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SCIENTIFIC OPINION

Commodity risk assessment of *Prunus avium* plants from United Kingdom

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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 *Prunus avium* possibly grafted on rootstocks of either *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids imported from the UK, taking into account the available scientific information, including the technical information provided by the UK. All pests associated with the commodities were evaluated against specific criteria for their relevance for this opinion. Three quarantine pests *Scirtothrips dorsalis*, tobacco ringspot virus and tomato ringspot virus), one protected zone EU quarantine pest (*Bemisia tabaci* (European population), and three non- regulated pests (*Colletotrichum aenigma*, *Eulecanium excrescens* and *Takahashia japonica*) that fulfilled all relevant criteria were selected for further evaluation. The risk mitigation measures proposed in the technical Dossier from the UK were evaluated, taking into account the possible limiting factors. For these pests, 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. The degree of pest freedom varies among the pests evaluated, with *Colletotrichum aenigma* being the pest most frequently expected on the imported potted plants. The Expert Knowledge Elicitation indicated with 95% certainty that between 9971 and 10,000 plants per 10,000 would be free from the above-mentioned fungus.

KEYWORDS

cherry, European Union, pathway risk assessment, plant health, plant pest, quarantine, sour cherry

CONTENTS

1 | INTRODUCTION

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

1.1.1 | Background

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

In view of the above and in accordance with Article 29 of Regulation (EC) No 178/2002, the Commission asks EFSA to provide scientific opinion in the field of plant health for *Prunus avium* possibly grafted on rootstocks of either *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids from United Kingdom (UK) taking into account the available scientific information, including the technical dossier provided by Department for Environment, Food and Rural Affairs of United Kingdom.

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 *Prunus avium* possibly grafted on rootstocks of either *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids from the UK following the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019).

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 (Severo Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug), San Marino, Serbia, Switzerland, Türkiye, Ukraine and United

[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.

Kingdom (except Northern Ireland[5])). Most of those countries are historically linked to the reference to 'non-European countries' existing in the previous legal framework, Directive 2000/29/EC.

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 its evaluation, the Panel:

- Checked whether the information provided by the applicant (Department for Environment, Food and Rural Affairs of United Kingdom) in the technical dossier (hereafter referred to as 'the Dossier') was sufficient to conduct a commodity risk assessment. When necessary, additional information was requested to the applicant.
- Selected the relevant union EU-regulated 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.
- Assessed whether or not the applicant country implements specific measures for Union quarantine pests for which specific measures are in place for the import of the commodity from the specific country in the relevant legislative texts for emergency measures (https://ec.europa.eu/food/plant/plant_health_biosecurity/legislation/emergency_measures_en); the assessment was restricted to whether or not the applicant country applies those measures. The effectiveness of those measures was not assessed.
- Assessed whether the applicant country implements the special requirements specified in Annex VII (points 1–101) and Annex X of the Commission Implementing Regulation (EU) 2019/2072 targeting Union quarantine pests for the commodity in question from the specific country.
- 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 import of the commodity from the specific applicant country and other relevant pests present in applicant country 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 claimed to be implemented by the Department for Environment, Food and Rural Affairs of United Kingdom.

2 | DATA AND METHODOLOGIES

2.1 | Data provided by the Department for Environment, Food and Rural Affairs of United Kingdom

The Panel considered all the data and information (hereafter called 'the Dossier') provided by the Department for Environment, Food and Rural Affairs of United Kingdom (DEFRA) in April 2023, including the additional information provided by DEFRA in November 2023 and February 2024 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.

[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 Windsor Framework in conjunction with Annex 2 to that Framework, for the purposes of this Opinion, references to the United Kingdom do not include Northern Ireland.

TABLE 1 Structure and overview of the Dossier.

Dossier section	Overview of contents	Filename
1.0	Technical dossier	Prunus avium commodity information final.pdf
2.0	Pest list	Prunus_pest_list_for submission – Prunus avium dossier.xlxs
3.0	Additional information provided by DEFRA of United Kingdom	Prunus avium additional information 8 November 2023.docx
4.0	Additional information provided by DEFRA of United Kingdom	Prunuses additional information 6 Feb 2024.pdf

The data and supporting information provided by DEFRA formed the basis of the commodity risk assessment.

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 *P. avium, P. canescens, P. cerasus* and *P. pseudocerasus*. The following searches were combined: (i) a general search to identify pests of *P. avium, P. canescens, P. cerasus* and *P. pseudocerasus* in different databases and (ii) a tailored search to identify whether these pests are present or not in the United Kingdom and the EU. The searches were run between 2 February 2024 and 4 April 2024. No language, date or document type restrictions were applied in the search strategy.

The search strategy and search syntax were adapted to each of the databases listed in Table 2, according to the options and functionalities of the different databases and the CABI keyword thesaurus.

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 2 Databases used by EFSA for the compilation of the pest list associated to *Prunus avium*.

Database	Platform/link
Aphids on World Plants	https://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm
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://webgate.ec.europa.eu/europhyt/
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/advanced.php
USDA ARS Fungal Database	https://nt.ars-grin.gov/fungaldatabases/fungushost/fungushost.cfm
Web of Science: All Databases (Web of Science Core Collection, CABI: CAB Abstracts, BIOSIS Citation Index, Chinese Science Citation Database, Current Contents Connect, Data Citation Index FSTA, KCI-Korean Journal Database, Russian Science Citation Index, MEDLINE SciELO Citation Index, Zoological Record)	Web of Science https://www.webofknowledge.com
World Agroforestry	https://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749
GBIF	https://www.gbif.org/
Fauna Europaea	https://fauna-eu.org/

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 were 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 proposed risk mitigation measures for each relevant pest were evaluated in terms of efficacy or compliance with EU requirements as explained in Section 1.2.

A conclusion on the likelihood of the commodity being free from each of the relevant pests was determined and uncertainties were identified using expert judgements.

Pest freedom was assessed by estimating the number of infested/infected:

1. Rooted plants in pots out of 10,000 exported plants.
2. Bare-root plants out of 10,000 exported plants and bundles of bare-root plants out of 10,000 exported bundles. Each bundle contains between 5 and 15 plants.
3. Bundles of budwood or graftwood and bundles of rotted cell grown young plants out of 10,000 exported bundles. Each bundle contains between 10 and 50 plant parts.

2.3.1 | Commodity data

Based on the information provided by 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 *P. avium* possibly grafted on rootstocks of either *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids from the UK a pest list was compiled. The pest list is a compilation of all identified plant pests associated with *P. avium, P. canescens, P. cerasus* and *P. pseudocerasus* based on (1) information provided in the dossier, (2) additional information provided by DEFRA and (3) as well as on searches performed by the Panel. The search strategy and search syntax were adapted to each of the databases listed in Table 2, according to the options and functionalities of the different databases and CABI keyword thesaurus.

The scientific name of the host plants (*P. avium, P. canescens, P. cerasus* and *P. pseudocerasus*) was 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 consulted by searching for the interceptions associated to commodities imported from United Kingdom, at species level, from 1998 to May 2020 and TRACES for interceptions from June 2020 to March 2024. For the pests selected for further evaluation, a search in the EUROPHYT and/or TRACES was performed for the interceptions from the whole world, at species level.

The search strategy used for Web of Science Databases was designed combining common names for pests and diseases, terms describing symptoms of plant diseases and the scientific and common names of the commodity. All the pests already retrieved using the other databases were removed from the search terms in order to be able to reduce the number of records to be screened.

The established search string is detailed in Appendix B and was run on 5 February 2024 for *P. avium*, 19 February for *P. cerasus* and *P. pseudocerasus*, and 21 February for *P. canescens*.

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

The compiled pest list (see Microsoft Excel® file in Appendix C) includes all identified pests that use *P. avium, P. canescens, P. cerasus* and *P. pseudocerasus* as a host. According to the Interpretation of Terms of Reference.

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).

2.3.3 | Listing and evaluation of risk mitigation measures

All proposed risk mitigation measures were listed and evaluated. When evaluating the likelihood of pest freedom at origin, the following types of potential infestation/infection sources for *P. avium, P. canescens, P. cerasus* and *P. pseudocerasus* in nurseries were considered (see also Figure 1):

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

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

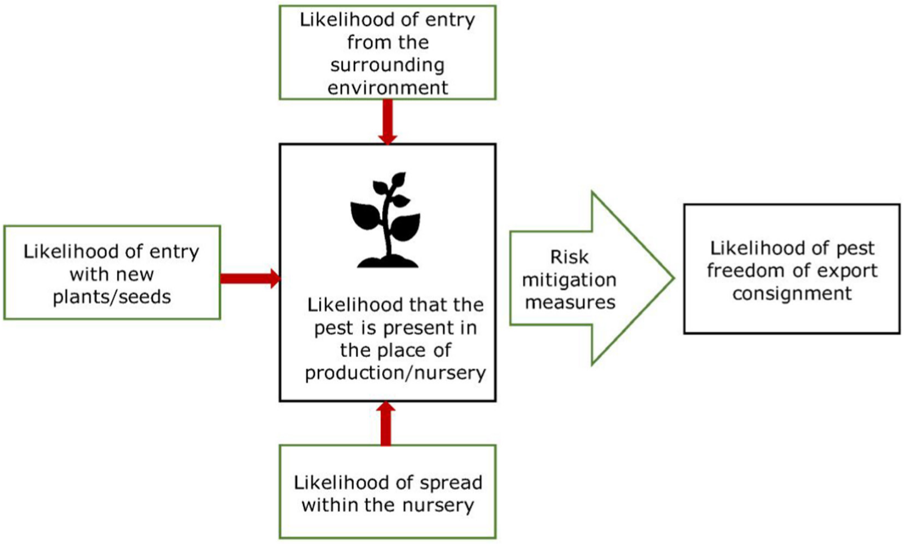

FIGURE 1 Conceptual framework to assess likelihood that plants are exported free from relevant pests. Source EFSA PLH Panel (2019).

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

2.3.4 | Expert Knowledge Elicitation

To estimate the pest freedom of the commodity an EKE was performed following EFSA guidance (Annex B.8 of EFSA Scientific Committee, 2018). The specific questions for each commodity type for EKE were:

1. 'Taking into account (i) the risk mitigation measures in place in the nurseries, and (ii) other relevant information, how many out of 10,000 potted plants of *P. avium,* possibly grafted on *P. avium*, *P. canescens, P. cerasus, P. pseudocerasus* or their hybrids plants are expected to be infested/infected with the relevant pest/pathogen upon arrival in the EU?'.
2. 'Taking into account (i) the risk mitigation measures in place in the nurseries, and (ii) other relevant information, how many out of 10,000 bundles of bare-root plants of *P. avium,* possibly grafted on *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids are expected to be infested/infected with the relevant pest/pathogen upon arrival in the EU?'.
3. 'Taking into account (i) the risk mitigation measures in place in the nurseries, and (ii) other relevant information, how many out of 10,000 bundles of budwood/graftwood and rooted cell grown young plants of *P. avium,* possibly grafted on *P. avium, P. canescens, P. cerasus, P. pseudocerasus* or their hybrids are expected to be infested/infected with the relevant pest/pathogen upon arrival in the EU?'.

The risk assessment is based on either single or bundled plants, as the most suitable units. The EKE questions were common to all pests for which the pest freedom of the commodity was estimated.

The following reasoning is given:

(i) Two commodities are handled as singular units (single plants in pots and single bare-root plants), and the other three commodity types (bare-root young plants and graftwood/budwood, cell-grown young plants) are grouped in bundles;
(ii) For the pests under consideration, cross-contamination during transport is possible;

The EKE questions were common to all pests for which the pest freedom of the commodity was estimated.

The uncertainties associated with the EKE were taken into account and quantified in the probability distribution by 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

According to the dossier and the integration of additional information provided by DEFRA, the commodities to be imported are either single plants in pots, or bare-root plants, young plants grown in cells, graftwood/budwood of:

1. *Prunus avium* (common names: cherry, wild cherry, sweet cherry; family: Rosaceae)

possibly grafted on rootstocks of hybrids of:

1. *P. avium* (common names: cherry, wild cherry, sweet cherry; family: Rosaceae)
2. *P. canescens* (common name: greyleaf cherry, family: Rosaceae)
3. *P. cerasus* (common names: sour cherry; family: Rosaceae)
4. *P. pseudocerasus* (common names: Chinese sour cherry, Chinese cherry; family: Rosaceae).

Specifically, the commodities considered to be imported into the EU from the UK are:

1. Budwood/Graftwood, bundles of 10–20 plants per bundle, up to 1 year old (from 6 to 12 mm in diameter and up to 40 cm height) (Figure 2).
2. Rooted cell grown young plants, ranging from 1 to 2 years old – grouped in bundles with 25–50 plants per bundle (from 4 mm to 10 mm in diameter and 20–60 cm height) (Figure 3).
3. Bare-root plants, age ranging from 1 to 2 years (whips) – grouped in bundles of 5–15 plants per bundle (from 4 to 10 mm in diameter and 20–200 cm height) (Figure 4).
4. Single bare-root trees, from 1 to 7 years old (from 4 to 40 mm in diameter and 60–300 cm height).
5. Single rooted plants in pots, age ranging from 1 to 7 years old (from 6 to 40 mm in diameter and 200–300 cm height) (Figure 5).
6. Large specimen trees in pots up to 15 years old (up to 80 mm diameter and up to 600 cm height).

Rooted plants either in pots or grown in cells can be moved at any time to fulfil consumer demand and may have leaves at the time of export. Bare-root plants exported to the EU may have some leaves at the time of export, in particular when exported in November. Plants will not bear fruit at the time of export. Budwood is dispatched in summer, graftwood is dispatched during winter for propagation material.

FIGURE 2 *Prunus avium* graftwood (photo provided by DEFRA).

FIGURE 3 *Prunus avium* cell grown plants (photo provided by DEFRA).

FIGURE 4 *Prunus avium* bare-root plants in bundles washed ready for dispatch (photo provided by DEFRA).

FIGURE 5 Single potted plant of *Prunus avium* (10 L pot) (photo provided by DEFRA).

3.2 | Description of the production areas

According to the dossier and additional information provided, producers do not set aside separate areas for export production.

Plants are mainly grown outdoors. 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.

Nurseries are mainly situated in the rural areas close to local markets. The minimum distance in a straight line, between the growing area in the nurseries and the closest *P. avium* plants in the local surroundings is 30 m.

The surrounding land would tend to be arable farmland with some pastures for animals and small areas of woodland. Hedges are often used to define field boundaries and grown along roadsides.

Arable crops: These are rotated in line with good farming practice and could include oilseed rape (*Brassica napus*), turnips (*Brassica rapa* subsp. *rapa*), barley (*Hordeum vulgare*), potatoes (*Solanum tuberosum*), wheat (*Triticum* spp.) and maize (*Zea mays*).

Pasture: Predominantly ryegrass (*Lolium* spp.)

Woodland: These tend to be a standard UK mixed woodland, with a range of UK native trees such as field maple (*Acer campestre*), Norway maple (*Acer platanus*), sycamore (*Acer pseudoplatanus*), ash (*Fraxinus* spp.), holly (*Ilex* spp.), oak (*Quercus robur*), pine (*Pinus*) and poplar (*Populus* spp.)

Hedges: They are made up of a range of species including alder (*Alnus glutinosa*), hazel (*Corylus avellana*), hawthorn (*Crataegus* spp.), leylandii (*Cupressus* × *leylandii*), ivy (*Hedera* spp.), holly (*Ilex* spp.), laurel (*Prunus laurocerasus*), blackthorn (*Prunus spinosa*) and yew (*Taxus baccata*).

3.3 | Production and handling processes

3.3.1 | Growing conditions

Most plants are grown in the field (Figure 6) and in containers outdoors; cell-grown plants may be grown in greenhouses.

According to the submitted dossier:

- In the production or procurement of plants, the use of growing media is assessed for the potential to harbour and transmit plant pests. Growers most commonly use virgin peat or peat-free compost, which is a mixture of coir, tree bark, wood fibre, etc. This compost is heat-treated by commercial suppliers during production to eliminate pests and pathogens. It is supplied in sealed bulk bags or shrink-wrapped bales and stored off the ground on pallets. 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.
- Growers must assess weeds and volunteer plants for the potential to host and transmit plant pests and have an appropriate programme of weed management in place in the nursery. Non-cultivated herbaceous plants grow on less than 1% of the nursery area. The predominant species is rye grass (*Lolium*). Other identified species may include common daisy (*Bellis perennis*), hairy bittercress (*Cardamine hirsute*), bluebells (*Hyacinthoides non-scripta*), creeping cinquefoil (*Potentilla reptans*) and dandelions (*Taraxacum officinale*). These are all extremely low in number.
- 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 may be obtained from the mains water supply, bore holes, rivers, or reservoirs/lagoons. Water is routinely sampled and sent for analysis. No quarantine pests have been found so far.
- General hygiene measures are undertaken as part of routine nursery production, including disinfection of tools and equipment between batches/lots. Tools are disinfected after the operation on a stock and before being used on a different plant species. The tools are in a disinfectant 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 substances: potassium peroxymonosulfate and sodium chloride) being a common example.
- All residues or waste materials are assessed for the potential to host, harbour, and transmit pests. Leaves, prunings and weeds are all removed from the nursery to reduce the number of overwintering sites for pests and diseases.

FIGURE 6 Field grown *Prunus avium* plants (photo provided by DEFRA).

3.3.2 | Source of planting material

Most of the nurseries expected to export to the EU do not produce plants from grafting, they use only seeds and seedlings; therefore, there are no mother plants present on those nurseries. Currently only one nursery is using grafting and has mother plants of *Prunus avium* and several other *Prunus* species present in the nursery (*P. domestica, P. spinosa, P. persica, P. americana, P. cerasifera, P. mume, P. subhirtella, P. yedoensis, P. serrula*) as well as other species (*Corylus avellana, Sorbus aucuparia*). Plants are mainly grown from UK material although some plants may be obtained from the EU (mostly the Netherlands). This is the only source of plants obtained from abroad.

Additionally, according to the submitted dossier, *Prunus* species are grown in Great Britain in line with the Plant Health (Amendment etc.) (EU Exit) Regulations 2020 and the Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020.

3.3.3 | Production cycle

As indicated in the submitted dossier, the starting material is a mix of seeds and seedlings depending on the nursery. Bare-root plants are planted in the field from late autumn to early spring (November to March) and rooted plants in pots are planted at any time of year, with winter as the most common. Flowering occurs during late spring (April–June), depending on the variety cultivar and weather conditions. Likewise, fruiting occurs from late summer to late autumn depending on the variety and weather conditions during the growing season.

- Grafting: Most of the nurseries expected to export to the EU do not use grafting in the production of *P. avium*. When grafting a longer length of the graftwood is grafted onto another rootstock to grow a new tree. Typically, a 6-inch (15 cm) length of wood with at least three good buds is used, so it is possible to get 3 three grafts out of one length of graftwood. It is carried out in late winter or early spring, using dormant scion wood from a tree of the variety cultivar one wants to propagate. Where it does occur, grafting is done indoors, and two different methods are used.

  - Side-spliced grafting is usually undertaken in late winter or early spring before bud break.
  - Whip and tongue grafting are normally undertaken in March or early April.

- Chip-budding:

  - Chip-budding to reproduce trees is typically done in August. The procedure for this is that a chip of wood containing a bud is cut out of scion. A similarly shaped chip is cut out of the rootstock, and the scion bud is placed in the cut, in such a way that the cambium layers match. The new bud is fixed in place using grafting tape.

Bare-root plants are harvested in winter to be able to lift plants from the field, as plants are into a dormant phase. These are washed on site.

Rooted plants in pots can be moved at any timepoint in during the year, but usually between September and May.

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. Field-grown trees may be transplanted in the field approximately every 2 years to space trees out as they grow. Large specimen trees up to 15 years old 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 and root-washed to remove any soil at no more than 6 years old and subsequently grown from that point in EU-compliant growing media. To ensure a good root architecture, potted plants may subsequently be re-potted every 2–3 years into larger pots with fresh EU-compliant growing media.

The growing medium used is either virgin peat or peat-free compost (a mixture of coir, tree bark, wood fibre, etc.) complying with the requirements for growing media as specified in the Annex VII of the Commission Implementing Regulation 2019/2072. 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 completely hygienic and 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.

3.3.4 | Pest monitoring during production

According to the submitted dossier, plant material is regularly monitored for plant health issues. This monitoring is carried out by trained nursery staff via regular crop walking and records kept of this monitoring. Qualified agronomists also undertake regular 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.

Growers designate trained or qualified personnel responsible for the plant health measures within their business. Training records of internal and external training must be maintained, and evidence of continuing professional development to maintain awareness of current plant health issues.

Incoming plant material and other goods such as packaging material and growing media, which 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.

Growers keep records allowing 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.

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.

Separate from any official inspection, plant material is checked by growers for plant health issues prior to dispatch.

All residues or waste materials shall be assessed for the potential to host, harbour and transmit pests.

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, prunings and weeds are all removed from the nursery to reduce the number of overwintering sites for pests and diseases.

The UK carries out surveys for Regulated Quarantine pests. These include *Candidatus phytoplasma prunorum, Erwinia amylovora* (see above), tobacco ringspot virus (TRSV) and *Xanthomonas arboricola* pv. *pruni*.

UK plant health inspectors monitor all producers for pests and diseases during crop certification and passporting inspections. In addition, the PHSI (in England and Wales) carry out a programme of Quarantine Surveillance in registered premises, inspecting plants grown and moved within the UK market. Similar arrangements operate in Scotland.

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), inspectors make use of their standard method 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 while 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 nematodes (PCN) with farms randomly selected and sampled at a rate of 50 cores per hectare.

In the last 3 years, there has been a substantial level of inspection of registered Prunus 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).

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, 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.

Once all other checks have been completed, 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.

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

3.3.5 | Post-harvest processes and export procedure

Graftwood is wrapped in plastic and packed in cardboard boxes or Dutch crates on ISPM 15-certified wooden pallets, or metal pallets, dependent on quantity. This may be exported in bundles of 10–20 items.

Bare-root plants are lifted and washed free from soil with a low-pressure washer in the outdoor nursery area away from the 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.

Prior to export bare-rooted plants may be placed in bundles, depending on the size of the plants (25 or 50 for seedlings or transplants; 5, 10 or 15 for whips; or single bare-root trees). 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.

Rooted plants in pots are transported on Danish trolleys for smaller containers, or ISPM 15-certified pallets, or individually in pots for larger containers.

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.

Plants are transported by lorry (size dependent on load quantity). Sensitive plants will occasionally be transported by temperature-controlled lorry if weather conditions during transit are likely to be very cold.

4 | IDENTIFICATION OF PESTS POTENTIALLY ASSOCIATED WITH THE COMMODITY

The search for potential pests associated with to *P. avium, P. canescens, P. cerasus, P. pseudocerasus* rendered 1694 species (see Microsoft Excel® file in Appendix C).

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.

Forty-three EU-quarantine species that are reported to use either of the selected *Prunus* species as a host plant were evaluated (Table 3) 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. either of the selected *Prunus* species 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 3 presents an overview of the evaluation of the 43 EU-quarantine pest species that are reported to use *P. avium* or one of the rootstocks species as a host or were included in the dossier submitted by DEFRA in regards of their relevance for this Opinion.

Four quarantine, species (*Bemisia tabaci* (European population), *Scirtothrips dorsalis*, TRSV and tomato ringspot virus (ToRSV)), known to use either of the selected *Prunus* species as a host, or associated with the commodity and present in the UK were selected for further evaluation.

Two species, *Erwinia amylovora* and *Meloidogyne fallax*, were evaluated and excluded from EKE due to high uncertainty concerning their interaction with selected *Prunus* hosts. *Erwinia amylovora* was not included, although, it may colonise flowers in an epiphytic phase (Johnson et al., 2006), since the commodities and plants would not be flowering during transport. *Meloidogyne fallax* has been reported from *P. avium*, but the host association was at a low level and under experimental conditions (den Nijs et al., 2004).

TABLE 3 Overview of the evaluation of the 43 EU-quarantine pest species known to use either *Prunus avium, P. canescens, P. cerasus or P. pseudocerasus* 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	Host *Prunus avium* (Pav) or *P. canescens* (Pca) or *P. cerasus* (Pc) or *P. pseudocerasus* (Ppc)	*Prunus* spp. confirmed as a host (reference)	Pest can be associated with the commodity[b]	Pest relevant for the opinion
1	*Aleurocanthus spiniferus*	ALECSN	Insects	No	Pav, Pc	Yes (EPPO, online)	NA	No
2	American plum line pattern virus	APLPV0	Viruses	No	Pav, Ppc, Pc	Yes (CABI, EPPO, online)	NA	No
3	*Anoplophora chinensis*	ANOLCN	Insects	No	Pav, Ppc, Pc	CABI, EPPO	NA	No
4	*Anthonomus quadrigibbus*	TACYQU	Insects	No	Pav, Pc, Pca	CABI, EPPO	NA	No
5	*Apiosporina morbosa*	DIBOMO	Fungi	No	Pav, Ppc, Pc, Pca	EPPO, USDA ARS Fungal Database	NA	No
6	*Apriona cinerea*	APRICI	Insects	No	Pav, Ppc, Pc, Pca	Yes (EPPO, online)	NA	No
7	*Apriona germari*	APRIGE	Insects	No	Ppc	Yes (EPPO, online)	NA	No
8	*Aromia bungii*	AROMBU	Insects	No	Pav, Ppc, Pc, Pca	CABI, EPPO	NA	No
9	*Bactrocera dorsalis*	DACUDO	Insects	No	Pav, Pc	CABI, EPPO	NA	No
10	*Bemisia tabaci* (European populations)	BEMITA	Insects	**Yes**	Pcf, Pp[e]	CABI (online)	Yes	Yes
11	*Carposina sasakii*	CARSSA	Insects	No	Pav, Ppc, Pc, Pca	Yes (EPPO, online)	NA	No
12	Cherry rasp leaf virus	CRLV00	Viruses	No	Pav, Pc	Yes (CABI, online)	NA	No
13	Cherry rosette virus	CRV000	Viruses	No	Pav	Yes (EPPO, online)	NA	No
14	Cherry rusty mottle associated virus	CRMAV0	Viruses	No	Pav, Pc	Yes (EPPO, online)	NA	No
15	Cherry twisted leaf associated virus	CTLAV0	Viruses	No	Pav	Yes (EPPO, online)	NA	No
16	*Choristoneura rosaceana*	CHONRO	Insects	No	Pav	CABI, EPPO	NA	No
17	*Conotrachelus nenuphar*	CONHNE	Insects	No	Pav, Pc, Pca	CABI, EPPO	NA	No
18	*Erwinia amylovora*	ERWIAM	Bacteria	Yes	Pav, Pc	Johnson et al. (2006)	No	No[c]
19	*Euphranta japonica*	RHACJA	Insects	No	Pav	Yes (EPPO, online)	NA	No
20	*Euwallacea fornicatus* sensu lato	XYLBFO	Insects	No	Pav	Yes (EPPO, online)	NA	No
21	*Grapholita inopinata*	CYDIIN	Insects	No	Pca	Yes (EPPO, online)	NA	No
22	*Grapholita packardi*	LASPPA	Insects	No	Pav, Ppc, Pc, Pca	CABI, EPPO	NA	No
23	*Grapholita prunivora*	LASPPR	Insects	No	Pav, Ppc, Pc, Pca	CABI, EPPO	NA	No
24	*Helicoverpa zea*	HELIZE	Insects	No	Pav, Ppc, Pc	Yes (EPPO, online)	NA	No
25	*Homalodisca vitripennis*	HOMLTR	Insects	No	Pav	Yes (CABI, online)	NA	No
26	*Lopholeucaspis japonica*	LOPLJA	Insects	No	Pav	CABI, EPPO	NA	No
27	*Lycorma delicatula*	LYCMDE	Insects	No	Pav, Pc	Yes (EPPO, online)	NA	No
28	*Margarodes vitis*	MARGVI	Insects	No	Pav	Yes (EPPO, online)	NA	No
29	*Meloidogyne chitwoodi*	MELGCH	Nematoda	No	Pav	Yes (Nemaplex, online)	NA	No
30	*Meloidogyne fallax*	MELGFA	Nematoda	Yes	Pav	Uncertain (Nemaplex, online)	No[d]	No
31	*Oemona hirta*	OEMOHI	Insects	No	Pav	Yes (EPPO, online)	NA	No

TABLE 3 (Continued)

No	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in the UK	Host *Prunus avium* (Pav) or *P. canescens* (Pca) or *P. cerasus* (Pc) or *P. pseudocerasus* (Ppc)	*Prunus* spp. confirmed as a host (reference)	Pest can be associated with the commodity[b]	Pest relevant for the opinion
32	Peach mosaic virus	PCMV00	Viruses	No	Pav, Pc, Pca	Yes (EPPO, online)	NA	No
33	*Phymatotrichopsis omnivora*	PHMPOM	Fungi	No	Pc	Yes (EPPO, online)	NA	No
34	*Popillia japonica*	POPIJA	Insects	No	Pav, Pc	Yes (EPPO, online)	NA	No
35	*Rhagoletis pomonella*	RHAGPO	Insects	No	Pav, Pc	CABI, EPPO	NA	No
36	*Saperda candida*	SAPECN	Insects	No	Pav, Pca	Yes (EPPO, online)	NA	No
37	*Scirtothrips dorsalis*	SCITDO	Insects	Yes (intercepted)	Pav	Yes (CABI, online)	Yes	Yes
38	Tobacco ringspot virus	TRSV00	Viruses	Yes	Pav	Yes (EPPO, online)	Yes	Yes
39	Tomato ringspot virus	TORSV0	Viruses	Yes	Pav, Pc	Yes (CABI, online)	Yes	Yes
40	*Trirachys sartus*	AELSSA	Insects	No	Pc	Yes (EPPO, online)	NA	No
41	*Xanthomonas arboricola* pv. *pruni*	XANTPR	Bacteria	No	Pav, Pc, Pca	CABI, EPPO	NA	No
42	*Xiphinema rivesi*	XIPHRI	Nematoda	No	Pav, Ppc	Yes (Nemaplex, CABI, online)	NA	No
43	*Xylella fastidiosa*	XYLEFA	Bacteria	No	Pav, Pc, Pca	CABI, EPPO	NA	No

[a]Commission Implementing Regulation (EU) 2019/2072.
[b]NA - Not assessed.
[c]Non disease host.
[d]Uncertain association.
[e]associated with other *Prunus* spp.

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 EFSA performed, was evaluated in order to assess whether there are other potentially relevant pests of *P. avium* 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:

1. the pest is present in the UK;
2. the pest is (i) absent or (ii) has a limited distribution in the EU;
3. *P. avium* is a host of the pest;
4. one or more life stages of the pest can be associated with the specified commodity;
5. the pest may have an impact in the EU.

Pest 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 C (Microsoft Excel® file).

Of the evaluated pests not regulated in the EU, three were selected for further evaluation because these met all the selection criteria (*Colletotrichum aenigma, Eulecanium excrescens, Takahashia japonica*). More information on these pests can be found in the pest datasheets (Appendix A).

4.3 | Overview of interceptions

Data on the interception of harmful organisms on plants of *P. avium* can provide information on some of the organisms that can be present on *P. avium* despite the current measures taken. According to EUROPHYT (online) (accessed on 20 April 2024) and TRACES (online) (accessed on 20 March 2024) there were no interceptions of plants for planting of *P. avium* from the UK destinated to the EU Member States due to presence of harmful organisms between the years 1998 and 2024 (February).

4.4 | Summary of pests selected for further evaluation

The pests identified to be present in the UK and having potential for association with the commodities destined for export are listed in Table 4.

Bemisia tabaci (European population) has been reported in the table due to association with other *Prunus* spp. Taking into consideration that this insect is highly polyphagous, the Panel has decided to evaluate *B. tabaci* as potentially associated with *P. avium*.

The effectiveness of the risk mitigation measures applied to the commodity was evaluated.

The Panel decided to group some species for the elicitations and graphical presentation of its outcome. This was the case of:

- TRSV and ToRSV grouped as 'Viruses' due to similar biology, impact on the commodity, distribution in UK and regulatory status in EU.
- *Eulecanium excrescens* and *Takahashia japonica* grouped as 'Scales' because of their similar biology, impact, taxonomy, risk mitigation measures, and/or regulatory status in EU.

TABLE 4 List of relevant pests selected for further evaluation.

Number	Current scientific name	EPPO code	Name used in the EU legislation	Taxonomic information	Group	Regulatory status
1	*Bemisia tabaci (European population)*	BEMITA	*Bemisia tabaci* Genn. (European populations)	Hemiptera Aleyrodidae	Insects	Protected Zone EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072
2	*Colletotrichum aenigma,*	COLLAE	NA	Glomerallales Glomerellaceae	Fungus	Non regulated
3	*Eulecanium excrescens*	EULCEX	NA	Hemiptera Coccidae	Insects	Non regulated
4	*Scirtothrips dorsalis*	SCITDO	*Scirtothrips dorsalis* Hood	Thysanoptera Thripidae	Insects	EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072
5	*Takahashia japonica*	TAKAJA	NA	Hemiptera Coccidae	Insects	Non regulated
6	Tobacco ringspot virus	TRSV00	Tobacco ringspot virus	*Picornavirales, Secoviridae*	Viruses	EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072
7	Tomato ringspot virus	TORSV0	Tomato ringspot virus	*Picornavirales, Secoviridae*	Viruses	EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072

5 | RISK MITIGATION MEASURES

For the seven selected pests (Table 4), the Panel assessed the possibility that they could be present in a *P. avium* nursery and assessed the probability that pest freedom of a consignment is achieved by the proposed risk mitigation measures acting on the pest under evaluation.

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

5.1 | Possibility of pest presence in the export nurseries and production areas

For these seven pests (Table 4), the Panel evaluated the likelihood that the pest could be present in a *Prunus* nursery by evaluating the possibility that the commodities in the export nursery are 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.

5.2 | Risk mitigation measures applied in the UK

With the dossier and additional information provided by the UK, the Panel summarised the risk mitigation measures (see Table 5) that are proposed in the production nurseries.

TABLE 5 Overview of proposed risk mitigation measures for *Prunus avium* plants designated for export to the EU from the UK.

No.	Risk mitigation measure	Implementation in United Kingdom
1	Certified material	All nurseries are registered as professional operators with the UK NPPO, either by the Animal and Plant Health Agency (APHA) in England and Wales, or by the Science and Advise for Scottish Agriculture (SASA), and are authorised to issue UK plant passports
2	Phytosanitary certificates	APHA (England and Wales) or SASA (Scotland) inspectors monitor the pests and diseases during crop certification and passport policy Phytosanitary certificates are only issued if the commodity meets the required plant health standards after inspection and/or testing according to appropriate official procedures
3	Cleaning and disinfection of facilities, tools and machinery	General hygiene measures are undertaken as part of routine nursery production, including disinfection of tools and equipment between batches/lots
4	Rouging and pruning	Leaves, prunings and weeds are all removed from the nursery to reduce the number of overwintering sites for pests and diseases No further details are available
5	Pesticide application, biological and mechanical control	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 No further details are available
6	Surveillance and monitoring	The UK carries out surveys for Regulated Quarantine pests. This will include the following identified in Table C3 (Appendix C) as present limited or for which there have been UK outbreaks: Xanthomonas arboricola pv pruni, Candidatus phytoplasma prunorum, Erwinia amylovora (see above) and tobacco ringspot virus UK plant health inspectors monitor all producers for pests and diseases during crop certification and passporting inspections. In addition, the PHSI (in England and Wales) carry out a programme of Quarantine Surveillance in registered premises, inspecting plants grown and moving within the UK market. Similar arrangements operate in Scotland 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) we make use of our standard method 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 nematodes (PCN) with farms randomly selected and sampled at a rate of 50 cores per hectare In the dossier it is stated that in the last 3 years, there has been a substantial level of inspection of registered *Prunus* 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) 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, 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 Once all other checks have been completed 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 The inspection procedure outlined above is set out in a standard operating procedure, different procedures are in place for different commodity types Action on findings The protocol is to treat the plants, if they are on site for a sufficient period of time or, if that is not possible, to destroy any plants infested by pests. All other host plants in the nursery would also be treated. A phytosanitary certificate for export will not be issued until the UK Plant Health inspectors confirm that the plants are free from pests
7	Sampling and laboratory testing	Assessments are normally made based on visual examinations, but samples may be taken for laboratory analysis to get a definitive diagnosis. Samples of pests and plants showing any suspicious symptoms are routinely sent to the laboratory for testing

TABLE 5 (Continued)

No.	Risk mitigation measure	Implementation in United Kingdom
8	Root washing	Bare-root plants are washed prior to export to remove the soil
9	Refrigeration and temperature control	Plants are transported by lorry (size dependent on load quantity). Sensitive plants will occasionally be transported by temperature-controlled lorry if weather conditions during transit are likely to be very cold
10	Pre-consignment inspection	Separate to any official inspection, plant material is checked by growers for plant health issues prior to dispatch

5.3 | 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 5.3.1–5.3.7). The outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures is summarised in the Section 5.3.8.

5.3.1 | Overview of the evaluation of *Bemisia tabaci*

Rating of the likelihood of pest freedom	**Pest free with few exceptional cases** to **Almost always pest free** (based on the Median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free single potted plants/large potted specimen trees	***9986*** out of 10,000 plants	***9990*** out of 10,000 plants	***9993*** out of 10,000 plants	***9997*** out of 10,000 plants	***9999*** out of 10,000 plants
Proportion of infested single potted plants/large potted specimen trees	***1*** out of 10,000 plants	***3*** out of 10,000 plants	***7*** out of 10,000 plants	***10*** out of 10,000 plants	***14*** out of 10,000 plants
Proportion of pest free bundled bare-root plants	***9993*** out of 10,000 bundles	***9995*** out of 10,000 bundles	***9997*** out of 10,000 bundles	***9999*** out of 10,000 bundles	***10,000*** out of 10,000 bundles
Proportion of infested bundled bare-root plants	***0*** out of 10,000 bundles	***1*** out of 10,000 bundles	***3*** out of 10,000 bundles	***5*** out of 10,000 bundles	***7*** out of 10,000 bundles
Proportion of pest free bundles of budwood/graftwood or cell grown young plants	***9989*** out of 10,000 bundles	***9992*** out of 10,000 bundles	***9995*** out of 10,000 bundles	***9998*** out of 10,000 bundles	***1000*** out of 10,000 bundles
Proportion of infested bundles of budwood/graftwood or cell grown young plants	***0*** out of 10,000 bundles	***2*** out of 10,000 bundles	***5*** out of 10,000 bundles	***8*** out of 10,000 bundles	***11*** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest could become associate with the commodity** The pest is present in the UK, with few occurrences but continuously intercepted. UK outbreaks of *B. tabaci* have been restricted to greenhouses. The pest is extremely polyphagous with a very wide host range *Prunus cerasifera* and *P. persica* are reported as hosts (Bayhan et al., 2006) There is no information on whether *B. tabaci* can also attack Prunus avium, however the species is known to be very polyphagous (EPPO online_d) **Measures taken against the pest/pathogen and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), and (v) Pre-consignment inspection **Interception records** There are no records of interceptions from UK **Shortcomings of current measures/procedures** Low infestation may remain unnoticed during visual inspection **Main uncertainties** • Possibility of development of the pest outside greenhouses. • Pest abundance in the nursery and the surroundings. • The precision of surveillance and the efficiency of measures targeting the pest. • Whether the pest and the symptoms underneath leaves are visible during inspections.				

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

5.3.2 | Overview of the evaluation of *Colletotrichum aenigma* for all commodity types

Rating of the likelihood of pest freedom	**Pest free with few exceptional cases** to **Almost always pest free** (based on the Median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free single potted plants/large potted specimen trees	***9971*** out of 10,000 plants	***9988*** out of 10,000 plants	***9985*** out of 10,000 plants	***9993*** out of 10,000 plants	***9999*** out of 10,000 plants
Proportion of infested single potted plants/large potted specimen trees	***1*** out of 10,000 plants	***7*** out of 10,000 plants	***15*** out of 10,000 plants	***22*** out of 10,000 plants	***29*** out of 10,000 plants
Proportion of pest free bundled bare-root plants	***9988.5*** out of 10,000 bundles	***9991*** out of 10,000 bundles	***9994*** out of 10,000 bundles	***9997*** out of 10,000 bundles	***9999*** out of 10,000 bundles
Proportion of infested bundled bare-root plants	***1*** out of 10,000 bundles	***3*** out of 10,000 bundles	***6*** out of 10,000 bundles	***9*** out of 10,000 bundles	***11.5*** out of 10,000 bundles
Proportion of pest free bundles of budwood/graftwood or cell grown young plants	***9995*** out of 10,000 bundles	***9996*** out of 10,000 bundles	***9997.5*** out of 10,000 bundles	***9999*** out of 10,000 bundles	***1000*** out of 10,000 bundles
Proportion of infested bundles of budwood/graftwood or cell grown young plants	***0*** out of 10,000 bundles	***1*** out of 10,000 bundles	***2.5*** out of 10,000 bundles	***4*** out of 10,000 bundles	***5*** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest could become associate with the commodity** *Colletotrichum aenigma* has been isolated from *Prunus avium* in China (Chethana et al. 2019) *C. aenigma* can develop on leaves and cause a disease referred to as Glomerella leaf spot *C. aenigma* has been reported in the UK (Baroncelli et al., 2015) **Measures taken against the pest and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil and plant debris from roots (washing), (v) Pesticide application, and (vi) Pre-consignment inspection **Interception records** There are no records of interceptions from UK **Shortcomings of current measures/procedures** The undetected presence of *C. aenigma* during inspections may contribute to the spread of plants infected by *C. aenigma* **Main uncertainties** • Symptoms caused by *C. aenigma* may be overlooked at the onset of infection. • Latent infections of *C. aenigma* cannot be detected. • *C. aenigma* is not under official surveillance in UK, as it does not meet criteria of quarantine pest for the UK. The actual distribution of the pest in the UK is uncertain.					

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

5.3.3 | Overview of the evaluation of *Eulecanium excrescens* for all the commodity types

Rating of the likelihood of pest freedom	**Pest free with few exceptional cases** to **Almost always pest free** (based on the Median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free single potted plants/large potted specimen trees and bare-root plants	***9981*** out of 10,000 plants	***9985*** out of 10,000 plants	***9990*** out of 10,000 plants	***9995*** out of 10,000 plants	***9999*** out of 10,000 plants
Proportion of infested single potted plants/large potted specimen trees and bare-root plants	***1*** out of 10,000 plants	***5*** out of 10,000 plants	***10*** out of 10,000 plants	***15*** out of 10,000 plants	***19*** out of 10,000 plants
Proportion of pest free bundles of budwood/graftwood or cell grown young plants	***9990*** out of 10,000 bundles	***9993*** out of 10,000 bundles	***9995*** out of 10,000 bundles	***9998*** out of 10,000 bundles	***10.000*** out of 10,000 bundles
Proportion of infested bundles of budwood/graftwood or cell grown young plants	***0*** out of 10,000 bundles	***2*** out of 10,000 bundles	***5*** out of 10,000 bundles	***7*** out of 10,000 bundles	***10*** out of 10,000 bundles

(Continued)

Summary of the information used for the evaluation	**Possibility that the pest could become associate with the commodity** *Eulecanium excrescens* is present in the UK as introduced species with restricted distribution to the Greater London Area; outside this area, the pest has been reported only in a few localities of the neighbouring county of Hertfordshire (Salisbury et al., 2010). The organism has been found at numerous sites in London and is likely to have been present in the UK since at least 2000. *E. excrescens* may be more widespread in the PRA area than is currently known. **Measures taken against the pest and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), (v) Pesticide application, and (vi) Pre-consignment inspection. **Interception records** There are no records of interceptions from UK. **Shortcomings of current measures/procedures** The undetected presence of *E. excrescens* during inspections may contribute to its spread. **Main uncertainties** • Symptoms caused by the presence of *E. excrescens* may be overlooked at the onset of infestation at the beginning of the infestation, when scale density is low. • The presence of early stages (crawlers) of *E. excrescens* cannot be easily detected easily. *E. excrescens* is not under official surveillance in UK, as it does not meet criteria of quarantine pest for the UK. It is uncertain how many other UK sites may be infested though being undetected.

