudoplatanus* 'Prinz Handjery'	695	*Morus* 'Giant Fruit'
58	*Acer rubrum*	696	*Morus* 'Mojo Berry'
59	*Acer rubrum* 'Autumn Flame'	697	*Morus* 'Pendula'
60	*Acer rubrum* 'Brandywine'	698	*Myrtus*
61	*Acer rubrum* 'October Glory'	699	*Nandina*
62	*Acer rubrum* 'Red Sunset'	700	*Nemesia*
63	*Acer rubrum* 'Scanlon'	701	*Nepeta*
64	*Acer rubrum* 'Sun Valley'	702	*Nothofagus*
65	*Acer saccharum*	703	*Nothofagus antarctica*
66	*Acer shirasawanum* 'Autumn Moon'	704	*Nyssa sylvatica*
67	*Acer* × *freemanii* 'Autumn Blaze'	705	*Nyssa sylvatica* 'Red Rage'
68	*Acer* × *freemanii* 'Morgan'	706	*Nyssa sylvatica* 'Wisley Bonfire'
69	*Achillea*	707	*Olearia*
70	*Acorus*	708	*Ophiopogon*
71	*Actaea*	709	*Osmanthus*
72	*Aesculus* × *carnea* 'Briotii'	710	*Osmunda*
73	*Aesculus parviflora*	711	*Pachysandra*
74	*Agapanthus*	712	*Pachystegia*
75	*Agastache*	713	*Paeonia*
76	*Ajuga*	714	*Panicum*
77	*Akebia*	715	*Parrotia persica*
78	*Albizia julibrissin* 'Chocolate Fountain'	716	*Parrotia persica* 'Bella'
79	*Albizia julibrissin* 'Evys Pride'	717	*Parrotia persica* 'Persian Spire'
80	*Albizia julibrissin* 'Ombrella'	718	*Parrotia persica* 'Vanessa'
81	*Albizia julibrissin* 'Shidare'	719	*Paulownia tomentosa*
82	*Albizia julibrissin* 'Summer Chocolate'	720	*Pennisetum*
83	*Alchemilla*	721	*Penstemon*
84	*Allium*	722	*Perovskia*
85	*Alnus*	723	*Persicaria*
86	*Alnus cordata*	724	*Philadelphus*
87	*Alnus glutinosa* 'Imperialis'	725	*Phlomis*
88	*Alnus glutinosa*	726	*Phlox*
89	*Alnus incana*	727	*Phormium*
90	*Alnus incana* 'Aurea'	728	*Photinia*
91	*Alnus rubra*	729	*Photinia* × *fraseri* 'Red Robin'
92	*Alnus spaethii*	730	*Phygelius*

