Adopted: 1 February 2024

DOI: 10.2903/j.efsa.2024.8647

efsa JOURNAL

SCIENTIFIC OPINION

Commodity risk assessment of plants of 12 selected *Prunus* species from Moldova

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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 defoliated 1- or 2-year old bare root plants for planting (grafted or not) of 12 *Prunus* species (*Prunus armeniaca, P. avium, P. canescens, P. cerasifera, P. cerasus, P. davidiana, P. domestica, P. dulcis, P. fontanesiana, P. persica, P. salicina, P. tomentosa*) imported from Moldova, taking into account the available scientific information, including the technical information provided by the applicant country. The evaluation identified three EU-quarantine pests, *Erwinia amylovora* (protected zone quarantine pest), *Xiphinema rivesi* non-EU populations and *Xanthomonas arboricola* pv. *pruni* (protected zone quarantine pest), which were selected for further evaluation, based on defined criteria, including their presence in the applicant country. It should be noted that there is uncertainty regarding whether all relevant pests have been identified due to a limited number of scientific publications and pest surveys in Moldova. For the three selected pests, the risk mitigation measures proposed in the technical dossier from Moldova were evaluated taking into account the possible limiting factors. For these pests, an expert judgement is given on the likelihood of pest freedom taking into consideration the risk mitigation measures acting on it, including uncertainties associated with the assessment. The degree of pest freedom varies among the pests evaluated, with *Erwinia amylovora* being the pest most frequently expected on the imported plants. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9823 and 10,000 bundles (comprising 10–20 plants per bundle) out of 10,000 bundles would be free from *E. amylovora*.

KEYWORDS

almond, apricot, cherry, European Union, Japanese plum, peach, plants for planting, plum, prunus, sour cherry, sweet cherry

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1 | INTRODUCTION

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

1.1.1 | Background

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

1.1.2 | Terms of Reference

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

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

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

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

In view of the above and in accordance with Article 29 of Regulation (EC) No 178/2002, the Commission asks EFSA to provide scientific opinion in the field of plant health for twelve selected *Prunus* species (*Prunus armeniaca, P. avium, P. canescens, P. cerasifera, P. cerasus, P. davidiana, P. domestica, P. dulcis, P. fontanesiana, P. persica, P. salicina, P. tomentosa*) from Moldova taking into account the available scientific information, including the technical dossier provided by Moldova.

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 for plants for planting of 12 selected *Prunus* species (*Prunus armeniaca, P. avium, P. canescens, P. cerasifera, P. cerasus, P. davidiana, P. domestica, P. dulcis, P. fontanesiana, P. persica, P. salicina, P. tomentosa*) from Moldova 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 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 considered 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.

Kingdom (except Northern Ireland[4])). 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 pests found in a European country that belongs to the same denomination as the pests listed as non-European populations or isolates in Annex II of Implementing Regulation (EU) 2019/2072, should be considered as European populations or isolates and should not be considered in the assessment of those countries.

Pests listed as 'Regulated Non-Quarantine Pest' (RNQP)' in Annex IV of the Commission Implementing Regulation (EU) 2019/2072, and deregulated pests (i.e. pests which were listed as quarantine pests in the Council Directive 2000/29/EC 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 (Plant Protection Department of the National Food Safety Agency, ANSA) 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,[5] hereafter referred to as 'EU quarantine pests'] and other relevant pests present in Moldova 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 or not the applicant country implements the special requirements specified in Annex VII (points 1–101) 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 implemented by Moldova.

2 | DATA AND METHODOLOGIES

2.1 | Data provided by National Food Safety Agency of the Republic of Moldova

The Panel considered all the data and information (hereafter called 'the Dossier') provided by ANSA (National Food Safety Agency of the Republic of Moldova) of Moldova on 30 September 2020, and the additional information provided on 17 September 2021 and 23 February 2023, after EFSA's request. The Dossier is managed by EFSA.

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

[4]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.

[5]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.

TABLE 1 Structure and overview of the Dossier.