For more details, see the relevant pest data sheet on *E. excrescens* (Section A.3 in Appendix A).

5.3.4 | Overview of the evaluation of *Scirtothrips dorsalis* for all the commodity types

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 of all the commodity types	***9999*** out of 10,000 plants	***9999*** out of 10,000 plants	***9999.5*** out of 10,000 plants	***10,000*** out of 10,000 plants	***10,000*** out of 10,000 plants
Proportion of infested plants of all the commodity types	***0*** out of 10,000 plants	***0*** out of 10,000 plants	***0.5*** out of 10,000 plants	***1*** out of 10,000 plants	***1*** out of 10,000 plants
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** *Scirtothrips dorsalis* was found for the first time in the UK in December 2007 in a greenhouse (Palm House) at Royal Botanic Garden Kew in South England (Scott-Brown et al., 2018). The widespread presence of the pest is doubtful in the UK, although not declared as eradicated. The adults fly and can be spread by the wind from the greenhouse where it was detected to the surroundings of the nurseries. The pest is extremely polyphagous. There are host species in the surroundings of the nurseries. An initial infestation of the pest could go undetected because symptoms are generic **Measures taken against the pest/pathogen and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), and (v) Pre-consignment inspection **Interception records** There are no records of interceptions from UK **Shortcomings of current measures/procedures** Detection can be difficult, especially of pupa in the soil and require expert identification **Main uncertainties** • Pest presence in the nursery and the surroundings. • Host suitability of *Prunus* spp. to the pest. • The precision of the surveillance measures.				

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

5.3.5 | Overview of the evaluation of *Takahashia japonica* for all the commodity types

Rating of the likelihood of pest freedom	**Pest free with few exceptional cases** to **Almost always pest free** (based on the median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free single potted plants/large potted specimen trees and bare-root plants	***9981*** out of 10,000 plants	***9985*** out of 10,000 plants	***9990*** out of 10,000 plants	***9995*** out of 10,000 plants	***9999*** out of 10,000 plants
Proportion of infested single potted plants/large potted specimen trees and bare-root plants	***1*** out of 10,000 plants	***5*** out of 10,000 plants	***10*** out of 10,000 plants	***15*** out of 10,000 plants	***19*** out of 10,000 plants

(Continues)

(Continued)

Proportion of pest free bundles of budwood/graftwood or cell grown young plants	***9990*** out of 10,000 bundles	***9993*** out of 10,000 bundles	***9995*** out of 10,000 bundles	***9998*** out of 10,000 bundles	***10.000*** out of 10,000 bundles
Proportion of infested bundles of budwood/graftwood or cell grown young plants	***0*** out of 10,000 bundles	***2*** out of 10,000 bundles	***5*** out of 10,000 bundles	***7*** out of 10,000 bundles	***10*** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest could become associate with the commodity** *Takahashia japonica* is present in the UK (Tuffen et al., 2019). The pest was recorded from West Berkshire in 2018 on Magnolia in a private garden (Malumphy et al., 2019; Tuffen et al., 2019). No action was taken reflecting the low threat assumed for this pest to poses to the UK. The UK NPPO have not revisited the original site to determine if it is present or not, so they have no evidence to prove that it is absent (answer by DEFRA). *Prunus cerasifera* is reported to be host for *T. japonica* (Limonta et al., 2022); however, it is not reported among the major hosts by the UK NPPO (DEFRA, online) **Measures taken against the pest and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), and (v) Pre-consignment inspection **Interception records** There are no records of interceptions from UK **Shortcomings of current measures/procedures** The undetected presence of *T. japonica* during inspections may contribute to its spread **Main uncertainties** • Symptoms caused by the presence of *T. japonica* may be overlooked at the beginning of the infestation, when scale density is low onset of infestation. • The presence of early stages (crawlers) of *T. japonica* cannot be detected easily. *Takahashia japonica* is not under official surveillance in UK, as it does not meet criteria of quarantine pest for GB. It is uncertain how many other UK sites may be infested but undetected.				

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

5.3.6 | Overview of the evaluation of tobacco ringspot virus for all the commodity types

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 of all the commodity types	***9998*** out of 10,000 plants	***9998.5*** out of 10,000 plants	***9999*** out of 10,000 plants	***9999.5*** out of 10,000 plants	***10,000*** out of 10,000 plants
Proportion of infested plants of all the commodity types	***0*** out of 10,000 plants	***0.5*** out of 10,000 plants	***1*** out of 10,000 plants	***1.5*** out of 10,000 plants	***2*** out of 10,000 plants
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** TRSV has a wide host range, including herbaceous and woody plant species. Its occurrence in the UK is restricted. The dispersal range of TRSV infection by natural processes appears to be constrained, as the nematode-vector species of the *Xiphinema americanum* group sensu lato (including *X. americanum* sensu stricto, *X. californicum, X. intermedium, X. rivesi, X. tarjanense*) have not been reported recently in the UK. TRSV has been shown to be transmitted via seed/pollen in a few plant species, and also by vegetative propagation of infected material plants. However, there is a paucity of data on the efficiency of seed/pollen transmission in woody plants and most of the nurseries expected to export to the EU do not use grafting in the production of *P. avium*. **Measures taken against the pest/pathogen and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), and (v) Pre-consignment inspection. **Interception records** There are no records of interceptions of *P. avium* plants for planting from the UK due to the presence of TRSV. **Shortcomings of current measures/procedures** Details on the inspections and surveillance to detect TRSV. **Main uncertainties** The certification process/status of the material. TRSV dispersal by other means (seeds or pollen to the mother plant) are unknown in woody plants. The extent of the inspections to detect TRSV infections is unknown.				

For more details, see relevant pest data sheet on tobacco ringspot virus (Section A.6 in Appendix A).

5.3.7 | Overview of the evaluation of tomato ringspot virus for all the commodity types

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 of all the commodity types	***9998*** out of 10,000 plants	***9998.5*** out of 10,000 plants	***9999*** out of 10,000 plants	***9999.5*** out of 10,000 plants	***10,000*** out of 10,000 plants
Proportion of infested plants of all the commodity types	***0*** out of 10,000 plants	***0.5*** out of 10,000 plants	***1*** out of 10,000 plants	***1.5*** out of 10,000 plants	***2*** out of 10,000 plants
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** ToRSV has a wide host range, including herbaceous and woody plant species. Its occurrence in the UK is restricted. The dispersal range of ToRSV infection by natural processes appears to be constrained, as the nematode-vector species of the *Xiphinema americanum* group sensu lato (including *X. americanum* sensu stricto, *X. californicum, X. intermedium, X. rivesi, X. tarjanense*) have not been reported recently in the UK. TRSV has been shown to be transmitted via seed/pollen in a few plant species, and also by vegetative propagation of infected material plants. However, there is a paucity of data on the efficiency of seed/pollen transmission in woody plants and most of the nurseries expected to export to the EU do not use grafting in the production of *P. avium* **Measures taken against the pest/pathogen and their efficacy** The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Cleaning and disinfection of facilities, tools and machinery, (iv) Removal of soil from roots (washing), and (v) Pre-consignment inspection **Interception records** There are no records of interceptions of *P. avium* plants for planting from the UK due to the presence of ToRSV **Shortcomings of current measures/procedures** Details on the inspections and surveillance to detect ToRSV **Main uncertainties** The certification process/status of the material. ToRSV dispersal by other means (seeds or pollen) are unknown in woody plants. The extent of the inspections to detect ToRSV infections is unknown				

For more details, see relevant pest data sheet on tomato ringspot virus (Section A.7 in Appendix A).

5.3.8 | Outcome of Expert Knowledge Elicitation

Table 6 and Figure 7 show the outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures for all the evaluated pests.

Figure 8 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for *P. avium* trees designated for export to the EU for *B. tabaci*, *C. aenigma*, *E. excrescens, S. dorsalis, T. japonica,* TRSV and ToRSV.

TABLE 6 Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against *Bemisia tabaci, Colletotrichum aenigma, Eulecanium excrescens, Scirtothrips dorsalis, Takahashia japonica*, tobacco ringspot virus (TRSV) and tomato ringspot virus (ToRSV) on *Prunus avium* 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.

Number	Group	Pest species	Sometimes pest free	More often than not pest free	Frequently pest free	Very frequently pest free	Extremely frequently pest free	Pest free with some exceptional cases	Pest free with few exceptional cases	Almost always pest free
1	Insects	*Bemisia tabaci*, Potted plants						**L**	**M**	**U**
2	Insects	*Bemisia tabaci* Bare-root							**L**	**MU**
3	Insects	*Bemisia tabaci*, Budwood/ graftwood and cell-grown plants						**L**		**MU**
4	Fungi	*Colletotrichum aenigma,* potted plants						**L**	**M**	**U**
5	Fungi	*Colletotrichum aenigma* bare-root						**L**	**M**	**U**
6	Fungi	*Colletotrichum aenigma* Budwood/graftwood and cell-grown plants						**L**	**M**	**U**
7	Insects	*Eulecanium excrescens* potted and bare-root plants						**L**	**M**	**U**
8	Insects	*Eulecanium excrescens* Budwood/graftwood and cell-grown plants							**L**	**MU**
9	Insects	*Scirtothrips dorsalis*, all commodity types								**LMU**
10	Insects	*Takahashia japonica* potted and bare-root plants						**L**	**M**	**U**
11	Insects	*Takahashia japonica* Budwood/ graftwood and cell-grown plants							**L**	**MU**
12	Viruses	Tobacco ringspot virus, all commodity types								**LMU**
13	Viruses	Tobacco ringspot virus, all commodity types								**LMU**

PANEL A

	Pest freedom category	Pest fee 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

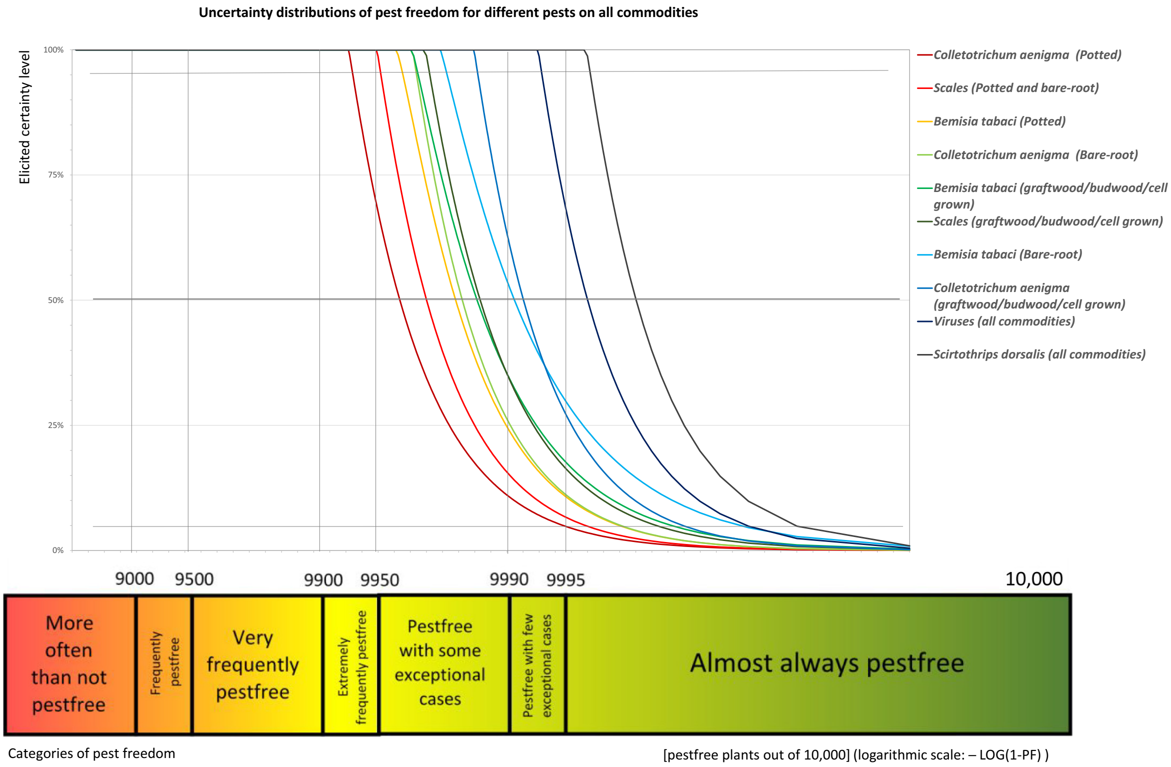

FIGURE 7 Elicited certainty (*y*-axis) of the number of pest-free *Prunus avium* commodities (*x*-axis; log-scaled) out of 10,000 designated for export to the EU from the UK for all evaluated pests visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%). The Panel is 95% confident that *9971* (*Colletotrichum aenigma* – potted plants), *9981*, – (scales – potted and bare-root plants), *9986* (*Bemisia tabaci* – potted plants), *9989* (*Colletotrichum aenigma* – bare-root plants), *9988* (*Bemisia tabaci* – graftwood/budwood/cell grown plants), *9990* (*scales* – graftwood/budwood/cell grown plants), *9995* (*Colletotrichum aenigma* -graftwood/budwood/cell grown plants), *9998* (viruses – all commodities), *9999* (*Scirtothrips dorsalis* – all commodities), will be pest free.

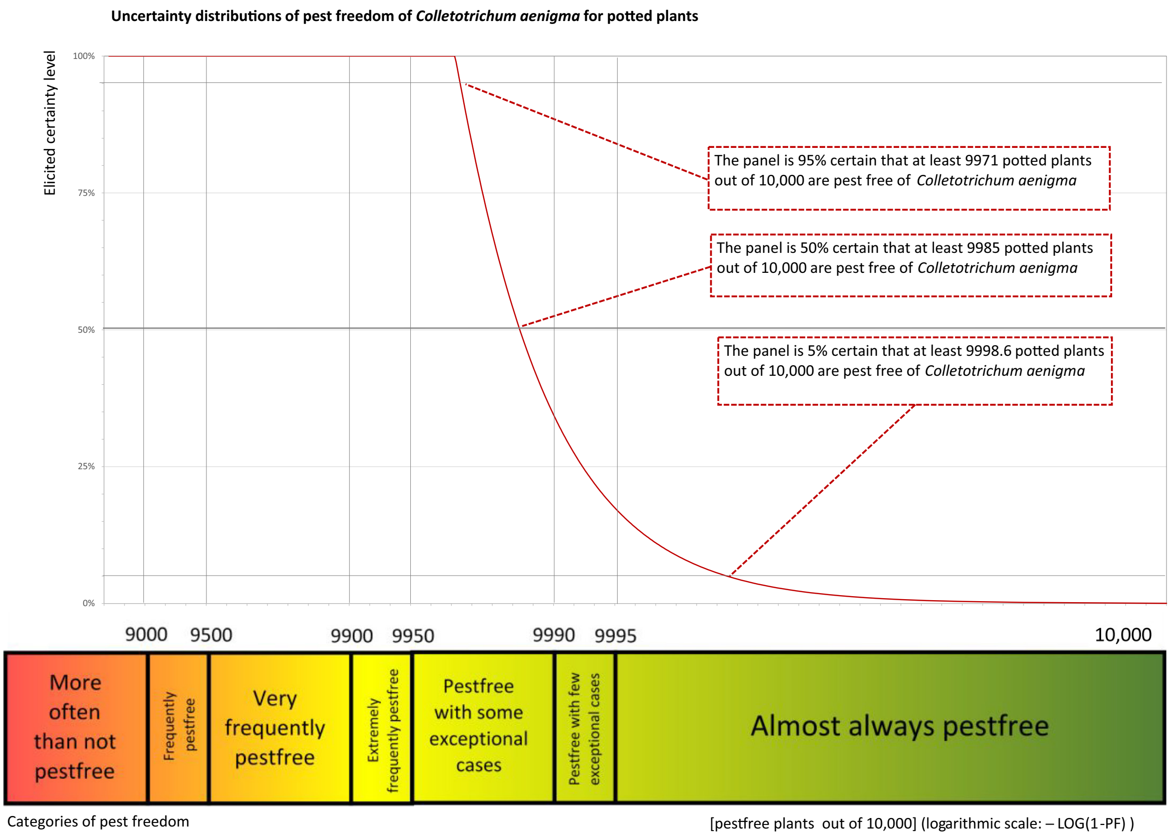

FIGURE 8 Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for potted plants designated for export to the EU based on based on the example of *Colletotrichum aenigma*.

6 | CONCLUSIONS

There are seven pests identified to be present in the UK and considered to be potentially associated with plants in pots, bare-root plants, seedlings of *P. avium* imported from the UK and relevant for the EU.

For the pests *Bemisia tabaci* (European population), *Colletotrichum aenigma, Eulecanium excrescens*, *Scirtothrips dorsalis*, *Takahashia japonica*, TRSV and ToRSV, the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for plants in pots, bare-root plants, budwood/graftwood and cell-grown plants of *P. avium* designated for export to the EU was estimated.

For *Bemisia tabaci* (European population), the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as:

a. For potted *P. avium* plants 'Pest free with few 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 9986 and 10,000 units per 10,000 will be free from *B. tabaci*.
b. For single and bundles of bare-root plants of *P. avium* 'Almost always pest free' 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 9992 and 10,000 units per 10,000 will be free from *B. tabaci*.
c. For graftwood/budwood and cell-grown plants of *P. avium* 'Almost always pest free' 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 9989 and 10,000 units per 10,000 will be free from *B. tabaci*.

For *C. aenigma*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as:

d. For potted *P. avium* plants 'Pest free with few 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 9971 and 10,000 units per 10,000 will be free from *C. aenigma*.
e. For single and bundles of bare-root plants of *P. avium* 'Pest free with few 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 9988 and 10,000 units per 10,000 will be free from *C. aenigma*.
f. For graftwood/budwood and cell-grown plants of *P. avium* 'Almost always pest free' with the 90% uncertainty range reaching from 'Almost always pest free' to 'Almost always pest free'. The EKE indicated, with 95% certainty, that between 9995 and 10,000 units per 10,000 will be free from *C. aenigma*.

For the two scale species (*E. excrescens and T. japonica*), the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as:

a. For potted and bare-root *P. avium* plants 'Pest free with few 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 9981 and 10,000 units per 10,000 will be free from scales (*E. excrescens, T. japonica*).
b. For graftwood/budwood cell grown plants of *P. avium* 'Almost always pest free' 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 9990 and 10,000 units per 10,000 will be free from scales (*E. excrescens, T. japonica*).

For *Scirtothrips dorsalis*, the likelihood of pest freedom following evaluation of current risk mitigation measures for all commodity types was estimated as 'Almost always pest free' with the 90% uncertainty range reaching from 'Almost always pest free' to 'Almost always pest free'. The EKE indicated, with 95% certainty, that between 9999 and 10,000 units per 10,000 will be free from *S. dorsalis*.

For the two virus species (TRSV and ToRSV), the likelihood of pest freedom following evaluation of current risk mitigation measures for all commodity types was estimated as 'Almost always pest free' with the 90% uncertainty range reaching from 'Almost always pest free' to 'Almost always pest free'. The EKE indicated, with 95% certainty, that between 9998 and 10,000 units per 10,000 will be free from both viruses.

GLOSSARY

Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2024).
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, 2024).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2024).
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, 2024).

Measures	Control (of a pest) is defined in ISPM 5 (FAO, 2024) 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, 2024).
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, 2024).
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, 2024).
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, 2024).
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, 2024).

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
FUN	Fungi
INS	Insect
ISPM	International Standards for Phytosanitary Measures
PCN	potato cyst nematodes
PLH	Plant Health
PRA	Pest Risk Assessment
RNQPs	Regulated Non-Quarantine Pests
SASA	Science and Advise for Scottish Agriculture
TRSV	tobacco ringspot virus
ToRSV	tomato ringspot virus

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.

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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 via Expert Knowledge Elicitation

A.1 | *BEMISIA TABACI* (EUROPEAN POPULATIONS)

A.1.1 | Organism information

Taxonomic information	Current valid scientific name: *Bemisia tabaci* Synonyms: *Aleurodes inconspicua*, *Aleurodes tabaci*, *Bemisia achyranthes*, *Bemisia bahiana*, *Bemisia costa-limai*, *Bemisia emiliae*, *Bemisia goldingi*, *Bemisia gossypiperda*, *Bemisia gossypiperda mosaicivectura*, *Bemisia hibisci*, *Bemisia inconspicua*, *Bemisia longispina*, *Bemisia lonicerae*, *Bemisia manihotis*, *Bemisia minima*, *Bemisia minuscula*, *Bemisia nigeriensis*, *Bemisia rhodesiaensis*, *Bemisia signata*, *Bemisia vayssieri* Name used in the EU legislation: *Bemisia tabaci* Genn. (European populations) Order: Hemiptera Family: Aleyrodidae Common name: cassava whitefly, cotton whitefly, silver-leaf whitefly, sweet-potato whitefly, tobacco whitefly Name used in the Dossier: –
Group	Insects
EPPO code	BEMITA
Regulated status	The pest is listed in Annex III as EU protected zone quarantine pest *Bemisia tabaci* Genn. (European populations) for Ireland and Sweden *Bemisia tabaci* is included in the EPPO A2 list (EPPO, online_a) The species is a quarantine pest in Belarus, Moldova, Norway and New Zealand. It is on A1 list of Azerbaijan, Chile, Georgia, Kazakhstan, Ukraine and the United Kingdom. It is on A2 list of Bahrain, East Africa, Southern Africa, Russia, Turkey and EAEU (= Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia) (EPPO, online_b)
Pest status in the UK	*Bemisia tabaci* (European populations) is present in the UK, with few occurrences (CABI, online; EPPO, online_c) and it is continuously intercepted in the UK. The intercepted populations were identified as Middle East-Asia Minor 1 (=MEAM1) and Mediterranean (=MED) (Cuthbertson, 2013) From 1998 to 2015, there were between 7 and 35 outbreaks per year of *B. tabaci* in the UK and all the findings were subject to eradication. The UK outbreaks of *B. tabaci* have been restricted to greenhouses and there are no records of the whitefly establishing outdoors during summer (Bradshaw et al., 2019; Cuthbertson and Vänninen, 2015)
Pest status in the EU	*Bemisia tabaci* (European populations) is widespread in the EU – Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Finland, France, Germany, Greece, Hungary, Italy, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia and Spain (CABI, online; EPPO, online_c) It is absent from Denmark, Estonia, Ireland, Latvia, Lithuania, Slovakia and Sweden (CABI, online; EPPO, online_c) In the EU, *B. tabaci* (European populations) is mainly present in the greenhouses, with exception of Mediterranean coastal region (Cyprus, Greece, Malta, Italy, south of France, certain parts of Spain and Portugal), where the whitefly occurs also outdoors (EFSA PLH Panel, 2013)
Host status on *Prunus avium*	*Prunus cerasifera* and *P. persica* are reported as hosts (Bayhan et al., 2006) There is no information on whether *B. tabaci* can also attack *Prunus avium*, however the species is known to be very polyphagous (EPPO online_d)
PRA information	Available Pest Risk Assessments: – Scientific Opinion on the risks to plant health posed by *Bemisia tabaci* species complex and viruses it transmits for the EU territory (EFSA PLH Panel, 2013); – UK Risk Register Details for *Bemisia tabaci* non-European populations (DEFRA, online_a); – UK Risk Register Details for *Bemisia tabaci* European populations (DEFRA, online_b).
Other relevant information for the assessment	
Biology	*Bemisia tabaci* is a cosmopolitan whitefly present on almost all continents except for Antarctica (CABI, online; EPPO, online_c). In the literature, it is reported as either native to Africa, Asia, India, North America or South America (De Barro et al., 2011). However, based on mtCO1 (mitochondrial cytochrome oxidase 1) sequence its origin is most likely to be sub-Saharan Africa (De Barro, 2012) *Bemisia tabaci* is a complex of at least 40 cryptic species that are morphologically identical but distinguishable at molecular level (Khatun et al., 2018). The species differ from each other in host association, spread capacity, transmission of viruses and resistance to insecticides (De Barro et al., 2011) *Bemisia tabaci* develops through three life stages: egg, nymph (four instars) and adult (Walker et al., 2010). Nymphs of *B. tabaci* mainly feed on phloem in minor veins of the underside leaf surface (Cohen et al., 1996). Adults feed on both phloem and xylem of leaves (Walker et al., 2010, citing others). Honeydew is produced by both nymphs and adults (Davidson et al., 1994). *Bemisia tabaci* is multivoltine with up to 15 generations per year (Ren et al., 2001). The life cycle from egg to adult requires from 2.5 weeks up to 2 months depending on the temperature (Norman et al., 1995) and the host plant (Coudriet et al., 1985) In the southern California desert on field-grown lettuce (from 27 October 1983 to 4 January 1984), *B. tabaci* completed at least one generation (Coudriet et al., 1985). In Israel, the reproduction of *B. tabaci* was much reduced in winter months, but adults emerging in December survived and started ovipositing at the end of the cold season (Avidov, 1956). The most cold-tolerant stage are eggs (−2°, −6°, −10°C) and the least tolerant are large nymphs. Short periods of exposure in 0° to −6°C have little effect on mortality. As the temperature lowers to −10°C, the duration of time required to cause significant mortality shortens dramatically (Simmons and Elsey, 1995).

(Continued)

	Bemisia tabaci is a cosmopolitan whitefly present on almost all continents except for Antarctica (CABI, online; EPPO, online_c). In the literature, it is reported as either native to Africa, Asia, India, North America or South America (De Barro et al., 2011). However, based on mtCO1 (mitochondrial cytochrome oxidase 1) sequence its origin is most likely to be sub-Saharan Africa (De Barro, 2012) *Bemisia tabaci* is a complex of at least 40 cryptic species that are morphologically identical but distinguishable at molecular level (Khatun et al., 2018). The species differ from each other in host association, spread capacity, transmission of viruses and resistance to insecticides (De Barro et al., 2011) *Bemisia tabaci* develops through three life stages: egg, nymph (four instars) and adult (Walker et al., 2010). Nymphs of *B. tabaci* mainly feed on phloem in minor veins of the underside leaf surface (Cohen et al., 1996). Adults feed on both phloem and xylem of leaves (Walker et al., 2010, citing others). Honeydew is produced by both nymphs and adults (Davidson et al., 1994). *Bemisia tabaci* is multivoltine with up to 15 generations per year (Ren et al., 2001). The life cycle from egg to adult requires from 2.5 weeks up to 2 months depending on the temperature (Norman et al., 1995) and the host plant (Coudriet et al., 1985) In the southern California desert on field-grown lettuce (from 27 October 1983 to 4 January 1984), *B. tabaci* completed at least one generation (Coudriet et al., 1985). In Israel, the reproduction of *B. tabaci* was much reduced in winter months, but adults emerging in December survived and started ovipositing at the end of the cold season (Avidov, 1956). The most cold-tolerant stage are eggs (−2°, −6°, −10°C) and the least tolerant are large nymphs. Short periods of exposure in 0° to −6°C have little effect on mortality. As the temperature lowers to −10°C, the duration of time required to cause significant mortality shortens dramatically (Simmons and Elsey, 1995)	
Symptoms	**Main type of symptoms**	Main symptoms of *B. tabaci* on plants are chlorotic spotting, decrease of plant growth, deformation of fruits, deformation of leaves, intervein yellowing, leaf yellowing, leaf curling, leaf crumpling, leaf vein thickening, leaf enations, leaf cupping, leaf loss, necrotic lesions on stems, plant stunting, reduced flowering, reduced fruit development, silvering of leaves, stem twisting, vein yellowing, wilting, yellow blotching of leaves, yellow mosaic of leaves, presence of honeydew and sooty mould. These symptoms are plant responses to the feeding of the whitefly and to the presence of transmitted viruses (CABI, online; EFSA PLH Panel, 2013; EPPO, 2004)
	Presence of asymptomatic plants	Symptoms of *B. tabaci* being present on the plants are usually visible. However, *B. tabaci* is a vector of several viruses and their infection could be asymptomatic
	Confusion with other pests	*Bemisia tabaci* can be easily confused with other whitefly species such as *B. afer*, *Trialeurodes lauri*, *T. packardi*, *T. ricini*, *T. vaporariorum* and *T. variabilis*. A microscopic slide is needed for morphological identification (EPPO, 2004) Different species of *B. tabaci* complex can be distinguished using molecular methods (De Barro et al., 2011)
Host plant range	*Bemisia tabaci* is an extremely polyphagous pest with a wide host range, including more than 1,000 different plant species (Abd-Rabou and Simmons, 2010) Some of the many hosts of *B. tabaci* are *Abelmoschus esculentus, Amaranthus blitoides, Amaranthus retroflexus, Arachis hypogaea*, *Atriplex semibaccata*, *Bellis perennis, Borago officinalis*, *Brassica oleracea* var. *botrytis*, *Brassica oleracea* var. *gemmifera*, *Brassica oleracea* var. *italica*, *Bryonia dioica*, *Cajanus cajan*, *Capsella bursa-pastoris*, *Capsicum annuum*, *Citrus* spp., *Crataegus* spp., *Cucumis sativus*, *Cucurbita pepo*, *Erigeron canadensis*, *Euphorbia pulcherrima*, *Gerbera jamesonii*, *Glycine max*, *Gossypium* spp., *Gossypium hirsutum*, *Hedera helix*, *Ipomoea batatas*, *Lactuca sativa*, *Lactuca serriola*, *Lavandula coronopifolia*, *Ligustrum lucidum*, *Ligustrum quihoui*, *Ligustrum vicaryiis*, *Manihot esculenta*, *Melissa officinalis*, *Nicotiana tabacum*, *Ocimum basilicum*, *Origanum majorana*, *Oxalis pes-caprae*, *Phaseolus* spp., *Phaseolus vulgaris*, *Piper nigrum*, *Potentilla* spp., *Prunus* spp., *Rosa* spp., *Rubus fruticosus*, *Salvia officinalis*, *Salvia rosmarinus*, *Senecio vulgaris*, *Sinningia speciosa*, *Solanum lycopersicum*, *Solanum melongena*, *Solanum nigrum*, *Solanum tuberosum*, *Sonchus oleraceus, Stellaria media, Tagetes erecta, Taraxacum officinale, Thymus serpyllum, Urtica urens, Vitis vinifera* and many more (CABI, online; EFSA PLH Panel, 2013; EPPO, online_c; Li et al., 2011) For a full host list refer to Li et al. (2011), EFSA PLH Panel (2013), CABI (online) and EPPO (online_c)	
Reported evidence of impact	*Bemisia tabaci* (European populations) is EU protected zone quarantine pest	
Evidence that the commodity is a pathway	*Bemisia tabaci* is continuously intercepted in the EU on different commodities including plants for planting (EUROPHYT/TRACES-NT, online). Therefore, the commodity is a pathway for *B. tabaci*	
Surveillance information	*Bemisia tabaci* (European populations) is present in the UK with few occurrences (EPPO, online_c; CABI, online) No specific surveillance in the nursery is carried out for this pest	

A.1.2 | Possibility of pest presence in the nursery

A.1.2.1 | Possibility of entry from the surrounding environment

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

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

Bemisia tabaci is polyphagous species that can infest number of different plants. Suitable hosts of *B. tabaci* like *Crataegus* spp., *Hedera* spp. and *Prunus* spp. are used as hedges surrounding the nursery.

Uncertainties:

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

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

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

The UK has regulations in place for fruit plant propagating material that are in line with those of European Union, and this equivalence has been recognised in Commission Implementing Decision (EU) 2020/2219. Thus, only material fulfilling characteristics of certified, basic or CAC levels of certification, including the origin of the material, can be marketed. The starting material for most nurseries is certified seeds and seedlings, but grafting may also be used. Plants are mainly grown from UK material although some plants may be obtained from the EU (mostly the Netherlands). This is the only source of plants obtained from abroad.

The exporting nurseries grow a range of other plant species. Most of the nurseries expected to export to the EU do not produce plants from grafting, they use only seed and seedlings; therefore, there are no mother plants present on those nurseries. One nursery is using grafting and has mother plants of *Prunus avium* and several other *Prunus* species present on the nursery, as well as other species (*Corylus avellana, Sorbus aucuparia*). The seeds are not a pathway for the whitefly; however, there is no information on how and where the other plants are produced. Therefore, if the plants are first produced in another nursery, the whitefly could possibly travel with them.

Uncertainties:

- No information is available on the provenance of new plants of *Prunus* spp. and other species used for plant production in the area of the nursery.

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

A.1.2.3 | Possibility of spread within the nursery

Prunus avium plants are grown in containers outdoors in the open air.

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

There are poly tunnels within the nursery used to grow early stages of plants (Dossier Section 3.14).

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

Uncertainties:

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

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

A.1.3 | Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no interceptions of plants for planting neither from the UK nor from other countries due to the presence of *Bemisia tabaci* between the years 1995 and March 2024 (EUROPHYT/TRACES-NT, online).

There were four interceptions of *B. tabaci* from the UK in 2007 and 2024 on other plants already planted likely produced under protected conditions (EUROPHYT, online).

A.1.4 | Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *B. tabaci* (European populations) is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Evaluation: Potential *B. tabaci* infestations can be detected although low initial infestations might be overlooked Uncertainties: • The details of the certification process are not known (e.g. number of plants, intensity of surveys and inspections, etc.).
2	Phytosanitary certificates	Yes	Evaluation: The procedures applied could be effective in detecting *B. tabaci* infestations though low initial infestations might be overlooked Uncertainties: • Specific figures on the intensity of survey (sampling effort) are not provided.
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Pesticide application and biological control	Yes	Evaluation: Chemicals listed in the dossier do not target specifically this pest, however they may be effective Chemical applications can affect biological control agents Uncertainties: • No details are given on the pesticide application schedule. • No details are provided on abundance and efficacy of the natural enemies.
6	Surveillance and monitoring	Yes	Evaluation: It can be effective Uncertainties: • Low initial infestations (crawlers) might be overlooked.
7	Sampling and laboratory testing	Yes	Evaluation: It can be effective and useful for specific identification. Low initial infestations might be overlooked.
8	Root washing	No	
9	Refrigeration and temperature control	Yes	Uncertainties: Figure 6: Reduced temperatures will only slow the insect development.
10	Pre-consignment inspection	Yes	Evaluation: It can be effective, though low initial infestations might be overlooked Uncertainties: • Though official checks are carried out at least one per year and they may increase if growing season inspections are required, details on the intensity of the inspections are not provided.

A.1.5 | Overall likelihood of pest freedom for plants for planting in pots

A.1.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infested grafted plants for planting in pots

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

A.1.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infested grafted plants for planting in pots

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

A.1.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested grafted plants for planting in pots (Median)

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

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

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

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

The elicited and fitted values for *Bemisia tabaci* (European population) agreed by the Panel are shown in Tables A.1–A.6 and in Figures A.1–A.3.

TABLE A.1 Elicited and fitted values of the uncertainty distribution of pest infestation by *Bemisia tabaci* per 10,000 potted plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					3		7		10					15
EKE	0.128	0.319	0.635	1.27	2.12	3.20	4.29	6.58	9.03	10.3	11.7	13.0	14.0	14.6	15.0

Note: The EKE results is the BetaGeneral (1.0095, 1.2555, 0, 15.4) 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.2.

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

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9985					9990		9993		9997					10,000
EKE results	9985.0	9985.4	9986	9987	9988	9990	9991	9993	9996	9997	9997.9	9998.7	9999.4	9999.7	9999.9

Note: The EKE results are the fitted values.

TABLE A.3 Elicited and fitted values of the uncertainty distribution of pest infestation by *Bemisia tabaci* (European populations) per 10,000 single or bundles of bare rooted plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					1		3		5					8
EKE	0.0121	0.0431	0.113	0.296	0.606	1.07	1.59	2.84	4.31	5.13	6.02	6.80	7.44	7.79	8.02

Note: The EKE results is the BetaGeneral (0.72005, 1.1194, 0, 8.2) 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.4.

TABLE A.4 The uncertainty distribution of plants free of *Bemisia tabaci* (European populations) per 10,000 plants calculated by Table A.3

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9992					9995		9997		9999					10,000
EKE results	9992.0	9992.2	9992.6	9993.2	9994	9995	9996	9997	9998.4	9998.9	9999.4	9999.7	9999.89	9999.96	9999.99

Note: The EKE results are the fitted values.

TABLE A.5 Elicited and fitted values of the uncertainty distribution of pest infestation by *Bemisia tabaci* (European populations) per 10,000 bundles of graftwood/budwood or cell grown plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					2		5		8					12
EKE	0.0441	0.132	0.301	0.690	1.28	2.08	2.94	4.85	6.97	8.11	9.33	10.4	11.3	11.7	12.0

Note: The EKE results is the BetaGeneral (0.83857, 1.141, 0, 12.3) 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.6.

TABLE A.6 The uncertainty distribution of plants free of *Bemisia tabaci* (European populations) 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	9988					9992		9995		9998					10,000
EKE result	9988.0	9988.3	9989	9990	9991	9992	9993	9995	9997	9997.9	9998.7	9999.3	9999.7	9999.87	9999.96

Note: The EKE results are the fitted values.