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
93	*Alstroemeria*	731	*Physocarpus*
94	*Amelanchier*	732	*Physocarpus opulifolius* 'Diabolo'
95	*Amelanchier alnifolia* 'Northline'	733	*Physocarpus opulifolius* 'Lady in Red'
96	*Amelanchier alnifolia* 'Obelisk'	734	*Physostegia*
97	*Amelanchier canadensis*	735	*Picea abies*
98	*Amelanchier canadensis* 'Rainbow Pillar'	736	*Picea omorika*
99	*Amelanchier* 'Edelweiss'	737	*Picea orientalis*
100	*Amelanchier* 'La Paloma'	738	*Picea ormorika*
101	*Amelanchier laevis* 'R J Hilton'	739	*Picea pungens* 'Erich Frahm'
102	*Amelanchier laevis* 'Snowflakes'	740	*Picea pungens* 'Glauca'
103	*Amelanchier lamarckii*	741	*Picea pungens* 'Iseli Fastigiate'
104	*Amelanchier* × *grandiflora* 'Ballerina'	742	*Picea sitchensis*
105	*Amelanchier* × *grandiflora* 'Robin Hill'	743	*Picea smithiana* 'Aurea'
106	*Ammonophylla*	744	*Pinus*
107	*Anemanthele*	745	*Pinus densiflora* 'Umbraculifera'
108	*Anemone*	746	*Pinus flexilis* 'Vanderwolf's Pyramid'
109	*Aquilegia*	747	*Pinus mugo* 'Winter Sun'
110	*Araucaria araucana*	748	*Pinus nigra* 'Bright Eyes'
111	*Arbutus*	749	*Pinus nigra* 'Obelisk'
112	*Arbutus unedo*	750	*Pinus nigra* var. *austriaca*
113	*Armeria*	751	*Pinus peuce*
114	*Artemisia*	752	*Pinus pinaster*
115	*Arum*	753	*Pinus pungens* 'Glauca'
116	*Aruncus*	754	*Pinus radiata*
117	*Asplenium*	755	*Pinus radiata* 'Aurea'
118	*Astelia*	756	*Pinus strobus* 'Minima'
119	*Aster*	757	*Pinus strobus* 'Tiny Kurls'
120	*Astilbe*	758	*Pinus sylvestris*
121	*Astrantia*	759	*Pinus sylvestris* 'Chantry Blue'
122	*Athyrium*	760	*Pinus sylvestris* 'Gold Medal'
123	*Aucuba*	761	*Pinus sylvestris* 'Westonbirt'
124	*Baptisia*	762	*Pinus thunbergii* 'Banshosho'
125	*Berberis*	763	*Pinus wallichiana*
126	*Berberis darwinii*	764	*Pinus* × *holdfordiana*
127	*Berberis thunbergii*	765	*Pittosporum*
128	*Berberis thunbergii* f. *atropurpurea*	766	*Platanus*
129	*Bergenia*	767	*Platanus* × *hispanica*
130	*Betula*	768	*Polemonium*
131	*Betula alba* 'Pendula'	769	*Polygonatum*
132	*Betula albosinensis* 'Chinese Ruby'	770	*Polypodium*
133	*Betula costata* 'Daleside'	771	*Polystichum*
134	*Betula ermanii* 'Mount Zao Purple'	772	*Populus nigra*
135	*Betula ermanii* 'Polar Bear'	773	*Populus tremula*
136	*Betula ermanii* 'White Chocolate'	774	*Potentilla*
137	*Betula* 'Fascination'	775	*Primula*
138	*Betula* 'Fetisowii'	776	*Prunus*
139	*Betula nigra* 'Shiloh Splash'	777	*Prunus* × *persicoides* 'Spring Glow'
140	*Betula pendula*	778	*Prunus* 'Accolade'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
141	*Betula pendula* 'Dalecarlica'	779	*Prunus* 'Amanogawa'
142	*Betula pendula* 'Fastigiata Joes'	780	*Prunus* 'Amber Heart'
143	*Betula pendula* 'Royal Frost'	781	*Prunus* 'Areko'
144	*Betula pendula* 'Spider Alley'	782	*Prunus armeniaca* 'Bergeron'
145	*Betula pendula* 'Tristis'	783	*Prunus armeniaca* 'Bergeval'
146	*Betula pendula* 'Youngii'	784	*Prunus armeniaca* 'Compacta'
147	*Betula pubescens*	785	*Prunus armeniaca* 'Garden Aprigold'
148	*Betula utilis* 'Cinnamon'	786	*Prunus armeniaca* 'Goldcot'
149	*Betula utilis* 'Dark-Ness'	787	*Prunus armeniaca* 'Golden Glow'
150	*Betula utilis* 'Edinburgh'	788	*Prunus armeniaca* 'Helena du Roussillon'
151	*Betula utilis* 'Melony Sanders'	789	*Prunus armeniaca* 'Kioto'
152	*Betula utilis* 'Moonbeam'	790	*Prunus armeniaca* 'Pink Marry'
153	*Betula utilis* 'Mount Luoji'	791	*Prunus armeniaca* 'Robada'
154	*Betula utilis* 'Snow Queen'	792	*Prunus armeniaca* 'Tomcot'
155	*Betula utilis* subsp. *albosinensis* 'Cacao'	793	*Prunus armeniaca* × *salicina* (Aprisali)
156	*Betula utilis* subsp. *albosinensis* 'China Rose'	794	*Prunus* 'Asano'
157	*Betula utilis* subsp. *albosinensis* 'Hergest'	795	*Prunus* 'Athos'
158	*Betula utilis* subsp. *albosinensis* 'Kansu'	796	*Prunus avium*
159	*Betula utilis* subsp. *albosinensis* 'Pink Champagne'	797	*Prunus avium* 'Plena'
160	*Betula utilis* subsp. *albosinensis* 'Red Panda'	798	*Prunus* 'Beni-yutaka'
161	*Betula utilis* var. *jacquemontii*	799	*Prunus* 'Black Oliver'
162	*Betula utilis* var. *jacquemontii* 'Grayswood Ghost'	800	*Prunus* 'Blushing Bride'
163	*Betula utilis* var. *jacquemontii* 'Jermyns'	801	*Prunus* 'Burcombe'
164	*Betula utilis* var. *jacquemontii* 'McBeath'	802	*Prunus* 'Candy Floss'
165	*Betula utilis* var. *jacquemontii* 'Silver Shadow'	803	*Prunus* 'Catherine'
166	*Betula utilis* var. *jacquemontii* 'Trinity College'	804	*Prunus* 'Celeste'
167	*Betula utilis* 'Wakehurst Place Chocolate'	805	*Prunus cerasifera*
168	*Blechnum*	806	*Prunus cerasifera* 'Countess'
169	*Brachyglottis*	807	*Prunus cerasifera* 'Crimson Pointe'
170	*Brunnera*	808	*Prunus cerasifera* 'de Nancy'
171	*Buddleja*	809	*Prunus cerasifera* 'Golden Sphere'
172	*Buxus*	810	*Prunus cerasifera* 'Gypsy'
173	*Buxus sempervirens*	811	*Prunus cerasifera* myrobalan
174	*Calamagrostis*	812	*Prunus cerasifera* 'Nigra'
175	*Callicarpa bodinieri* var. *giraldii* 'Profusion'	813	*Prunus cerasifera* 'Ruby COLUMNAR'
176	*Calluna*	814	*Prunus* 'Chocolate Ice'
177	*Calycanthus* 'Aphrodite'	815	*Prunus* 'Collingwood Ingram'
178	*Campanula*	816	*Prunus* 'Daikoku'
179	*Carex*	817	*Prunus domestica* 'Aprimira'
180	*Carpinus*	818	*Prunus domestica* 'Avalon'
181	*Carpinus betulus*	819	*Prunus domestica* 'Belle de Louvain'
182	*Carpinus betulus* 'Chartreuse'	820	*Prunus domestica* 'Blaisdon Red'
183	*Carpinus betulus* 'Frans Fontaine'	821	*Prunus domestica* 'Blue Tit'
184	*Carpinus betulus* 'Lucas'	822	*Prunus domestica* 'Cambridge'
185	*Carpinus betulus* 'Rockhampton Red'	823	*Prunus domestica* 'Coes Golden Drop'