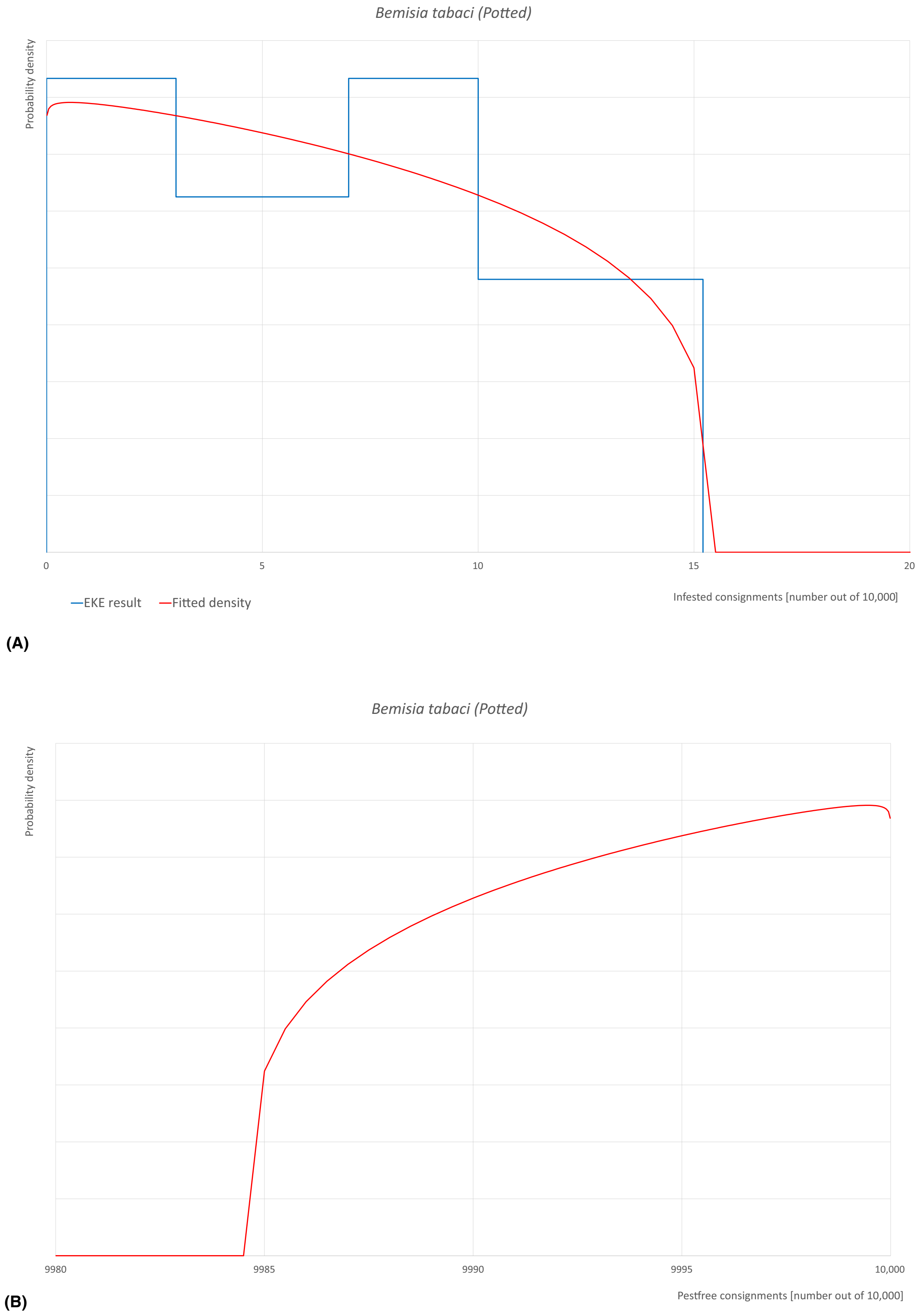


FIGURE A.1 (Continued)

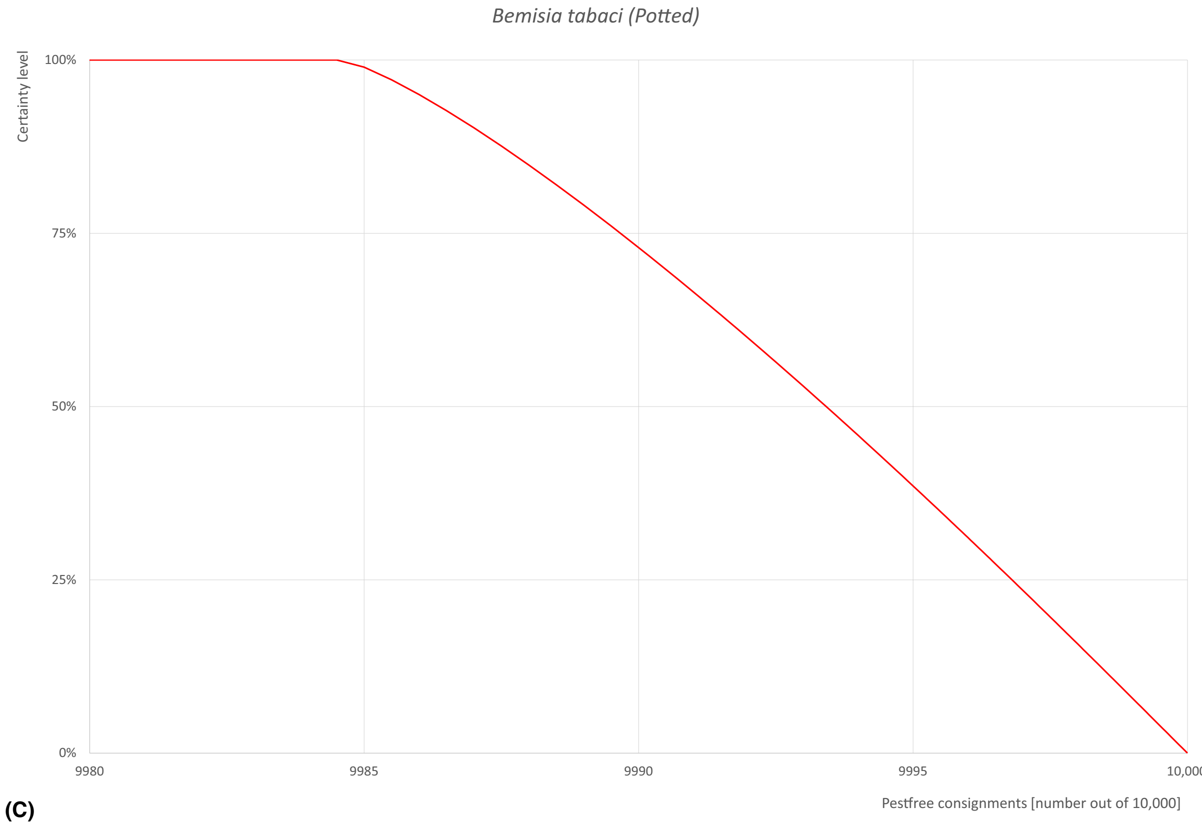
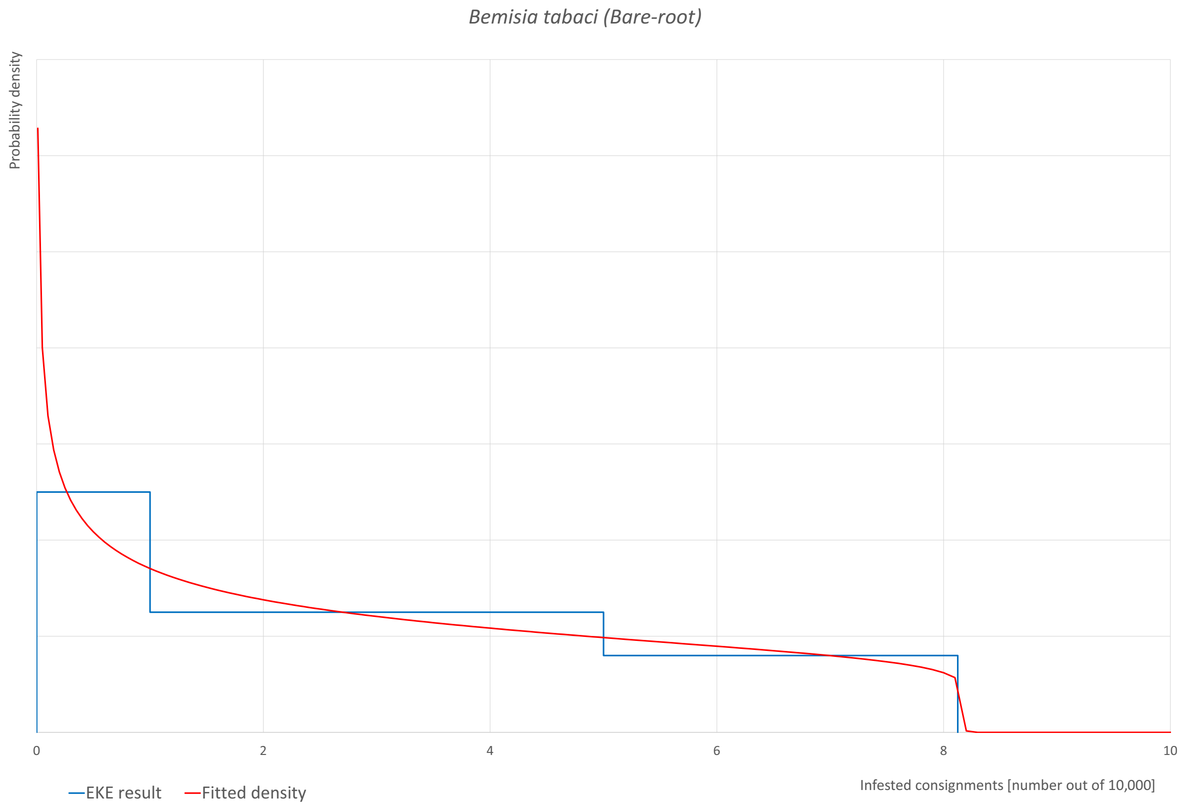
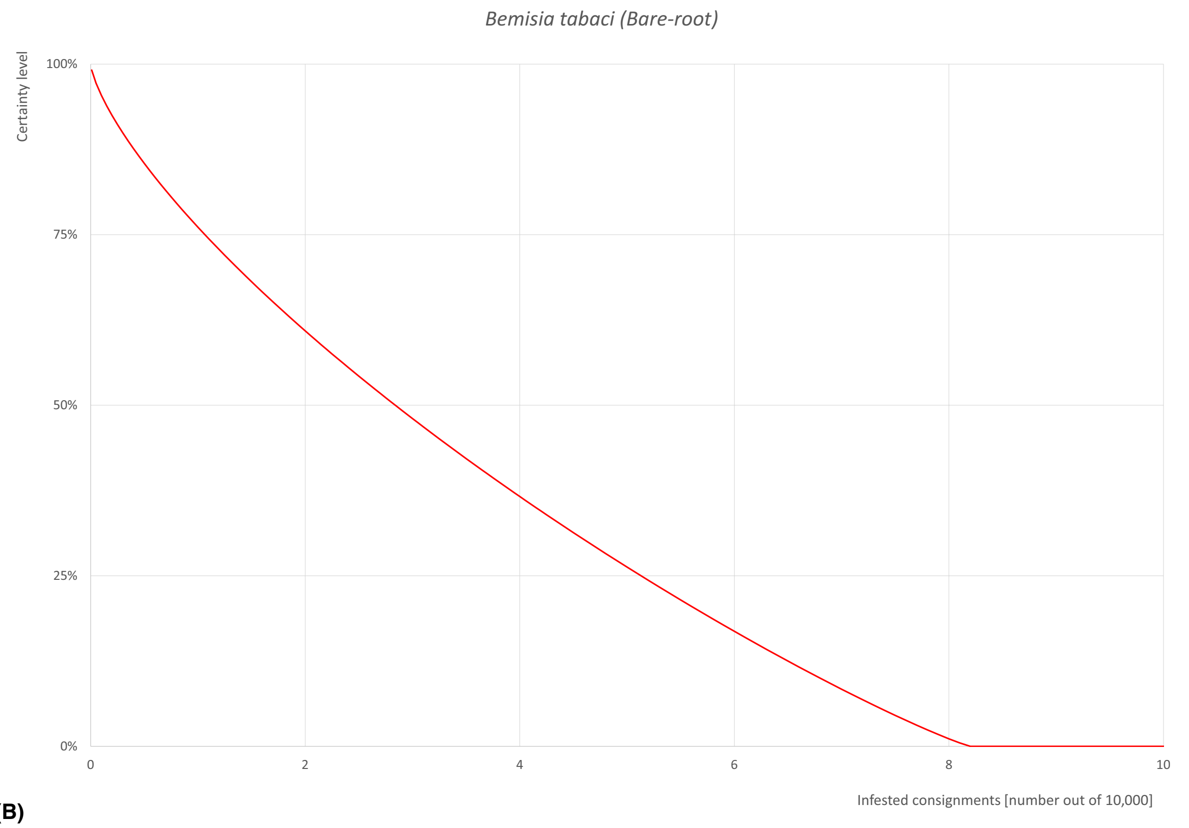


FIGURE A.1 (A) Elicited uncertainty of pest infestation per 10,000 potted plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free plants per 10,000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

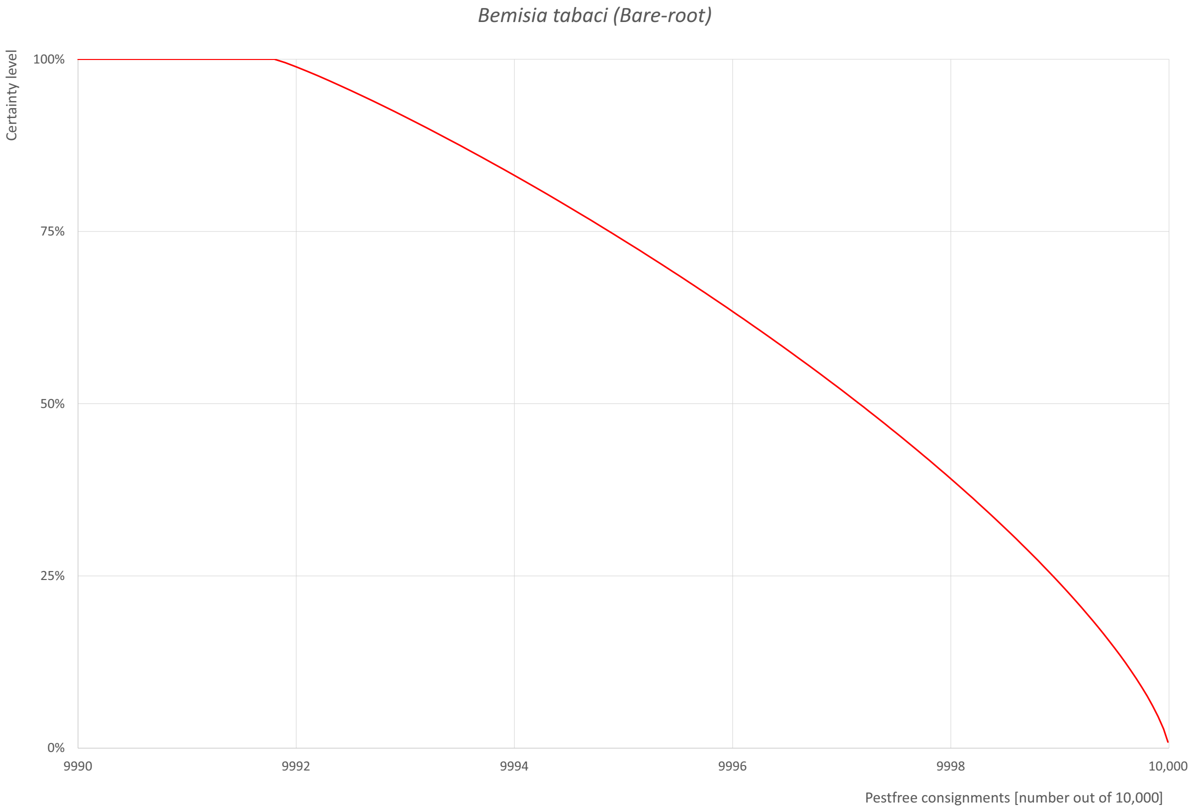


(A)



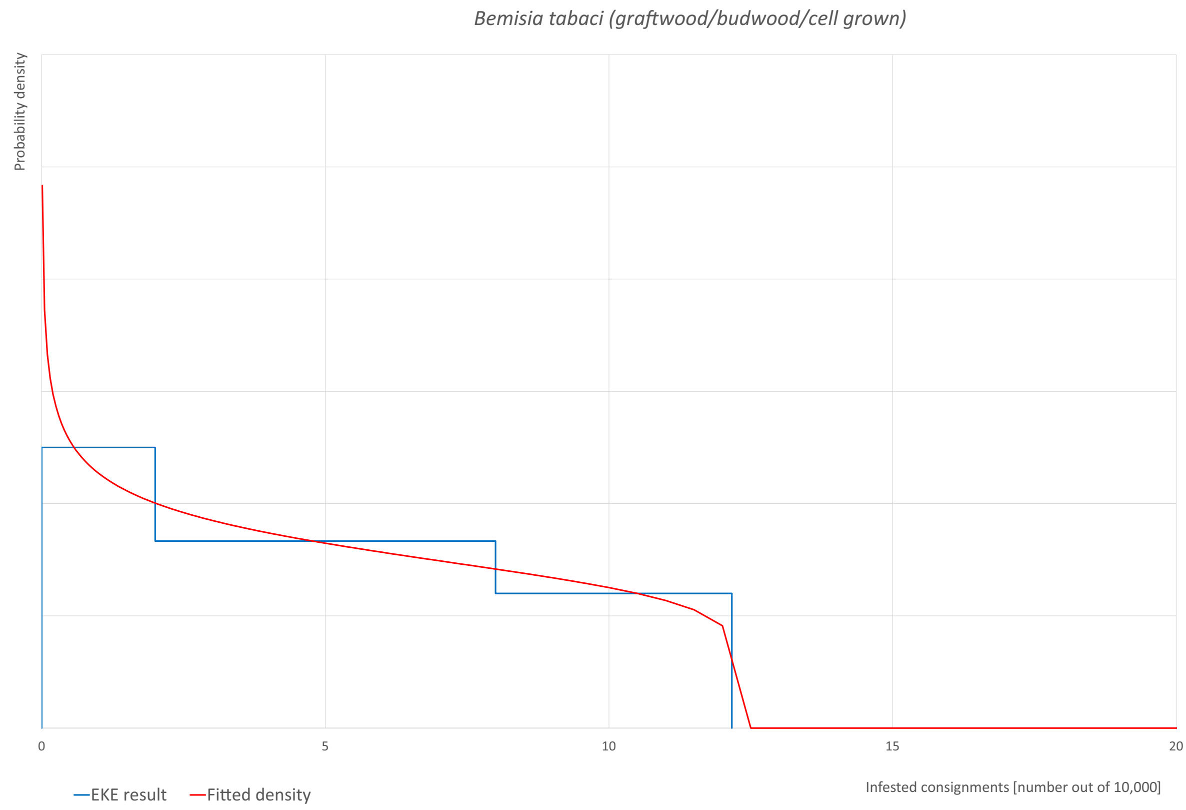
(B)

FIGURE A.2 (Continued)

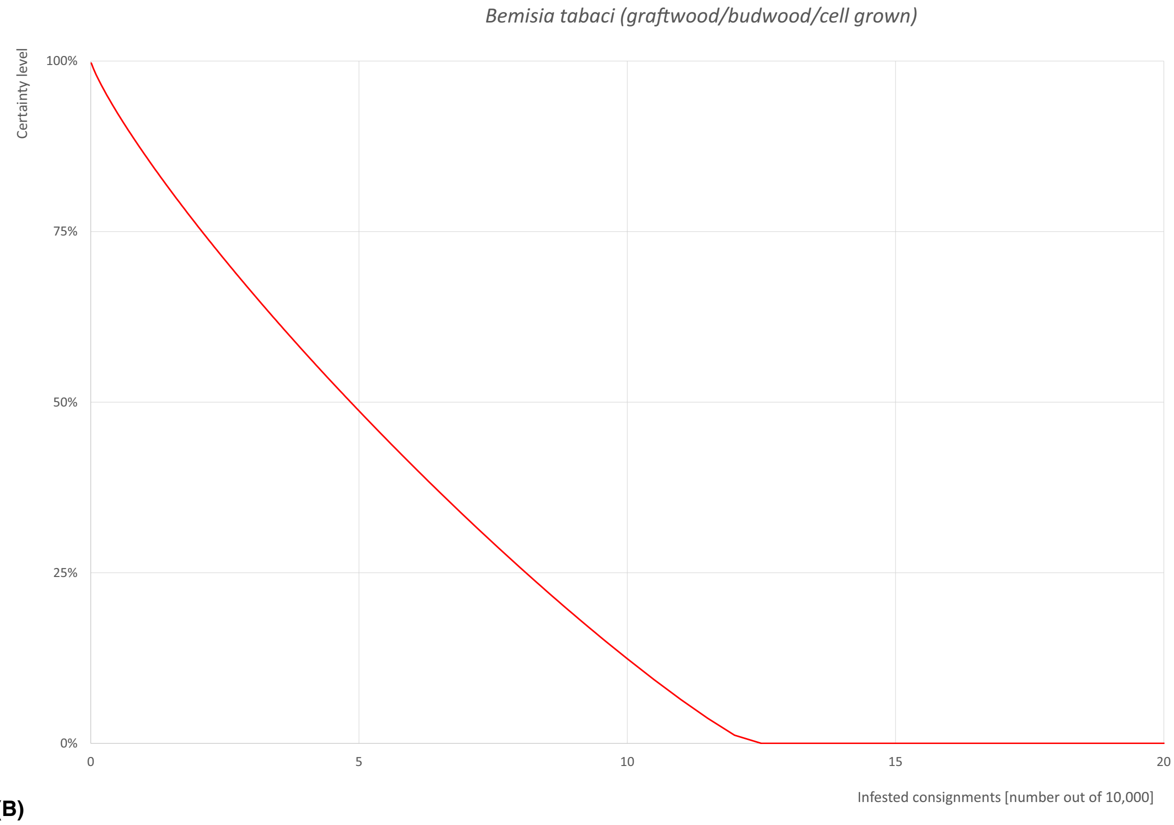


(C)

FIGURE A.2 (A) Elicited uncertainty of pest infestation per 10,000 bare-root 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.

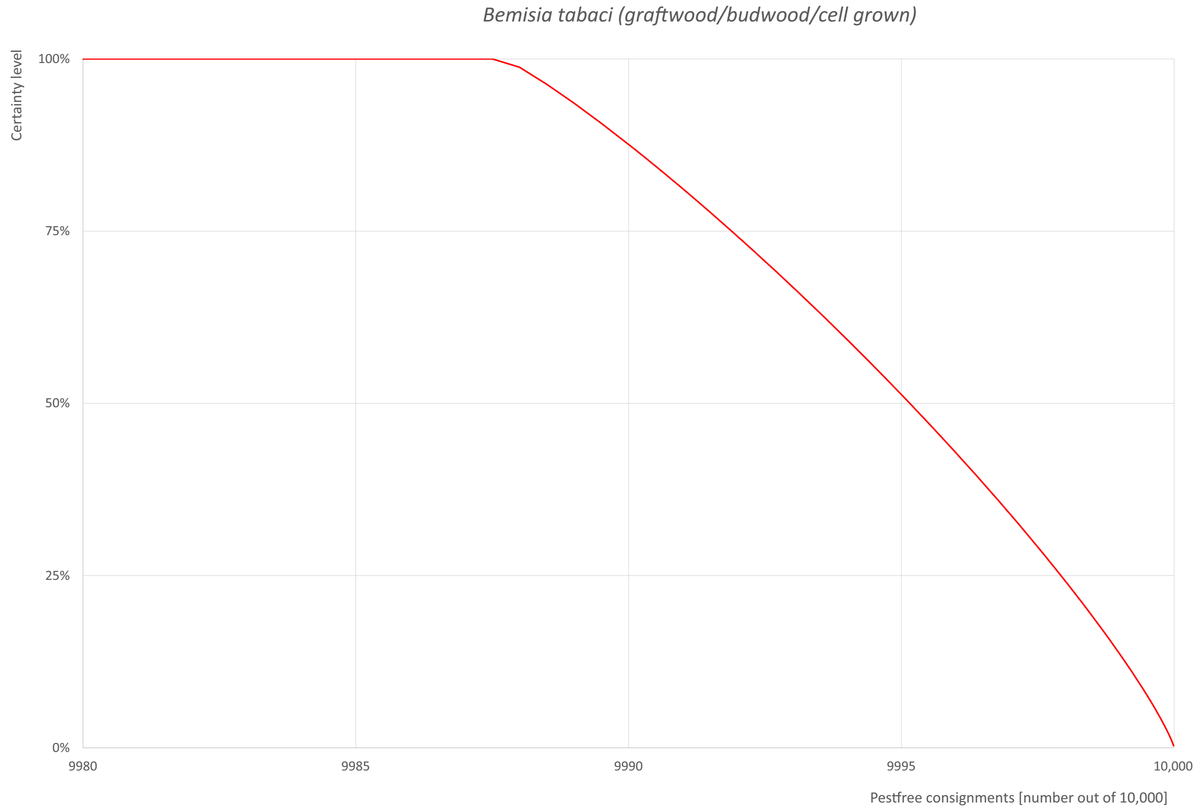


(A)



(B)

FIGURE A.3 (Continued)



(C)

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

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A.2 | *COLLETOTRICHUM AENIGMA*

A.2.1 | Organism information

Taxonomic information	Current valid scientific name: *Colletotrichum aenigma* (Anthracnose and Glomerella leaf blight pathogen) Synonyms: *Colletotrichum populi* (Farr and Rossman, online) Name used in the EU legislation: – Order: Glomerellales Family: Glomerellaceae Common name: – Name used in the Dossier: –
Group	Fungi
EPPO code	COLLAE
Regulated status	**EU status**: N/A **Non-EU**: N/A

(Continues)

(Continued)

Pest status in UK	*Colletotrichum aenigma* has been reported in the UK (Baroncelli et al., 2015)	
Pest status in the EU	*Colletotrichum aenigma* has been reported in Italy from: *Citrus sinensis, Olea europaea* and *Pyrus communis* (Schena et al., 2014)	
Host status on selected *Prunus* species	*Colletotrichum aenigma* has been isolated from *Prunus avium* in China (Chethana et al., 2019)	
PRA information	Available Pest Risk Assessments: – Pest categorisation of *Colletotrichum aenigma, C. alienum, C. perseae, C. siamense and C. theobromicola* (EFSA PLH Panel, 2022). – Final report for the review of biosecurity import requirements for fresh strawberry fruit from Japan (Australian Government, 2020).	
Other relevant information for the assessment		
Biology	*Colletotrichum* spp. are dispersed through asexual conidiospores which are produced on diseased plant tissue and plant debris via acervuli, but they can also, produce ascospores through sexual reproduction (Australian Government, 2020) Conidia and ascospores can be dispersed through rain drops, wind-blown rain, wind or insects Infected nursery stock, contaminated soil, infected leaves and fruits are the main pathways. Moreover, *Colletotrichum* spp. can be distributed through asymptomatic hosts (mainly fruits) and can survive in the soil for a long period (80 days during summer, 120 days during winter) (Australian Government, 2020) *C. aenigma* mycelium can grow between 10°C and 36°C with an optimum of 28°C *Colletotrichum* spp. development, sporulation and spread is favoured by warm, wet weather with an optimum temperature of 27°C. They can remain dormant in fruits and leaves, without causing any symptoms (quiescent period) (De Silva et al., 2017) If the sexual stage of the *Colletotrichum* spp. occurs, perithecia are formed, which can act as overwintering structures and source of inoculum The pathogen can over-winter mainly on fresh/dry leaves and on fresh twigs	
Symptoms	**Main type of symptoms**	Anthracnose symptoms can develop on flowers, stems, fruits, leaves and twigs (Velho et al., 2019) Leaves: – Disease on leaves referred to as Glomerella leaf spot; – Spots (from yellowish to brown discolorations); – Necrosis across or between leaf veins and at leaf tips; – Drop of leaves prematurely; – Dead or unhealthy. Shoots: – Brown or purplish lesions; – Dieback. Flowers: – Turn dark and die. Fruits: – Disease on fruits called 'bitter rot'; – Before harvest: Brown depressed lesions on fruit on the peel of young fruits which result in reduced fruit quality and fruit drop (Marais, 2004); – Lesions can become larger, darker and can show concentric rings of acervuli; – Pink spores on the surface; – Sectioning the fruit can reveal a v-shaped lesion.
	Presence of asymptomatic plants	Quiescent infections can occur in fruits and leaves. The fungus infects young fruits but enters a dormant phase until fruit maturity (Chen et al., 2022; Marais, 2004)
	Confusion with other pests	Due to the taxonomic re-evaluation of the *Colletotrichum* genus, the individual species can only be identified by combining morphometric characters as well as multi-locus phylogenetic analyses by DNA sequencing (EFSA PLH Panel, 2022)
Host plant range	*Colletotrichum aenigma* has previously been reported from a wide range of hosts including *Camellia sinensis*, *Citrus sinensis*, *Fragaria* x *ananassa*, *Malus domestica*, *Olea europaea*, *Persea americana*, *Pyrus communis*, *Pyrus pyrifolia, Prunus avium* and *Vitis vinifera* (Chethana et al., 2019; EFSA PLH Panel, 2022; Fu et al., 2019; Han et al., 2016; Schena et al., 2014; Sharma et al., 2017; Velho et al., 2019; Weir et al., 2012; Wang et al., 2016; Yan et al., 2015)	
Reported evidence of impact	*Colletotrichum aenigma* has been identified in association with other *Colletotrichum* species causing anthracnose and pre- and post-harvest fruit rot in several economically important crop plants	
Pathways and evidence that the commodity is a pathway	– Infected nursery stock, contaminated soil/substrate and fruits are the main pathways (Australian Government, 2020); – The pathogen can be dispersed through spores on dead twigs, leaves and mummified fruit.	
Surveillance information	According to the information provided by the NPPO – DEFRA of the UK: – *Colletotrichum aenigma* is not included in the list of pests associated with *P. avium* in the UK. According to Baroncelli et al. (2015), *C. aenigma* has been isolated from strawberry infected tissue in the UK. However, there is no further information about the distribution within the UK	

A.2.2 | Possibility of pest presence in the nursery

A.2.2.1 | Possibility of entry from the surrounding environment

Colletotrichum spp. have a wide host range. *C. aenigma* can infect a large number of plants, including fruits, vegetables, and ornamentals (EFSA PLH Panel, 2022). The major source of inoculum is from infected plant material, which can be leaves, twigs, and fruit of the affected plant species. While splash dispersal from rain or irrigation water is required to dislodge the conidia from the acervuli of the fungus, subsequent drying of the water droplets can lead to air-borne inoculum, which can be further dispersed via wind. Therefore, the presence of host species in the environment of the nurseries with *P. avium* plants is an important factor for the possible movement spread of inoculum into the nursery.

Uncertainties:

- It is uncertain which plant species are present in private gardens in the surrounding area. There may be private gardens containing plants that can serve as hosts e.g. *Fragaria* X *ananassa*.

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

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

The UK has regulations in place for fruit plant propagating material that are in line with those of European Union, and this equivalence has been recognised in Commission Implementing Decision (EU) 2020/2219. Thus, only material fulfilling characteristics of certified, basic, or CAC levels of certification, including the origin of the material, can be marketed.

The starting material for most nurseries is certified seeds and seedlings, but grafting may also be used. The material is from UK or EU countries.

Uncertainties:

- Many *Colletotrichum* species can have extended hemibiotrophic or quiescent phases of their life cycles in asymptomatic plants (De Silva et al., 2017). Latent infections might be present in the grafting material if *Colletotrichum* spp. is undetectable in the mother plants due to an extended quiescent phase.

Taking the above evidence and uncertainties into consideration, the Panel considers it is possible but not very likely that the pathogen could enter the nursery with new plants/seeds (via budwood/graftwood with latent infections or seeds).

A.2.2.3 | Possibility of spread within the nursery

If *C. aenigma* is present within the nursery, it can spread to other plants via asexual spores (conidia). Conidia are disseminated from infected plants by rain splash or wind onto healthy leaves, young fruits or blossoms (De Silva et al., 2017). The fungi continue to produce conidia throughout the season resulting in a polycyclic disease cycle and further spread of the disease within the nursery. The fungi overwinter in plant tissue or on plant debris in the soil. If the sexual stage of the *C. aenigma* occurs, perithecia are formed, which can act as overwintering structures and source of inoculum. Planting of contaminated plants of other plant species in the nursery may also contribute to the spread of the disease. Contamination of pruning tools with spores may also contribute to the spread of disease.

Many *Colletotrichum* species can have extended hemibiotrophic or quiescent phases of their life cycles in asymptomatic plants, which can be overlooked by visual inspections and lead to an unintentional spread of the disease. (De Silva et al., 2017). Inspections are required once a year for Basic 1–3 and Certified materials. Trained nursery staff perform regular inspections of the material and implement relevant control measures but these apparently vary from nursery to nursery and no details were provided.

Uncertainties:

- There is uncertainty of the length of a possible dormant phase of the *Colletotrichum* species and whether this will lead to the undetected presence of *Colletotrichum* species in the exported plants and scions despite the regular inspections.
- The *Colletotrichum* species have a wide host range. In the dossier, there is no information on whether other host plant species are present within the nursery from which the *Colletotrichum* spp. could potentially spread to the *Prunus* plants.

Taking the above evidence and uncertainties into consideration, the Panel considers it is likely that the pathogen could spread within the nursery.

A.2.3 | Information from interceptions

There are no records of interceptions of *Colletotrichum aenigma* plants for planting from the UK due to the presence of *C. aenigma* between 1998 and March 2024 (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 UK are listed and an indication of their effectiveness on *C. aenigma* is provided. The description of the risk mitigation measures currently applied in UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., the visual inspection might be insufficient.
2	Phytosanitary certificates	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., the visual inspection might be insufficient.
3	Cleaning and disinfection of facilities, tools and machinery	Yes	Uncertainties: – Details on cleaning and disinfection of facilities, tools, and machinery that would be effective against fungi are not provided.
4	Rouging and pruning	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., infected plant material may be overlooked and not removed.
5	Pesticide application and biological control	Yes	Uncertainties: – Resistance to fungicides is present in some populations of *Colletotrichum* spp. – The risk of fungicide resistance can vary according to the active ingredient (FRAC, 2020). – Fungicide treatment may not be sufficient to remove quiescent infections.
6	Surveillance and monitoring	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., the visual inspection might be insufficient.
7	Sampling and laboratory testing	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., this procedure (visual inspection followed by laboratory test) might be insufficient.
8	Root washing	No	
9	Refrigeration and temperature control	Yes	Uncertainties: – Reduced temperatures will only slow the growth of the fungus but not eliminate it. – The effect on latent or endophytic presence is unclear.
10	Pre-consignment inspection	Yes	Uncertainties: – Due to the potential dormant phase of *Colletotrichum* spp., the visual inspection might be insufficient.

A.2.5 | Overall likelihood of pest freedom

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

- Pest pressure is very low in the UK
- There are no other host plants present in the surroundings and within nursery
- Proper and effective application of fungicides to control fungal diseases; visual inspections are in place
- Growers and inspectors inspect plants and are effective in detecting and discarding infected materials
- Latent infections are rare (with leaves showing symptoms of infection if present)
- Transport of the commodities is during the dormant stage

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

- There are other host plants present in the surroundings and within nursery
- There is no targeted survey in the UK
- Growers are not trained and misidentification with other *Colletotrichum* species could happen.
- Latent infections are common and could be overlooked
- Leaves will be present in potted plants at the time of export
- High pest pressure in the UK
- Applied fungicides are not efficient in controlling the disease

A.2.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

The Panel assumes a scenario in which infections if they should occur would be below the estimated mid point value.

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

The main uncertainty is the presence of latent infections.

A.2.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Colletotrichum aenigma*

The elicited and fitted values for ***Colletotrichum aenigma*** agreed by the Panel are shown in Tables A.7–A.12 and in Figures A.4–A.7.

TABLE A.7 Elicited and fitted values of the uncertainty distribution of pest infestation by *Colletotrichum aenigma* per 10,000 potted plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					7		15		22					30
EKE	0.279	0.703	1.41	2.85	4.79	7.21	9.65	14.6	19.7	22.3	24.9	27.0	28.6	29.5	30.0

Note: The EKE results is the BetaGeneral (0.99116, 1.0471, 0, 30.4) 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.8.

TABLE A.8 The uncertainty distribution of plants free of *Colletotrichum aenigma* per 10,000 potted 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	9970					9978		9985		9993					10,000
EKE results	9970	9971	9971	9973	9975	9978	9980	9985	9990	9993	9995	9997	9998.6	9999.3	9999.7

Note: The EKE results are the fitted values.

TABLE A.9 Elicited and fitted values of the uncertainty distribution of pest infestation by *Colletotrichum aenigma* per 10,000 single or bundles of bare rooted plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					3		6		9					12
EKE	0.128	0.315	0.621	1.22	2.03	3.01	4.00	5.99	7.99	9.00	10.0	10.9	11.5	11.8	12.1

Note: The EKE results is the BetaGeneral (1.0223, 1.0507, 0, 12.2) 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.10.

TABLE A.10 The uncertainty distribution of plants free of *Colletotrichum aenigma* per 10,000 plants 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					9991		9994		9997					10,000
EKE results	9987.9	9988.2	9988.5	9989.1	9990.0	9991	9992	9994	9996	9997	9998.0	9998.8	9999.4	9999.7	9999.9

Note: The EKE results are the fitted values.

TABLE A.11 Elicited and fitted values of the uncertainty distribution of pest infestation by *Colletotrichum aenigma* per 10,000 bundles of graftwood/budwood or cell grown plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.00					1.25		2.50		3.75					5.00
EKE	0.0526	0.130	0.256	0.508	0.842	1.25	1.67	2.50	3.33	3.75	4.18	4.52	4.79	4.93	5.01

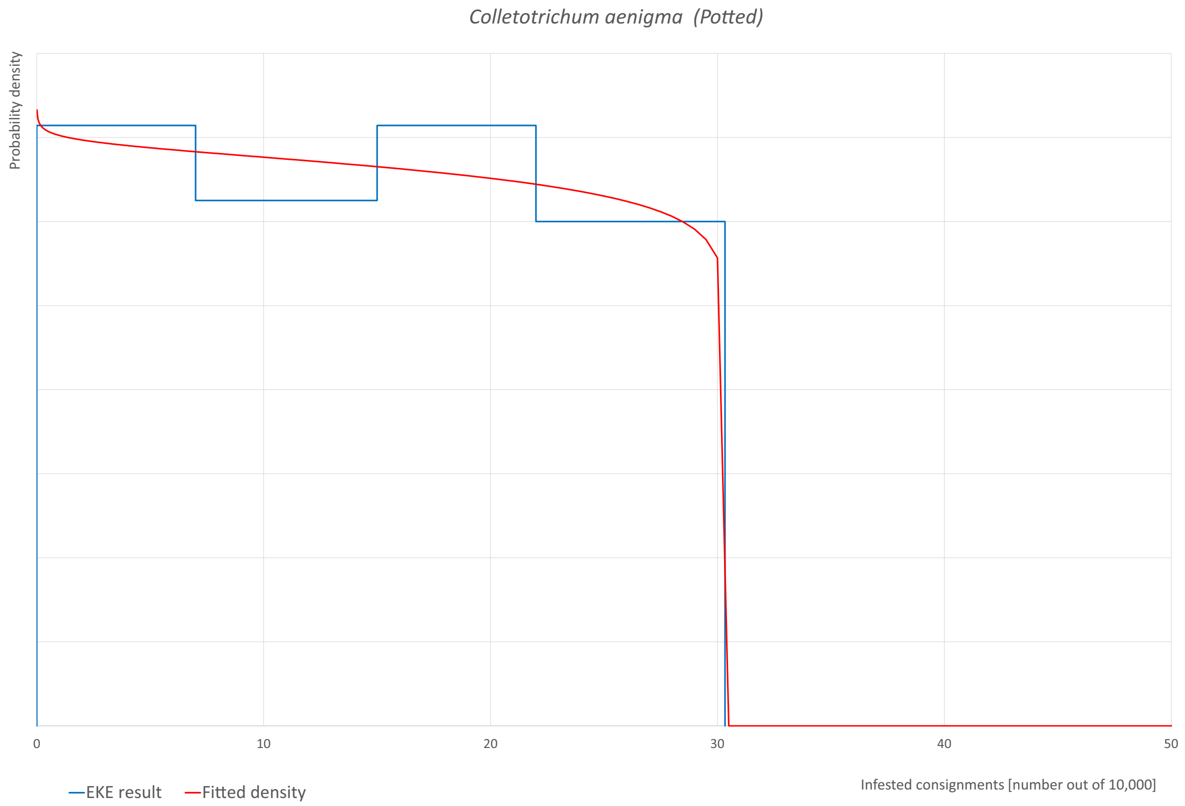
Note: The EKE results is the BetaGeneral (1.017, 1.0405, 0, 5.07) distribution fitted with @Risk version 7.6.

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.12.

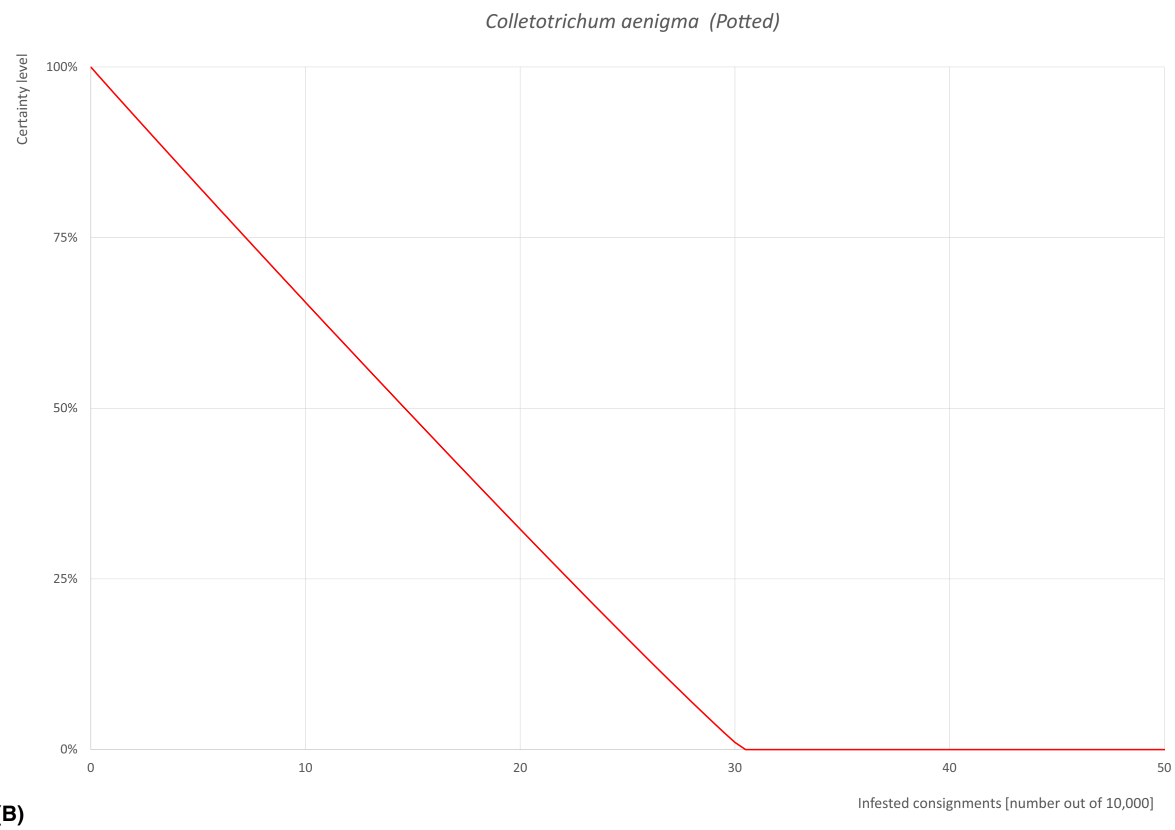
TABLE A.12 The uncertainty distribution of plants free of *Colletotrichum aenigma* per 10,000 plants calculated by Table A.11.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9995					9996		9998		9999					10,000
EKE results	9995.0	9995.1	9995.2	9995.5	9995.8	9996.2	9996.7	9997.5	9998.3	9998.7	9999.2	9999.5	9999.7	9999.87	9999.95

Note: The EKE results are the fitted values.



(A)



(B)

FIGURE A.4 (Continued)

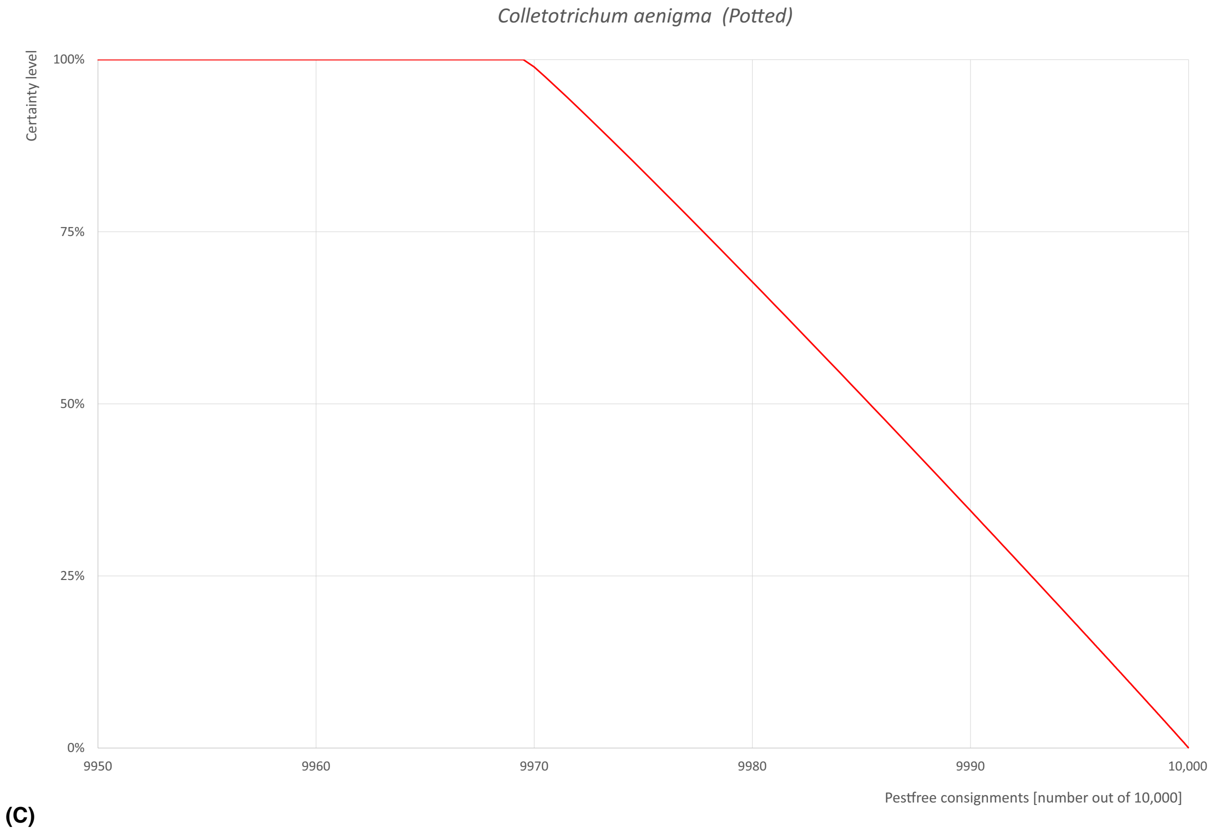
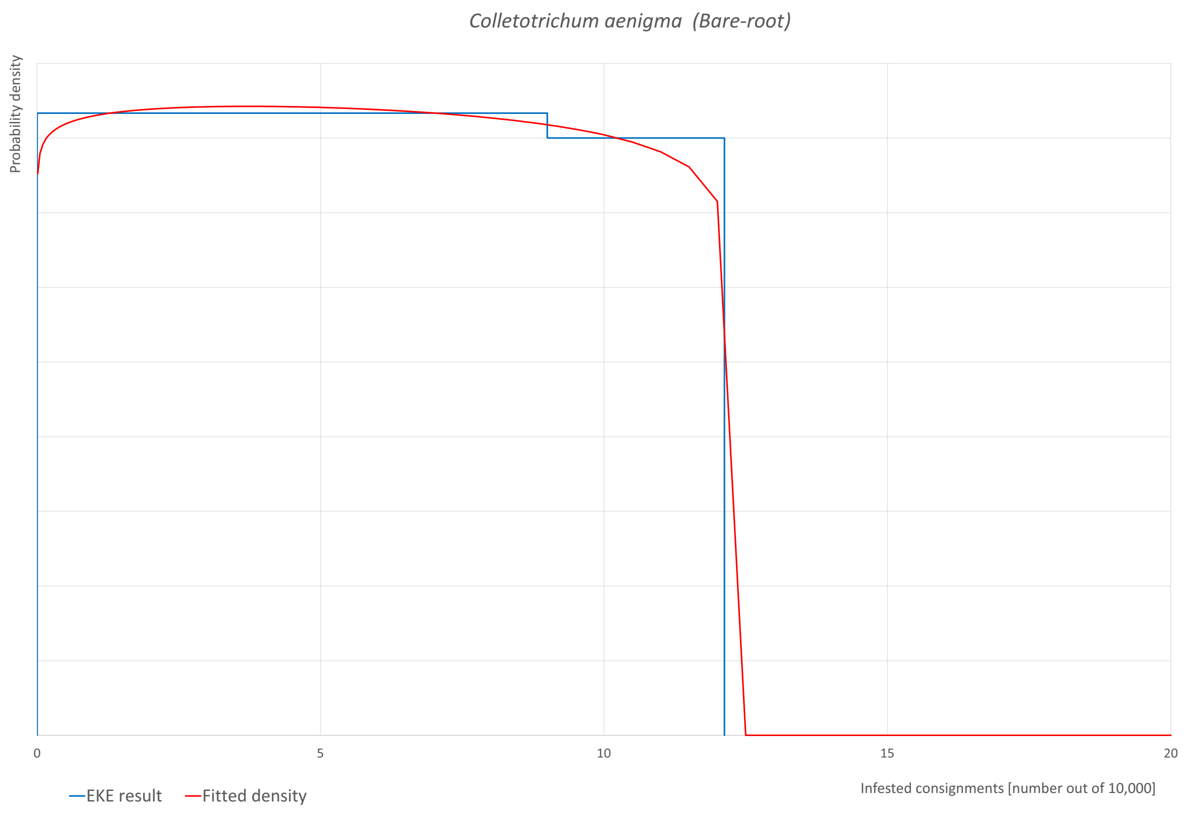
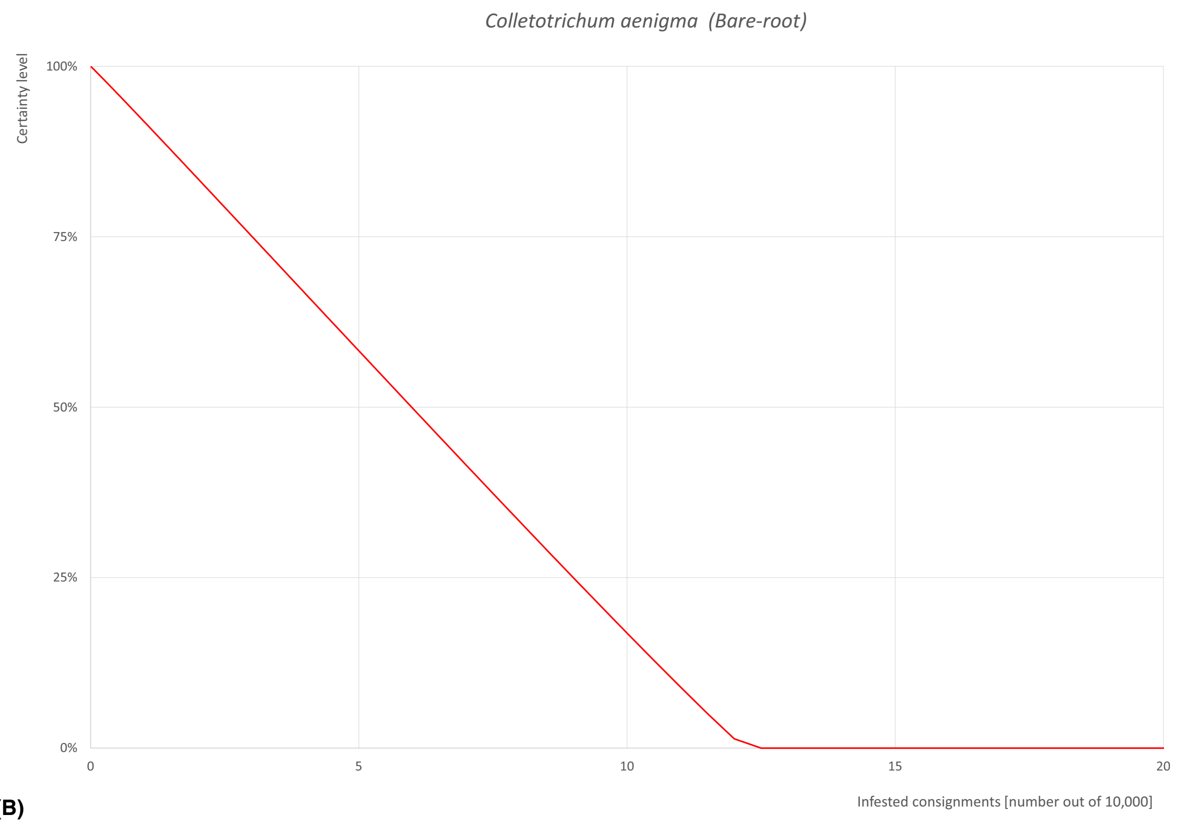


FIGURE A.4 (A) Elicited uncertainty of pest infestation per 10,000 potted plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free plants per 10,000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

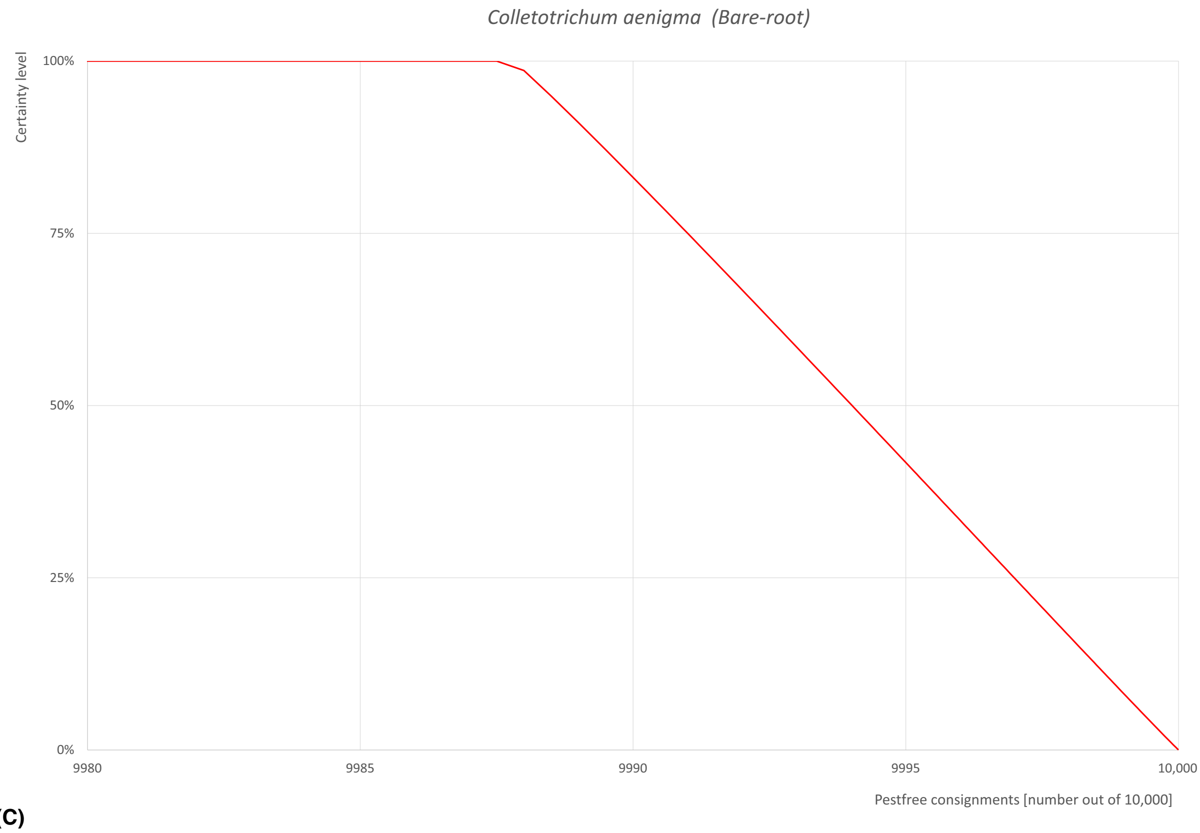


(A)



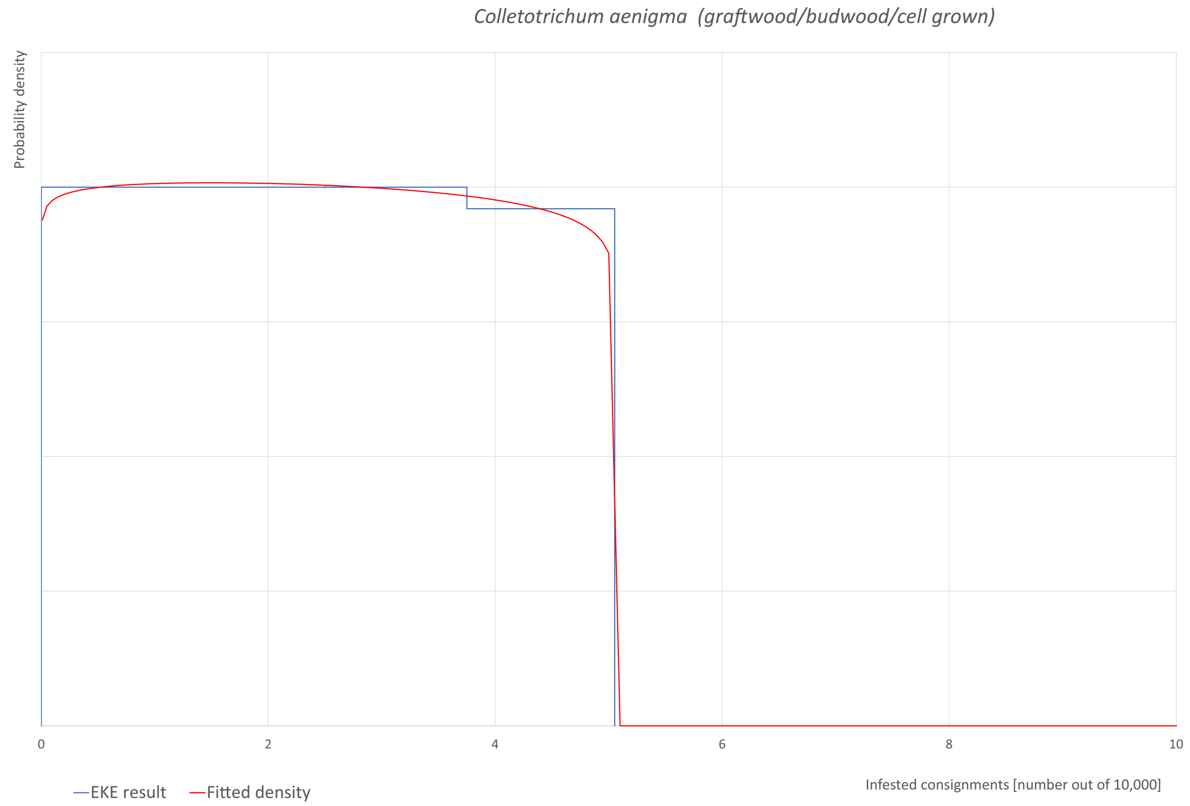
(B)

FIGURE A.5 (Continued)

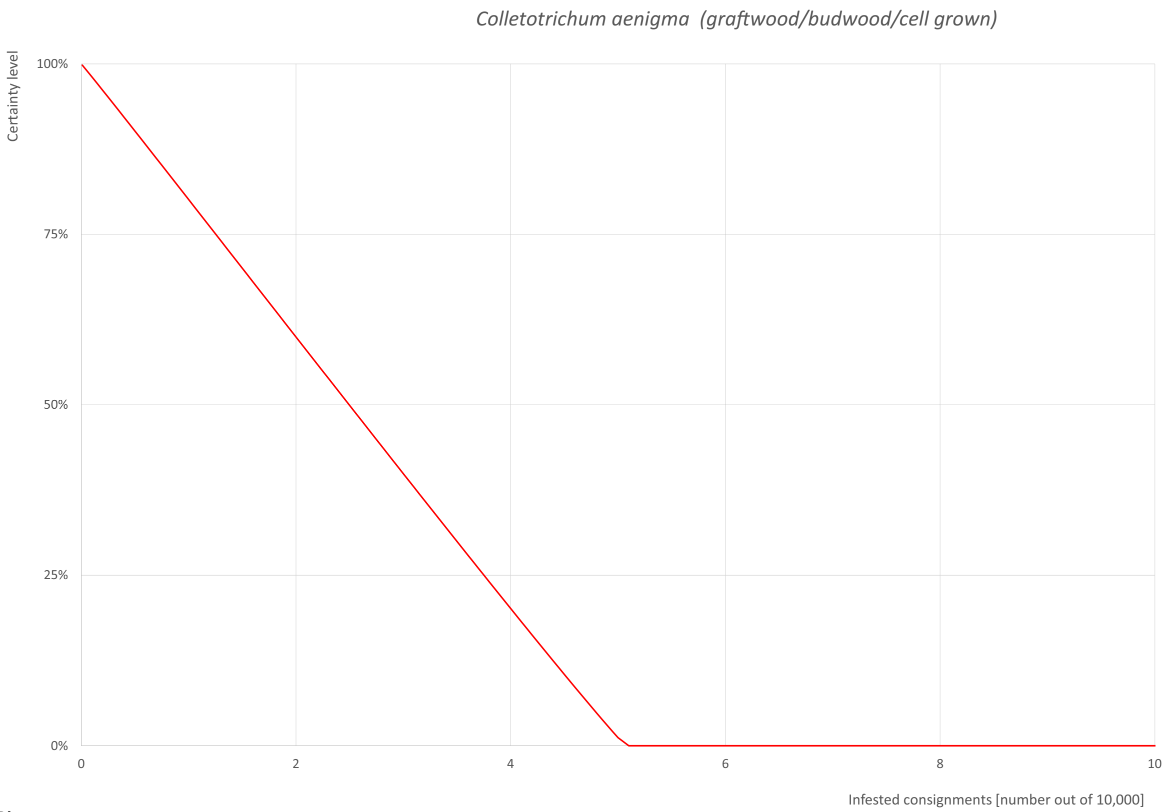


(C)

FIGURE A.5 (A) Elicited uncertainty of pest infestation per 10,000 single or bundles of bare-root 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 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)



(B)

FIGURE A.6 (Continued)

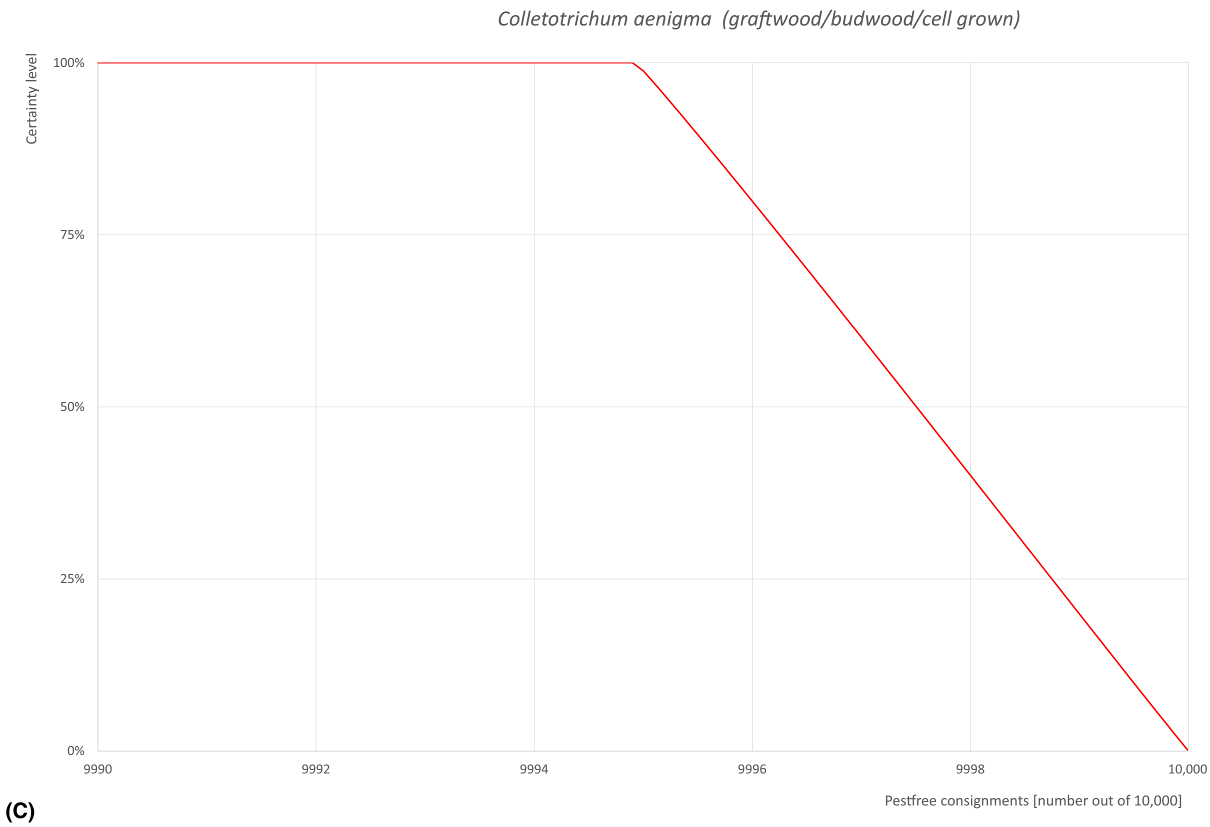


FIGURE A.6 (A) Elicited uncertainty of pest infestation per 10,000 bundles of graftwood/budwood or cell-grown plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free 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.

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A.3 | *EULECANIUM EXCRESCENS*

A.3.1 | Organism information

Taxonomic information	Current valid scientific name: *Eulecanium excrescens* Synonyms: *Lecanium excrescens* Name used in the EU legislation: – Order: Hemiptera Family: Coccidae Common name: excrescent scale, wisteria scale Name used in the Dossier: *Eulecanium excrescens*
Group	Insects
EPPO code	–
Regulated status	The pest is neither regulated in the EU nor listed by EPPO *Eulecanium excrescens* is listed in the UK Plant Health Risk Register but archived in 2020 as considered to pose a low risk to the UK (DEFRA, online)
Pest status in UK	*Eulecanium excrescens* is present in the UK as an introduced species with restricted distribution to the Greater London Area; outside this area, the pest has been reported only in a few localities of the neighbouring county of Hertfordshire (Salisbury et al., 2010) The scale has been found at numerous sites in London and is likely to have been present in the UK since at least 2000. *E. excrescens* may be more widespread in the PRA area than is currently known The species is currently considered present in the UK

(Continued)

Pest status in the EU	*Eulecanium excrescens* is absent from the territory of the EU (García Morales et al., online)	
Host status on *Prunus avium*	*Prunus domestica* and *Prunus* spp. are reported as hosts of *E. excrescens* (Deng, 1985)	
PRA information	Pest Risk Assessments available: – UK Risk Register Details for *Eulecanium excrescens* (DEFRA, online); – CSL Pest Risk Analysis for *Eulecanium excrescens* (MacLeod and Matthews, 2005).	
Other relevant information for the assessment		
Biology	According to Malumphy (2005), *E. excrescens* has one generation/year; the nymphs overwinter and reach maturity in April. The adult females lay eggs in May; eggs hatch in May–June and crawlers settle on the leaves; in Autumn, before the leaves fall, they move from the leaves to the twigs to overwinter	
Symptoms	**Main type of symptoms**	*Eulecanium excrescens* is a sap sucker able to damage host plants by removing large quantities of sap, so causing weakening, leaf loss and dieback; large amount of honeydew is also produced, reducing photosynthesis and disfiguring ornamental plants in parks and gardens (MacLeod and Matthews, 2005)
	Presence of asymptomatic plants	The globular, dark brown, mature adult females of *E. excrescens* can usually be distinguished from other Coccidae found in the UK by their large size, up to 13 mm long and 10 mm high. A grey powdery wax resembling a growth of mould usually covers the scale, although this may be lost as they mature. The immature nymphs are pale brown with rectangular whitish encrustations on their surface. Both adults and nymphs occur on the stems and branches of the host plants. A detailed description is given in Malumphy (2005) and references therein
	Confusion with other pests	Low initial infestations may be overlooked
Host plant range	*E. excrescens* is considered highly polyphagous and has been recorded on a wide range of deciduous orchard and ornamental trees, e.g. *Malus* spp. (apple), *Prunus* spp. (peach/cherry) and *Pyrus* spp. (pear) (Essig, 1958; Gill, 1988; Kosztarab, 1996). To date in the UK, *E. excrescens* has not been found on fruit trees in gardens or commercial orchards but only on ornamentals in private gardens on *Wisteria* (Fabaceae), *Prunus* spp. and South African trumpet vine (*Podranea ricasoliana*: Bignoniaceae). However, due to its polyphagy, this scale could be economically important for apple (*Malus* spp.), almond (*Prunus dulcis* (Mill.)), apricot (*Prunus armeniaca* L.), cherry (*Prunus* spp.), elm (*Ulmus* spp.), peach (*Prunus persica* (L.)), pear (*Pyrus communis* L.), sycamore (*Acer pseudoplatanus* L.), walnut (*Juglans regia* L.) and *Wisteria* spp. (Essig, 1958; Gill, 1988)	
Reported evidence of impact	In the vast majority of cases, the host plant has been *Wisteria* spp. and this is likely to be the preferred host, as it is in the USA (Gill, 1988). However, given its polyphagy further hosts could be reported	
Pathways and evidence that the commodity is a pathway	The soft scale *E. excrescens* is native to Asia and introduced in the USA, where it is present in California, Connecticut, New York, Oregon and Pennsylvania (MacLeod and Matthews, 2005; Malumphy, 2005). Though as mentioned above, this species mainly feeds on *Wisteria* spp., it is also known to attack other vines as *Podranea ricasoliana*, *Parthenocyssus quinquefolia* and *P. tricuspidata*, and trees as *Malus, Prunus*, *Pyrus*, *Ulmus*, Zelkova (Salisbury et al., 2010)	
Surveillance information	In China, this scale is regarded as a pest damaging fruit orchards (MacLeod and Matthews, 2005), i.e. *Malus* spp., *Prunus* spp. and *Pyrus* spp. (Deng, 1985). In the USA, *E. excrescens* is included in the list of pests harmful to hazelnut (*Corylus avellana*) production in Oregon (Murray and Jepson, 2018). In California, it is rare and not regarded as a pest of economic importance (Gill, 1988). There are no data from other US states. However, through feeding, *E. excrescens* does remove large quantities of sap, weakening the plant causing some leaf loss and slow dieback. Large amounts of honeydew are produced and aesthetic damage to host plants may occur. Wisterias are very high value plants, often a main feature of gardens and buildings where they climb and cover south facing walls. Although detracting from the aesthetic appearance of the host, *E. excrescens* is unlikely to kill mature plants. Young, small plants would be more susceptible and could be killed. A parasitoid species has been detected attacking *E. excrescens* on one infested plant in London (Malumphy, 2005). Thus, natural enemies may be able to limit further damage	

A.3.2 | Possibility of pest presence in the nursery

A.3.2.1 | Possibility of entry from the surrounding environment

If present in the surroundings, the pest can enter the nursery (as the UK is producing these plants for planting outdoors). Indeed, although only reported on ornamental plants in private gardens in the Greater London Area and a few localities of the neighbouring county of Hertfordshire, *E. excrescens* may be more widespread than is currently known. The pest could enter the nursery either by passive dispersal (e.g. wind), especially crawlers, which can be easily uplifted by wind, infested plant material by nursery workers and machinery. Given that the pest is very polyphagous it could be associated with several plant species in the nursery surroundings.

Uncertainties:

- No information on possible host plants of the pest in the nursery surroundings is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible, although unlikely, for the pest to enter the nursery.

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

The pest can be found on the trunk, stem, branches, leaves of plants for planting (scions, grafted rootstocks). Although adults can be relatively easily spotted during visual inspections, young stages can be difficult to detect. The pest can be hidden inside bark cracks. In case of initial low populations, the species can be overlooked. Introduction of the pest with certified material is very unlikely.

Uncertainties:

- Uncertain if certified material is screened for this pest

Uncertain if the pest could enter with other incoming plants. Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery although very unlikely.

A.3.2.3 | Possibility of spread within the nursery

If the scale enters the nursery from the surroundings, it could spread within the nursery either by passive dispersal (e.g. wind), especially crawlers, that can be easily uplifted by wind, infested plant material, or by nursery workers and machinery. Active dispersal is possible and movement from plant to plant by mobile young instars is possible. Given that the pest is very polyphagous, it could be associated with other crops in the nursery. During the production process, visual inspections are performed, with microscopic observations if needed. Chemical control is applied targeting other species but potentially effective towards *E. excrescens*. Pruning can also affect scale populations either directly by removal of infested branches and indirectly exposing the pest to biotic and abiotic control agents.

Uncertainties:

- Uncertain if other plants are grown in the nurseries.

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

A.3.3 | Information from interceptions

There are no records of interceptions of *E. excrescens on P. avium* plants for planting from the UK between 1998 and March 2024 (EUROPHYT and TRACES-NT, online).

A.3.4 | Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in the UK are listed and an indication of their effectiveness on *E. excrescens* is provided. The description of the risk mitigation measures currently applied in UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Evaluation: Potential *E. excrescens* infestations could easily be detected, though low initial infestations might be overlooked. Uncertainties: – The details of the certification process are not given (e.g. number of plants, intensity of surveys and inspections, etc.). Specific figures on the intensity of survey (sampling effort) are not provided.
2	Phytosanitary certificates	Yes	Evaluation: The procedures applied could be effective in detecting *E. excrescens* infestations, though low initial infestations might be overlooked. Uncertainties: – Specific figures on the intensity of survey (sampling effort) are not provided.

(Continued)

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Rouging and pruning	Yes	Evaluation: Pruning can affect scale populations either directly by removal of infested branches and indirectly exposing the pest to biotic and abiotic control agents
5	Pesticide application and biological control	Yes	Evaluation: Chemicals listed in the dossier do not target specifically this pest; however, they may be effective Chemical applications can affect biological control agents. Uncertainties: – No details are given on the pesticide application schedule. – No details are provided on abundance and efficacy of the natural enemies.
6	Surveillance and monitoring	Yes	Evaluation: It can be effective Uncertainties: Low initial infestations (crawlers) might be overlooked.
7	Sampling and laboratory testing	Yes	Evaluation: It can be effective and useful for specific identification Uncertainties: – Low initial infestations might be overlooked.
8	Root washing	No	
9	Refrigeration and temperature control	Yes	Uncertainties: – Reduced temperatures will only slow the insect development but not kill it.
10	Pre-consignment inspection	Yes	Evaluation: It can be effective Uncertainties: – There is a lack of details on the frequency and intensity of these inspections at this stage. – Low initial infestations might be overlooked.

A.3.5 | Overall likelihood of pest freedom

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

- Registration and certification of propagation material ensure pest-free production
- Most of nurseries are placed in areas where the pest is not present
- *E. excrescens* has not been reported on *Prunus* spp. in the UK
- No other host plants are present in the nurseries and in the surroundings
- Visual inspections can easily detect pest presence at adult stage

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

- Registration and certification of propagation material does not target this pest and therefore does not ensure pest-freedom
- The pest spread in the UK from its first record site
- *Prunus* spp. is a host of *E. excrescens* and could be infested in the UK as well
- Other host plants are present in the nurseries and in the surroundings
- Visual inspections cannot easily detect pest presence at crawler stage

A.3.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- Uncertainty about pest pressure in the UK
- Information on infestations on *P. avium* plants in the UK is uncertain
- Lack of reports of infestation within the *P. avium* growing area in the UK

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

- Presence of the pest in the surrounding areas is unknown

A.3.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Eulecanium excrescens*

The elicited and fitted values for *Eulecanium excrescens* agreed by the Panel are shown in Tables A.13–A.16 and in Figures A.7 and A.8

TABLE A.13 Elicited and fitted values of the uncertainty distribution of pest infestation by *Eulecanium excrescens* per 10,000 potted or bare-root plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					5		10		15					20
EKE	0.212	0.521	1.03	2.03	3.37	5.02	6.66	10.0	13.3	15.0	16.7	18.1	19.2	19.7	20.1

Note: The EKE results is the BetaGeneral (1.019, 1.0443, 0, 20.3) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants the pest freedom was calculated (i.e. = 10,000 – the 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 *Eulecanium excrescens* per 10,000 potted or bare-root 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	9980					9985		9990		9995					10,000
EKE results	9980	9980	9981	9982	9983	9985	9987	9990	9993	9995	9997	9998.0	9999.0	9999.5	9999.8

Note: The EKE results are the fitted values.

TABLE A.15 Elicited and fitted values of the uncertainty distribution of pest infestation by *Eulecanium excrescens* per 10,000 graftwood/budwood or cell-grown plants.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	EKE	0.0					2		5		7				
EKE	Fit-GB	0.0649	0.176	0.374	0.796	1.39	2.17	2.96	4.64	6.38	7.27	8.19	8.95	9.53	9.83

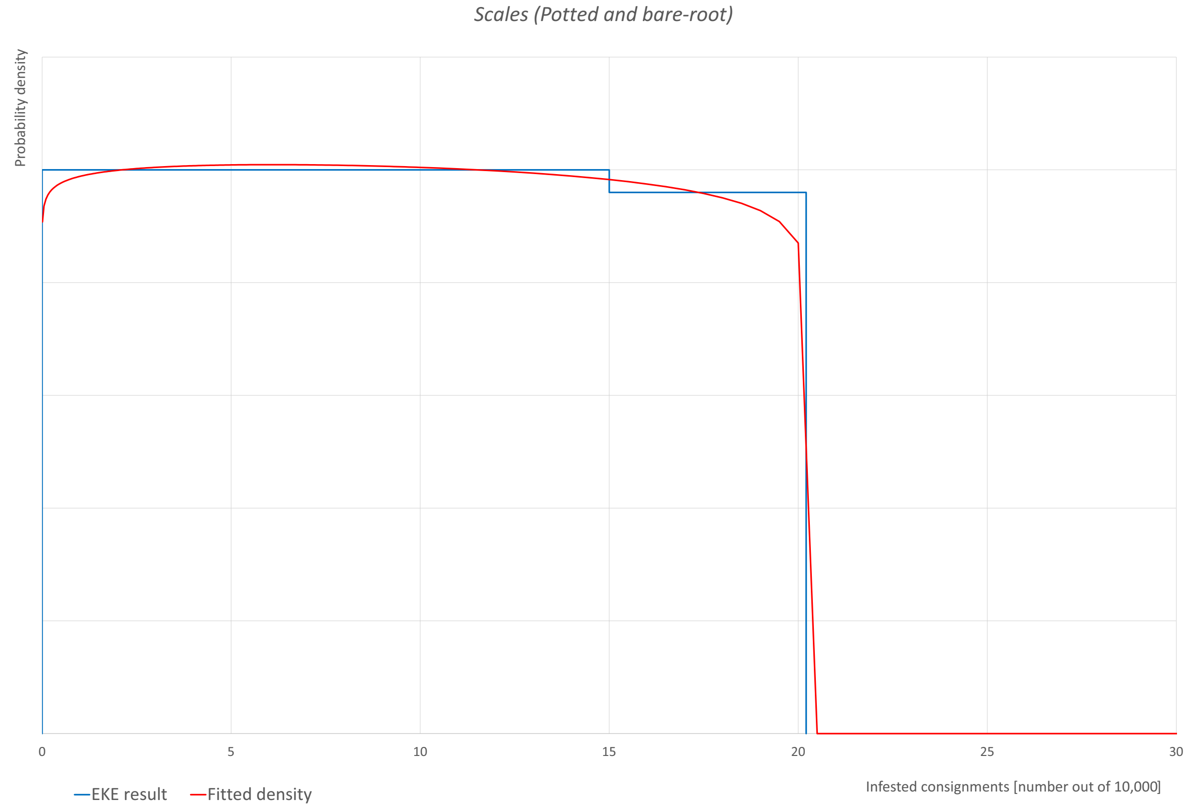
Note: The EKE results is the BetaGeneral (0.91894, 1.0407, 0, 10.15) distribution fitted with @Risk version 7.6.

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

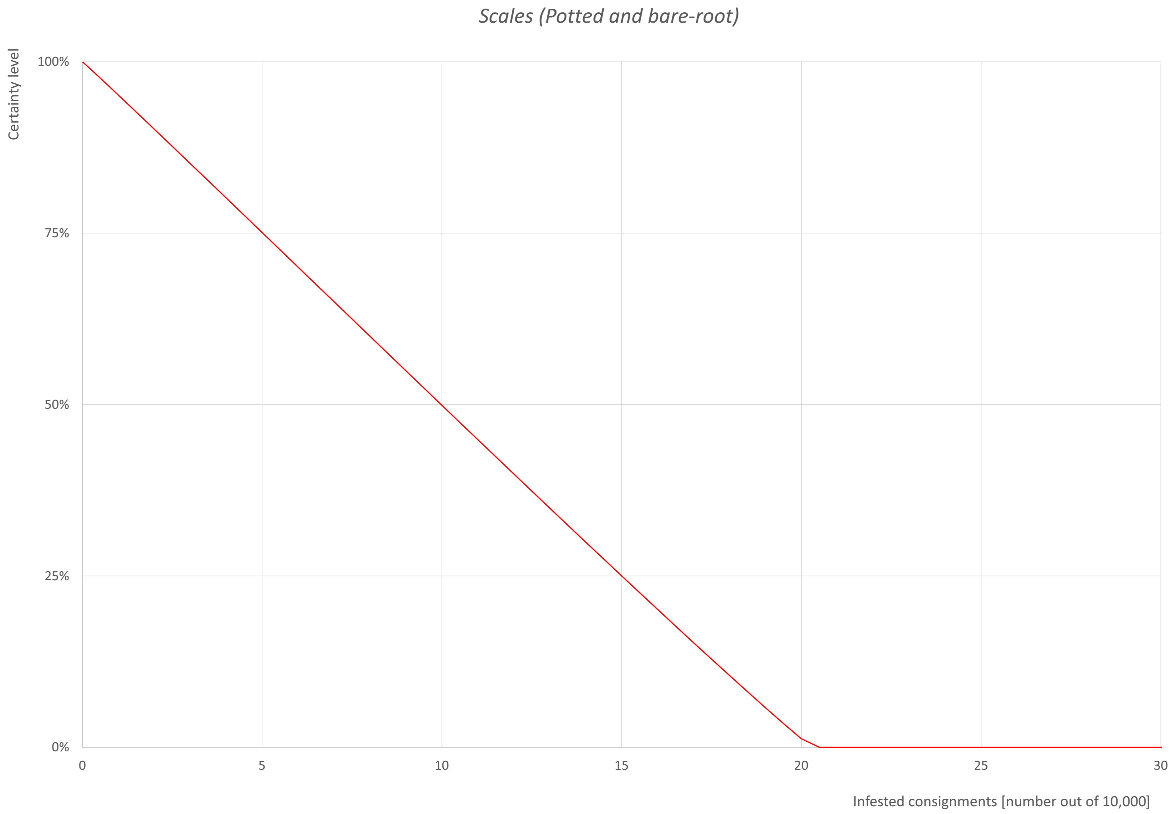
TABLE A.16 The uncertainty distribution of bundles free of *Eulecanium excrescens* per 10,000 graftwood/budwood or cell-grown plants calculated by Table A.15.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9990					9993		9995		9998					10,000
EKE results	9990	9990	9990	9991	9992	9993	9994	9995	9997.0	9997.8	9998.6	9999.2	9999.6	9999.8	9999.9

Note: The EKE results are the fitted values.

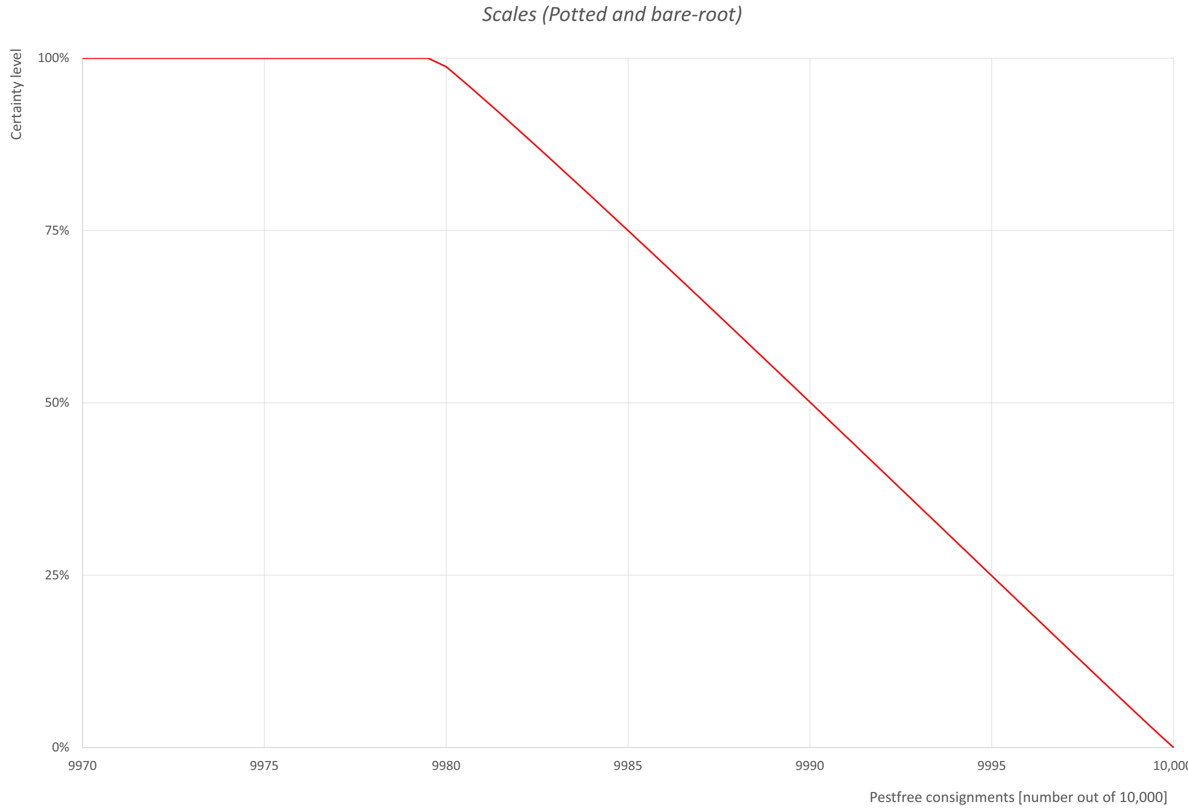


(A)



(B)

FIGURE A.7 (Continued)



(C)

FIGURE A.7 (A) Elicited uncertainty of pest infestation per 10,000 potted or bare-root 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.