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
186	*Caryopteris*	824	*Prunus domestica* 'Czar'
187	*Castanea sativa*	825	*Prunus domestica* 'Denniston's Superb'
188	*Catalpa bignonioides* 'Aurea'	826	*Prunus domestica* 'Early Transparent'
189	*Catalpa* × *erubescens* 'Purpurea'	827	*Prunus domestica* 'Edda'
190	*Ceanothus*	828	*Prunus domestica* 'Excalibur'
191	*Ceanothus arboreus* 'Trewithen Blue'	829	*Prunus domestica* 'Ferbleue'
192	*Cedrus atlantica*	830	*Prunus domestica* 'Gordon Castle'
193	*Cedrus atlantica* 'Glauca'	831	*Prunus domestica* 'Guinevere'
194	*Cedrus atlantica* 'Glauca Pendula'	832	*Prunus domestica* 'Haganta'
195	*Cedrus deodara*	833	*Prunus domestica* 'Herman'
196	*Cedrus deodara* 'Karl Fuchs'	834	*Prunus domestica* 'Jefferson'
197	*Cedrus deodara* 'Klondyke'	835	*Prunus domestica* 'Jubilee'
198	*Cedrus libani*	836	*Prunus domestica* 'Katinka'
199	*Centaurea*	837	*Prunus domestica* 'Lindsey Gage'
200	*Centranthus*	838	*Prunus domestica* 'Malling Elizabeth'
201	*Ceratostigma*	839	*Prunus domestica* 'Marjorie's Seedling'
202	*Cercidiphyllum japonicum*	840	*Prunus domestica* 'Meritare'
203	*Cercidiphyllum japonicum* 'Pendulum'	841	*Prunus domestica* 'Old Green Gage'
204	*Cercis canadensis*	842	*Prunus domestica* 'Opal'
205	*Cercis canadensis* 'Alley Cat'	843	*Prunus domestica* 'Oullins Golden'
206	*Cercis canadensis* 'Carolina Sweetheart'	844	*Prunus domestica* 'Purple Pershore'
207	*Cercis canadensis* 'Eternal Flame'	845	*Prunus domestica* 'Queen's Crown'
208	*Cercis canadensis* 'Forest Pansy'	846	*Prunus domestica* 'Reeves'
209	*Cercis canadensis* 'Golden Falls'	847	*Prunus domestica* 'Reine Claude de Bavay'
210	*Cercis canadensis* 'Hearts of Gold'	848	*Prunus domestica* 'River's Early Prolific'
211	*Cercis canadensis* 'Lavender Twist'	849	*Prunus domestica* 'Sanctus Hubertus'
212	*Cercis canadensis* 'Merlot'	850	*Prunus domestica* 'Seneca'
213	*Cercis canadensis* 'Pink Pom Pom'	851	*Prunus domestica* 'Stella's Star'
214	*Cercis canadensis* 'Rising Sun'	852	*Prunus domestica* subsp. *insititia* 'Aylesbury Prune'
215	*Cercis canadensis* 'Ruby Falls'	853	*Prunus domestica* subsp. *insititia* 'Farleigh'
216	*Cercis canadensis* 'Vanilla Twist'	854	*Prunus domestica* subsp. *insititia* 'King of the Damsons'
217	*Cercis chinensis* 'Avondale'	855	*Prunus domestica* subsp. *insititia* 'Merryweather'
218	*Cercis chinensis* 'Diane'	856	*Prunus domestica* subsp. *insititia* 'Shepherds Bullace'
219	*Cercis reniformis* 'Oklahoma'	857	*Prunus domestica* subsp. *insititia* 'Shropshire Prune'
220	*Cercis reniformis* 'Texan White'	858	*Prunus domestica* subsp. *insititia* 'Sweet Prune'
221	*Cercis siliquastrum* 'Bodnant'	859	*Prunus domestica* 'Swan'
222	*Chaenomeles*	860	*Prunus domestica* 'Topend Plus'
223	*Chamaecyparis*	861	*Prunus domestica* 'Topfive'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
224	*Chamaecyparis lawsoniana*	862	*Prunus domestica* 'Tophit Plus'
225	*Choisya*	863	*Prunus domestica* 'Toptaste'
226	*Cistus*	864	*Prunus domestica* 'Victoria'
227	*Cladrastis kentuckea*	865	*Prunus domestica* 'Violet'
228	*Clematis*	866	*Prunus domestica* 'Warwickshire Drooper'
229	*Convolvulus*	867	*Prunus domestica* 'Willingham'
230	*Coprosma*	868	*Prunus domestica* 'Yellow Pershore'
231	*Coreopsis*	869	*Prunus* 'Early Red'
232	*Cornus*	870	*Prunus* 'Fertile'
233	*Cornus kousa* var. *chinensis*	871	*Prunus* 'Fice'
234	*Cornus sanguinea*	872	*Prunus* ''Flavor King'
235	*Cortaderia*	873	*Prunus* 'Folfer'
236	*Corydalis*	874	*Prunus* 'Fragrant Cloud'
237	*Corylus allevana* 'Cosford'	875	*Prunus* 'Frilly Frock'
238	*Corylus allevana* 'Red Filbert'	876	*Prunus* 'Fugenzo'
239	*Corylus avellana*	877	*Prunus* 'Gyoiko'
240	*Corylus avellana* 'Contorta'	878	*Prunus* 'Hally Jolivette'
241	*Corylus avellana* 'Gunslebert'	879	*Prunus* 'Henriette'
242	*Corylus avellana* 'Hall's Giant'	880	*Prunus* 'Hertford'
243	*Corylus avellana* 'Lang Tidlig Zeller'	881	*Prunus* 'Hokusai'
244	*Corylus avellana* 'Nottingham'	882	*Prunus* 'Horinji'
245	*Corylus avellana* 'Tonda Di Giffoni'	883	*Prunus* 'Ichiyo'
246	*Corylus avellana* 'Tonda Gentile de le Romana'	884	*Prunus incisa* 'Kojo-No-Mai'
247	*Corylus avellana* 'Tonda Gentile Trilobata'	885	*Prunus incisa* 'Mikinori'
248	*Corylus avellana* 'Webbs Prize Cob'	886	*Prunus incisa* 'Oshidori'
249	*Corylus* 'Te-Terra Red'	887	*Prunus incisa* 'Pendula'
250	*Cosmos*	888	*Prunus incisa* 'Praecox'
251	*Cotinus*	889	*Prunus incisa* 'Yamadei'
252	*Cotoneaster*	890	*Prunus* 'Jacqueline'
253	*Cotoneaster* × *suecicus* 'Coral Beauty'	891	*Prunus* 'Kanzan'
254	*Cotoneaster* × *suecicus* 'Juliette'	892	*Prunus* Ki 2004 R11 B93
255	*Cotoneaster bullatus*	893	*Prunus* Ki 2004 R14 B56
256	*Cotoneaster franchettii*	894	*Prunus* 'Kiku-shidare-zakura'
257	*Cotoneaster frigidus* 'Cornubia'	895	*Prunus* KIR LAMOUR
258	*Cotoneaster horizontalis*	896	*Prunus* KIR ROSSO
259	*Cotoneaster* 'Hybridus Pendulus'	897	*Prunus* KIR VULCANO
260	*Cotoneaster lacteus*	898	*Prunus* 'Knights Early Black'
261	*Cotoneaster salicifolius* 'Exburiensis'	899	*Prunus* 'Kobuku-zakura'
262	*Cotoneaster salicifolius* 'Repens'	900	*Prunus* 'Kofugen'
263	*Cotoneaster simonsii*	901	*Prunus* 'Kordia'
264	*Crataegus*	902	*Prunus* 'Kursar'
265	*Crataegus azarolus*	903	*Prunus* 'Lapins Cherokee'
266	*Crataegus laevigata* 'Crimson Cloud'	904	*Prunus laurocerasus*
267	*Crataegus laevigata* 'Pauls Scarlet'	905	*Prunus laurocerasus* 'Rotundifolia'
268	*Crataegus laevigata* 'Plena'	906	*Prunus litigiosa*
269	*Crataegus laevigata* 'Rosea Flore Pleno'	907	*Prunus* 'Little Pink Perfection'
270	*Crataegus monogyna*	908	*Prunus lusitanica*
271	*Crataegus monogyna* 'Stricta'	909	*Prunus* 'Merchant'
272	*Crataegus pinnatifida* var. *major* 'Big Golden Star'	910	*Prunus* 'Merton Glory'