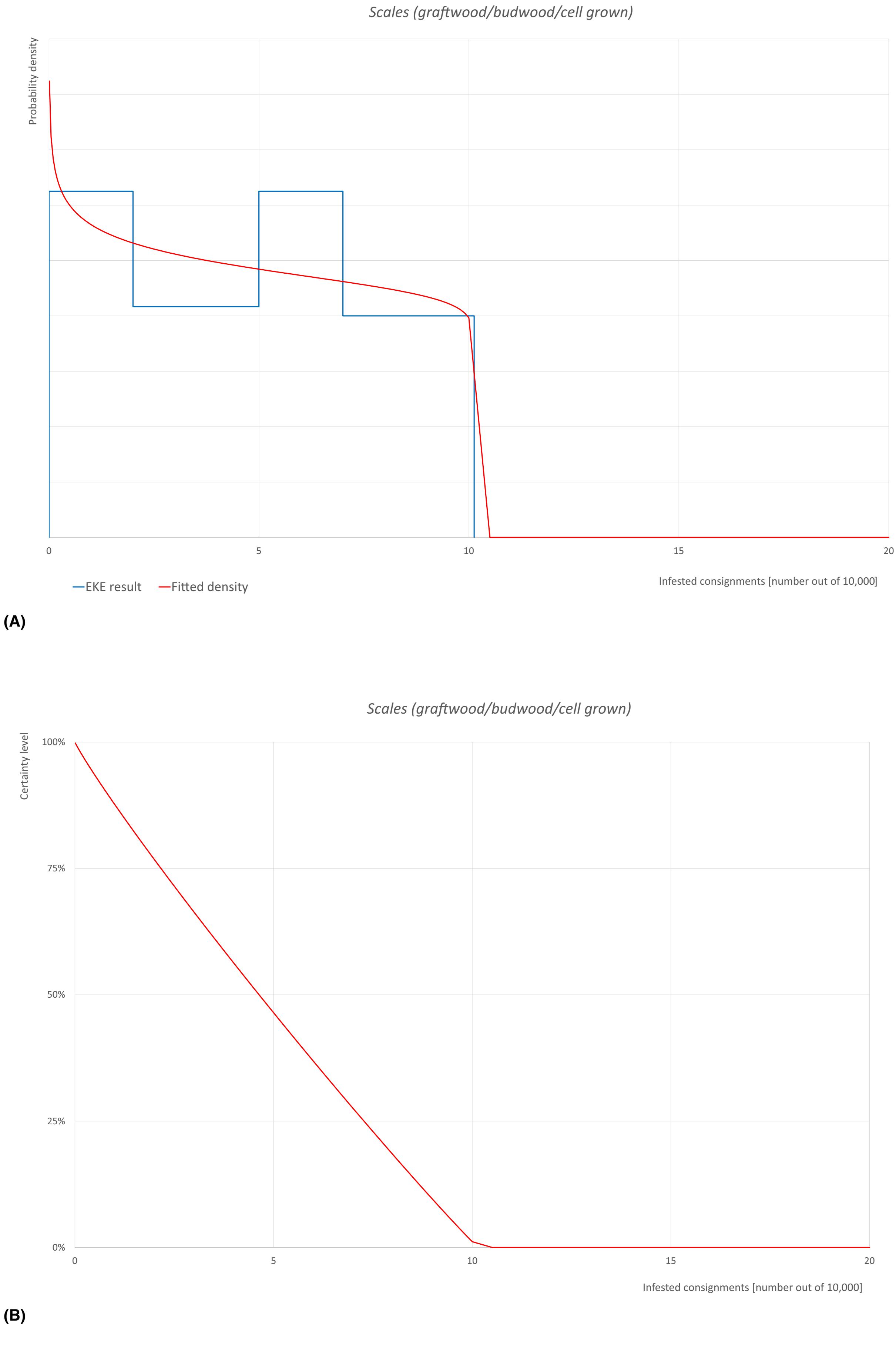


FIGURE A.8 (Continued)

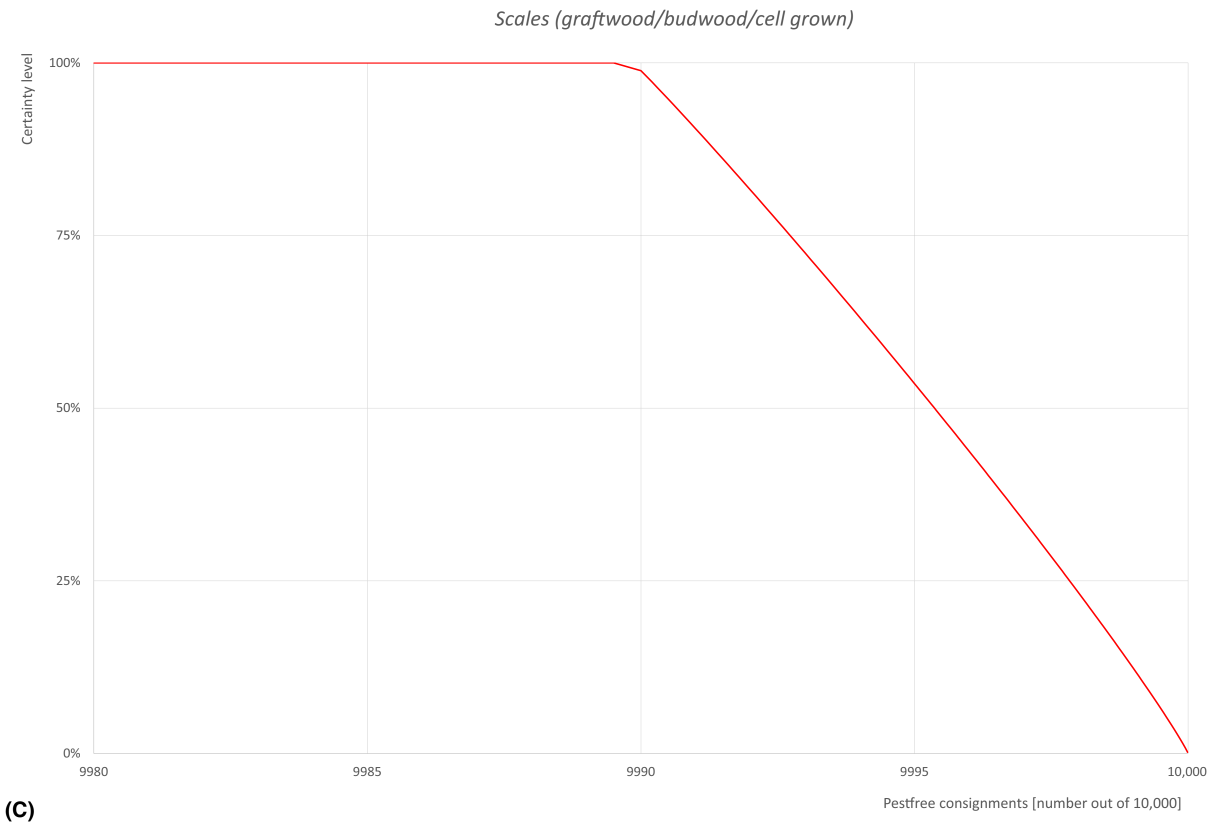


FIGURE A.8 (A) Elicited uncertainty of pest infestation per 10,000 bundles of graftwood/budwood or cell-grown plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free 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.

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A.4 | *SCIRTOTHRIPS DORSALIS*

A.4.1 | Organism information

Taxonomic information	Current valid scientific name: *Scirtothrips dorsalis* Synonyms: *Anaphothrips andreae, Anaphothrips dorsalis, Anaphothrips fragariae, Heliothrips minutissimus, Neophysopus fragariae, Scirtothrips andreae, Scirtothrips dorsalis padmae, Scirtothrips fragariae, Scirtothrips minutissimus, Scirtothrips padmae* Name used in the EU legislation: *Scirtothrips dorsalis* Hood [SCITDO] Order: Thysanoptera Family: Thripidae Common name: Assam thrips, chilli thrips, flower thrips, strawberry thrips, yellow tea thrips, castor thrips Name used in the Dossier: *Scirtothrips dorsalis*
Group	Insects
EPPO code	SCITDO
Regulated status	The pest is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072 as *Scirtothrips dorsalis* Hood [SCITDO] *Scirtothrips dorsalis* is included in the EPPO A2 list (EPPO, online_a) The species is a quarantine pest in Israel, Mexico, Morocco and Tunisia. It is on A1 list of Brazil, Chile, Egypt, Kazakhstan, Russia, Turkey, Ukraine, United Kingdom and EAEU (Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia). It is on A2 list of Bahrain (EPPO, online_b)
Pest status in the UK	*Scirtothrips dorsalis* was found for the first time in the UK in December 2007 in a greenhouse (Palm House) at Royal Botanic Garden Kew in South England (Scott-Brown et al., 2018). Since 2008 the discovered population has been under official control by the plant health authorities with the objective of achieving complete eradication (Collins, 2010). Eradication measures were applied and since 2019 the pest has no longer been found (EPPO, online_c). EPPO reports it in the UK as: Absent, pest eradicated (EPPO, online_c)
Pest status in the EU	*Scirtothrips dorsalis* is present under eradication in the Netherlands and Spain (CABI, online; EPPO, online_c) According to Europhyt Oubreaks database (online) there were three outbreaks, which are under eradication: – in the Netherlands (2019) on plants for planting of *Podocarpus*, – in Spain (2016) on plants of citrus and pomegranate; – in Spain (2019) in mango greenhouses. *Scirtothrips dorsalis* is continuously intercepted in the EU points-of-entry on different commodities: plants for planting; cut flowers and branches with foliage; fruits and vegetables (EUROPHYT/TRACES-NT, online)
Host status on *Prunus avium*	*Prunus avium* is reported as a host of *Scirtothrips dorsalis* (Muraoka, 1988; Ohkubo, 1995)
PRA information	Available Pest Risk Assessments: – CSL pest risk analysis for *Scirtothrips dorsalis* (MacLeod and Collins, 2006); – Pest Risk Assessment *Scirtothrips dorsalis* (Vierbergen and van der Gaag, 2009); – Scientific Opinion on the pest categorisation of *Scirtothrips dorsalis* (EFSA PLH Panel, 2014); – UK Risk Register Details for *Scirtothrips dorsalis* (DEFRA, online).
Other relevant information for the assessment	
Biology	*Scirtothrips dorsalis* is a thrips present in Africa (Cote d'Ivoire, Kenya, Uganda), Asia (Bangladesh, Brunei Darussalam, China, India, Indonesia, Iran, Israel, Japan, Malaysia, Myanmar, North Korea, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam), Europe (Netherlands, Spain, UK), North America (Caribbean, Florida, Georgia, Hawaii, Mexico, Texas), Oceania (Australia, Papua New Guinea, Solomon Islands) and South America (Brazil, Colombia, French Guiana, Suriname, Venezuela) (CABI, online; EPPO, online_c). In the literature, its origin is contradictory, it is reported as either native to Asia, Australasia or South Africa. For more details, refer to Mound and Palmer (1981), Seal et al. (2006), Hoddle et al. (2008), Kumar et al. (2013) and CABI (online) According to Dickey et al. (2015), *S. dorsalis* is a species complex that includes at least nine cryptic species and two morphologically distinguishable species (*S. aff. dorsalis* and *S. oligochaetus*). The information about the UK populations is not available *Scirtothrips dorsalis* develops through five life stages: egg, larva (two instars), propupa, pupa and adult (Dev, 1964; Kumar et al., 2013). They can be found on all the aboveground plant parts (Kumar et al., 2014), and they damage young leaves, buds, tender stems and fruits by sucking tender tissues with their stylets (Kumar et al., 2013) Temperature thresholds for development are 9.7°C and 32°C, with 265 degree-days required for development from egg to adult (Tatara, 1994). The adult can live up to 13–15 days (Kumar et al., 2013, citing others). *Scirtothrips dorsalis* can have annually up to 8 generations in Japan (Tatara, 1994). In the USA, it was estimated by a degree day model that in some of the southern states the thrip can potentially have up to 18 generations (Nietschke et al., 2008) *Scirtothrips dorsalis* can reproduce both sexually and by haplo-diploid parthenogenesis, with females developing from fertilised and males from unfertilised eggs (Dev, 1964). Female can lay between 60 and 200 eggs (Seal and Klassen, 2012), which are inserted into soft plant tissues of buds and young leaves near the mid rib or into the veins. But sometimes they are also laid into older leaves (Dev, 1964). The eggs hatch in 6–8 days (Seal and Klassen, 2012). Eggs are glassy white about 0.25 mm long and 0.1 mm wide. First and second instar larvae are white, yellow to light orange and their length size ranges between 0.29–0.32 and 0.48–0.59 mm, respectively (Dev, 1964). Prepupa is yellowish and pupa dark yellow (CABI, online) with 0.59–0.63 mm in length (Dev, 1964). Adults are pale yellow to greyish white in colour (Seal and Klassen, 2012). Female is approximately 1.05 mm long and 0.19 mm wide. Males are smaller 0.71 mm long and 0.14 mm wide (Dev, 1964). Larvae and adults tend to gather near the mid-vein or near the damaged part of leaf tissue. Pupae are found in the leaf litter, on the axils of the leaves, in curled leaves or under the calyx of flowers and fruits (MacLeod and Collins, 2006; Kumar et al., 2013). Prepupa and pupa stages never feed (Tatara, 1994)

(Continues)

(Continued)

Biology	Adults fly actively for short distances – tens of metres (Masui, 2007_a) and passively on wind currents, which enables long-distance spread (EFSA PLH Panel, 2014). They overwinter as adults (Okada and Kudo, 1982) in bark, litter, soil and protected in plant parts (Shibao, 1991; Holtz, 2006). The thrips cannot survive if the temperature remains below −4°C for 5 or more days (Nietschke et al., 2008) *Scirtothrips dorsalis* is a vector of plant viruses including capsicum chlorosis virus (CaCV), chilli leaf curl virus (CLC), melon yellow spot virus (MYSV), peanut chlorotic fan virus (PCFV), peanut necrosis virus (PBNV), peanut yellow spot virus (PYSV), tobacco streak virus (TSV) and watermelon silver mottle virus (WsMoV) (Kumar et al., 2013; Satyanarayana et al., 1996; Seal et al., 2010; Rao et al., 2003) *Scirtothrips dorsalis* causes economic loses to chilli (*Capsicum annuum*) in India with yield loss estimated between 61% and 74% (Kumar et al., 2013, citing others), mango in Malaysia (Aliakbarpour et al., 2010), vegetables in China and the USA (Reitz et al., 2011), tea, grapevine and citrus in Japan (Tatara, 1994, citing others; Masui, 2007_b) No information is available about damage on *Prunus* species Possible pathways of entry for *S. dorsalis* are plants for planting, cut flowers, fruits, vegetables, soil and growing media (EFSA PLH Panel, 2014)	
Symptoms	**Main type of symptoms**	According to Dev (1964) and Kumar et al. (2013; 2014) main symptoms caused by *S. dorsalis* are: – 'sandy paper lines' on the epidermis of the leaves; – leaf crinkling and upwards leaf curling; – leaf size reduction; – discoloration of buds, flowers and young fruits; – silvering of the leaf surface; – linear thickenings of the leaf lamina; – brown frass markings on the leaves and fruits; – corky tissues on fruits; – grey to black markings on fruits; – fruit distortion; – early senescence of leaves; – defoliation. When the population is high, thrips may feed on the upper surfaces of leaves and cause defoliation and yield loss (Kumar et al., 2013) There is no information on the symptoms caused to *Prunus* plants
	Presence of asymptomatic plants	Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves). The presence of *S. dorsalis* on the plants could hardly be observed
	Confusion with other pests	Plants infested by *S. dorsalis* appear similar to plants damaged by the feeding of other thrips and broad mites (Kumar et al., 2013) Due to small size and morphological similarities within the genus, the identification of *S. dorsalis*, using traditional taxonomic keys, is difficult. The most precise identification of the pest is combination of molecular and morphological methods (Kumar et al., 2013)
Host plant range	*Scirtothrips dorsalis* is a polyphagous pest with more than 100 reported hosts (Kumar et al., 2013). The pest can infect many more plant species, but they are not considered to be true hosts, since the pest cannot reproduce on all of them (EFSA PLH Panel, 2014). Some of the many hosts of *S. dorsalis* are (alphabetically): *Abelmoschus esculentus*, *Acacia auriculiformis*, *Acacia brownii*, *Actinidia deliciosa*, *Allium cepa*, *Allium sativum*, *Anacardium occidentale*, *Arachis hypogaea*, *Asparagus officinalis*, *Beta vulgaris*, *Camellia sinensis*, *Capsicum annuum*, *Capsicum frutescens*, *Citrus* spp., *Citrus aurantiifolia*, *Citrus sinensis*, *Cucumis melo*, *Cucumis sativus*, *Cucurbita pepo*, *Dahlia pinnata*, *Dimocarpus longan*, *Diospyros kaki*, *Fagopyrum esculentum*, *Ficus* spp., *Ficus carica*, *Fragaria* spp., *Fragaria ananassa*, *Fragaria chiloensis*, *Glycine max*, *Gossypium* spp., *Gossypium hirsutum*, *Hedera helix*, *Helianthus annuus*, *Hevea brasiliensis*, *Hydrangea* spp., *Ipomoea batatas*, *Lablab purpureus*, *Ligustrum japonicum, Litchi chinensis*, *Mangifera indica*, *Melilotus indica*, *Mimosa* spp., *Morus* spp., *Nelumbo* spp., *Nelumbo lutea*, *Nelumbo nucifera*, *Nephelium lappaceum*, *Nicotiana tabacum*, *Passiflora edulis*, *Persea americana*, *Phaseolus vulgaris*, *Populus deltoides*, *Portulaca oleracea*, *Prunus* spp., *Prunus persica*, *Punica granatum*, *Pyrus* spp., *Ricinus communis*, *Rosa* spp., *Rubus* spp., *Saraca* spp., *Solanum* spp., *Solanum lycopersicum*, *Solanum melongena*, *Solanum nigrum*, *Syzygium samarangense*, *Tamarindus indica*, *Viburnum* spp., *Vigna radiata*, *Vitis* spp., *Vitis vinifera*, *Zea mays* subsp. *mays* and *Ziziphus mauritiana* (CABI, online; Hodges et al., 2005; Kumar et al., 2014; Ohkubo, 1995) For a full host list, refer to Ohkubo (1995), Hodges et al. (2005), Kumar et al. (2014), CABI (online)	
Reported evidence of impact	*Scirtothrips dorsalis* is an EU quarantine pest	
Evidence that the commodity is a pathway	*Scirtothrips dorsalis* is continuously intercepted in the EU on different commodities including plants for planting (EUROPHYT/TRACES-NT, online) and according to EFSA PLH Panel (2014), *S. dorsalis* can travel with plants for planting. Therefore, plants for planting are possible pathways of entry for *S. dorsalis*	
Surveillance information	*Scirtothrips dorsalis* is under official control and was subjected to eradication in the greenhouse of Royal Botanic Garden Kew in the UK (Collins, 2010) Surveillance in the nursery did not result in the detection of the pest during the last 5 years	

A.4.2 | Possibility of pest presence in the nursery

A.4.2.1 | Possibility of entry from the surrounding environment

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

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

Given that the pest is very polyphagous, it could be associated with several plant species in the nursery surroundings.

Uncertainties:

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

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

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

The starting material is a mix of seeds and seedlings depending on the nursery. Seeds are not a pathway for the thrips. Plants are mainly grown from UK material although some plants may be obtained from the EU (mostly the Netherlands where there was an outbreak, which is under eradication).

The pest can be found on the trunk, stem, branches of plants for planting and on the leaves of rooted plants in pots and bare rooted plants. Although adults can be relatively easily spotted during visual inspections, young stages can be difficult to detect. The pest can be hidden inside bark cracks. In case of initial low populations, the species can be overlooked. Introduction of the pest with certified material is very unlikely.

In addition to *P. avium* plants, the nursery also produces other plants and use plant hedges. Out of them *Hedera helix* is a suitable host of the thrips. However, there is no information on how and where the plants are produced. Therefore, if the plants are first produced in another nursery, the thrips could possibly travel with them.

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

Uncertainties:

- Uncertain if certified material is screened for this pest.

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

A.4.2.3 | Possibility of spread within the nursery

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

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

The early stages of plants grown under protection are maintained in plastic polytunnels, or in glasshouses.

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

Uncertainties:

- Possibility of the thrips to survive the UK winter in outdoor conditions.
- Possibility of different plant host species for trade.
- Possibility that polytunnels and glasshouses allow the pest to overwinter.

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

A.4.3 | Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus* plants for planting neither from the UK nor from other countries due to the presence of *Scirtothrips dorsalis* between the years 1995 and March 2024 (EUROPHYT/TRACES-NT, online).

A.4.4 | Evaluation of the risk mitigation measures

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

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	As the plant passport is very similar to the EU one, the plants shall be free from quarantine pests – No uncertainties.
2	Phytosanitary certificates	Yes	Evaluation: The measure is effective against the pest Uncertainties: – Specific figures on the intensity of survey (sampling effort) are not provided.
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Rouging and pruning	Yes	Evaluation: Pruning can affect pest populations either directly by removal of infested branches and indirectly exposing the pest to biotic and abiotic control agents
5	Pesticide application and biological control	Yes	Evaluation: Chemicals listed in the dossier do not target specifically this pest, however they may be effective Chemical applications can affect biological control agents Uncertainties: – No details are given on the pesticide application schedule. – No details are provided on abundance and efficacy of the natural enemies.
6	Surveillance and monitoring	Yes	Evaluation: It can be effective Uncertainties: – Low initial infestations might be overlooked.
7	Sampling and laboratory testing	Yes	Evaluation: It can be effective and useful for specific identification. Uncertainties: – Low initial infestations might be overlooked.
8	Root washing	No	
9	Refrigeration and temperature control	Yes	Uncertainties: – Reduced temperatures will only slow the insect development but not kill it.
10	Pre-consignment inspection	Yes	Evaluation: It can be effective Uncertainties: – Though the frequency of the inspections is declared in the dossier, details on the intensity of the inspections are not provided. – Low initial infestations might be overlooked.

A.4.5 | Overall likelihood of pest freedom

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

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

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

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

A.4.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

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

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

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

A.4.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Scirtothrips dorsalis*

The elicited and fitted values for *Scirtothrips dorsalis* agreed by the Panel are shown in Tables A.17, A.18 and in Figure A.9

TABLE A.17 Elicited and fitted values of the uncertainty distribution of pest infestation by *Scirtothrips dorsalis* per 10,000 plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0.00					0.25		0.50		0.75					1.00
EKE	0.01	0.03	0.05	0.10	0.17	0.25	0.33	0.50	0.67	0.75	0.84	0.91	0.96	0.99	1.00

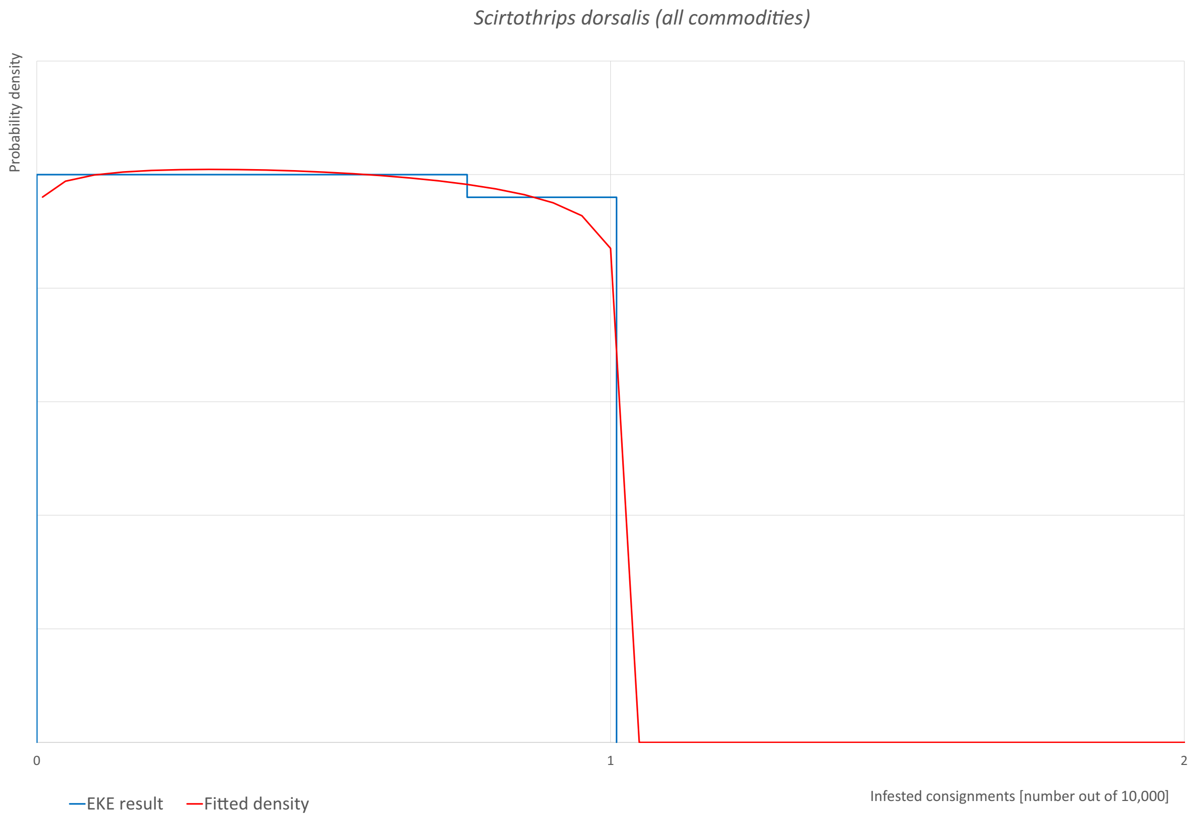
Note: The EKE results is the BetaGeneral (1.019, 1.0443, 0, 1.015) distribution fitted with @Risk version 7.6.

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.18.

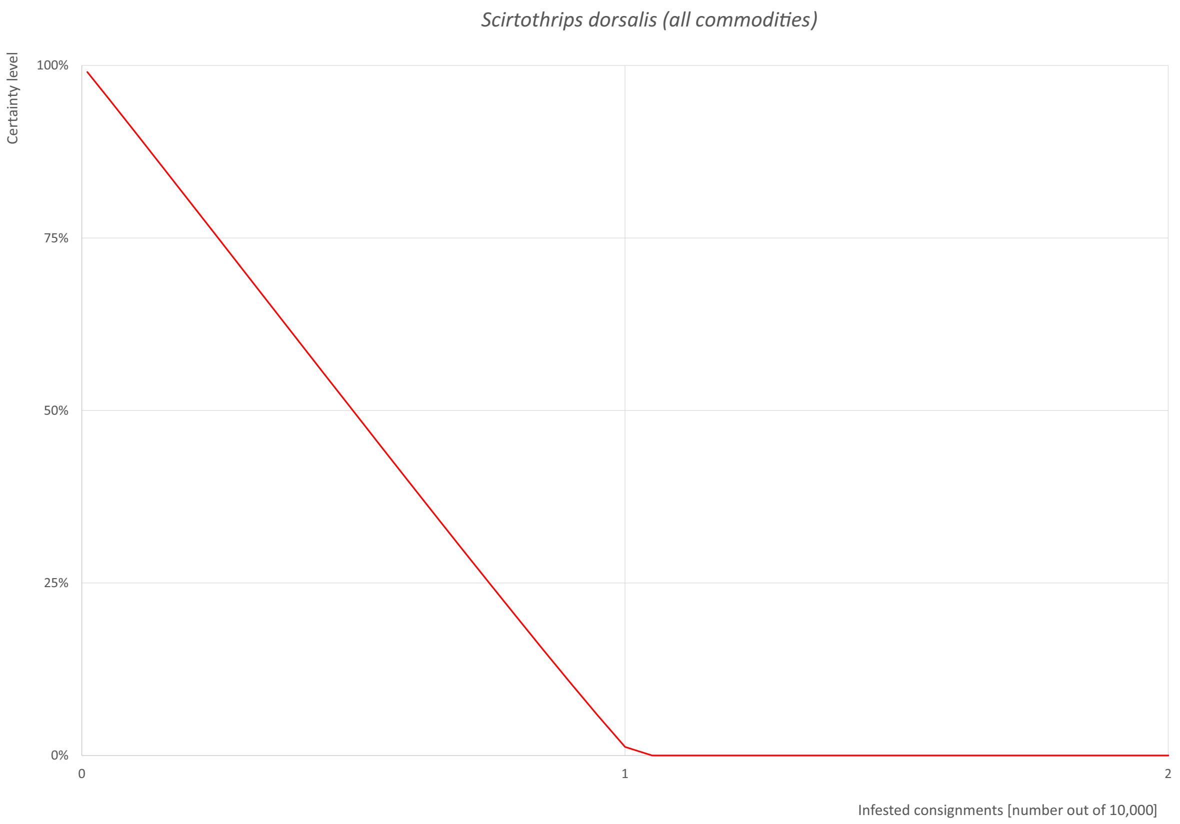
TABLE A.18 The uncertainty distribution of plants free of *Scirtothrips dorsalis* per 10,000 plants calculated by Table A.17

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9999.00					9999.25		9999.50		9999.75					10,000.00
EKE results	9999.00	9999.01	9999.04	9999.09	9999.16	9999.25	9999.33	9999.50	9999.67	9999.75	9999.83	9999.90	9999.95	9999.97	9999.99

Note: The EKE results are the fitted values.

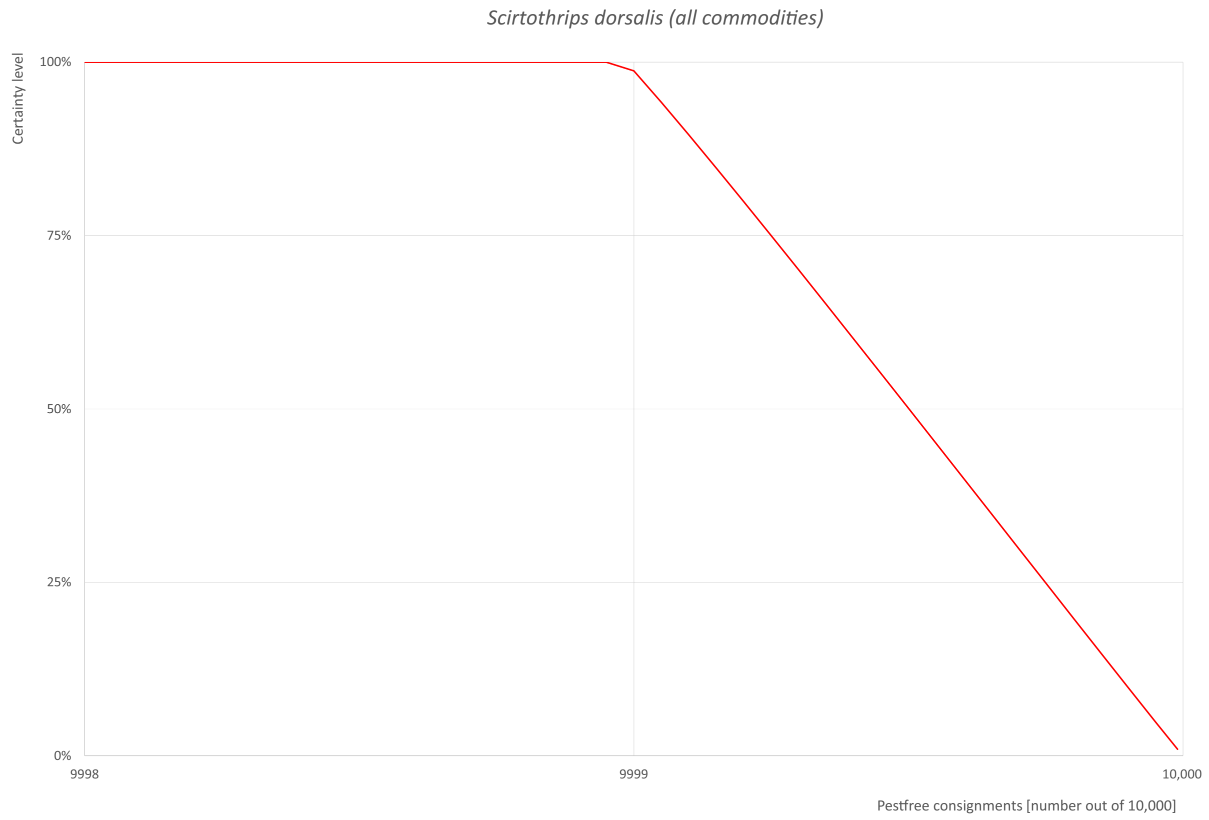


(A)



(B)

FIGURE A.9 (Continued)



(C)

FIGURE A.9 (A) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free plants per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 plants.

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A.5 | *TAKAHASHIA JAPONICA*

A.5.1 | Organism information

Taxonomic information	Current valid scientific name: *Takahashia japonica* Synonyms: *Pulvinaria japonica*, *Takahashia wuchangensis* Name used in the EU legislation: – Order: Hemiptera Family: Coccidae Common name: Asiatic string cottony scale, string cottony scale Name used in the Dossier: –
Group	Insects
EPPO code	TAKAJA
Regulated status	*Takahashia japonica* is neither regulated in the EU, nor anywhere in the world

(Continues)

(Continued)

Pest status in UK	*Takahashia japonica* is present in the UK (Tuffen et al., 2019) The pest was recorded from West Berkshire in 2018 on *Magnolia* in a private garden (Malumphy et al., 2019; Tuffen et al., 2019). No action was taken reflecting the low threat this pest poses to the UK. The UK NPPO have not revisited the original site to determine if it is present or not so they have no evidence to prove that it is absent (answer by DEFRA)	
Pest status in the EU	*Takahashia japonica* is native to Asia (Limonta et al., 2022), where it is reported from China, India, Japan, South Korea and Taiwan (García Morales et al., online) In the EU, it is present in Croatia and Italy (Limonta and Pellizzari, 2018; Landeka et al., 2021) In Italy, the pest was first reported in 2017 from the Northern provinces of Milano and Varese. High infestations of *T. japonica* indicated that the pest was most probably introduced some years before its detection (Limonta and Pellizzari, 2018) In Croatia, the pest was observed for the first time in 2019 from the city of Pula (Landeka et al., 2021) and eradication measures were applied by cutting down the infested branches and by applying insecticides (EPPO, online). There is no information whether the eradication was successful or not and the pest has continued to spread. (Mandic Bulic et al., 2022) This insect was recently subjected to Pest categorisation by EFSA (EFSA PLH Panel, 2023)	
Host status on *Prunus avium*	*Prunus* spp. are reported to be host for *T. japonica* (Limonta et al., 2022); *P. cerasifera* (Limonta and Pellizzari, 2018), *Prunus P. glandulosa* (Suh, 2020), *P. salicina* (Takahashi and Tachikawa, 1956) and *P. tomentosa* (Suh, 2020); however, *P. avium* it is not reported among the hosts in the existing literature	
PRA information	Available Pest Risk Assessments: – UK Risk Register Details for *Takahashia japonica* (DEFRA, online). – Scientific Opinion on the pest categorisation of *Takahashia japonica* (EFSA 2023)	
Other relevant information for the assessment		
Biology	*T. japonica* is a monovoltine parthenogenetic species native to Asia. Its life cycle is characterised by the migrations of first instar crawlers from twigs to leaf undersides in May–June, and second instar nymphs from leaves to twigs in September–October, to overwinter. After overwintering, the nymphs resume activity from March onwards and reach the length of about 1.5 mm and 0.5 mm wide. The moult to the adult female occurs at the same overwintering site. The first moults occur in early April, and the whole population reaches the adult stage over about 10 days. The adult female's body size increases quickly from about 1.5 mm long to 6–7 mm long and 5 mm wide and becomes slightly convex in the adult reproductive female. In this growing phase, the adult preovigerous females feed and produce honeydew droplets. Oviposition starts in late April and goes on until early May. Females settled on the twigs, secrete the long eggsacs that can reach 6–7 cm in length over several days. Egg-sacs produced by females kept in the laboratory were usually 2.5–4.0 cm long. Fecundity is high:, about 1200 eggs were counted in a 1 cm length of ovisac, so the estimated fecundity in the laboratory was over 4000–5000 eggs/female. In the environment, egg hatching occurs in early June, and the first instar nymphs or 'crawlers' are the main natural dispersal stage. Indeed, they move to the undersides of leaves, where they settle on the veins. During this migration, the crawlers can be easily carried by the wind, insects or birds to other conterminous host plants. Long-distance dispersal is likely to be with infested plants being moved in trade. In late August–September, the population consists of second instar nymphs, each about 1.3 mm long. From September to October, the second-instar nymphs migrate gradually from the leaf undersides to the twigs, settling to overwinter. Overwintering second-instar nymphs are brown and covered by transparent wax plates (Limonta et al., 2022)	
Symptoms	**Main type of symptoms**	Heavy infestations of *T. japonica* on twigs cause dieback and necrosis of buds, which is mostly harmful to newly planted young trees. The production of honeydew is limited. From late April onwards (when the females start oviposition), the trees assume a striking and unsightly appearance due to the many conspicuous white ovisacs hanging from the twigs and branches, reducing their aesthetic value and causing concern among citizens. Moreover, the ovisacs persist on the plants long after the eggs have hatched and are still present in winter, so the unsightly appearance persists (Limonta et al., 2022) The early instars and young females are small and inconspicuous. It is the conspicuous ovisacs that are most likely to be detected first (Malumphy et al., 2019)
	Presence of asymptomatic plants	Low initial infestations in the absence of waxy ovisacs may be overlooked
	Confusion with other pests	*T. japonica* can hardly be confused with other scales. Indeed, mature adult females have characteristic long, string-like, looped ovisacs, hanging from the bark (Malumphy et al., 2019)
Host plant range	*T. japonica* is a highly polyphagous species with total of 35 known host species in 17 families (Limonta et al., 2022). The hosts are *Acer negundo*, *A. buergerianum*, *A. pseudoplatanus*, *A. pseudosieboldianum*, *Albizia julibrissin*, *Alnus japonica*, *Carpinus betulus*, *Celtis australis*, *C. sinensis*, *Citrus* sp., *Cornus officinalis*, *Cydonia oblonga*, *Diospyros kaki*, *Juglans regia*, *Lespedeza* sp., *Lespedeza bicolor*, *Liquidambar styraciflua*, *Loropetalum chinense*, *Magnolia kobus*, *M. obovate*, *Malus pumila*, *Morus* sp., *M. alba*, *M. nigra*, *Parthenocissus tricuspidate*, *Prunus cerasifera*, *P. glandulosa*, *P. salicina*, *P. tomentosa*, *Pyrus serotina*, *Rhododendron schlippenbachii*, *Robinia pseudoacacia*, *Salix chaenomeloides*, *S. glandulosa*, *Styphnolobium japonicum*, *Ulmus davidiana* and *Zelkova serrata* (Limonta et al., 2022)	

(Continued)

Reported evidence of impact	There are no reports of economic or ecological damage induced by *T. japonica* in Asia (Malumphy et al., 2019). According to Limonta et al. (2022) in Italy, its impact on urban trees has mostly involved some honeydew production and the appearance of infested trees due to long white ovisacs hanging from the branches. *T. japonica* can potentially reduce esthetical value of plants (Malumphy et al., 2019) No data about damage on *P. avium* are available Three European new country records of *T. japonica* in a 4-year interval (Italy, Great Britain, and Croatia) indicate that this species could expand its range in Europe, primarily due to the import and trade in ornamental trees. In Italy, 5 years after its detection, the first infested area (Lombardy region) has expanded slightly, and the level of infestation is high. Still, so far, no new infestation foci in other Italian regions have been reported Despite some heavy infestations, no real impact on plant vigour has been noticed in fully grown trees (Limonta et al., 2022) So far, its impact on urban trees has mostly involved some honeydew production and the unsightly appearance of infested trees from the oviposition period onwards (8 or 9 months of the year). Pruning off most of the infested twigs and branches in winter, when the overwintering nymphs are clearly visible in spring (April–May), before the eggs hatch, are suggested to reduce infestations Several natural enemies of *T. japonica* are recorded in the literature (Tuffen et al., 2019) *T. japonica* has been reported to cause significant damage on *Acer* sp. and *Morus alba* L., in Croatia, some of which suffered significant defoliation and crown decline (Landeka et al., 2021)
Pathways and evidence that the commodity is a pathway	Possible pathways of entry for *T. japonica* are plants for planting (excluding seeds bulbs and tubers), bonsai and cut branches (Malumphy et al., 2019)
Surveillance information	No surveillance information is currently available from the UK NPPO

A.5.2 | Possibility of pest presence in the nursery

A.5.2.1 | Possibility of entry from the surrounding environment

If present in the surroundings, the pest can enter the nursery (as UK is producing these plants for planting outdoors). However, the only official record available is from one Magnolia plant in West Berkshire in 2018, and no further information is available on its distribution and presence in the country. The pest could enter the nursery either by passive dispersal (e.g. wind), especially crawlers, that can be easily uplifted by wind, infested plant material by nursery workers and machinery. Given that the pest is very polyphagous, it could be associated with several plant species in the nursery surroundings.

Uncertainties:

- The UK NPPO has not revisited the original site to determine if the pest is present or not so there is no evidence to prove that it is absent or it is spread from there.
- No information on the specific host plants of the pest in the nursery surroundings is available.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible, although unlikely for the pest to enter the nursery.

A.5.2.2 | Possibility of entry with new plants/seeds

The pest can be found on the trunk, stem, branches, leaves of plants for planting (scions, grafted rootstocks). Although adults can be relatively easily spotted during visual inspections, young stages can be difficult to detect. The pest can be hidden inside bark cracks. In case of initial low populations, the species can be overlooked. Introduction of the pest with certified material is very unlikely.

Uncertainties:

- Uncertain if certified material is screened for this pest
- Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery although unlikely.

A.5.2.3 | Possibility of spread within the nursery

If the scale enters the nursery from the surroundings, the pest could spread within the nursery either by passive dispersal (e.g. wind), especially crawlers than can be easily uplifted by wind, infested plant material, or by nursery workers and machinery. Active dispersal is possible and movement from plant to plant by mobile young instars is possible. Given that the pest is very polyphagous, the pest could be associated with other crops in the nursery. During the production process, visual inspections are performed, with microscopic observations if needed. Chemical control is applied targeting other species but potentially effective towards *T. japonica*. Pruning can also affect scale populations either directly by removal of infested branches and indirectly exposing the pest to biotic and abiotic control agents.

Uncertainties:

- Uncertain if other plants are grown in the nurseries.

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

A.5.3 | Information from interceptions

There are no records of interceptions of *Prunus* plants for planting from the UK due to the presence of T. *japonica* between 1998 and March 2024 (EUROPHYT and TRACES-NT, online).

A.5.4 | Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in UK are listed and an indication of their effectiveness on *Takahashia japonica* is provided. The description of the risk mitigation measures currently applied in UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Evaluation: Potential *T. japonica* infestations could easily be detected, though low initial infestations might be overlooked. Uncertainties: – The details of the certification process are not known (e.g. number of plants, intensity of surveys and inspections, etc.).
2	Phytosanitary certificates	Yes	Evaluation: The procedures applied could be effective in detecting *T. japonica* infestations though low initial infestations might be overlooked. Uncertainties: – Specific figures on the intensity of survey (sampling effort) are not provided.
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Rouging and pruning	Yes	Evaluation: Pruning can affect scale populations either directly by removal of infested branches and indirectly exposing the pest to biotic and abiotic control agents.
5	Pesticide application and biological control	Yes	Evaluation: Chemicals listed in the dossier do not target specifically this pest, however they may be effective. Chemical applications can affect biological control agents. Uncertainties: – No details are given on the pesticide application schedule. – No details are provided on abundance and efficacy of the natural enemies.
6	Surveillance and monitoring	Yes	Evaluation: It can be effective Uncertainties: – Low initial infestations (crawlers) might be overlooked.
7	Sampling and laboratory testing	Yes	Evaluation: It can be effective and useful for specific identification. Low initial infestations might be overlooked.
8	Root washing	No	
9	Refrigeration and temperature control	Yes	Uncertainties: – Reduced temperatures will only slow the insect development.
10	Pre-consignment inspection	Yes	Evaluation: It can be effective, though low initial infestations might be overlooked. Uncertainties: – Though official checks are carried out at least one per year and they may increase if growing season inspections are required, details on the intensity of the inspections are not provided.

A.5.5 | Overall likelihood of pest freedom

A.5.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Registration and certification of propagation material ensure pest-free production
- Most of nurseries are placed in areas where the pest is not present
- *T. japonica* has not been reported on *Prunus* spp. in the UK
- No other host plants are present in the nurseries and in the surroundings
- Visual inspections can easily detect pest presence at adult stage

A.5.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Registration and certification of propagation material does not target this pest and therefore does not ensure pest-freedom
- The pest spread in the UK from its first record site
- *Prunus* spp. is a host of *T. japonica* and could be infested in the UK as well
- Other host plants are present in the nurseries and in the surroundings
- Visual inspections cannot easily detect pest presence at crawler stage

A.5.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- Uncertainty about pest pressure in the UK
- Information on infestations on *P. avium* plants in the UK is uncertain
- Lack of reports of infestation within the *P. avium* growing area in the UK

A.5.5.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- Presence of the pest in the surrounding areas is unknown

A.5.5.5 | Elicitation outcomes of the assessment of the pest freedom *Takahashia japonica*

The elicited and fitted values for *Takahashia japonica* agreed by the Panel are shown in Tables A.19–A.22 and in Figures A.10, A.11

TABLE A.19 Elicited and fitted values of the uncertainty distribution of pest infestation by *Takahashia japonica* per 10,000 potted or bare-root plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					5		10		15					20
EKE	0.212	0.521	1.03	2.03	3.37	5.02	6.66	10.0	13.3	15.0	16.7	18.1	19.2	19.7	20.1

Note: The EKE results is the BetaGeneral (1.019, 1.0443, 0, 20.3) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants the pest freedom was calculated (i.e. = 10,000 – the number of infested plants per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.20.

TABLE A.20 The uncertainty distribution of plants free of *Takahashia japonica* per 10,000 potted or bare-root plants calculated by Table A.19

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9980					9985		9990		9995					10,000
EKE results	9980	9980	9981	9982	9983	9985	9987	9990	9993	9995	9997	9998.0	9999.0	9999.5	9999.8

Note: The EKE results are the fitted values.

TABLE A.21 Elicited and fitted values of the uncertainty distribution of pest infestation by *Takahashia japonica* per 10,000 graftwood/budwood or cell-grown plants

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	EKE	0.0					2		5		7				
EKE	Fit-GB	0.0649	0.176	0.374	0.796	1.39	2.17	2.96	4.64	6.38	7.27	8.19	8.95	9.53	9.83

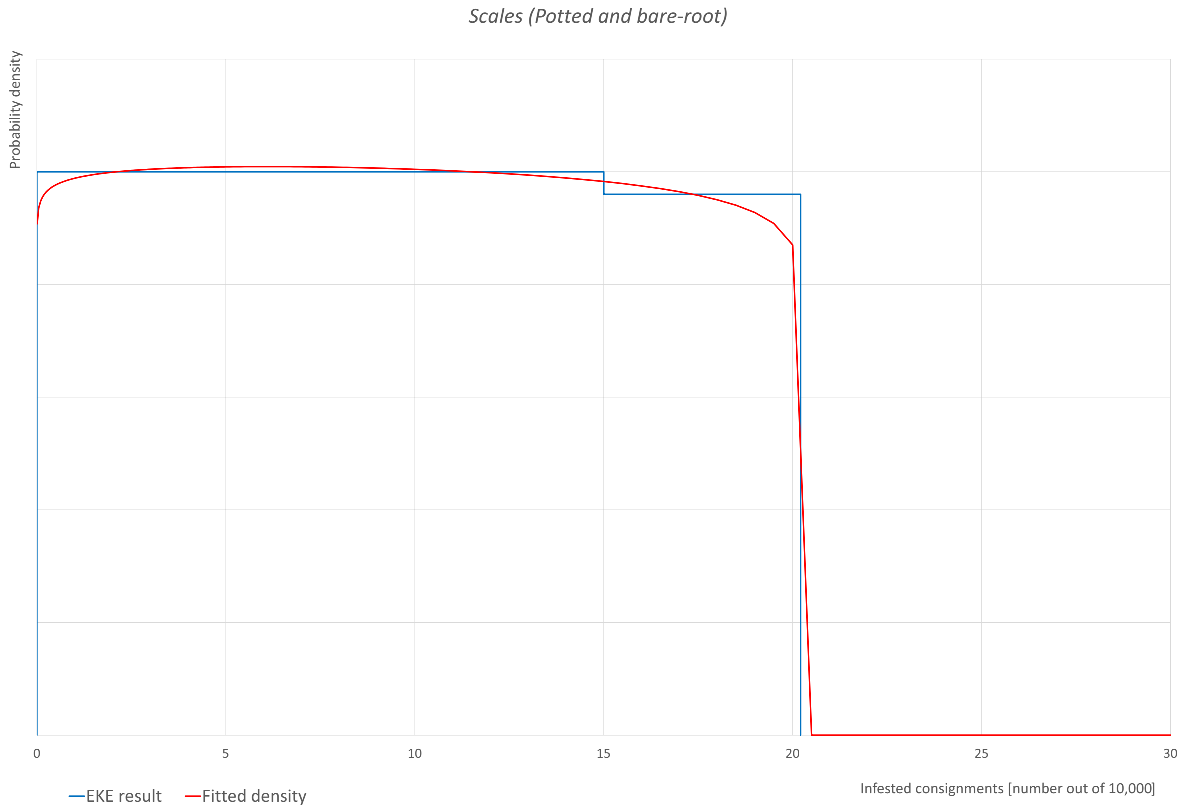
Note: The EKE results is the BetaGeneral (0.91894, 1.0407, 0, 10.15) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles of bare-root plants, the pest freedom was calculated (i.e. = 10,000 – the number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.21.

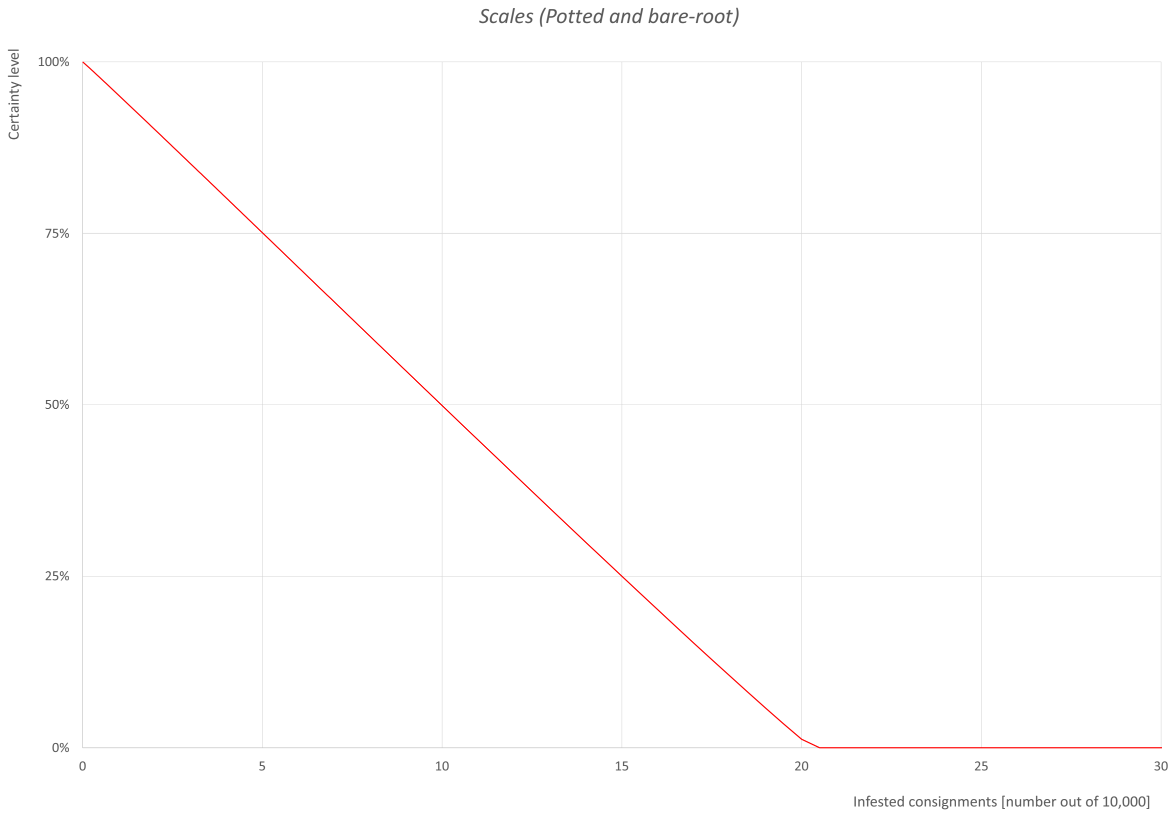
TABLE A.22 The uncertainty distribution of bundles free of *Takahashia japonica* per 10,000 graftwood/budwood or cell-grown plants calculated by Table A.21.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9990					9993		9995		9998					10,000
EKE results	9990	9990	9990	9991	9992	9993	9994	9995	9997.0	9997.8	9998.6	9999.2	9999.6	9999.8	9999.9

Note: The EKE results are the fitted valuesThe EKE results are the fitted values.

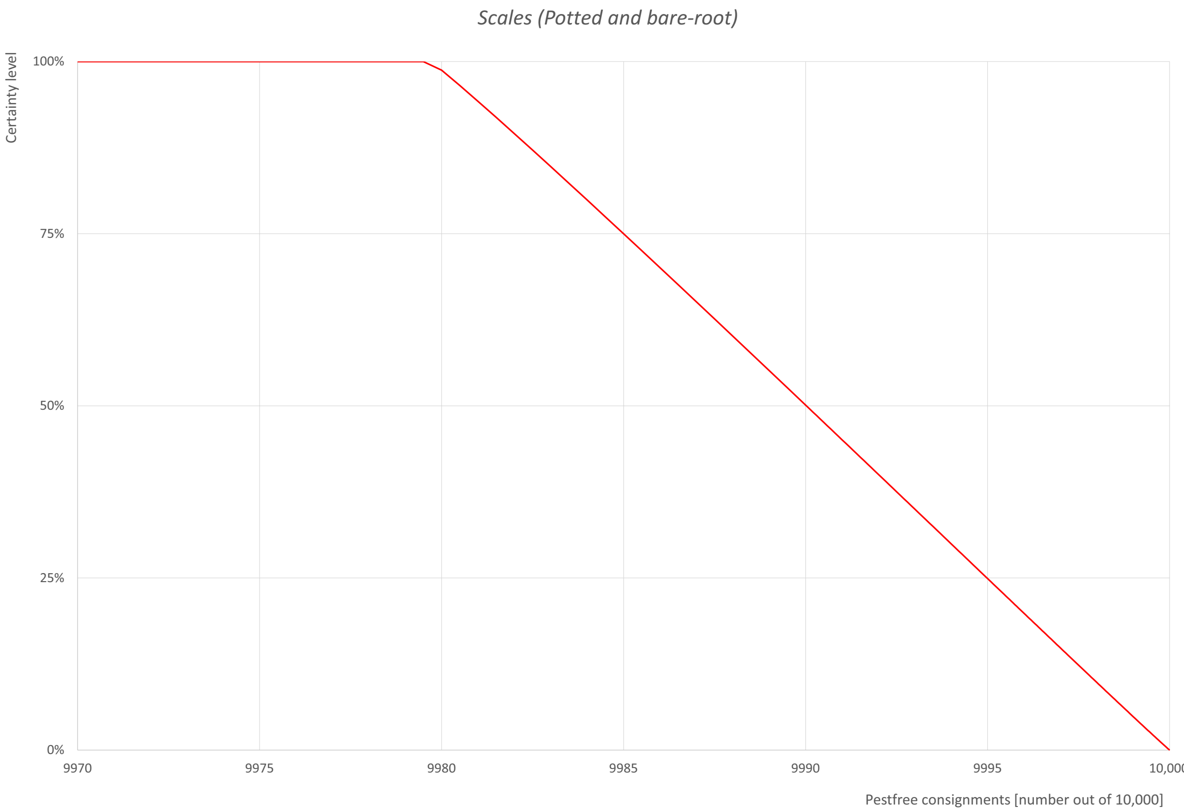


(A)



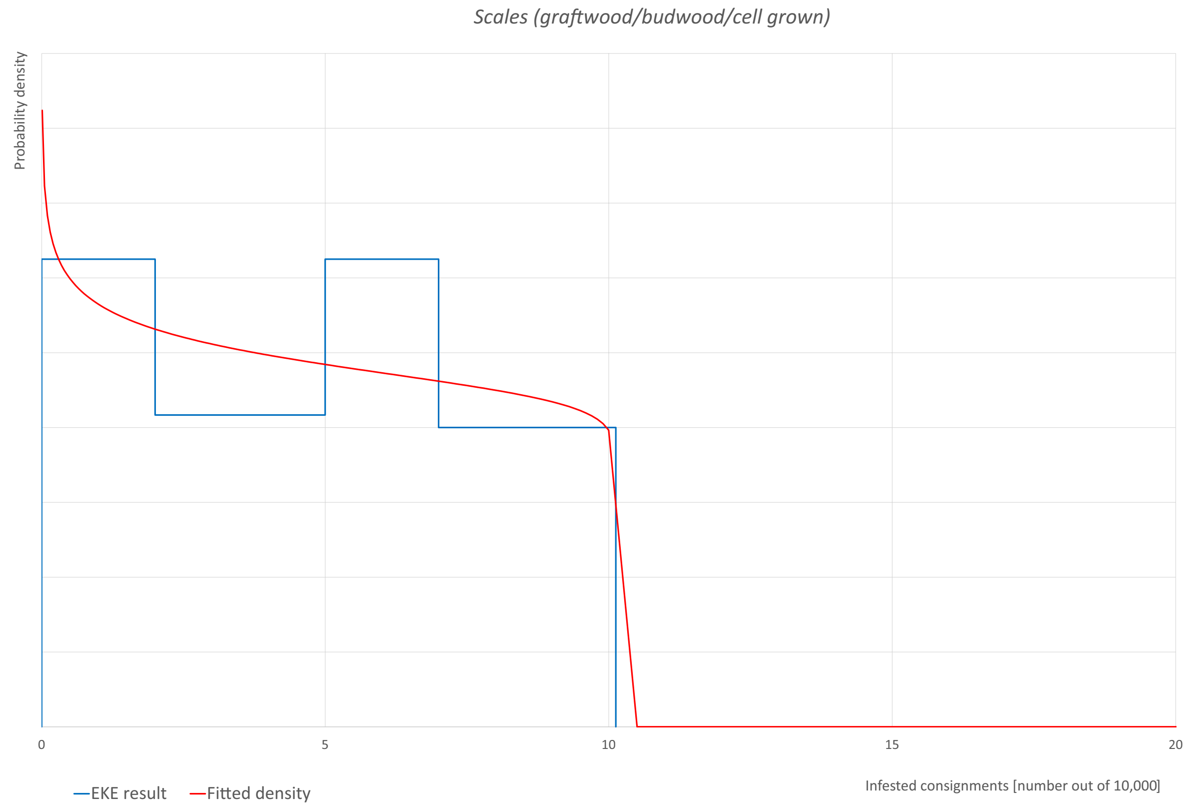
(B)

FIGURE A.10 (Continued)

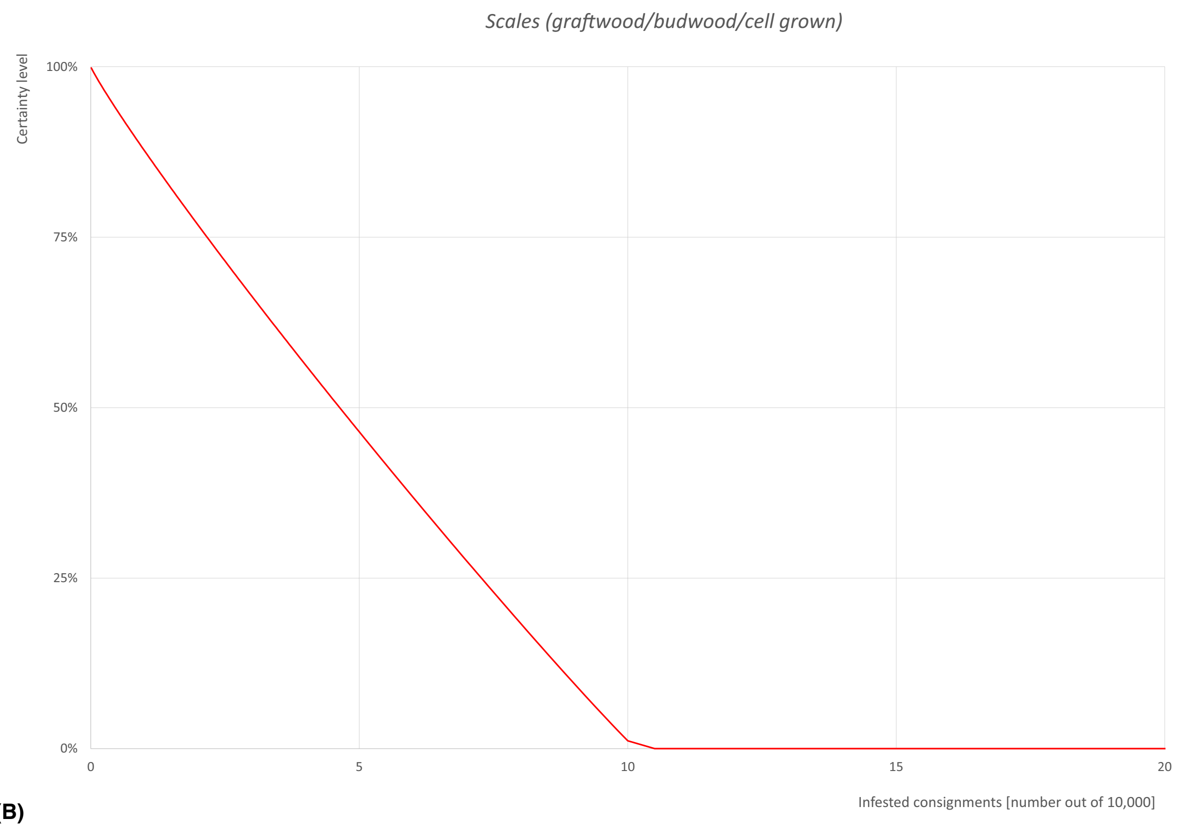


(C)

FIGURE A.10 (A) Elicited uncertainty of pest infestation per 10,000 potted or bare-root 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)



(B)

FIGURE A.11 (Continued)

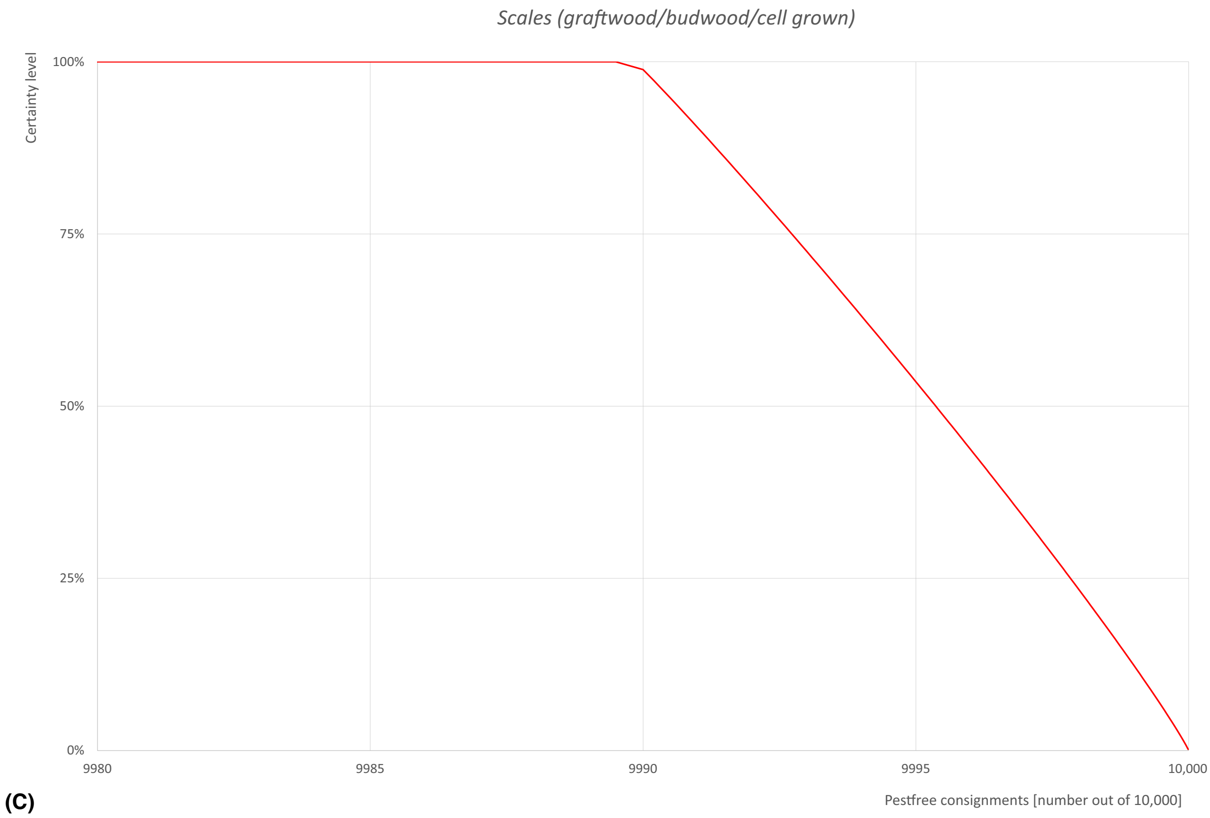


FIGURE A.11 (A) Elicited uncertainty of pest infestation per 10,000 bundles of graftwood/budwood or cell-grown plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free 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.

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A.6 | TOBACCO RINGSPOT VIRUS (TRSV)

A.6.1 | Organism information

Taxonomic information	Current valid scientific name: tobacco ringspot virus Synonyms: TRSV, Tobacco ringspot, Tobacco ringspot nepovirus Name used in the EU legislation: Tobacco ringspot virus [TRSV00] Order: *Picornavirales* Family: *Secoviridae* Common name: ringspot of tobacco Name used in the Dossier: Tobacco ringspot virus (TRSV)
Group	Virus and Viroids
EPPO code	TRSV00
Regulated status	TRSV is listed as EU Quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072); Pests not known to occur in the EU Union territory (2019) Quarantine pest: Morocco (2018), Tunisia (2012), Canada (2019), Mexico (2018), Israel (2009), Norway (2012) A1 list: East Africa (2001), Argentina (2019), Brazil (2018), Paraguay (1995), Jordan (2013), Kazakhstan (2017), Turkey (2016), Ukraine (2019) A2 list: Egypt (2018), China (1993), Jordan (2013), Russia (2014), APPPC (1993), EAEU (2016), EPPO (1995) (EPPO, online_a)
Pest status in UK	Present, few occurrences (EPPO, online_b) According to the NPPO (2021), TRSV is present in a few reports. It has been detected in pelargonium (ornamental) and anemone (wild plant) in the UK
Pest status in the EU	Present, no details (Georgia, Lithuania, Poland, Turkey). Few occurrences (Hungary, Italy). Transient under eradication (Netherlands) (EPPO, online_b)
Host status on *Prunus avium*	*Prunus avium* is reported as a host for TRSV in the EPPO Global Database (EPPO, online_c)
PRA information	Available Pest Risk Assessments: • Scientific Opinion on the pest categorisation of non-EU viruses and viroids of *Cydonia* Mill., *Prunus* Mill. and *Pyrus* L. (EFSA PLH Panel, 2019). • Rapid Pest Risk Analysis (PRA) for Tobacco ringspot virus (TRSV) (DEFRA, 2018).

Other relevant information for the assessment		
Biology	TRSV is a bipartite positive-sense RNA virus with isometric particles about 28 nm in diameter. TRSV occurs in a wide range of herbaceous and woody hosts (Stace-Smith, 1985). TRSV is transmitted by the ectoparasitic dagger nematode *Xiphinema americanum* sensu lato (including *X. americanum* sensu stricto, *X. bricolense*, *X. californicum*, *X. intermedium*, *X. rivesi*, *X. inaequale* and *X. tarjanense*) (Douthit and McGuire, 1978; Brown et al.; 1995 EFSA PLH Panel, 2018). Additionally, TRSV can be spread through seeds in soybean, petunia, *Nicotiana glutinosa*, *Gomphrena globosa* and *Taraxacum officinale*; including tobacco, cantaloupe, cucumber, muskmelon and lettuce (Yang and Hamilton, 1974). It can be also transmitted by vegetative propagation (Yang and Hamilton, 1974). Pollen transmission occurs also in some species (Card et al., 2007), but this has been poorly studied and its efficiency is unclear, in particular in woody plants	
Symptoms	**Main type of symptoms**	TRSV mostly does not cause striking symptoms, and symptom expression varies according to the plant species and variety, as well as virus strain and environmental conditions. In apple plants, TRSV causes stem pitting, necrosis, and breaking or separation of scion/rootstock at the graft union. The foliage is sparse, and the leaves are chlorotic and diffusely mottled (Lana et al., 1983). In grapevine, it shows symptoms of decline, whereas new growth is weak and sparse, internodes are shortened, leaves are small and distorted (Gonsalves, 1988). In soybean, it shows curved, brown coloured and necrotic buds. Brown streaks can be seen in the pith of stems and branches, and occasionally on petioles and leaf veins. Leaflets are dwarfed and rolled (Demski and Kuhn, 1989) In tobacco, it causes ring and line patterns on the foliage and stunting (Gooding, 1991) In cucurbits, leaves are mottled and stunted, and fruits are deformed (Sinclair and Walker, 1956) In cherry trees, in which the disease has only ever been seen in a few individual trees, young leaves show irregular chlorotic blotching over the whole leaf blade, and the leaf margins are deformed and lobed. These symptoms are seen in scattered leaves throughout the crown. Fruits mature late on infected trees (Stace-Smith and Hansen, 1974)
	Presence of asymptomatic plants	TRSV disease could be asymptomatic, depending on the virus strain, host species and/or environmental conditions
	Confusion with other pests	No definite symptoms have been associated with TRSV in woody plants. It might be confused with tomato ringspot virus (ToRSV), which has a similar host range (EPPO/CABI, 1996)

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Host plant range	TRSV infects a wide range of herbaceous and woody hosts and can cause significant yield loss in soybeans (*Glycine max*), tobacco (*Nicotiana tabacum*), *Vaccinium* spp., and Cucurbitaceae (Stace-Smith, 1985). In addition, many other hosts have been also found naturally infected, such as Anemone, apples (*Prunus domestica*), aubergines (*Solanum melongena*), blackberries (*Rubus fruticosus*), Capsicum, cherries (*Prunus avium*), Cornus, *Fraxinus*, *Gladiolus*, grapes (*Vitis vinifera*), *Iris*, *Lupinus*, *Mentha*, *Narcissus pseudonarcissus*, pawpaws (*Carica papaya*), *Pelargonium*, *Petunia*, *Sambucus*, and various weeds (Gonsalves, 1988)
Reported evidence of impact	TRSV can cause economically important diseases of fruit crops and soybean, particularly where the nematode vectors are present. Minor damage has been reported to ornamentals and capsicum. Although it has been also reported in grapevines (Uyemoto, 1975), the economic importance on these crops is lower than in other crops TRSV is listed as EU Quarantine pest (Annex II, part A)
Pathways and evidence that the commodity is a pathway	Plants for planting of *Prunus, Pelargonium, Prunus* and *Rubus* are potential host commodities for TRSV (EPPO, online_c). Thus, plants for planting coming from a country where TRSV occurs can be the main pathway of entry (EFSA PLH Panel, 2019), including asymptomatic plants, infected nematodes, seeds, pollen and soil attached to the plants may also serve as potential pathway for the TRSV spread
Surveillance information	According to the information dated 1984 and 2018 from CABI and EPPO, as well as information provided by the UK NPPO, TRSV has a restricted presence in UK, with only a few reported occurrences TRSV was first reported from an outbreak of Anemone necrosis in Somerset in 1957 (Hollings, 1965). Then, it was occasionally reported in Iiris rhizomes and bulbs imported from other countries (Brunt, 1974). In 1981, TRSV was detected in Pelargonium in the UK (Stone et al., 1981), and also from amenity grasses (Cooper and Edwards, 1985). In 2011, during pre-export testing, TRSV was found on lettuce seeds originated from France. Several findings have been reported in Pelargonium stocks in the UK, with the most recent survey from 2018 to 2022 by a Rapid Pest Risk Analysis for TRSV indicating no evidence of eradication, despite the nematode vectors responsible for transmission are not known to occur in the UK (DEFRA, unpublished)

A.6.2 | Possibility of pest presence in the nursery

A.6.2.1 | Possibility of entry from the surrounding environment

The natural host range of TRSV is wide, including herbaceous, woody plant, and uncultivated plant species (EPPO, online_c). TRSV is naturally transmitted by *Xiphinema americanum* sensu lato*, Xiphinema americanum* sensu lato *(including X. americanum* sensu stricto*, X. bricolense, X. californicum, X. intermedium, X. rivesi, X. inaequale and X. tarjanense)* (Brown et al., 1995; EFSA PLH Panel, 2018). These vectors are not known to occur in the UK, although the virus is still present DEFRA (2018). Most of TRSV infections are associated with ornamentals and its presence within Pelargonium and possibly other ornamental hosts is very likely in the UK. Based on the dossier information, TRSV is considered a quarantine pest in the UK, and there is a set of standard precautions to ensure that no plants other than certified plants are present in the production facilities. Infected plants may not show symptoms, and TRSV has been shown to be seed and pollen transmitted in a few plant species (Card et al., 2007; Scarborough and Smith, 1977). But this aspect has been poorly studied and its efficiency is unclear, in particular in woody plants. There have been no other records in the UK (DEFRA, 2018), on any other hosts, including *Malus* spp. and *Prunus* spp.

<u>Uncertainties:</u>

- There is a lack of information about the particular plant species in the nursery's surroundings.
- The presence of vector species in the nurseries and the surrounding area, and the efficiency of pollen and seed transmission in woody plants is unknown.

Taking into consideration the above evidence and uncertainties, the Panel considers that the possibility of the pest entry into the nursery infecting *M. avium* plants from the surrounding orchards may be very unlikely.

A.6.2.2 | Possibility of entry with new plants/seeds

At the nurseries, plant material is supervised and certified as virus-free. TRSV host range is wide, and despite some infected hosts can be symptomless carriers, symptom expression is often severe enough to ensure its detection. There is evidence that TRSV can be established via seed/pollen transmission in a few plant species (Card et al., 2007; Scarborough and Smith, 1977). TRSV can also spread via clonally vegetatively propagated material. However, there is scarce information on the efficiency of seed and pollen transmission, in particular in woody hosts, so these mechanisms may be relevant only for other species possibly present in the nurseries.

<u>Uncertainties:</u>

- It is uncertain to what extent detection and sampling strategies are effective to detect asymptomatic infections.
- It is unknown whether TRSV can be transmitted from seed to *P. avium* seedlings.

Taking into consideration the above evidence and uncertainties, the Panel considers that the possibility of entry with seeds is very unlikely.

A.6.2.3 | Possibility of spread within the nursery

TRSV can be established via vegetative propagation of infected material plants. However, *P. avium* fruit-tree propagating materials are produced under the certification scheme in nurseries, and the plant materials are monitored and inspected during the vegetation period. Additionally, most of the nurseries expected to export to the EU do not use grafting in the production of *Prunus avium*. TRSV has been shown to be transmitted by pollen and seed in a few plant species, but there is a paucity of data on the efficiency of seed/pollen transmission in woody plants.

Uncertainties:

- It is unknown whether TRSV can be transmitted from seed to *P. avium* seedlings.
- It is unknown if other plant species are grown in the nurseries

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pathogen within the nursery is very unlikely.

A.6.3 | Information from interceptions

There are no records of interceptions of *P. avium* plants for planting from UK due to the presence of ToRSV between 1998 and March 2024 (EUROPHYT, online; TRACES-NT, online).

A.6.4 | 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 TRSV is provided. The description of the risk mitigation measures currently applied in the UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Evaluation: The UK has a Fruit Propagation Certification Scheme, and practices for inspections and detections are applied according to the UK regulations and guidelines 2017. In particular, an explanatory guide on how these are applied to Prunus is provided. However, TRSV is not included in the list of viruses for testing Uncertainties: – There is a lack of details for the surveillance and monitoring process including the TRSV detection during the production cycle.
2	Phytosanitary certificates	Yes	Evaluation: The UK has a Fruit Propagation Certification Scheme, and practices for inspections and detections are applied according to the UK regulations and guidelines 2017 Uncertainties: – There is a lack of details in the survey protocols and laboratory methodologies for the certification process.
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Rouging and pruning	Yes	Evaluation: Only rouging is applicable. Identifying and removing suspicious plants could be effective to decrease the virus spread and further infections Uncertainties: – It is unclear the effectiveness of visual inspections to detect early infections, including the presence of latent infections.
5	Pesticide application, biological and mechanical control	No	
6	Surveillance and monitoring	Yes	Visual inspections may be effective to delay viral spread Uncertainties: – The effectiveness of visual inspections to detect early infections, including the presence of latent infections, is questionable.

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No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
7	Sampling and laboratory testing	No	
8	Root washing	No	
9	Refrigeration and controlled temperature	No	Not relevant
10	Pre-consignment inspection	Yes	Evaluation: It can be effective, though early infection can be overlooked

A.6.5 | Overall likelihood of pest freedom

A.6.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Registration and certification of propagation material ensure virus-free production
- Most of nurseries are placed in areas where the virus has not been reported
- TRSV has not been reported in *P. avium*
- Nematode vectors are the only efficient way to spread within the nurseries, and they are absent in the production areas
- No other vectors, human activities or plant material may spread the virus
- Visual inspections are effective because of official regulation, and virus symptoms seems easy to detect in diseased plants.

A.6.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- The adherence to registration and certification criteria of propagation material for this pest is inappropriate and may increase the risk of entry and spread
- Unidentified virus outbreaks are present in the surrounding of *P. avium* production areas, or the nurseries are placed in areas close to places where the TRSV is present
- Nematode vectors may be unidentified and present in the production areas
- Pest can enter by pollen and seed and other unknown mechanisms
- Visual inspection will not detect early stages of infections or asymptomatic plants
- Increasing numbers of plants in a bundle lead to increasing risks associated to the virus presence in the bundle.

A.6.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- TRSV has not been reported in Prunus or other fruiting crops in the UK
- Presence of the primary nematode vectors is very unlikely
- Introduction of the virus from the surrounding areas or from propagation material within the nurseries is very unlikely

A.6.5.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- Transmission efficiency by other potential nematode vectors species is not well documented
- Status of the virus in the surrounding areas is unknown

A.6.5.5 | Elicitation outcomes of the assessment of the pest freedom for tobacco ringspot virus

The elicited and fitted values for tobacco ringspot virus agreed by the Panel are shown in Tables A.23, A.24 and in Figure A.12

TABLE A.23 Elicited and fitted values of the uncertainty distribution of pest infestation by tobacco ringspot virus 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					0.5		1.0		1.5					2.0
EKE	0.0212	0.0521	0.103	0.203	0.337	0.502	0.666	1.00	1.33	1.50	1.67	1.81	1.92	1.97	2.01

Note: The EKE results is the BetaGeneral (1.019, 1.0443, 0, 2.03) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants, the pest freedom was calculated (i.e. = 10,000 – the number of infested plants per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.24.

TABLE A.24 The uncertainty distribution of plants free of tobacco ringspot virus per 10,000 plants calculated by Table A.23.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9998					9999		9999		10000					10,000
EKE results	9997.99	9998.03	9998.08	9998.19	9998.33	9998.50	9998.67	9999.00	9999.33	9999.50	9999.66	9999.80	9999.90	9999.95	9999.98

Note: The EKE results are the fitted values.

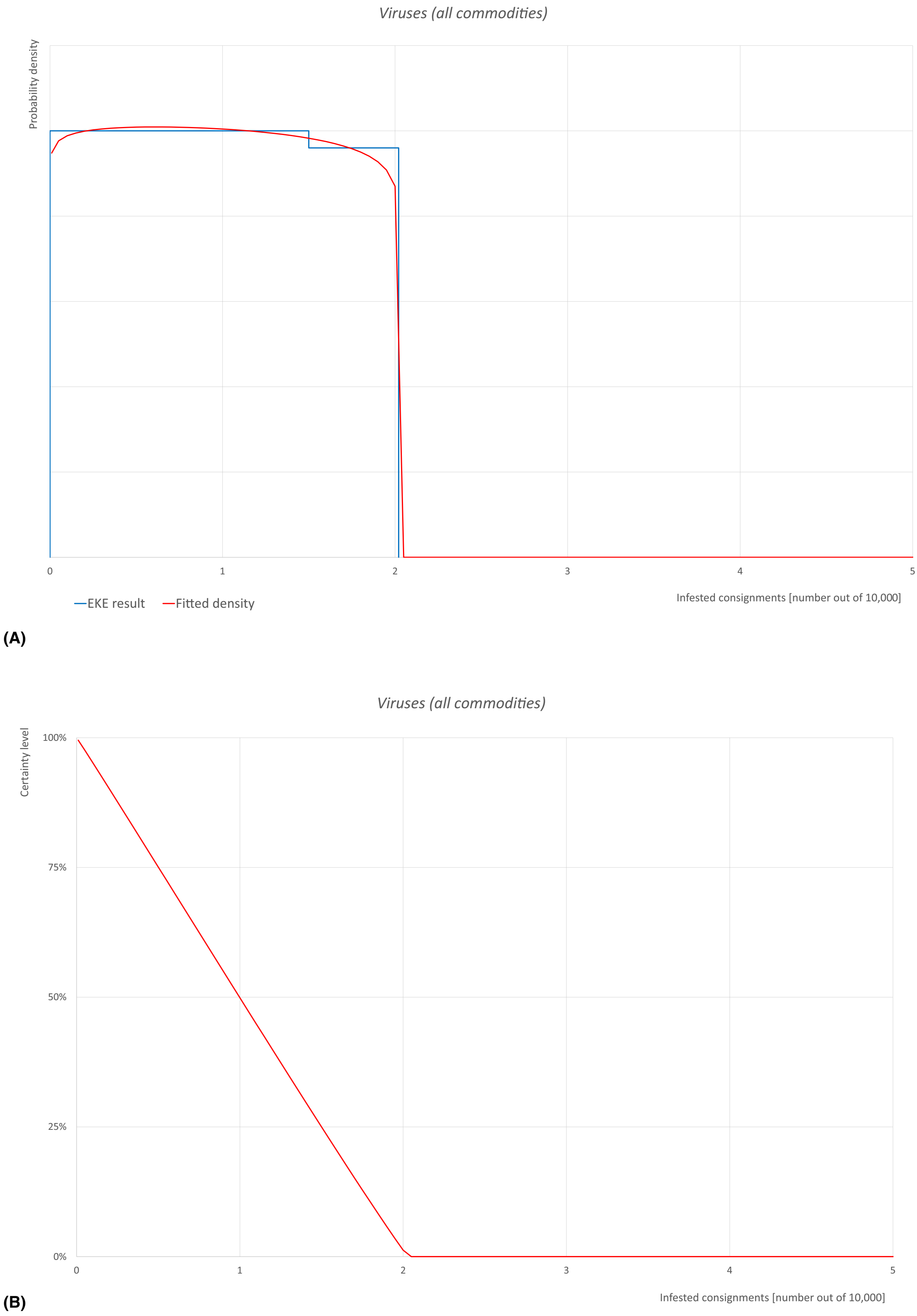
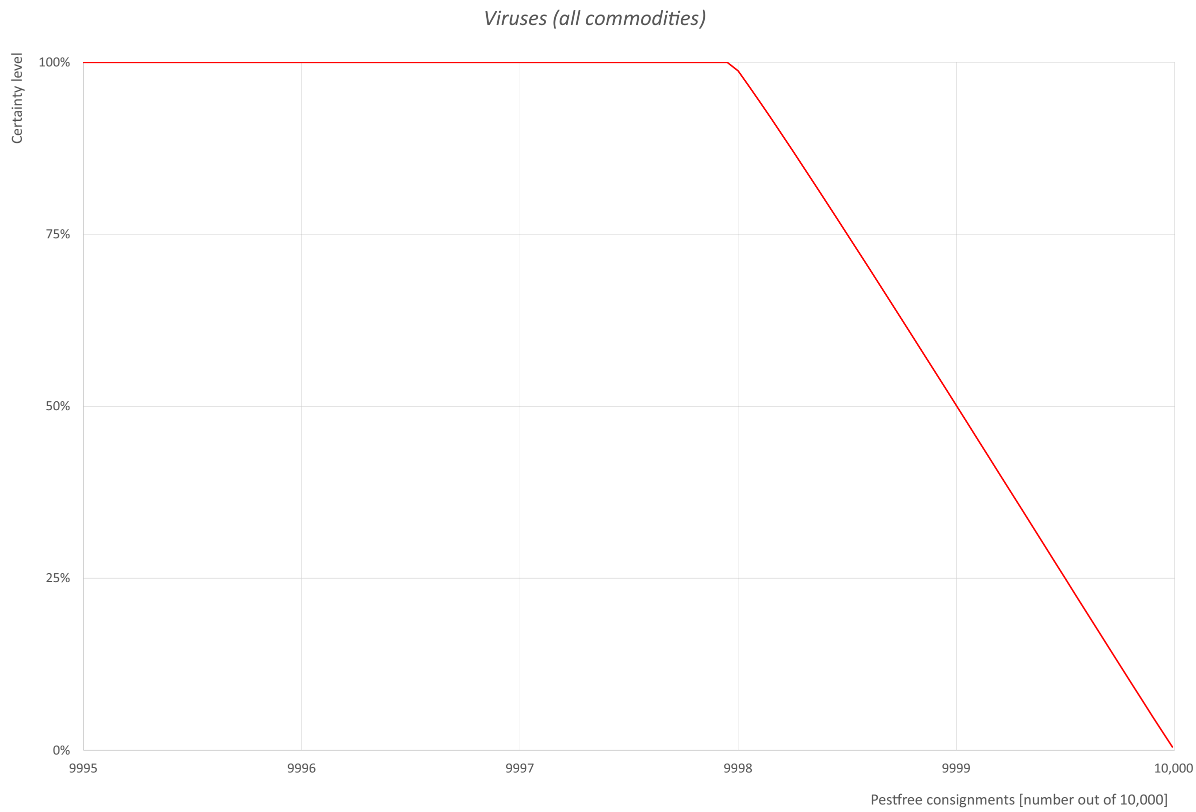


FIGURE A.12 (Continued)



(C)

FIGURE A.12 (A) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue – vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (B) uncertainty of the proportion of pest free plants per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (C) descending uncertainty distribution function of pest infestation per 10,000 plants.