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
273	*Crataegus schraderiana*	911	*Prunus* 'Mikurama-gaeshi'
274	*Crataegus succulenta* 'Jubilee'	912	*Prunus* 'Morello'
275	*Crataegus* × *dippeliana*	913	*Prunus* 'Nabella'
276	*Crataegus* × *lavalleei* 'Carrierei'	914	*Prunus* 'Napoleon Bigarreau'
277	*Crataegus* × *persimilis* 'Prunifolia Splendens'	915	*Prunus* 'Nimba'
278	*Crocosmia*	916	*Prunus* 'Okame'
279	*Cryptomeria japonica*	917	*Prunus* padus
280	*Cryptomeria japonica* 'Gracilis'	918	*Prunus* padus 'Le Thoureil'
281	*Cryptomeria japonica* 'Sekkan-sugi'	919	*Prunus* 'Pandora'
282	*Cupressocyparis*	920	*Prunus* 'Papillon'
283	*Cupressocyparis leylandii*	921	*Prunus pendula* 'Ascendens Rosea'
284	*Cupressus*	922	*Prunus pendula* 'Pendula Rubra'
285	*Cupressus glabra* 'Blue Ice'	923	*Prunus pendula* 'Stellata'
286	*Cupressus macrocarpa*	924	*Prunus* 'Penny'
287	*Cupressus macrocarpa* 'Wilma'	925	*Prunus persica* 'Amsden June'
288	*Cupressus sempervirens* 'Totem'	926	*Prunus persica* 'Avalon Pride'
289	*Cydonia oblonga* 'Aromatnaya'	927	*Prunus persica* 'Garden Beauty'
290	*Cydonia oblonga* 'Bereczki'	928	*Prunus persica* 'Garden Lady'
291	*Cydonia oblonga* 'Isfahan'	929	*Prunus persica* 'Gorgeous'
292	*Cydonia oblonga* 'Meech's Prolific'	930	*Prunus persica* 'Hales Early'
293	*Cydonia oblonga* 'Serbian Gold'	931	*Prunus persica* 'Lord Napier'
294	*Cydonia oblonga* 'Vranja'	932	*Prunus persica* 'Mesembrine'
295	*Cynoglossum*	933	*Prunus persica* 'Nectarella'
296	*Cytisus*	934	*Prunus persica* 'Peregrine'
297	*Dahlia*	935	*Prunus persica* 'Pineapple'
298	*Daphne*	936	*Prunus persica* 'Red Haven'
299	*Davidia involucrata*	937	*Prunus persica* 'Rochester'
300	*Davidia involucrata* 'Sonoma'	938	*Prunus persica* 'Saturn'
301	*Delosperma*	939	*Prunus persica* 'Terrace Amber'
302	*Delphinium*	940	*Prunus persicoides* 'Ingrid'
303	*Deschampsia*	941	*Prunus* 'Petit Noir'
304	*Deutzia*	942	*Prunus* 'Pink Parasol'
305	*Dicentra*	943	*Prunus* 'Pink Perfection'
306	*Diervilla*	944	*Prunus* 'Pink Shell'
307	*Digitalis*	945	*Prunus pumila* var. *besseyi* × *P. armeniaca* Aprikyra (Cherrycot)
308	*Doronicum*	946	*Prunus* 'Regina'
309	*Dryopteris*	947	*Prunus* 'Roundel Heart'
310	*Echinacea*	948	*Prunus* 'Royal Burgundy'
311	*Echinops*	949	*Prunus* 'Royal Flame'
312	*Elaeagnus*	950	*Prunus rufa*
313	*Elaeagnus angustifolia* 'Quicksilver'	951	*Prunus sargentii*
314	*Epimedium*	952	*Prunus serrula*
315	*Eremurus*	953	*Prunus serrula* 'Branklyn'
316	*Erigeron*	954	*Prunus* 'Shirotae'
317	*Eriophorum*	955	*Prunus* 'Shosar'
318	*Eriostemon*	956	*Prunus* 'Skeena'
319	*Eryngium*	957	*Prunus* 'Snow Goose'
320	*Erysimum*	958	*Prunus* 'Snow Showers'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
321	*Escallonia*	959	*Prunus spinosa*
322	*Eucalyptus*	960	*Prunus* 'Spire'
323	*Eucalyptus* 'Azura'	961	*Prunus* 'Spring Snow'
324	*Eucalyptus glaucescens*	962	*Prunus* 'Stardust'
325	*Eucalyptus gunnii*	963	*Prunus* 'Stella'
326	*Euonymus*	964	*Prunus subhirtella* 'Autumnalis'
327	*Euonymus alatus* 'Compactus'	965	*Prunus subhirtella* 'Autumnalis Rosea'
328	*Euonymus clivicola*	966	*Prunus subhirtella* 'Pendula Plena Rosea'
329	*Euonymus europaeus*	967	*Prunus* 'Summer Sun'
330	*Euonymus europaeus 'Brilliant'*	968	*Prunus* 'Sunburst'
331	*Euonymus europaeus* 'Red Cascade'	969	*Prunus* 'Sunset Boulevard'
332	*Euonymus hamiltonianus* 'Indian Summer'	970	*Prunus* 'Sweetheart'
333	*Euonymus hamiltonianus* 'Koi Boy'	971	*Prunus* 'Sylvia'
334	*Euonymus japonicus* 'Bravo'	972	*Prunus* 'Tai-haku'
335	*Euonymus phellomanus*	973	*Prunus* 'Taoyame'
336	*Euonymus planipes*	974	*Prunus* 'The Bride'
337	*Euonymus planipes* 'Sancho'	975	*Prunus* 'Tiltstone Hellfire'
338	*Euphorbia*	976	*Prunus* 'Trailblazer'
339	*Exochorda*	977	*Prunus* 'Ukon'
340	*Exochorda* × *macrantha* 'The Bride'	978	*Prunus* 'Vanda'
341	*Fagus*	979	*Prunus* 'Walter'
342	*Fagus sylvatica*	980	*Prunus* 'Waterloo'
343	*Fagus sylvatica* 'Atropurpurea'	981	*Prunus* 'Weeping Yoshino'
344	*Fagus sylvatica* 'Black Swan'	982	*Prunus* × *persicoides* 'Robijn'
345	*Fagus sylvatica* 'Dawyck'	983	*Prunus* × *yedoensis*
346	*Fagus sylvatica* 'Dawyck Gold'	984	*Pseudotsuga menziesii*
347	*Fagus sylvatica* 'Dawyck Purple'	985	*Pulmonaria*
348	*Fagus sylvatica* 'Midnight Feather'	986	*Pyracantha*
349	*Fagus sylvatica* 'Pendula'	987	*Pyrus*
350	*Fagus sylvatica* 'Purple Fountain'	988	*Pyrus* 'Barnet'
351	*Fagus sylvatica* 'Purpurea'	989	*Pyrus* 'Benita'
352	*Fagus sylvatica* 'Purpurea Pendula'	990	*Pyrus* 'Beth'
353	*Fagus sylvatica* 'Purpurea Tricolor'	991	*Pyrus* 'Beurre Hardy'
354	*Fagus sylvatica* 'Riversii'	992	*Pyrus* 'Beurre Superfin'
355	*Fagus sylvatica* var. *heterophylla* 'Asplenifolia'	993	*Pyrus* 'Black Worcester'
356	*Fargesia*	994	*Pyrus* 'Blakeney Red'
357	*Fatsia*	995	*Pyrus* 'Brandy'
358	*Festuca*	996	*Pyrus calleryana* 'Chanticleer'
359	*Ficus carica* 'Brown Turkey'	997	*Pyrus* 'Catillac'
360	*Ficus carica* 'Dalmatie'	998	*Pyrus* 'Celebration'
361	*Ficus carica* 'Ice Crystal'	999	*Pyrus* 'Christie'
362	*Ficus carica* 'Little Miss Figgy'	1000	*Pyrus communis*
363	*Ficus carica* 'Panache'	1001	*Pyrus* 'Concorde'
364	*Filipendula*	1002	*Pyrus* Concorde/Conference/Comice
365	*Foeniculum*	1003	*Pyrus* 'Conference'
366	*Forsythia*	1004	*Pyrus* 'Conference Moors Giant'
367	*Forsythia suspensa* 'Nymans'	1005	*Pyrus* Conference/Comice/Williams

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
368	*Forsythia* × *intermedia* 'Lynwood'	1006	*Pyrus* 'Doyenne du Comice'
369	*Fraxinus ornus* 'Obelisk'	1007	*Pyrus elaeagnifolia* 'Silver Sails'
370	*Fuchsia*	1008	*Pyrus* 'Fondante d'Automne'
371	*Galium*	1009	*Pyrus* 'Gin'
372	*Garrya*	1010	*Pyrus* 'Glou Morceau'
373	*Gaultheria procumbens*	1011	*Pyrus* 'Gorham'
374	*Gaultheria shallon*	1012	*Pyrus* 'Green Horse'
375	*Gaura*	1013	*Pyrus* 'Hellens Early'
376	*Genista*	1014	*Pyrus* 'Hendre Huffcap'
377	*Geranium*	1015	*Pyrus* 'Humbug'
378	*Geum*	1016	*Pyrus* 'Invincible delwinor fertilia'
379	*Ginkgo biloba*	1017	*Pyrus* 'Jargonelle'
380	*Ginkgo biloba* 'Blagon'	1018	*Pyrus* 'Josephine de Malines'
381	*Ginkgo biloba* 'Menhir'	1019	*Pyrus* 'Judge Amphlet'
382	*Gleditsia triacanthos* 'Sunburst'	1020	*Pyrus* 'Kumoi'
383	*Griselinia*	1021	*Pyrus* 'Louise Bonne of Jersey'
384	*Hakonechloa*	1022	*Pyrus* 'Merton Pride'
385	*Halesia carolina*	1023	*Pyrus* 'Moonglow'
386	*Halimium*	1024	*Pyrus* 'Obelisk'
387	*Hamamelis* × *intermedia* 'Arnold Promise'	1025	*Pyrus* 'Olympic'
388	*Hamamelis* × *intermedia* 'Diane'	1026	*Pyrus* 'Onward'
389	*Hamamelis* × *intermedia* 'Jelena'	1027	*Pyrus* 'Packham's Triumph'
390	*Hamamelis* × *intermedia* 'Pallida'	1028	*Pyrus* 'Pitmaston Dutchess'
391	*Hebe*	1029	*Pyrus* 'Red Pear'
392	*Hedera*	1030	*Pyrus salicifolia* 'Pendula'
393	*Helenium*	1031	*Pyrus* 'Sensation'
394	*Helichrysum*	1032	*Pyrus* 'Shinseiki'
395	*Helleborus*	1033	*Pyrus* 'Shipover'
396	*Hemerocallis*	1034	*Pyrus* 'Thorn'
397	*Heptacodium miconioides*	1035	*Pyrus* 'Williams' Bon Chrétien'
398	*Heuchera*	1036	*Pyrus* 'Winnal's Longdon'
399	*Heucherella*	1037	*Pyrus* 'Winter Nelis'
400	*Hippophae*	1038	*Pyrus* 'Yellow Huffcap'
401	*Hippophae rhamnoides*	1039	*Quercus ilex*
402	*Hoheria sexstylosa* 'Snow White'	1040	*Quercus myrsinifolia*
403	*Hosta*	1041	*Quercus palustris*
404	*Houttuynia*	1042	*Quercus palustris* 'Pingreen'
405	*Hydrangea*	1043	*Quercus petraea*
406	*Hypericum*	1044	*Quercus robur*
407	*Iberis*	1045	*Quercus rubra*
408	*Ilex*	1046	*Quercus texana* 'New Madrid'
409	*Ilex aquifolium*	1047	*Quercus* × *warei* 'Regal Prince'
410	*Ilex aquifolium* 'Alaska'	1048	*Rhamnus*
411	*Ilex aquifolium* 'Argentea Marginata'	1049	*Rhamnus cathartica*
412	*Ilex aquifolium* 'Handsworth New Silver'	1050	*Rhamnus frangula*
413	*Ilex aquifolium* 'J.C. van Tol'	1051	*Rheum* 'Strawberry Surprise'
414	*Ilex aquifolium* 'Nellie R Stevens'	1052	*Rheum* 'Timperley Early'
415	*Ilex crenata*	1053	*Rheum* 'Victoria'
416	*Ilex* × *altaclerensis* 'Golden King'	1054	*Rhus*
417	*Imperata*	1055	*Ribes*