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A.7 | TOMATO RINGSPOT VIRUS

A.7.1 | Organism information

Taxonomic information	Current valid scientific name: Tomato ringspot virus Synonyms: ToRSV, Tomato ringspot, *Tomato ringspot nepovirus* Name used in the EU legislation: *Tomato ringspot virus* [ToRSV] Category: Virus Order: *Picornavirales* Family: *Secoviridae* Common name: ringspot of tomato, union necrosis of apple, chlorosis mosaic of raspberry, chlorosis of pelargonium, stem pitting of *Prunus*, yellow vein of grapevine Name used in the Dossier: Tomato ringspot virus (ToRSV)
Group	Virus and Viroids
EPPO code	ToRSV0
Regulated status	ToRSV is listed as EU Quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072); Pests not known to occur in the EU Union territory (2019) Quarantine pest: Morocco (2018), Tunisia (2012), Canada (2019), Mexico (2018), Israel (2009), Moldova (2017), Norway (2012) (EPPO, online_a) A1 list: Egypt (2018), Argentina (2019), Brazil (2018), Paraguay (1995), Uruguay (1995), Bahrain (2003), China (1993), Kazakhstan (2017), Georgia (2018), Ukraine (2019), APPPC (1993) (EPPO, online_a) A2 list: Jordan (2013), Russia (2014), UK (2016), EAEU (2016), EPPO (1975) (EPPO, online_a)
Pest status in UK	Present, few occurrences (EPPO, online_b; dated 2021) or absent, eradicated (CABI, online) According to the NPPO, ToRSV is a regulated non-quarantine pest (2020) and is present at very low levels, with only a few occurrences detected in pelargonium (ornamentals)
Pest status in the EU	Present, no details (France, Lithuania, Poland). Few occurrences (Croatia). Transient under eradication (Germany and Netherlands) (EPPO, online_b)
Host status on *Prunus avium*	*Prunus* spp. *and Prunus avium* are reported as hosts for ToRSV in the EPPO Global Database (EPPO, online_c)
PRA information	Available Pest Risk Assessment: – Rapid Pest Risk Analysis for *Xiphinema americanum* s.l. (European populations) (FERA, 2014); – Rapid Pest Risk Analysis (PRA) for: Tomato ringspot virus (ToRSV) (DEFRA, 2018); – Pest categorisation of non-EU viruses and viroids of *Cydonia* Mill., *Prunus* Mill. and *Pyrus* L. (EFSA PLH Panel, 2019a); – Pest categorisation of non-EU viruses and viroids of *Prunus* L. (EFSA PLH Panel, 2019b); – Pest categorisation of non-EU viruses and viroids of *Vitis* L. (EFSA PLH Panel, 2019c); – Pest categorisation of non-EU viruses of *Fragaria* L. (EFSA PLH Panel, 2019d); – Pest categorisation of non-EU viruses of *Ribes* L. (EFSA PLH Panel, 2019e); – Pest categorisation of non-EU viruses of *Rubus* L. (EFSA PLH Panel, 2020).
Other relevant information for the assessment	
Biology	ToRSV is a bipartite positive-sense RNA virus, with isometric particles in *Secoviridae* family, *Nepovirus* genus (Sanfaçon et al., 2006). ToRSV has a wide range of hosts, infecting primarily plants such as tomato, tobacco, cucumber, pepper, peach, apple, grape, cherry, strawberry, raspberry, plum, geranium, walnut and ornamental plants (Stace-Smith, 1984). Experimentally, its host diversity is also very high and about 35 families are susceptible to this virus (Zindović et al., 2014). ToRSV is transmitted by the ectoparasitic dagger nematode *Xiphinema americanum* sensu lato (including *X. americanum* sensu stricto, *X. bricolense, X. californicum, X. intermedium, X. rivesi, X. inaequale, X. tarjanense*) (EFSA PLH Panel, 2018). ToRSV is naturally spread by different species of the nematode *Xiphinema americanum* group, and can be also transmitted via seed, pollen and vegetative propagation (Bitterlin et al., 1987; Pinkerton et al., 2008)

(Continued)

Symptoms	**Main type of symptoms**	The most common symptom of ToRSV infection is the presence of annular spots on the leaves. However, symptom expression varies according to the plant species, virus isolate, the age of the plant at the time of infection, and environmental conditions In general, infected plants show typical symptoms such as a shock reaction. Plants can be seen as pale yellow and showing pale green spots on the leaves that develop along the major side veins, causing systemic chlorotic or necrotic ring stains, as well as deformation of the fruit growth. Chronically infected plants usually exhibit no obvious symptoms but show a general decline in productivity (EPPO, 2013; Gonsalves, 1988; Stace-Smith, 1984) Major diseases caused by ToRSV on fruit crops include vein yellowing in grapevines, and yellow bud mosaic in peach and almond which cause pale-green to pale-yellow blotches to develop along the main vein or large lateral veins of leaves (EPPO, 2005) In apple plants, ToRSV causes a delay in foliation, the leaves are small and sparse, showing a vein yellowing and pale green colour. Terminal shoot growth is reduced, and the stem internodes are short. And commonly, there is a partial or complete separation of the graft union on severely affected trees (EPPO, 2013) In stone fruit, there can be severe pitting of the scion, rootstock, or both on either side of the graft union. The graft union can show various degrees of necrosis. Foliage symptoms slowly spread throughout the canopy as the virus moves up into scion wood and there is a general decline (Uyemoto and Scott, 1992)
	Presence of asymptomatic plants	In certain cases, ToRSV disease could be asymptomatic, depending on the viral strain, host species and /or environmental conditions
	Confusion with other pests	Note that geographical distribution, natural host range and vector relations of ToRSV are closely parallel to Tobacco ringspot virus (TRSV) (EPPO/CABI, 1996)
Host plant range	In nature, ToRSV occurs mostly in vegetable and perennial crops, including vegetable, ornamental and woody plants, such as *Lycopersicon esculentum Mill*. (tomato), *Cucumis sativus* (cucumber), *Nicotiana tabacum* (tobacco), *Solanum tuberosum* (potato), *Vitis vinifera* (grapevine), *Vaccinium corymbosum* (blueberry), *Fragaria vesca* (strawberry), *Pelargonium domesticum* (geranium), *Rubus idaeus* (raspberry), *Rubus fruticosus, Rubus* sp. (blackberry), *Prunus* sp. (apple), *Hosta* sp., *Aquilegia vulgaris*, *Delphinium* sp., *Fragaria ananassa*, *Fraxina americana*, *Gladiolus* sp., *Heleborus foetidus*, *Hydrangea macrophylla*, *Iris* sp., *Punica granatum*, *Phaseolus vulgaris*, *Prunus persica*, *Prunus* sp., *Rosa* sp., *Trifolium* sp., *Vigna unguiculate* and *Viola cornuta* (EPPO, 2013; Samuitienė and Navalinskienė, 2001; Sanfaçon et al., 2006) Additionally, other uncultivated hosts, such as *Taraxacum officinale, Rumex acetosella, Stellaria* spp., among other 21 species can be infected by ToRSV (Mountain et al., 1983; Powell et al., 1984)	
Reported evidence of impact	ToRSV causes severe decline in productivity. Trees grown on peach, almond, cherry and plum rootstocks become unproductive (Uyemoto and Scott, 1992; Adaskaveg and Caprile, online) ToRSV is listed as EU Quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072)	
Pathways and evidence that the commodity is a pathway	Plants for planting of *Prunus, Pelargonium, Malus* and *Rubus* are potential host commodities for ToRSV (EPPO, online_c). Thus, plants for planting coming from a country where ToRSV occurs can be the main pathway of entry, including asymptomatic plants, infected nematodes, seeds, pollen and soil attached to the plants may also serve as potential pathways for the TRSV spread	
Surveillance information	According to the information dated 2021 from EPPO, as well as information provided by the UK NPPO, ToRSV has a restricted presence in the UK, with only a few reported occurrences in *Pelargonium* (ornamentals) A survey in 1979–1980 found that ToRSV was distributed throughout the UK pelargonium industry, but only a small number of infected cultivars were present on individual holdings (DEFRA, additional information). Surveys conducted in the late 1990s found that the ToRSV was present in Pelargonium cultivars and was found in seven nurseries across 17 varieties (DEFRA, additional information). Surveys conducted in the early 2000s found eight positive findings for ToRSV The most recent survey from 2018 to 2022 indicates that ToRSV has not been eradicated, since it has been found in pelargonium from old nursery stock plants, despite the nematode vectors responsible for transmission are not known to occur in the UK (DEFRA, additional information)	

A.7.2 | Possibility of pest presence in the nursery

A.7.2.1 | Possibility of entry from the surrounding environment

ToRSV has a wide natural host range. ToRSV is naturally transmitted by nematode vectors of the *Xiphinema americanum* group (including *X. americanum* sensu stricto, *X. bricolense, X. californicum, X. intermedium, X. rivesi, X. inaequale, X. tarjanense*) (Brown et al., 1995, EFSA PLH Panel, 2018). These vectors are not known to occur in the UK, although there is no evidence of ToRSV eradication (DEFRA, 2018). Its occurrence in the UK is restricted to *Pelargonium* (ornamentals) at very low levels (NPPO, 2021). There have been no other records in the UK, on any other hosts, including *Prunus* sp. Based on the dossier information, ToRSV is considered a Regulated non-quarantine pest with 0% tolerance on findings on propagating material of ornamental plants and fruit propagating material and fruit plants intended for fruit production. Infected plants may not show symptoms. There have been no other records in the UK, on any other hosts, including *Malus* and *Prunus* sp.

Uncertainties:

- There is a lack of information about the particular plant species in the nursery´s surroundings.
- The presence of vector species in the nurseries and the surrounding area and the efficiency of pollen and seed transmission in woody plants is unknown.

Taking into consideration the above evidence and uncertainties, the Panel considers that the possibility of ToRSV entry into the nursery infecting *P. avium* plants from the surrounding orchards may be very unlikely.

A.7.2.2 | Possibility of entry with new plants/seeds

At the nurseries, plant material is supervised and certified as virus-free. ToRSV host range is wide, and despite some hosts can be symptomless carriers, symptom expression is often severe enough to ensure its detection. There is a set of standard precautions to ensure that no plants other than certified plants are present in the production facilities. Seed transmission has been reported in a range of test species (soybean, strawberry, raspberry, and pelargonium) and pollen transmission in pelargonium (Braun and Keplinger, 1973; Card et al., 2007; Kahn, 1956; Mellor and Stace-Smith, 1963; Scarborough and Smith, 1977). However, no seed transmission has been reported in woody hosts. However, there is scarce information on the efficiency of seed and pollen transmission, in particular in woody hosts, so these mechanisms may be relevant only for other species possibly present in the nurseries.

Uncertainties:

- It is uncertain to what extent detection and sampling strategies are effective to detect asymptomatic infections.
- It is unknown whether ToRSV can be transmitted from seed to *P. avium* seedlings.

Taking into consideration the above evidence and uncertainties, the Panel considers that the possibility of entry with seeds is very unlikely.

A.7.2.3 | Possibility of spread within the nursery

TRSV can be established via vegetative propagation of infected material plants. However, *P. avium* fruit-tree propagating materials are produced under the certification scheme in nurseries, and the plant materials are monitored and inspected during the vegetation period. Additionally, most of the nurseries expected to export to the EU do not use grafting in the production of *Prunus avium*. TRSV has been shown to be transmitted by pollen and seed in a few plant species, but there is a paucity of data on the efficiency of seed/pollen transmission in woody plants.

Uncertainties:

- It is unknown whether ToRSV can be transmitted from seed to *P. avium* seedlings.
- It is unknown if other plant species are grown in the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pathogen within the nursery is very unlikely.

A.7.3 | Information from interceptions

There are no records of interceptions of *P. avium* plants for planting from UK due to the presence of ToRSV between 1998 and March 2024 (EUROPHYT, online; TRACES-NT, online).

A.7.4 | Evaluation of the risk mitigation measures

In the table below, all risk mitigation measures currently applied in UK are listed and an indication of their effectiveness on ToRSV is provided. The description of the risk mitigation measures currently applied in UK is provided in Table 5.

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
1	Certified material	Yes	Evaluation: The UK has a Fruit Propagation Certification Scheme, and practices for inspections and detections are applied according to the UK regulations and guidelines 2017. In particular, an explanatory guide on how these are applied to Prunus is provided. However, ToRSV is not included in the list of viruses for testing. Uncertainties: • There is a lack of details for the surveillance and monitoring process including the ToRSV detection during production cycle.

(Continued)

No.	Risk mitigation measure	Effect on the pest	Evaluation and uncertainties
2	Phytosanitary certificates	Yes	Evaluation: The UK has a Fruit Propagation Certification Scheme, and practices for inspections and detections are applied according to the UK regulations and guidelines 2017. Uncertainties: • There is a lack of details in the survey protocols and laboratory methodologies for the certification process.
3	Cleaning and disinfection of facilities, tools and machinery	No	
4	Rouging and pruning	Yes	Evaluation: Only rouging is applicable. Identifying and removing suspicious plants could be effective to decrease the virus spread and further infections. Uncertainties: • It is unclear the effectiveness of visual inspections to detect early infections, including the presence of latent infections.
5	Pesticide application, biological and mechanical control	No	
6	Surveillance and monitoring	Yes	Evaluation: Visual inspections may be effective to delay viral spread. Uncertainties: • The effectiveness of visual inspections to detect early infections, including the presence of latent infections, is questionable.
7	Sampling and laboratory testing	No	
8	Root washing	No	
9	Refrigeration and temerature control	No	Not relevant
10	Pre-consignment inspection	Yes	Evaluation: It can be effective, though early infection can be overlooked

A.7.5 | Overall likelihood of pest freedom

A.7.5.1 | Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Registration and certification of propagation material ensure virus-free production
- Most of nurseries are placed in areas where the virus has not been reported
- ToRSV has not been reported in *P. avium*
- Nematode vectors are the only efficient way to spread within the nurseries, and they are absent in the production areas
- No other vectors, human activities or plant material may spread the virus
- Visual inspections are effective because of official regulation, and virus symptoms seem easy to detect in diseased plants.

A.7.5.2 | Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- The adherence to registration and certification criteria of propagation material for this pest is inappropriate and may increase the risk of entry and spread
- Unidentified virus outbreaks are present in the surrounding of P. avium production areas, or the nurseries are placed in areas close to places where the ToRSV is present
- Nematode vectors may be unidentified and present in the production areas
- Pest can enter by pollen and seed and other unknown mechanisms
- Visual inspection will not detect early stages of infections or asymptomatic plants
- Increasing numbers of plants in a bundle lead to increasing risks associated to the virus presence in the bundle.

A.7.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

- ToRSV has not been reported in *P. avium* and other plant host species in the UK
- Presence of the primary nematode vectors is very unlikely
- Introduction of the virus from the surrounding areas or from propagation material within the nurseries is very unlikely.

A.7.5.4 | Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- Transmission efficiency by other potential nematode vectors species is not well documented.
- Status of the virus in the surrounding areas is unknown.

A.7.5.5 | Elicitation outcomes of the assessment of the pest freedom for tomato ringspot virus

The elicited and fitted values for tomato ringspot virus agreed by the Panel are shown in Tables A.25, A.26 and in Figures A.13, A.14

TABLE A.25 Elicited and fitted values of the uncertainty distribution of pest infestation by tomato ringspot virus 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					0.5		1.0		1.5					2.0
EKE	0.0212	0.0521	0.103	0.203	0.337	0.502	0.666	1.00	1.33	1.50	1.67	1.81	1.92	1.97	2.01

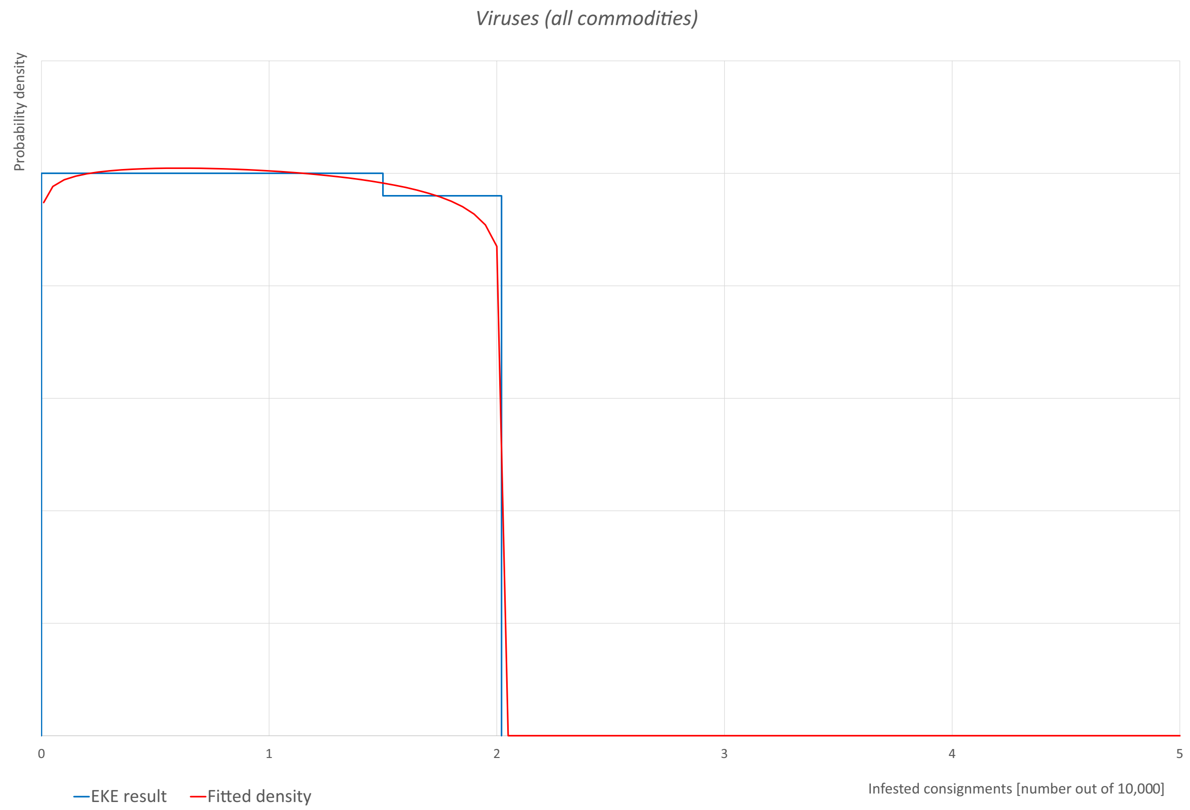
Note: The EKE results is the BetaGeneral (1.019, 1.0443, 0, 2.03) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested plants the pest freedom was calculated (i.e. = 10,000 – the number of infested plants per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.26.

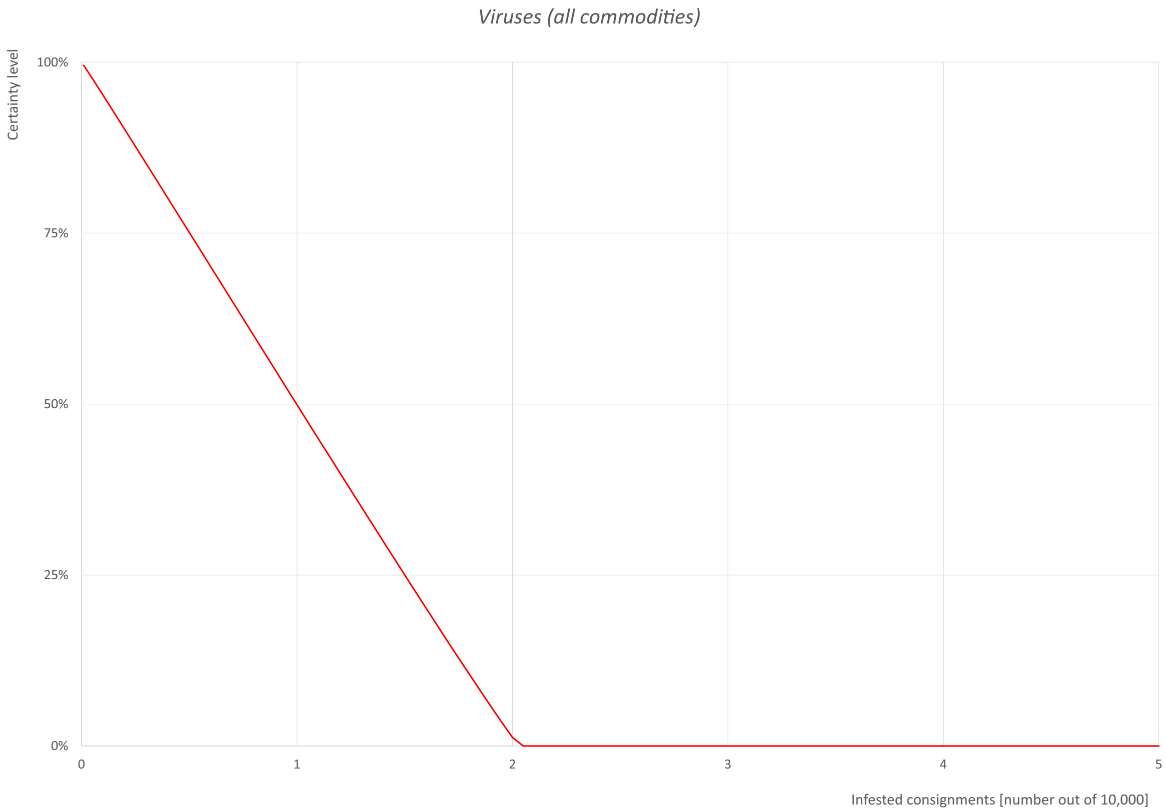
TABLE A.26 The uncertainty distribution of plants free of tomato ringspot virus per 10,000 plants calculated by Table A.25.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9998					9999		9999		10,000					10,000
EKE results	9997.99	9998.03	9998.08	9998.19	9998.33	9998.50	9998.67	9999.00	9999.33	9999.50	9999.66	9999.80	9999.90	9999.95	9999.98

Note: The EKE results are the fitted values.

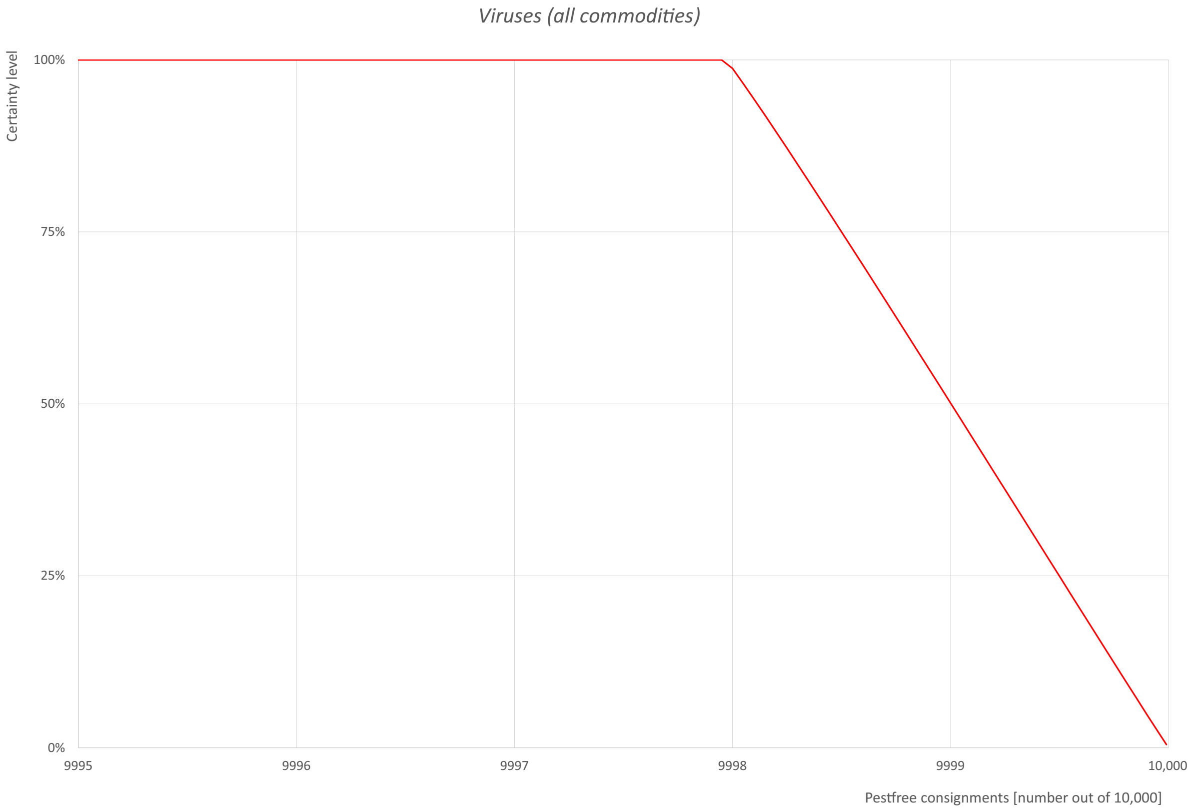


(A)



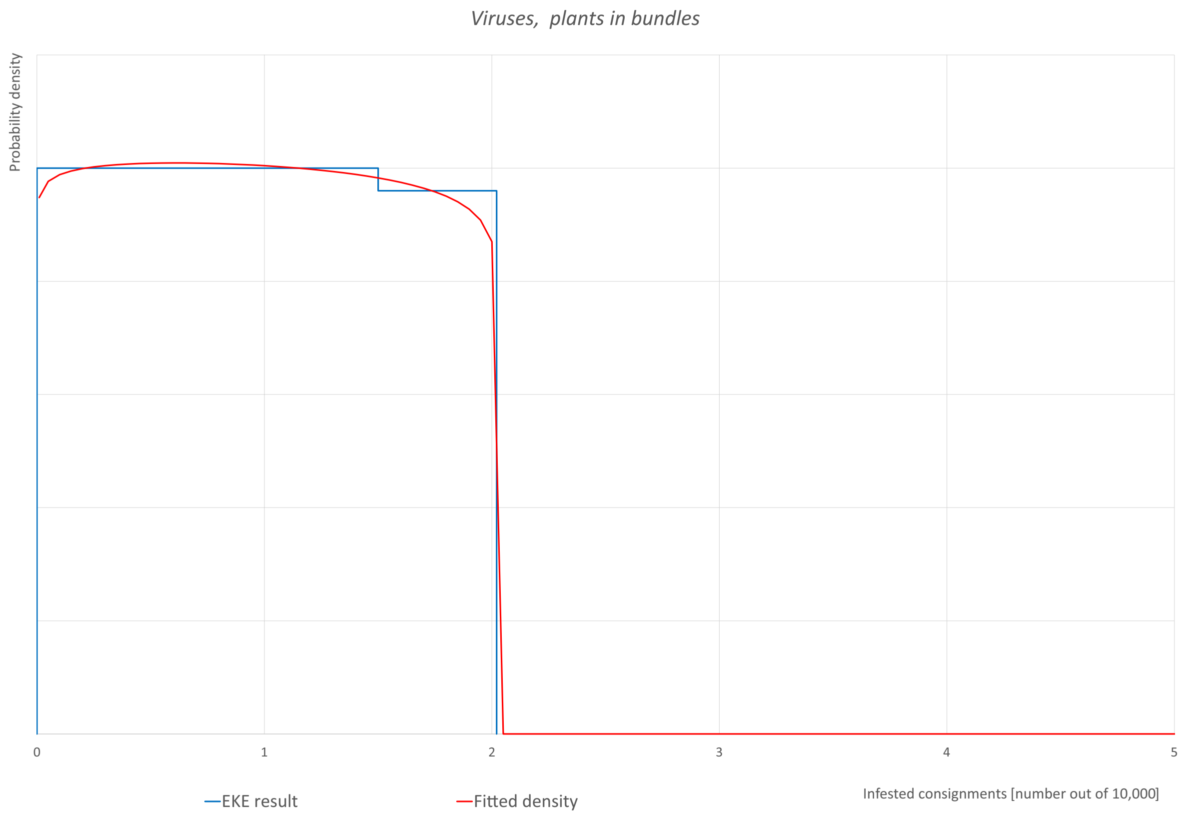
(B)

FIGURE A.13 (Continued)

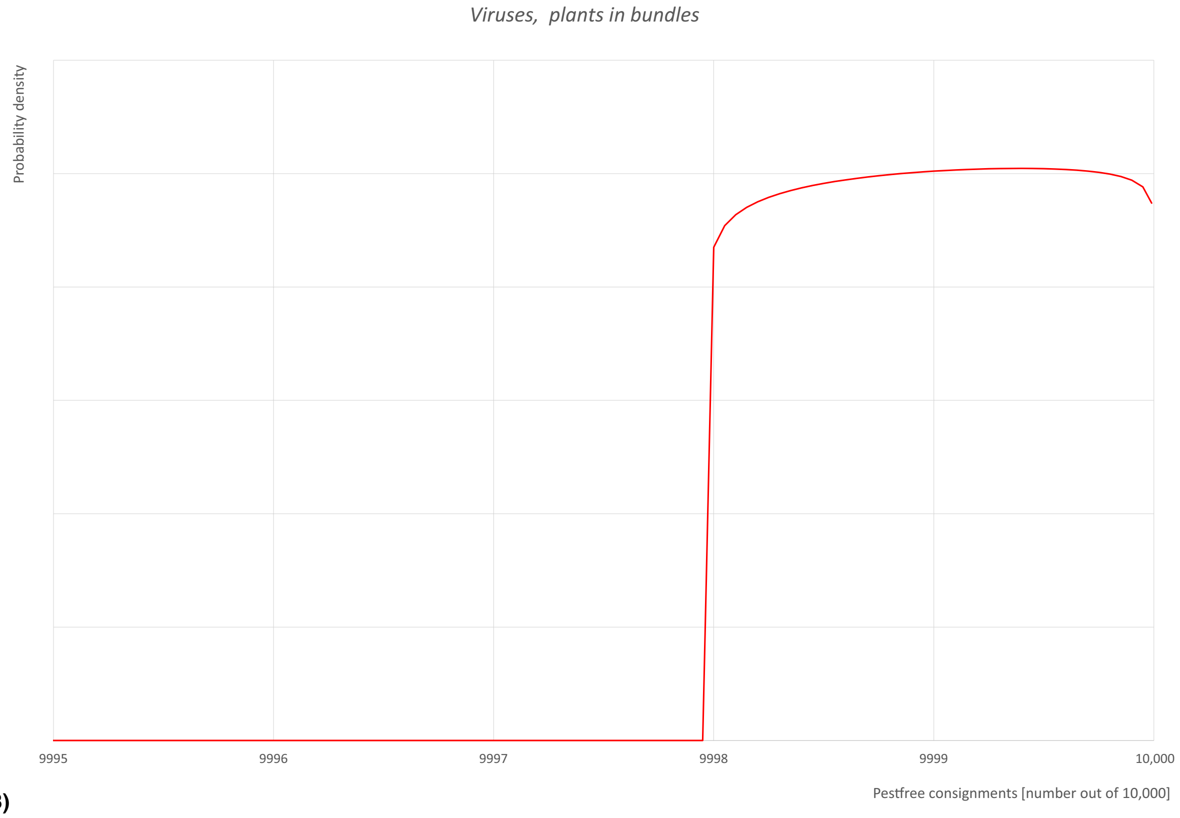


(C)

FIGURE A.13 (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.

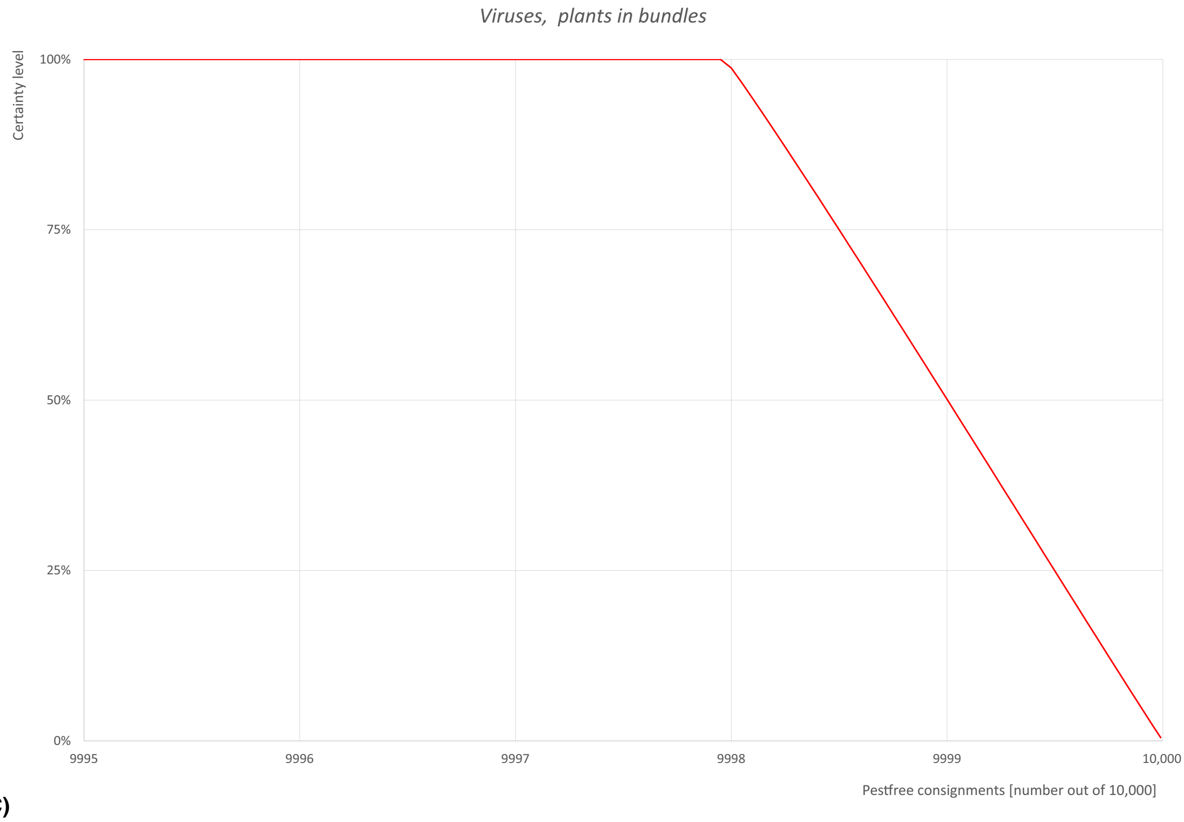


(A)



(B)

FIGURE A.14 (Continued)



(C)

FIGURE A.14 (A) Elicited uncertainty of pest infestation per 10,000 bundles of bare-root plants or rooted cell grown young 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 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.

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APPENDIX B

Web of Science All Databases Search String

In the table below, the search string used in Web of Science is reported. In total, 448 papers were retrieved. Titles and abstracts were screened, and 128 pests were added to the list of pests (see Appendix C).

Web of Science All databases	TOPIC: ("Prunus avium" OR "P. avium" OR "sweet cherry tree$") AND TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest$" OR "vector" OR "host plant$" OR "host-plant$" OR "host" OR "root lesion$" OR "decline$" OR "infestation$" OR "damage$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight$" OR "canker" OR "scab$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst$ OR "dagger" OR "plant parasitic" OR "root feeding" OR "root$ feeding" OR "plant$parasitic" OR "root lesion$" OR damage$ OR infestation$ OR symptom* OR pest$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR decline$ OR infestation$ OR damage$ OR virosis OR canker OR blister$ OR mosaic OR "leaf curl" OR "latent" OR insect$ OR mite$ 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 caterpillar$ OR "foliar feeder$" OR "root feeder$") NOT TOPIC: ("heavy metal$" OR "pollut*" OR "weather" OR "propert*" OR probes OR "spectr*" OR "antioxidant$" OR "transformation" OR "RNA" OR peel OR resistance OR gene OR DNA OR "Secondary plant metabolite$" OR metabolite$ OR Catechin OR "Epicatechin" OR "Rutin" OR "Phloridzin" OR "Chlorogenic acid" OR "Caffeic acid" OR "Phenolic compounds" OR "Quality" OR "Appearance" OR Postharvest OR Antibacterial OR Abiotic OR Storage OR Pollin* OR Ethylene OR Thinning OR fertil* OR Mulching OR Nutrient$ OR Pruning 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$") NOT TOPIC: («Acherontia atropos» OR «Acleris rhombana» OR «Acleris variegana» OR «Acrobasis indigenella» OR «Acronicta lanceolaria» OR «Acronicta psi» OR «Aculus fockeui» OR «Adoxophyes orana» OR «Aeolothrips intermedius» OR «Agriopis bajaria» OR «Agrobacterium» OR «Agrobacterium sp. (tumourigenic strain)» OR «Agrobacterium tumefaciens» OR «Aguriahana stellulata» OR «Alebra wahlbergi» OR «Aleimma loeflingiana» OR «Aleurocanthus spiniferus» OR «Aleurodicus dispersus» OR «Allophyes oxyacanthae» OR «Alnetoidia alneti» OR «Alsophila aescularia» OR «Alsophila pometaria» OR «Alternaria alternata» OR «Alternaria cerasidanica» OR «Alternaria citri var. cerasi» OR «Alternaria mali» OR «Alternaria prunicola» OR «Alternaria pseudoeichhorniae» OR «Alternaria sp.» OR «Alternaria tenuis» OR «American plum line pattern virus» OR «Ampedus pomorum» OR «Amphitetranychus viennensis» OR «Amylostereum sacratum» OR «Anarsia lineatella» OR «Anastrepha fraterculus» OR «Anoplophora chinensis» OR «Anthaxia nitidula» OR «Anthonomus humeralis» OR «Anthonomus rectirostris» OR «Aphelia ochreana» OR «Aphis fabae» OR «Apiognomonia erythrostoma» OR «Apion vorax Herbst» OR «Apiosporina morbosa» OR «Apolygus lucorum» OR «Aporia crataegi» OR «Apple chlorotic leaf spot virus» OR «Apple mosaic virus» OR «Apple rubbery wood phytoplasma» OR «Apple scar skin viroid» OR «Apple stem grooving virus» OR «Apricot ring pox and cherry twisted leaf diseases» OR «Apriona cinerea» OR «Arabis mosaic virus» OR «Archips argyrospila» OR «Archips cerasivorana» OR «Archips fuscocupreanus» OR «Archips nr. argyrospilus» OR «Archips podanus» OR «Archips rosana» OR «Archips xylosteana» OR «Argyresthia pruniella» OR «Argyrotaenia citrana» OR «Argyrotaenia ljungiana» OR «Armillaria gallica» OR «Armillaria luteobubalina» OR «Armillaria mellea» OR «Armillaria sp.» OR «Armillariella tabescens» OR «Aromia bungii» OR «Arthrinium phaeospermum» OR «Aspergillus niger» OR «Aspidiotus nerii» OR «Aulacorthum solani» OR «Aureobasidium pullulans» OR «Automeris io» OR «Bactrocera correcta» OR «Bactrocera dorsalis» OR «Bactrocera tryoni» OR «Basidioradulum radula» OR «Berkeleyomyces basicola» OR «Blumeriella jaapii» OR «Botryosphaeria» OR «Botryosphaeria dothidea» OR «Botryosphaeria obtusa» OR «Botryosphaeria ribis» OR «Botrytis cinerea» OR «Botrytis sp.» OR «Brachycaudus amygdalinus» OR «Brachycaudus cardui» OR «Brachysporium bloxami» OR «Brachysporium masonii» OR «Brachysporium obovatum» OR «Bryobia angustisetis» OR «Bryobia marcandrei» OR «Bryobia praetiosa» OR «Bryobia rubrioculus» OR «Cacoecimorpha pronubana» OR «Cacopsylla pruni» OR «Cadra cautella» OR «Cadra figulilella» OR «Caliroa cerasi» OR «Callisto multimaculata» OR «Calonectria cliffordiicola» OR «Calosphaeria ambigua» OR «Calosphaeria calva» OR «Calosphaeria pulchella» OR «Calosphaeriophora pulchella» OR «Candidatus Phytoplasma asteris» OR «Candidatus Phytoplasma mali» OR «Candidatus Phytoplasma pruni» OR «Candidatus Phytoplasma prunorum» OR «Candidatus Phytoplasma pyri» OR «Candidatus Phytoplasma solani» OR «Candidatus Phytoplasma trifolii» OR «Capnodis tenebrionis» OR «Carnation ringspot virus» OR «Carposina sasakii» OR «Catenophora pruni» OR «Catocala ultronia» OR «Cerambyx scopolii Fuessly» OR «Ceratitis capitata» OR «Cercospora cerasella» OR «Cercospora cerasella f. avium» OR «Cercospora circumscissa» OR «Ceresa alta» OR «Ceroplastes japonicus» OR «Cerura scitiscripta» OR «Chaetocnema confinis» OR «Cheravirus avii» OR «Cherry European rusty mottle agent» OR «Cherry green ring mottle virus» OR «Cherry leaf roll virus» OR «Cherry mottle leaf virus» OR «Cherry necrotic rusty mottle virus» OR «Cherry rasp leaf virus» OR «Cherry rosette virus» OR «Cherry rough fruit agent» OR «Cherry rusty mottle associated virus» OR «Cherry rusty mottle disease» OR «Cherry twisted leaf associated virus» OR «Cherry virus A» OR «Chilecomadia valdiviana» OR «Chinavia hilaris» OR «Chionaspis furfura» OR «Chloroclysta siterata» OR «Chondrostereum purpureum» OR «Choreutis pariana» OR «Choristoneura rosaceana» OR «Chrysobothris femorata» OR «Chrysobothris mali» OR «Cicadella viridis» OR «Cirsium arvense» OR «Citrus leaf blotch virus» OR «Cladophialophora hachijoensis» OR «Cladosporium» OR «Cladosporium carpophilum» OR «Cladosporium cladosporioides» OR «Cladosporium herbarum» OR «Cladosporium herbarum var. macrocarpum» OR «Cladosporium macrocarpum» OR «Cladosporium malorum» OR «Cladosporium phyllophilum» OR «Cladosporium sp.» OR «Cladosporium xylophilum» OR «Clasterosporium

(Continues)