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
418	*Iris*	1056	*Ribes* 'Ben Connan'
419	*Jasminum*	1057	*Ribes* 'Ben Sarek'
420	*Juglans* 'Apollo'	1058	*Ribes* 'Black 'n' Red Premiere'
421	*Juglans* 'Broadview'	1059	*Ribes* 'Blackbells'
422	*Juglans* 'Buccaneer'	1060	*Ribes* 'Blanka'
423	*Juglans* 'Chandler'	1061	*Ribes* 'Lowberry'
424	*Juglans* 'Fernette'	1062	*Ribes* 'Ojebyn'
425	*Juglans* 'Fernor'	1063	*Ribes rubrum* 'Jonkheer van Tets'
426	*Juglans* 'Franquette'	1064	*Ribes rubrum* 'Junifer'
427	*Juglans* 'Mars'	1065	*Ribes rubrum* 'Rovada'
428	*Juglans nigra*	1066	*Ribes* 'Titania'
429	*Juglans regia*	1067	*Ribes uva-crispa* 'Captivator'
430	*Juniperus*	1068	*Ribes uva-crispa* 'Hinnonmaki Red'
431	*Juniperus communis*	1069	*Ribes uva-crispa* 'Hinnonmaki Yellow'
432	*Juniperus scopulorum* 'Blue Arrow'	1070	*Ribes uva-crispa* 'Invicta'
433	*Knautia*	1071	*Ribes uva-crispa* 'Mucurines'
434	*Kniphofia*	1072	*Robinia*
435	*Koelreuteria paniculata* 'Coral Sun'	1073	*Robinia pseudoacacia*
436	*Laburnum*	1074	*Robinia pseudoacacia* 'Frisia'
437	*Laburnum anagyroides*	1075	*Robinia pseudoacacia* 'Lace Lady'
438	*Laburnum anagyroides* 'Yellow Rocket'	1076	*Robinia* × *margaretta* 'Pink Cascade'
439	*Lamium*	1077	*Rosa*
440	*Larix*	1078	*Rosa arvensis*
441	*Larix decidua*	1079	*Rosa canina*
442	*Larix kaempferi*	1080	*Rosa rubiginosa*
443	*Larix* × *decidua*	1081	*Rosa rugosa*
444	*Larix* × *eurolepsis*	1082	*Rosa rugosa* 'Alba'
445	*Lavandula*	1083	*Rosa rugosa* 'Rubra'
446	*Lavatera*	1084	*Rosa spinosissima*
447	*Leucanthemum*	1085	*Rosmarinus*
448	*Leucothoe*	1086	*Rubus* 'Allgold'
449	*Leycesteria*	1087	*Rubus* 'Autumn Bliss'
450	*Leymus*	1088	*Rubus* 'Buckingham'
451	*Liatris*	1089	*Rubus* 'Cascade Delight'
452	*Ligularia*	1090	*Rubus fruticosus* 'Arapaho'
453	*Ligustrum ovalifolium*	1091	*Rubus fruticosus* 'Loch Ness'
454	*Ligustrum ovalifolium* 'Aureum'	1092	*Rubus fruticosus* 'Lowberry'
455	*Ligustrum vulgare*	1093	*Rubus fruticosus* 'Navaho Summerlong'
456	*Liquidambar*	1094	*Rubus fruticosus* 'Oregon Thornless'
457	*Liquidambar styraciflua*	1095	*Rubus fruticosus* 'Thornfree'
458	*Liquidambar styraciflua* 'Lane Roberts'	1096	*Rubus* 'Glen Ample'
459	*Liquidambar styraciflua* 'Palo Alto'	1097	*Rubus* 'Glen Carron'
460	*Liquidambar styraciflua* 'Slender Silhouette'	1098	*Rubus* 'Golden Everest'
461	*Liquidambar styraciflua* 'Stared'	1099	*Rubus* 'Joan J'
462	*Liquidambar styraciflua* 'Worplesdon'	1100	*Rubus* 'Lowberry'
463	*Liriodendron tulipifera*	1101	*Rubus* 'Malling Juno'
464	*Liriodendron tulipifera* 'Snow Bird'	1102	*Rubus* 'Octavia'

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
465	*Liriope*	1103	*Rubus* 'Tulameen'
466	*Lithodora*	1104	*Rudbeckia*
467	*Lobelia*	1105	*Salix*
468	*Lonicera nitida*	1106	*Salix aurita*
469	*Lonicera periclymenum*	1107	*Salix caprea*
470	*Lupinus*	1108	*Salix caprea* 'Pendula'
471	*Luzula*	1109	*Salix cinerea*
472	*Lycium barbarum* 'Instant Success'	1110	*Salix erythroflexuosa* 'Golden Curls'
473	*Lysimachia*	1111	*Salix* 'Hakuro Nishiki'
474	*Magnolia*	1112	*Salix pentandra*
475	*Magnolia* × *brooklynensis* 'Yellow Bird'	1113	*Salix viminalis*
476	*Magnolia* 'Aphrodite'	1114	*Salvia*
477	*Magnolia* 'Black Tulip'	1115	*Sambucus nigra*
478	*Magnolia* 'Blue Opal'	1116	*Sambucus nigra* 'Black Beauty'
479	*Magnolia* 'Cleopatra'	1117	*Sambucus nigra* 'Black Lace'
480	*Magnolia* 'Daphne'	1118	*Sambucus nigra* 'Black Tower'
481	*Magnolia* 'Daybreak'	1119	*Sambucus* 'Sampo'
482	*Magnolia* 'Eskimo'	1120	*Sanguisorba*
483	*Magnolia* 'Fairy Blush'	1121	*Santolina*
484	*Magnolia* 'Fairy Cream'	1122	*Sarcococca confusa*
485	*Magnolia* 'Fairy White'	1123	*Scabiosa*
486	*Magnolia* 'Felix Jury'	1124	*Schizostylis*
487	*Magnolia* 'Galaxy'	1125	*Sedum*
488	*Magnolia* 'Genie'	1126	*Senecio*
489	*Magnolia* 'Golden Pond'	1127	*Sequoia sempervirens*
490	*Magnolia grandiflora* 'Alta'	1128	*Sequoiadendron giganteum*
491	*Magnolia grandiflora* 'Kay Parris'	1129	*Sequoiadendron* 'Pendulum'
492	*Magnolia* 'Heaven Scent'	1130	*Sesleria*
493	*Magnolia* 'Honey Tulip'	1131	*Sophora japonica* 'Gold Standard'
494	*Magnolia* 'Hot Flash'	1132	*Sorbaria*
495	*Magnolia* 'Joli Pompom'	1133	*Sorbaronia* 'Likjormaja Liquorice'
496	*Magnolia kobus*	1134	*Sorbus alnifolia* 'Red Bird'
497	*Magnolia* 'Livingstone'	1135	*Sorbus* 'Amber Light'
498	*Magnolia* 'March-Till-Frost'	1136	*Sorbus aria*
499	*Magnolia* 'Peachy'	1137	*Sorbus aria* 'Lutescens'
500	*Magnolia* 'Red as Red'	1138	*Sorbus arranensis*
501	*Magnolia* 'Satisfaction'	1139	*Sorbus aucuparia*
502	*Magnolia* 'Shirazz'	1140	*Sorbus aucuparia* 'Aspleniifolia'
503	*Magnolia* 'Spectrum'	1141	*Sorbus aucuparia* 'Beissneri'
504	*Magnolia* 'Sunsation'	1142	*Sorbus aucuparia* 'Croft Coral'
505	*Magnolia* 'Susan'	1143	*Sorbus aucuparia* 'Fingerprint'
506	*Magnolia* 'Watermelon'	1144	*Sorbus* 'Autumn Spire'
507	*Magnolia wilsonii* 'Eileen Baines'	1145	*Sorbus bissetii* 'Pearls'
508	*Mahonia*	1146	*Sorbus* 'Cardinal Royal'
509	*Malus*	1147	*Sorbus carmesina* 'Emberglow'
510	*Malus* × *purpurea* 'Crimson Cascade'	1148	*Sorbus cashmiriana*
511	*Malus* 'Adam's Pearmain'	1149	*Sorbus* 'Chinese Lace'
512	*Malus* 'Admiration'	1150	*Sorbus* 'Copper Kettle'
513	*Malus* 'Angela'	1151	*Sorbus discolor*
514	*Malus* 'Annie Elizabeth'	1152	*Sorbus* 'Eastern Promise'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
515	*Malus* 'Aros'	1153	*Sorbus* 'Ghose'
516	*Malus* 'Arthur Turner'	1154	*Sorbus* 'Glendoick Spire'
517	*Malus* 'Ashmead's Kernel'	1155	*Sorbus* 'Glendoick White Baby'
518	*Malus baccata*	1156	*Sorbus gonggashanica* 'Snow Balls'
519	*Malus* 'Ballerina Flamenco'	1157	*Sorbus hemsleyi* 'John Bond'
520	*Malus* 'Ballerina Samba'	1158	*Sorbus hupehensis*
521	*Malus* 'Bardsey'	1159	*Sorbus hupehensis* 'Pink Pagoda'
522	*Malus* 'Beauty of Bath'	1160	*Sorbus hybrida* 'Gibbsii'
523	*Malus* 'Black Dabinett'	1161	*Sorbus intermedia*
524	*Malus* 'Bladon Pippin'	1162	*Sorbus japonica*
525	*Malus* 'Blenheim Orange'	1163	*Sorbus* 'Joseph Rock'
526	*Malus* 'Bloody Ploughman'	1164	*Sorbus* 'Leonard Messel'
527	*Malus* 'Bountiful'	1165	*Sorbus* 'Matthew Ridley'
528	*Malus* 'Braeburn'	1166	*Sorbus* 'Pink Ness'
529	*Malus* 'Braeburn Mariri Red'	1167	*Sorbus* 'Pink Pearl'
530	*Malus* 'Bramley 20'	1168	*Sorbus pseudovilmorinii*
531	*Malus* Bramley 20/Christmas P/Scrumptious	1169	*Sorbus* 'Ravensbill'
532	*Malus* 'Bramley's Original'	1170	*Sorbus* 'Rose Queen'
533	*Malus* 'Bramley's Seedling'	1171	*Sorbus sargentiana*
534	*Malus brevipes* 'Wedding Bouquet'	1172	*Sorbus scalaris*
535	*Malus* 'Browns'	1173	*Sorbus splendens*
536	*Malus* 'Butterball'	1174	*Sorbus* 'Sunshine'
537	*Malus* 'Candymint'	1175	*Sorbus thibetica* 'John Mitchell'
538	*Malus* 'Cardinal'	1176	*Sorbus torminalis*
539	*Malus* 'Charles Ross'	1177	*Sorbus ulleungensis* 'Olympic Flame'
540	*Malus* 'Chivers Delight'	1178	*Sorbus vilmorinii*
541	*Malus* 'Christmas Pippin'	1179	*Sorbus vilmorinii* 'Pink Charm'
542	*Malus* 'Cinderella'	1180	*Sorbus wardii*
543	*Malus* 'Cobra'	1181	*Sorbus* 'Wisley Gold'
544	*Malus* 'Comtesse de Paris'	1182	*Spiraea*
545	*Malus* 'Coralburst'	1183	*Stachys*
546	*Malus* 'Core Blimey'	1184	*Stachyurus*
547	*Malus* 'Cornish Aromatic'	1185	*Stewartia pseudocamellia*
548	*Malus coronaria* 'Elk River'	1186	*Stipa*
549	*Malus* 'Coul Blush'	1187	*Styrax japonicus* 'Fragrant Fountain'
550	*Malus* 'Cox Lavera'	1188	*Styrax japonicus* 'June Snow'
551	*Malus* 'Cox Self Fertile'	1189	*Styrax japonicus* 'Pink Snowbell'
552	*Malus* Cox SF/James Grieve/Katy	1190	*Symphoricarpos*
553	*Malus* Cox/Fiesta/Herefordshire Russet	1191	*Symphytum*
554	*Malus* 'Cox's Orange Pippin'	1192	*Syringa* 'Pink Perfume'
555	*Malus* 'Dabinett'	1193	*Syringa vulgaris* 'Beauty of Moscow'
556	*Malus* 'Devonshire Quarrenden'	1194	*Syringa vulgaris* 'Charles Joly'
557	*Malus* 'Discovery'	1195	*Syringa vulgaris* 'Katherine Havemeyer'
558	*Malus* 'Discovery NFT'	1196	*Syringa vulgaris* 'Madame Lemoine'
559	*Malus domestica* 'Baya Marisa'	1197	*Syringa vulgaris* 'Mrs Edward Harding'

(Continues)

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
560	*Malus* 'Donald Wyman'	1198	*Syringa vulgaris* 'Primrose'
561	*Malus* 'Dr Campbells'	1199	*Syringa vulgaris* 'Sensation'
562	*Malus* 'Eden'	1200	*Syringa vulgaris* 'Souvenir de Louis Spaeth'
563	*Malus* 'Egremont Russet'	1201	*Taxodium distichum*
564	*Malus* 'Ellison's Orange'	1202	*Taxodium distichum* 'Shawnee Brave'
565	*Malus* 'Evereste'	1203	*Taxodium distichum* var. *imbricarium* 'Nutans'
566	*Malus* 'Fiesta'	1204	*Taxus baccata*
567	*Malus florentina*	1205	*Taxus baccata* 'Fastigiata Robusta'
568	*Malus floribunda*	1206	*Taxus baccata* 'Standishii'
569	*Malus* 'Fortune'	1207	*Tellima*
570	*Malus* 'Gala'	1208	*Tetradium daniellii*
571	*Malus* 'Galloway Pippin'	1209	*Thalictrum*
572	*Malus* 'Gilly'	1210	*Thuja*
573	*Malus* 'Golden Delicious'	1211	*Thuja plicata*
574	*Malus* 'Golden Gem'	1212	*Thymus*
575	*Malus* 'Golden Glory'	1213	*Tiarella*
576	*Malus* 'Golden Hornet'	1214	*Tilia cordata*
577	*Malus* 'Gorgeous'	1215	*Tilia cordata* 'Greenspire'
578	*Malus* 'Granny Smith'	1216	*Tilia cordata* 'Winter Orange'
579	*Malus* 'Greensleeves'	1217	*Tilia euchlora*
580	*Malus* 'Grenadier'	1218	*Tilia henryana* 'Arnold Select'
581	*Malus* 'Halloween'	1219	*Tilia platyphyllos*
582	*Malus* 'Harry Baker'	1220	*Tilia platyphyllos* 'Tiltstone Filigree'
583	*Malus* 'Harry M Jersey'	1221	*Tilia* × *europaea* 'Golden Sunset'
584	*Malus* 'Hastings'	1222	*Tilia* × *europaea* 'Wratislaviensis'
585	*Malus* 'Herefordshire Russet'	1223	*Trachelospermum*
586	*Malus* 'Hidden Rose'	1224	*Trachycarpus fortunei*
587	*Malus* 'Honeycrisp'	1225	*Tradescantia*
588	*Malus* 'Howgate Wonder'	1226	*Tricyrtis*
589	*Malus hupehensis*	1227	*Trollius*
590	*Malus* 'Indian Magic'	1228	*Tsuga heterophylla*
591	*Malus ioe* 'Fimbriata'	1229	*Ulex*
592	*Malus ioe* 'Purpurea EVELYN'	1230	*Ulex europaeus*
593	*Malus* 'Irish Peach'	1231	*Ulmus*
594	*Malus* 'Isaac Newton'	1232	*Ulmus glabra*
595	*Malus* 'James Grieve'	1233	*Ulmus* × *hollandica* 'Wredei'
596	*Malus* 'Jelly King'	1234	*Ulmus* × Wingham
597	*Malus* 'John Downie'	1235	*Uncinia*
598	*Malus* 'Julia's Late Golden'	1236	*Vaccinium* 'Bluecrop'
599	*Malus* 'Jumbo'	1237	*Vaccinium* 'Chandler'
600	*Malus* 'Jupiter'	1238	*Vaccinium* 'Darrow'
601	*Malus* 'Katy'	1239	*Vaccinium* 'Duke'
602	*Malus* 'Keswick Codlin'	1240	*Vaccinium* 'Liberty'
603	*Malus* 'Kidd's Orange Red'	1241	*Vaccinium* 'Northland'
604	*Malus* 'King of the Pippins'	1242	*Vaccinium* 'Patriot'
605	*Malus* 'King's Acre Pippin'	1243	*Vaccinium* 'Pink Lemonade'
606	*Malus* 'Kingston Black'	1244	*Vaccinium* 'Sunshine Blue'