(Continued)

	carpophilum» OR «Clethridium corticola» OR «Coccomyces hiemalis» OR «Coleophora adjectella Herrich-Schaffer» OR «Coleophora anatipennella» OR «Coleophora hemerobiella» OR «Coleophora trigeminella» OR «Colladonus montanus» OR «Colletotrichum acutatum» OR «Colletotrichum aenigma» OR «Colletotrichum clavatum» OR «Colletotrichum fructicola» OR «Colletotrichum godetiae» OR «Colletotrichum pseudotheobromicola» OR «Colletotrichum sp.» OR «Collybia drucei» OR «Comstockaspis perniciosa» OR «Conotrachelus nenuphar» OR «Coriolus versicolor» OR «Corticium solani» OR «Coryneum beijerinckii» OR «Coryneum carpophilum» OR «Corythucha arcuata» OR «Cossus cossus» OR «Cryptodiaporthe castanea» OR «Cryptovalsa ampelina» OR «Cucumber mosaic virus» OR «Curculio betulae» OR «Cydia molesta» OR «Cydia pomonella» OR «Cylindrocarpon sp.» OR «Cylindrocladium scoparium» OR «Cylindrosporium hiemalis» OR «Cylindrosporium padi» OR «Cylindrosporium pruni-cerasi» OR «Cylindrosporium sp.» OR «Cytospora cincta» OR «Cytospora leucostoma» OR «Cytospora mali» OR «Cytospora sorbicola» OR «Cytospora sp.» OR «Dactylonectria novozelandica» OR «Daedalea sp.» OR «Daldinia childiae» OR «Dasychira cinnamomea» OR «Dendrophora erumpens» OR «Dermatea cerasi» OR «Dermea cerasi» OR «Diabrotica speciosa» OR «Diaporthe eres» OR «Diaporthe foeniculina» OR «Diaspidiotus lenticularis» OR «Diaspidiotus marani» OR «Diaspidiotus ostreaeformis» OR «Diaspidiotus perniciosus» OR «Diaspidiotus prunorum» OR «Diaspidiotus pyri» OR «Diatrype flavovirens» OR «Dibotryon morbosum» OR «Diloba caeruleocephala» OR «Diplodia cerasorum» OR «Diplodia seriata» OR «Diptacus gigantorhynchus» OR «Dothiorella viticola» OR «Drosophila suzukii» OR «Ectoedemia atricollis» OR «Ectoedemia mahalebella» OR «Ectomyelois ceratoniae» OR «Edwardsiana crataegi» OR «Edwardsiana rosae» OR «Electrophaes corylata» OR «Empoasca vitis» OR «Enarmonia formosana» OR «Endostilbum albidum» OR «Ennomos autumnaria» OR «Eotetranychus carpini » OR «Eotetranychus pruni» OR «Eotetranychus prunicola» OR «Eotetranychus uncatus» OR «Ephestiodes infimella» OR «Epichoristodes acerbella» OR «Epicoccum pseudokeratinophilum» OR «Epidiaspis leperii» OR «Epiphyas postvittana» OR «Erannis defoliaria» OR «Erwinia amylovora» OR «Erysiphe polyphaga» OR «Euchlaena pectinaria» OR «Eulecanium rugulosum» OR «Eulia ministrana» OR «Eumacaria latiferrugata brunneata» OR «Euphranta japonica» OR «Eupithecia tripunctaria Herrich-Schaffer» OR «Eupoecilia ambiguella» OR «Euproctis chrysorrhoea» OR «Eutypa armeniacae» OR «Eutypa lata» OR «Eutypella prunastri» OR «Euwallacea fornicatus sensu lato» OR «Euwallacea fornicatus sensu stricto» OR «Euzophera semifuneralis» OR «Exoascus pruni» OR «Fagocyba cruenta» OR «Filippia follicularis» OR «Fomes annosus» OR «Fomes cajanderi» OR «Fomes pinicola» OR «Fomitopsis pinicola» OR «Forficula auricularia» OR «Frankliniella australis» OR «Frankliniella tritici» OR «Furcipus rectirostris» OR «Furcula borealis» OR «Fusarium lateritium» OR «Fusarium oxysporum» OR «Fusarium oxysporum f. sp. vasinfectum» OR «Fusarium poae» OR «Fusarium sp.» OR «Fusicladium cerasi» OR «Ganoderma applanatum» OR «Ganoderma australe» OR «Ganoderma lucidum» OR «Gibberella fujikuroi» OR «Globisporangium irregulare» OR «Gloeocystidiellum sacratum» OR «Gloeophyllum hirsutum» OR «Gloeosporium sp.» OR «Gloiothele lactescens» OR «Glomerella cingulata» OR «Gnomonia circumscissa» OR «Gnomonia erythrostoma» OR «Golovinomyces orontii» OR «Grapholita cerasivora» OR «Grapholita funebrana» OR «Grapholita molesta» OR «Grapholita packardi» OR «Grapholita prunivora» OR «Halyomorpha halys» OR «Hedya dimidioalba» OR «Hedya nubiferana» OR «Hedya pruniana» OR «Helicobasidium mompa» OR «Helicotylenchus digonicus» OR «Helicotylenchus dihystera» OR «Helicotylenchus erythrinae» OR «Helicotylenchus sp.» OR «Helicoverpa zea» OR «Helminthosporium macrocarpum» OR «Hemiberlesia lataniae» OR «Hemicriconemoides sp.» OR «Hemileuca eglanterina» OR «Higginsia hiemalis» OR «Homalodisca vitripennis» OR «Homona coffearia» OR «Homona magnanima» OR «Hop stunt viroid» OR «Hoplocampa flava» OR «Hyalophora cecropia» OR «Hyalopterus amygdali» OR «Hyalopterus pruni» OR «Hyphantria cunea» OR «Hyphoderma radula» OR «Hypocrea citrina » OR «Ilyonectria liriodendri» OR «Iphiclides podalirius» OR «Irpex lacteus» OR «Irpex sp.» OR «Isa textula» OR «Kuwanina parva» OR «Laetiporus sulphureus» OR «Lambertella jasmini» OR «Lambertella pruni» OR «Lambertella sp.» OR «Lenzites betulina» OR «Lenzites sepiaria» OR «Lepidosaphes ulmi» OR «Leptosphaeria rimicola» OR «Leucoptera malifoliella» OR «Leucostoma cinctum» OR «Leucostoma persoonii» OR «Leucostoma sp. » OR «Lithophane antennata» OR «Little cherry virus» OR «Little cherry virus 1» OR «Little cherry virus 2» OR «Lobesia botrana» OR «Lomographa bimaculata» OR «Lomographa temerata» OR «Longidorus» OR «Longidorus arthensis» OR «Longidorus euonymus» OR «Longidorus macrosoma» OR «Lopadostoma gastrinum» OR «Lopholeucaspis japonica» OR «Lucanus cervus» OR «Lycorma delicatula» OR «Lymantria dispar» OR «Lyonetia clerkella» OR «Macrophomina phaseoli» OR «Macrophomina phaseolina» OR «Macrosiphum euphorbiae» OR «Macrothylacia rubi» OR «Malacosoma americanum» OR «Malacosoma castrensis» OR «Malacosoma disstria» OR «Malacosoma neustria» OR «Malacosoma parallela» OR «Megaplatypus mutatus» OR «Melanaspis inopinata» OR «Melanomma pulvis-pyrius» OR «Meloidogyne chitwoodi» OR «Meloidogyne fallax» OR «Meloidogyne sp.» OR «Mercetaspis halli» OR «Merlinius brevidens» OR «Mesocriconema xenoplax» OR «Microdiplodia microsporella» OR «Micropera drupacearum» OR «Microstroma tonellianum» OR «Mimas tiliae» OR «Minutiella pruni-avium» OR «Monilia cinerea f. americana» OR «Monilia fructigena» OR «Monilia laxa» OR «Monilia mumecola» OR «Monilinia fructicola» OR «Monilinia fructigena» OR «Monilinia kusanoi» OR «Monilinia laxa» OR «Monilinia polystroma» OR «Monilinia sp.» OR «Monoleuca semifascia» OR «Mucor piriformis» OR «Mucor sp.» OR «Murgantia histrionica» OR «Mycosphaerella cerasella» OR «Mycosphaerella tassiana» OR «Myrmica rubra» OR «Myrobalan latent ringspot virus» OR «Myzus cerasi» OR «Nattrassia mangiferae» OR «Naupactus xanthographus» OR «Nearctaphis bakeri» OR «Nectria cinnabarina» OR «Nectria galligena» OR «Neofusicoccum mangiferae» OR «Neofusicoccum parvum» OR «Neoscytalidium novaehollandiae» OR «Nepovirus arabis» OR «Nepovirus avii» OR «Nepovirus lycopersici» OR «Nepovirus nicotianae» OR «Nepovirus nigranuli» OR «Nepovirus rubi» OR «Neurotoma saltuum» OR «Nothophoma pruni» OR «Nothophoma quercina» OR «Nymphalis polychloros» OR «Oemona hirta» OR «Oidium cerasi» OR «Oidium sp.» OR «Oligonychus bicolor » OR «Oligonychus coffeae » OR «Oligonychus perditus» OR «Oligonychus perseae» OR «Omophlus lepturoides» OR «Operophtera brumata» OR «Operophtera fagata» OR «Orgyia antiqua» OR «Orgyia leucostigma» OR «Orientus ishidae» OR «Orsodacne cerasi» OR «Oxyporus latemarginatus» OR «Paecilomyces sp.» OR «Pandemis cerasana» OR «Pandemis pyrusana» OR «Panonychus citri» OR «Panonychus ulmi» OR «Parabemisia myricae» OR «Paraphlepsius irroratus» OR «Parasa chloris» OR «Parasa indetermina» OR «Paratrichodorus minor» OR «Paratylenchus dianthus» OR «Paratylenchus hamatus» OR «Parlatoria oleae» OR «Parornix geminatella» OR «Parthenolecanium corni» OR «Parthenolecanium corni corni» OR «Pasiphila rectangulata» OR «Passalora circumscissa» OR «Passalora rubrotincta» OR «Peach latent mosaic viroid» OR «Peach rosette phytoplasma» OR «Peach wart disease» OR «Peach yellows phytoplasma» OR «Penicillium crustosum» OR «Penicillium expansum» OR «Penicillium italicum» OR «Petunia asteroid mosaic virus» OR «Pezicula cinnamomea» OR «Phaeoacremonium minimum» OR «Phaeoacremonium parasiticum» OR «Phaeoacremonium viticola» OR «Phalera bucephala» OR «Phellinus igniarius» OR «Phellinus pomaceus» OR «Phenacoccus aceris» OR «Phenacoccus cerasi» OR «Phialophora parasitica» OR «Phialophora sp.» OR «Philaenus spumarius» OR «Phloeosporella padi» OR «Phoma pomorum» OR «Phomopsis» OR

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	«Phomopsis padina» OR «Phomopsis sp.» OR «Phtheochroa micana» OR «Phyllactinia corylea» OR «Phyllactinia mali» OR «Phyllactinia suffulta» OR «Phyllonorycter cerasicolella» OR «Phyllonorycter corylifoliella» OR «Phyllonorycter crataegella» OR «Phyllonorycter elmaella» OR «Phyllonorycter pomonella» OR «Phyllonorycter sorbicola» OR «Phyllosticta persicae» OR «Phyllosticta pruni-avium» OR «Phyllosticta prunicola» OR «Phyllosticta virginiana» OR «Phymatodes testaceus» OR «Phytobia cerasiferae» OR «Phytophthora cactorum» OR «Phytophthora cambivora» OR «Phytophthora cinnamomi» OR «Phytophthora citricola» OR «Phytophthora citrophthora» OR «Phytophthora cryptogea» OR «Phytophthora drechsleri» OR «Phytophthora megasperma» OR «Phytophthora megasperma var. sojae» OR «Phytophthora nicotianae» OR «Phytophthora palmivora» OR «Phytophthora plurivora» OR «Phytophthora rosacearum» OR «Phytophthora sp.» OR «Phytophthora syringae» OR «Phytoplasma mali» OR «Phytoplasma pruni» OR «Phytoplasma prunorum» OR «Phytoplasma pyri» OR «Phytoplasma ziziphi» OR «Pithomyces sacchari» OR «Plagodis pulveraria» OR «Platynota idaeusalis» OR «Platypus cylindrus» OR «Pleospora sp.» OR «Plodia interpunctella» OR «Plowrightia morbosa» OR «Plum bark necrosis stem pitting-associated virus» OR «Plum pox virus» OR «Pochazia shantungensis» OR «Podosphaera cerasi» OR «Podosphaera clandestina» OR «Podosphaera clandestina var. clandestina» OR «Podosphaera oxyacanthae» OR «Podosphaera pruni-avium» OR «Podosphaera tridactyla» OR «Podosphaera tridactyla var. tridactyla» OR «Polia nebulosa» OR «Polistes dominula» OR «Polyporus hirsutus» OR «Polyporus hirsutus var. ochraceus» OR «Polyporus lacteus» OR «Polyporus pubescens» OR «Polyporus tulipiferae» OR «Polyporus versicolor» OR «Popillia japonica» OR «Poria ambigua» OR «Pratylenchus brachyurus» OR «Pratylenchus coffeae» OR «Pratylenchus fallax» OR «Pratylenchus loosi» OR «Pratylenchus neglectus» OR «Pratylenchus penetrans» OR «Pratylenchus pratensis» OR «Pratylenchus sp.» OR «Pratylenchus thornei» OR «Pratylenchus vulnus» OR «Prionus coriarius» OR «Proeulia auraria» OR «Proliferodiscus ingens» OR «Proliferodiscus sp.» OR «Prune dwarf virus» OR «Pruniphilomyces circumscissus» OR «Prunus necrotic ringspot virus» OR «Prunus virus F» OR «Pseudaulacaspis pentagona» OR «Pseudaulacaspis prunicola prunicola» OR «Pseudocercospora pruni-persicicola» OR «Pseudococcus calceolariae» OR «Pseudococcus comstocki» OR «Pseudococcus viburni» OR «Pseudomonas fluorescens» OR «Pseudomonas phytophila» OR «Pseudomonas sp.» OR «Pseudomonas syringae» OR «Pseudomonas syringae pv. morsprunorum» OR «Pseudomonas syringae pv. syringae» OR «Pseudomonas syringae pv. avii» OR «Pseudomonas syringae pv. morsprunorum » OR «Pseudomonas viridiflava» OR «Pterochloroides persicae» OR «Ptycholoma circumclusana» OR «Ptycholoma lecheana» OR «Puccinia cerasi» OR «Pucciniastrum areolatum» OR «Pullularia sp.» OR «Pulvinaria kuwacola» OR «Pulvinaria regalis» OR «Pycnoporus coccineus» OR «Pythium sp.» OR «Quadraspidiotus ostreaeformis» OR «Ramphus oxyacanthae» OR «Raspberry ringspot virus» OR «Recurvaria nanella» OR «Reptalus panzeri» OR «Rhagoletis cerasi» OR «Rhagoletis cingulata» OR «Rhagoletis fausta» OR «Rhagoletis indifferens» OR «Rhagoletis pomonella» OR «Rhagoletis tabellaria» OR «Rhizobium radiobacter» OR «Rhizobium rhizogenes» OR «Rhizoctonia solani» OR «Rhizopus sp.» OR «Rhizopus stolonifer» OR «Rhodococcus turanicus» OR «Rhopalosiphum nymphaeae» OR «Rhynchites aequatus» OR «Rhynchites auratus» OR «Rhynchites bacchus» OR «Rhynchites cupreus» OR «Rosellinia necatrix» OR «Rotylenchus sp.» OR «Russellaspis pustulans» OR «Saissetia oleae oleae» OR «Saperda candida» OR «Saperda scalaris» OR «Saturnia lindia» OR «Saturnia pyri» OR «Schizophyllum alneum» OR «Schizophyllum commune» OR «Scirtothrips dorsalis» OR «Sclerotinia fructicola» OR «Sclerotinia fruticola» OR «Sclerotinia kusanoi» OR «Sclerotinia laxa» OR «Sclerotinia sclerotiorum» OR «Sclerotinia sp.» OR «Scolytus rugulosus» OR «Scolytus schevyrewi» OR «Scopula limboundata» OR «Selenia tetralunaria» OR «Septobasidium bogoriense» OR «Septobasidium tanakae» OR «Sparganothis reticulatana» OR «Spencermartinsia viticola» OR «Sphaceloma siculum» OR «Sphaerolecanium prunastri» OR «Sphinx drupiferarum» OR «Spilonota ocellana» OR «Spiroplasma citri» OR «Sporocadus carpophilus» OR «Stagonosporopsis citrulli» OR «Steccherinum ochraceum» OR «Stemphylium sp.» OR «Stereum hirsutum» OR «Stigmella oxyacanthella» OR «Stigmella plagicolella» OR «Stigmella prunetorum» OR «Stigmina carpophila» OR «Stralarivirus fragariae» OR «Strangalia revestita» OR «Strawberry latent ringspot virus» OR «Suturaspis archangelskyae» OR «Swammerdamia pyrella» OR «Synanthedon exitiosa» OR «Synanthedon hector» OR «Synanthedon myopaeformis» OR «Synanthedon pictipes» OR «Synanthedon vespiformis» OR «Taeniothrips inconsequens» OR «Taphrina cerasi» OR «Taphrina minor» OR «Taphrina pruni» OR «Taphrina wiesneri» OR «Tetranychus kanzawai» OR «Tetranychus ludeni» OR «Tetranychus mcdanieli» OR «Tetranychus pacificus» OR «Tetranychus turkestani» OR «Tetranychus urticae» OR «Tetranychus viennensis Zacher» OR «Thecla betulae» OR «Thekopsora areolata» OR «Thekopsora pseudocerasi» OR «Thelonectria aurea» OR «Thrips angusticeps» OR «Thrips flavus» OR «Thrips imaginis» OR «Thrips major» OR «Thrips tabaci» OR «Tischeria gaunacella» OR «Tobacco necrosis virus» OR «Tomato black ring virus» OR «Tomato bushy stunt virus» OR «Tomato ringspot virus» OR «Trametes hirsuta» OR «Trametes sp.» OR «Trametes versicolor» OR «Tranzschelia discolor» OR «Tranzschelia japonica» OR «Tranzschelia pruni-spinosae» OR «Trichodorus» OR «Trichoferus campestris» OR «Trichosporum sarcinula» OR «Trichothecium roseum» OR «Trirachys holosericeus» OR «Tylenchorhynchus clarus» OR «Tylenchorhynchus claytoni» OR «Tylenchorhynchus dubius» OR «Tylenchorhynchus sp.» OR «Typhlocyba quercus»« OR «Tyromyces fissilis» OR «Uncinula prunastri var. prunastri» OR «Valsa leucostoma» OR «Valsa sp.» OR «Venturia cerasi» OR «Verticillium albo-atrum» OR «Verticillium dahliae» OR «Verticillium nigrescens» OR «Wilsonomyces carpophilus» OR «Xanthomonas arboricola pv. pruni» OR «Xestia c-nigrum» OR «Xiphinema americanum» OR «Xiphinema index» OR «Xiphinema rivesi» OR «Xylaria longiana» OR «Xylaria mali» OR «Xyleborinus attenuatus» OR «Xyleborus dispar» OR «Xylella fastidiosa» OR «Xylella fastidiosa subsp. fastidiosa» OR «Xylella fastidiosa subsp. pauca» OR «Xylosandrus crassiusculus» OR «Xylotrechus namanganensis» OR «Yponomeuta mahalebella» OR «Yponomeuta padella» OR «Yponomeuta padellus» OR «Zeiraphera isertana» OR «Zeuzera multistrigata» OR «Zeuzera pyrina» OR «Zygina flammigera»)

In the table below, the search string used in Web of Science is reported. In total, 194 papers were retrieved. Titles and abstracts were screened, and 48 pests were added to the list of pests (see Appendix C).

Web of Science **All databases**	TOPIC: ("Prunus cerasus" OR "P. cerasus" OR "sour cherry tree$") AND TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest$" OR "vector" OR "host plant$" OR "host-plant$" OR "host" OR "root lesion$" OR "decline$" OR "infestation$" OR "damage$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight$" OR "canker" OR "scab$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst$ OR "dagger" OR "plant parasitic" OR "root feeding" OR "root$ feeding" OR "plant$parasitic" OR "root lesion$" OR damage$ OR infestation$ OR symptom* OR pest$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR decline$ OR infestation$ OR damage$ OR virosis OR canker OR blister$ OR mosaic OR "leaf curl" OR "latent" OR insect$ OR mite$ 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 caterpillar$ OR "foliar feeder$" OR "root feeder$") NOT TOPIC: ("heavy metal$" OR "pollut*" OR "weather" OR "propert*" OR probes OR "spectr*" OR "antioxidant$" OR "transformation" OR "RNA" OR peel OR resistance OR gene OR DNA OR "Secondary plant metabolite$" OR metabolite$ OR Catechin OR "Epicatechin" OR "Rutin" OR "Phloridzin" OR "Chlorogenic acid" OR "Caffeic acid" OR "Phenolic compounds" OR "Quality" OR "Appearance" OR Postharvest OR Antibacterial OR Abiotic OR Storage OR Pollin* OR Ethylene OR Thinning OR fertil* OR Mulching OR Nutrient$ OR Pruning 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$") NOT TOPIC: («Abagrotis alternata» OR «Acleris quinquefasciana» OR «Acleris rhombana» OR «Acleris tripunctana» OR «Acronicta alni» OR «Acronicta clarescens» OR «Acronicta impleta» OR «Acronicta interrupta» OR «Acronicta lanceolaria» OR «Acronicta pruni» OR «Acronicta psi» OR «Acronicta radcliffei» OR «Acronicta rumicis» OR «Acronicta superans» OR «Actebia fennica» OR «Actias selene» OR «Aculus fockeui» OR «Adoxophyes orana» OR «Agrobacterium tumefaciens» OR «Aleurocanthus spiniferus» OR «Aleurodicus dispersus» OR «Allophyes oxyacanthae» OR «Alsophila pometaria» OR «Alternaria cerasi » OR «American plum line pattern virus» OR «Amphisphaeria vibratilis » OR «Amphitetranychus viennensis» OR «Anarsia lineatella» OR «Anoplophora chinensis» OR «Anthaxia nitidula» OR «Antheraea polyphemus» OR «Anthonomus humeralis» OR «Anthonomus quadrigibbus» OR «Aphelenchoides ritzemabosi» OR «Aphis aurantii» OR «Aphis gossypii» OR «Aphis odinae» OR «Aphis spiraecola» OR «Apiognomonia erythrostoma» OR «Apiosporina morbosa » OR «Apple chlorotic leaf spot virus» OR «Apple mosaic virus» OR «Apple rubbery wood phytoplasma» OR «Apriona cinerea» OR «Archips fuscocupreanus» OR «Archips xylosteanus» OR «Argyresthia bonnetella» OR «Argyresthia ephippella» OR «Argyresthia pruniella» OR «Arhopalus tristis» OR «Armillaria mellea » OR «Armillaria ostoyae» OR «Ascochyta ovalispora » OR «Aspergillus niger » OR «Asteromella cerasicola » OR «Aureobasidium pulluls » OR «Automeris io» OR «Bactrocera correcta» OR «Bactrocera dorsalis» OR «Balsa malana» OR «Basilarchia arthemis» OR «Betacallis prunicola» OR «Blastobasis decolorella» OR «Blumeriella jaapii » OR «Botryosphaeria dothidea » OR «Botryosphaeria stevensii» OR «Botrytis cinerea » OR «Brachycaudus cardui» OR «Brachycaudus cerasicola» OR «Brachycaudus helichrysi» OR «Cacoecimorpha pronubana» OR «Cadophora novi-eboraci » OR «Cadophora prunicola » OR «Cadophora ramosa » OR «Caeoma makinoi » OR «Caliroa annulipes» OR «Callosamia promethea» OR «Calosphaeria princeps» OR «Calosphaeria pulchella » OR «Candidatus Phytoplasma asteris» OR «'Candidatus Phytoplasma pruni'« OR «'Candidatus Phytoplasma prunorum'« OR «Carnation ringspot virus» OR «Carposina sasakii» OR «Carsia sororiata» OR «Cerambyx scopolii Fuessly» OR «Ceratitis capitata» OR «Cercospora cerasella» OR «Cercospora circumscissa» OR «Ceroplastes japonicus» OR «Cerura scitiscripta» OR «Ceuthospora laurocerasi» OR «Cherry green ring mottle virus» OR «Cherry leaf roll virus» OR «Cherry necrotic rusty mottle virus» OR «Cherry rasp leaf virus» OR «Cherry rusty mottle disease» OR «Cherry virus A» OR «Chionaspis furfura» OR «Chlidaspis asiatica» OR «Chloroclysta siterata» OR «Chondrostereum purpureum » OR «Chrysobothris mali» OR «Chrysomphalus aonidum» OR «Cladosporium carpophilum» OR «Cladosporium epiphyllum» OR «Cladosporium phyllophilum » OR «Clytus arietis» OR «Coccomyces hiemalis» OR «Coccus hesperidum L.» OR «Coleophora coracipennella» OR «Coleophora prunifoliae» OR «Coleophora spinella» OR «Collophora paarla» OR «Comoclathris permunda» OR «Comstockaspis perniciosa» OR «Conotrachelus nenuphar» OR «Coptotriche gaunacella» OR «Coronophora gregaria » OR «Coryneum carpophilum» OR «Cosmia trapezina» OR «Curculio betulae» OR «Curvularia geniculata » OR «Cylindrocarpon destructs» OR «Cylindrosporium hiemalis» OR «Cytospora cincta » OR «Cytospora leucostoma » OR «Cytospora salicacearum » OR «Cytospora sorbicola » OR «Cytosporina ludibunda » OR «Dasychira meridionalis» OR «Datana ministra» OR «Dermatea cerasi» OR «Dermea cerasi » OR «Diabrotica speciosa» OR «Diaporthe decortics» OR «Diaporthe eres » OR «Diaporthe perniciosa » OR «Diaspidiotus forbesi» OR «Diaspidiotus juglansregiae» OR «Diaspidiotus ostreaeformis» OR «Diaspidiotus prunorum» OR «Diaspidiotus pyri» OR «Diatrype macrothecia» OR «Dibotryon morbosum» OR «Diloba caeruleocephala» OR «Diplodia cerasorum » OR «Diplodia mutila » OR «Diplodia seriata» OR «Diptacus gigantorhynchus» OR «Drosicha maskelli» OR «Drosicha stebbingii» OR «Drosophila suzukii» OR «Enarmonia formosana» OR «Enarmonia prunivorana» OR «Eotetranychus rubiphilus» OR «Epichoristodes acerbella» OR «Epidiaspis leperii» OR «Epiphyas postvittana» OR «Erannis tiliaria» OR «Eriogaster lanestris» OR «Eulecanium cerasorum» OR «Eulecanium ciliatum» OR «Eulecanium kunoense» OR «Eulecanium rugulosum» OR «Eulecanium tiliae» OR «Euproctis chrysorrhoea» OR «Eupsilia morrisoni» OR

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	«Eupsilia sidus» OR «Eupsilia transversa» OR «Euscelidius variegatus» OR «Eutetranychus orientalis» OR «Eutypa lata» OR «Euxoa auxiliaris» OR «Euxoa tessellata» OR «Euzophera semifuneralis» OR «Exidia gldulosa var. scutelliformis » OR «Exoascus cerasi» OR «Exoascus pruni» OR «Fomes fomentarius » OR «Fomes pomaceus» OR «Frankliniella australis» OR «Furcipus rectirostris» OR «Fusarium lateritium » OR «Fuscoporia gilva » OR «Fusicladium carpophilum» OR «Fusicladium cerasi» OR «Gibberella avenacea» OR «Glomerella cingulata» OR «Gnomonia erythrostoma» OR «Goderma applatum » OR «Gonimbrasia gueinzii» OR «Grammoptera ruficornis» OR «Grapholita funebrana» OR «Grapholita molesta» OR «Grapholita packardi» OR «Grapholita prunivora» OR «Halyomorpha halys» OR «Harkenclenus titus» OR «Hedya dimidioalba» OR «Helicoverpa zea» OR «Hemigraphiphora plebeia» OR «Hemileuca eglanterina» OR «Hemileuca maia» OR «Heterocampa biundata» OR «Heterocampa guttivitta» OR «Higginsia hiemalis» OR «Homohadena badistriga» OR «Hop stunt viroid» OR «Hoplocampa flava» OR «Hyalophora cecropia» OR «Hyalophora columbia» OR «Hyalopterus pruni» OR «Hyphantria cunea» OR «Hypoxylon rubiginosum » OR «Hysterium vulgare» OR «Hysteroneura setariae» OR «Ilyonectria robusta » OR «Imbrasia gueinzii» OR «Iphiclides podalirius» OR «Kuwanina parva» OR «Lacanobia subjuncta» OR «Laetiporus sulphureus » OR «Lambdina fervidaria» OR «Lepidosaphes malicola» OR «Lepidosaphes ulmi» OR «Leucoptera malifoliella» OR «Leucostoma cinctum» OR «Leucostoma personii » OR «Leucostoma persoonii» OR «Lithophane antennata» OR «Lithophane bethunei» OR «Lithophane grotei» OR «Lithophane hemina» OR «Lithophane laticinerea» OR «Little cherry virus» OR «Little cherry virus 1» OR «Little cherry virus 2» OR «Lomographa temerata» OR «Longidorus euonymus» OR «Longidorus leptocephalus» OR «Lophocampa argentata» OR «Lophocampa caryae» OR «Lycorma delicatula» OR «Lymantria dispar» OR «Lymantria dispar asiatica» OR «Lymantria obfuscata» OR «Lyonetia clerkella» OR «Macrophomina phaseoli» OR «Macrophomina phaseolina» OR «Magdalis ruficornis» OR «Malacosoma americana» OR «Malacosoma americanum» OR «Malacosoma californica» OR «Malacosoma disstria» OR «Malacosoma parallela» OR «Megaplatypus mutatus» OR «Meloidogyne hapla» OR «Meloidogyne javanica» OR «Mercetaspis halli» OR «Mesocriconema xenoplax» OR «Metarranthis warnerae» OR «Microdiplodia microsporella » OR «Microgloeum pruni» OR «Monilia fructigena» OR «Monilia laxa» OR «Monilinia fructicola» OR «Monilinia fructigena» OR «Monilinia kusoi » OR «Monilinia laxa» OR «Monilinia padi » OR «Monilinia polystroma» OR «Monilinia seaveri » OR «Mycosphaerella cerasella» OR «Myzus cerasi» OR «Myzus mushaensis» OR «Myzus ornatus» OR «Myzus persicae» OR «Myzus siegesbeckiae» OR «Myzus varians» OR «Nattrassia mgiferae» OR «Naupactus xanthographus» OR «Nectria cinnabarina » OR «Nemapogon ruricolella» OR «Neofusicoccum mangiferae» OR «Neonectria radicicola» OR «Neopulvinaria innumerabilis innumerabilis» OR «Nepovirus avii» OR «Nepovirus nigranuli» OR «Nymphalis polychloros» OR «Nymphalis polychloros» OR «Nysius vinitor» OR «Oligonychus perseae» OR «Omophlus lepturoides» OR «Operophtera brumata» OR «Orgyia leucostigma» OR «Orgyia vetusta» OR «Orthosia gracilis» OR «Orthosia hibisci» OR «Pammene rhediella» OR «Panonychus ulmi» OR «Paonias astylus» OR «Paonias excaecata» OR «Paonias myops» OR «Papilio glaucus» OR «Papilio multicaudatus» OR «Papilio rutulus» OR «Parabemisia myricae» OR «Paraphoma radicina » OR «Paratrichodorus catharinae» OR «Parlatoria oleae» OR «Parlatoria theae» OR «Parornix geminatella» OR «Parthenolecanium corni» OR «Parthenolecanium corni corni» OR «Peach rosette phytoplasma» OR «Peach wart disease» OR «Peach yellows phytoplasma» OR «Penicillium expsum » OR «Peridroma saucia» OR «Pestalotia adusta» OR «Pestalotiopsis adusta » OR «Petunia asteroid mosaic virus» OR «Phaeoacremonium minimum » OR «Phaeoacremonium parasiticum» OR «Phaeosporis catacrypta » OR «Phellinus igniarius » OR «Phellinus pomaceus » OR «Phenacoccus aceris» OR «Phenacoccus transcaucasicus» OR «Phialophora sp. » OR «Phloeosporella padi » OR «Phoma macrostoma var. macrostoma» OR «Phoma pomorum» OR «Phomopsis padina» OR «Phorodon humuli» OR «Phyllactinia mali » OR «Phyllactinia suffulta» OR «Phyllobius oblongus» OR «Phyllobius pyri» OR «Phyllodesma americana» OR «Phyllonorycter cavella» OR «Phyllonorycter cerasicolella» OR «Phyllonorycter corylifoliella» OR «Phyllosticta circumscissa » OR «Phyllosticta prunicola» OR «Phymatotrichopsis omnivora» OR «Phymatotrichum omnivorum» OR «Physatocheila dumetorum» OR «Phytophthora cactorum » OR «Phytophthora cambivora» OR «Phytophthora cryptogea» OR «Phytophthora gregata » OR «Phytophthora megasperma» OR «Phytophthora plurivora » OR «Phytophthora syringae » OR «Phytoplasma pruni» OR «Phytoplasma prunorum» OR «Plagodis fervidaria» OR «Plagodis pulveraria» OR «Plemyria rubiginata» OR «Pleospora cerasi » OR «Plum pox virus» OR «Podosphaera cldestina » OR «Podosphaera oxyacthae» OR «Podosphaera pannosa» OR «Podosphaera pnosa » OR «Podosphaera tridactyla var. tridactyla » OR «Podosphaera tridactyla » OR «Polygonia c-album» OR «Polyporus ciliatus » OR «Polyporus leptocephalus » OR «Polyporus tulipiferae» OR «Popillia japonica» OR «Pratylenchus neglectus» OR «Pratylenchus penetrans» OR «Pratylenchus pratensis» OR «Pratylenchus thornei» OR «Pratylenchus vulnus» OR «Prune dwarf virus» OR «Pruniphilomyces circumscissus » OR «Prunus necrotic ringspot virus» OR «Prunus virus F» OR «Pseudaulacaspis pentagona» OR «Pseudaulacaspis prunicola prunicola» OR «Pseudocercospora circumscissa» OR «Pseudococcus calceolariae» OR «Pseudococcus comstocki» OR «Pseudococcus viburni» OR «Pseudomonas pruni » OR «Pseudomonas syringae» OR «Pseudomonas syringae pv. morsprunorum» OR «Pseudomonas syringae pv. syringae» OR «Pterochloroides persicae» OR «Puccinia cerasi » OR «Pucciniastrum areolatum» OR «Pus rudis» OR «Quadraspidiotus ostreaeformis» OR «Radulum orbiculare» OR «Ramphus oxyacanthae» OR «Ramularia cerasorum » OR «Ramularia mali » OR «Reptalus panzeri» OR «Rhagium bifasciatum F.» OR «Rhagoletis cerasi» OR «Rhagoletis cingulata» OR «Rhagoletis fausta» OR «Rhagoletis indifferens» OR «Rhagoletis pomonella» OR «Rhizobium radiobacter» OR «Rhizobium rhizogenes» OR «Rhizopus stolonifer » OR «Rhodococcus turanicus» OR «Rhopalosiphum maidis» OR «Rhopalosiphum nymphaeae» OR «Rhopalosiphum oxyacanthae» OR «Rhynchites aequatus» OR «Rhynchites auratus» OR «Rhynchites cupreus» OR «Roepkea marchali» OR «Rosellinia necatrix» OR «Saperda scalaris» OR «Satyrium liparops» OR «Schizophyllum alneum» OR «Schizura concinna» OR «Schizura unicornis» OR «Schoutedenia ralumensis» OR «Sclerotinia fructicola» OR «Sclerotinia laxa» OR «Sclerotium bataticola» OR «Scolecocampa liburna» OR «Scolytus schevyrewi» OR «Selenia tetralunaria» OR «Septoria cerasi » OR «Sinomegoura citricola» OR «Smerinthus jamaicensis» OR «Sour cherry pink fruit agent» OR «Sphinx drupiferarum» OR «Spilosoma virginica» OR «Stenocorus meridianus» OR «Stereum hirsutum » OR «Stereum purpureum» OR «Stigmella prunetorum» OR

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	«Stigmina carpophila» OR «Strangalia aurulenta» OR «Swammerdamia pyrella» OR «Synanthedon myopaeformis» OR «Synanthedon pictipes» OR «Taphrina cerasi» OR «Taphrina wiesneri » OR «Tetranychus urticae» OR «Tetranychus viennensis» OR «Thekopsora areolata» OR «Thekopsora pseudocerasi » OR «Thyridopteryx ephemeraeformis» OR «Tinocalloides montanus» OR «Tischeria gaunacella» OR «Tolype velleda» OR «Tomato black ring virus» OR «Tomato ringspot virus» OR «Trametes hirsuta » OR «Trametes velutina » OR «Trametes versicolor » OR «Trametes zonata » OR «Trzschelia discolor » OR «Trzschelia japonica » OR «Trzschelia pruni-spinosae var. discolor» OR «Trzschelia pruni-spinosae » OR «Tuberocephalus higansakurae» OR «Tuberocephalus momonis» OR «Tuberocephalus sakurae» OR «Venturia cerasi» OR «Verticillium albo-atrum » OR «Verticillium dahliae » OR «Wilsonomyces carpophilus » OR «Xanthomonas arboricola pv. pruni» OR «Xiphinema americanum» OR «Xylaria mali » OR «Xyleborus dispar» OR «Xylella fastidiosa» OR «Xylella fastidiosa subsp. multiplex» OR «Yponomeuta evonymella» OR «Yponomeuta mahalebella» OR «Yponomeuta padella» OR «Zaprionus indianus» OR «Zygina flammigera»)

In the table below, the search string used in Web of Science is reported. In total, 18 papers were retrieved. Titles and abstracts were screened, and 2 pests were added to the list of pests (see Appendix C).

Web of Science **All databases**	TOPIC: ("Prunus pseudocerasus" OR "P. pseudocerasus" OR "Chinese fruiting cherry" OR "Chinese sour cherry") AND TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest$" OR "vector" OR "host plant$" OR "host-plant$" OR "host" OR "root lesion$" OR "decline$" OR "infestation$" OR "damage$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight$" OR "canker" OR "scab$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst$ OR "dagger" OR "plant parasitic" OR " root feeding" OR " root$ feeding" OR "plant$parasitic" OR "root lesion$" OR damage$ OR infestation$ OR symptom* OR pest$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR decline$ OR infestation$ OR damage$ OR virosis OR canker OR blister$ OR mosaic OR "leaf curl" OR "latent" OR insect$ OR mite$ 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 caterpillar$ OR "foliar feeder$" OR "root feeder$") NOT TOPIC: ("heavy metal$" OR "pollut*" OR "weather" OR "propert*" OR probes OR "spectr*" OR "antioxidant$" OR "transformation" OR "RNA" OR peel OR resistance OR gene OR DNA OR "Secondary plant metabolite$" OR metabolite$ OR Catechin OR "Epicatechin" OR "Rutin" OR "Phloridzin" OR "Chlorogenic acid" OR "Caffeic acid" OR "Phenolic compounds" OR "Quality" OR "Appearance" OR Postharvest OR Antibacterial OR Abiotic OR Storage OR Pollin* OR Ethylene OR Thinning OR fertil* OR Mulching OR Nutrient$ OR Pruning 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$") NOT TOPIC: («Actias artemis» OR «Actias selene ningpoana» OR «Aleurodicus dispersus» OR «Alternaria alternata» OR «Alternaria cerasi » OR «American plum line pattern virus» OR «Amphitetranychus viennensis» OR «Anarsia lineatella» OR «Anoplophora chinensis» OR «Apiosporina morbosa» OR «Apriona cinerea» OR «Apriona germari» OR «Aromia bungii» OR «Blastospora itoa » OR «Botryotinia fuckelia» OR «'Candidatus Phytoplasma prunorum'« OR «Carposina sasakii» OR «Ceratitis capitata» OR «Cercospora circumscissa» OR «Cladosporium cladosporioides » OR «Cladosporium malorum» OR «Cytospora leucostoma » OR «Diabrotica speciosa» OR «Dichomeris picrocarpa» OR «Epichoristodes acerbella» OR «Epiphyas postvittana» OR «Euproctis chrysorrhoea» OR «Fusicladium cerasi» OR «Gibberella intricans» OR «Grapholita funebrana» OR «Grapholita molesta» OR «Grapholita packardi» OR «Grapholita prunivora» OR «Helicobasidium mompa » OR «Helicoverpa zea» OR «Hyphantria cunea» OR «Kuwanina parva» OR «Laetiporus sulphureus » OR «Leucostoma persoonii» OR «Little cherry virus 1» OR «Lymantria dispar» OR «Malacosoma americanum» OR «Malacosoma disstria» OR «Malacosoma parallela» OR «Meliola kusoi» OR «Monilia mumecola» OR «Monilinia fructicola» OR «Monilinia fructicola» OR «Monilinia fructigena» OR «Monilinia kusoi » OR «Monilinia laxa » OR «Monilinia laxa » OR «Mycosphaerella cerasella» OR «Myzus cerasi» OR «Nepovirus avii» OR «Nepovirus nigranuli» OR «Oligonychus perseae» OR «Omophlus lepturoides» OR «Orgyia leucostigma» OR «Parabemisia myricae» OR «Peach yellows phytoplasma» OR «Pestalotiopsis adusta » OR «Phyllosticta vulgaris var. philadelphi » OR «Phytophthora cactorum» OR «Plum pox virus» OR «Podosphaera tridactyla var. tridactyla » OR «Podosphaera tridactyla » OR «Pseudaulacaspis pentagona» OR «Pseudocercospora circumscissa» OR «Pseudococcus calceolariae» OR «Pseudococcus comstocki» OR «Pseudococcus viburni» OR «Pseudomonas syringae pv. morsprunorum» OR «Puccinia radiata » OR «Pycnoporus cinnabarinus » OR «Reptalus panzeri» OR «Rhagoletis cingulata» OR «Rhagoletis fausta» OR «Rhopalosiphum rufiabdominale» OR «Sclerotinia kusoi » OR «Scolytus schevyrewi» OR «Sishania nigropilata» OR «Sphinx drupiferarum» OR «Sporidesmium pruni » OR «Taphrina cerasi» OR «Taphrina wiesneri » OR «Trichoferus campestris» OR «Tuberocephalus higansakurae» OR «Tuberocephalus liaoningensis» OR «Tuberocephalus misakurae» OR «Tuberocephalus momonis» OR «Tuberocephalus sakurae» OR «Tuberocephalus tianmushanensis» OR «Tumoranuraphis indica» OR «Valsa japonica» OR «Xiphinema Americanum» OR «Xiphinema brevicolle» OR «Xiphinema riversi»)

In the table below, the search string used in Web of Science is reported. In total, 85 papers were retrieved. Titles and abstracts were screened, and 5 pests were added to the list of pests (see Appendix C).

Web of Science All databases	TOPIC: ("Prunus canescens" OR "P. canescens" OR "Cerasus canescens") AND TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest$" OR "vector" OR "host plant$" OR "host-plant$" OR "host" OR "root lesion$" OR "decline$" OR "infestation$" OR "damage$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight$" OR "canker" OR "scab$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst$ OR "dagger" OR "plant parasitic" OR " root feeding" OR " root$ feeding" OR "plant$parasitic" OR "root lesion$" OR damage$ OR infestation$ OR symptom* OR pest$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR decline$ OR infestation$ OR damage$ OR virosis OR canker OR blister$ OR mosaic OR "leaf curl" OR "latent" OR insect$ OR mite$ 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 caterpillar$ OR "foliar feeder$" OR "root feeder$") NOT TOPIC: ("heavy metal$" OR "pollut*" OR "weather" OR "propert*" OR probes OR "spectr*" OR "antioxidant$" OR "transformation" OR "RNA" OR peel OR resistance OR gene OR DNA OR "Secondary plant metabolite$" OR metabolite$ OR Catechin OR "Epicatechin" OR "Rutin" OR "Phloridzin" OR "Chlorogenic acid" OR "Caffeic acid" OR "Phenolic compounds" OR "Quality" OR "Appearance" OR Postharvest OR Antibacterial OR Abiotic OR Storage OR Pollin* OR Ethylene OR Thinning OR fertil* OR Mulching OR Nutrient$ OR Pruning 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$") NOT TOPIC: («Anarsia lineatella» OR «Anthonomus quadrigibbus» OR «Apiosporina morbosa» OR «Apriona cinerea» OR «Aromia bungii» OR «'Candidatus Phytoplasma prunorum'« OR «Carposina sasakii» OR «Ceratitis capitata» OR «Ceratitis quinaria» OR «Coleophora fuscocuprella» OR «Comstockaspis perniciosa» OR «Conotrachelus nenuphar» OR «Drosophila suzukii» OR «Grapholita inopinata» OR «Grapholita molesta» OR «Grapholita packardi» OR «Grapholita prunivora» OR «Hyphantria cunea» OR «Iphiclides podalirius» OR «Little cherry virus 1» OR «Malacosoma americanum» OR «Malacosoma parallela» OR «Monilinia fructicola» OR «Nepovirus lycopersici» OR «Parabemisia myricae» OR «Peach mosaic virus» OR «Plum pox virus» OR «Pratylenchus vulnus» OR «Rhagoletis cingulata» OR «Rhagoletis fausta» OR «Rhagoletis indifferens» OR «Saperda candida» OR «Xanthomonas arboricola pv. pruni»)

APPENDIX C

Excel file with the pest list of *Prunus avium*

Appendix C can be found in the online version of this output (in the 'Supporting information' section).