TABLE C.1 (Continued)

Number	Plant taxa	Number	Plant taxa
607	*Malus* 'Lady Henniker'	1245	*Verbena*
608	*Malus* 'Lane's Prince Albert'	1246	*Veronica*
609	*Malus* 'Laura'	1247	*Viburnum*
610	*Malus* 'Laxton's Superb'	1248	*Viburnum lantana*
611	*Malus* 'Limelight'	1249	*Viburnum opulus*
612	*Malus* 'Little Pax'	1250	*Viburnum opulus* 'Roseum'
613	*Malus* 'Lord Derby'	1251	*Viburnum plicatum* 'Kilimanjaro'
614	*Malus* 'Lord Lambourne'	1252	*Vinca*
615	*Malus* 'Louisa'	1253	*Vitis* 'Bacchus'
616	*Malus* 'Major'	1254	*Vitis* 'Dornfelder'
617	*Malus* 'Marble'	1255	*Vitis* 'Lakemont'
618	*Malus* 'Melrose Belmonte'	1256	*Vitis* 'Muscat Bleu'
619	*Malus* 'Meridian'	1257	*Vitis* 'Phoenix'
620	*Malus* 'Michelin'	1258	*Vitis* 'Polo Muscat'
621	*Malus* 'Newton Wonder'	1259	*Vitis* 'Regent'
622	*Malus* 'Orleans Reinette'	1260	*Vitis* 'Strawberry'
623	*Malus* 'Paradice Gold'	1261	*Vitis* 'Suffolk Red'
624	*Malus* 'Peasgood's Nonsuch'	1262	*Weigela*
625	*Malus* 'Pink Glow'	1263	*Wisteria brachybotrys* 'Golden Dragon'
626	*Malus* 'Pink Perfection'	1264	*Wisteria brachybotrys* 'Kapiteyn Fugi'
627	*Malus* 'Pinot Prince SUPERNOVA'	1265	*Wisteria brachybotrys* 'Okayama'
628	*Malus* 'Pitmaston Pine Apple'	1266	*Wisteria brachybotrys* 'Shiro Beni'
629	*Malus* 'Pixie'	1267	*Wisteria* 'Burford'
630	*Malus* 'Porters Perfection'	1268	*Wisteria floribunda* 'Black Dragon'
631	*Malus* 'Prairie Fire'	1269	*Wisteria floribunda* 'Hon-beni'
632	*Malus* 'Prince William'	1270	*Wisteria sinensis*
633	*Malus* 'Professor Sprenger'	1271	*Wisteria sinensis* 'Prolific'
634	*Malus* 'Queen Cox S.F 18'	1272	x *Cupressocyparis leylandii*
635	*Malus* 'Queen of the Realm'	1273	*Xanthocyparis nootkatensis* 'Pendula'
636	*Malus* 'Red Devil'	1274	*Yucca*
637	*Malus* 'Red Falstaff'	1275	*Yucca filamentosa*
638	*Malus* 'Red Foxwhelp'	1276	*Zelkova serrata* 'Kiwi Sunset'

APPENDIX D

Water used for irrigation

All mains water used 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)). 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 (Dossier Section 1.0).

Bore hole water supply: in some cases, where the underlying geology permits, nurseries can draw water directly from bore holes drilled into underground aquafers. The water that fills these aquafers is naturally filtered through the layers of rock (e.g. limestone) over long periods of time, many millennia in some cases. The water from such supplies is generally of such high quality that it is fit for human consumption with little to no further processing and is often bottled and sold as mineral water (Dossier Section 1.0).

Rainwater or freshwater watercourse supply: some nurseries contributing to this application for both environmental and efficiency reasons use a combination of rain capture systems or abstract directly from available watercourses. All water is passed through a sand filtration system to remove contaminants and is contained in storage tanks prior to use. One nursery that operates this approach is currently in the process of installing additional nanobubble technology to treat the water (Dossier Section 1.0).

APPENDIX E

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

TABLE E.1 List of potential pests not further assessed.

N	Pest name	EPPO code	Group	Pest present in the UK	Present in the EU	*Corylus avellana* confirmed as a host (reference)	Pest can be associated with the commodity	Impact	Justification for inclusion in this list
1	*Clonostachys compactiuscula*	–	Fungi	Yes	Limited	Yes (Hicks, 2022)	Uncertain	No data	There is an uncertainty about the association with the commodities and the impact
2	*Pestalotiopsis oxyanthi*	–	Fungi	Yes	Limited	Uncertain (Vasić et al., 2017)	Uncertain	Yes	There is no real evidence for the pest to be associated with *Corylus avellana*
3	*Pezicula corylina*	–	Fungi	Yes	Limited	Yes (Farr & Rossman, online)	Yes	No data	There is an uncertainty about the impact

APPENDIX F

Excel file with the pest list of *Corylus avellana*

Appendix F is available under the Supporting Information section on the online version of the scientific output.