Dossier section	Overview of contents	Filename
1.	Dossier with description of the commodities and risk reduction options	Annex 2_Prunus_EN_main_dossier.pdf
2.	Additional information provided by ANSA on 17 September 2021 after EFSA's request for clarification	Additionally Prunus spp–final
3.	Additional information provided by ANSA on 23 February 2023 after EFSA's request for clarification	Annex on add information on Prunus, RoM.pdf

The data and supporting information provided by Moldova 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 the 12 selected *Prunus* species. The searches were run between 17th of May 2021 and 27th of December 2022. 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 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 with *Prunus* spp.

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
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), was taken into account.

2.3 | Methodology

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

In the first step, pests potentially associated with the commodity in the country of origin (EU-quarantine pests and other pests) that may require risk mitigation measures are identified. The EU non-quarantine pests not known to occur in the EU are 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 are 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 pest was determined and uncertainties identified using expert judgements.

Pest freedom was assessed by estimating the number of infested/infected bundles out of 10,000 exported bundles. Each bundle contains 10 or 20 plants.

2.3.1 | Commodity data

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

2.3.2 | Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of the 12 *Prunus* species from Moldova a pest list was compiled. The pest list is a compilation of all identified plant pests associated with these *Prunus* species based on information provided in the Dossier and on literature searches performed by the Panel.

The scientific names of the host plants (i.e. *Prunus armeniaca, P. avium, P. canescens, P. cerasifera, P. cerasus, P. davidiana, P. domestica, P. dulcis, P. fontanesiana, P. persica, P. salicina, P. tomentosa*) were used when searching in the EPPO Global database and CABI Crop Protection Compendium.

EUROPHYT was consulted by searching for the interceptions associated with commodities imported from Moldova from 1995 to May 2020 and TRACES for interceptions from May 2020 to present.

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 from 7th of July 2021 to 27th December 2022 (*P. domestica* and *P. cerasifera*: 14 October 2021; *P. salicina*: 7 July 2021; *P. armeniaca*: 21 June 2021; *P. persica*: 30 August 2021; *P. avium*: 24 August 2021; *P. dulcis*: 26 September 2021; *P. cerasus*, *P. davidiana* and *P. tomentosa*: 5 August 2022; *P. canescens* and *P. fontanesiana*: 27 December 2022).

The titles and abstracts of the scientific papers retrieved were screened and the pests associated with at least one of the 12 *Prunus* species were included in the pest list. The pest list was eventually further compiled with other relevant information (e.g. EPPO code per pest, taxonomic information, categorisation, distribution) useful for the selection of the pests relevant for the purposes of this opinion.

The system used to identify which pests are present in the applicant country depends on publications that are accessed by the relevant databases. If an applicant country does not produce a sufficient volume of publications, the number of pests identified could be underestimated. In the case of Moldova, there is uncertainty as to whether all the relevant pests present in the country have been identified using this method.

For instance, certain cosmopolitan fungi, such as *Botrytis cinerea* or *Alternaria alternata*, are flagged as 'not present' due to the lack of publications confirming their presence in Moldova. The data search was not able to verify the presence of *Coryneum beijerinckii* (referred as *Stigmina carpophila*) in Moldova, despite control measures for this fungus were mentioned in the submitted dossier.

EFSA asked if pest surveys were conducted for 33 possible pests (including *Erwinia amylovora, Xiphinema rivesi, Xanthomonas arboricola* pv. *pruni*) reported from neighbouring countries (of which 9 are EU quarantine pests). Of these, two were absent in the planting material 'according to test results before export' and two were absent 'according to the results achieved within the Monitoring Program'. Further details were not provided. For example, the NPPO stated that *X. rivesi* and *E. amylovora* were absent 'according to the results achieved within the Monitoring Program' and 'it was not tested due to the lack of requests from the importing country for *Prunus* sp.', respectively. Moreover, as indicated in the additional information provided, there is no pest-specific survey conducted in Moldova for the 33 above-mentioned pests.

In the EPPO Global database, the official status of *X. rivesi* is 'present widespread' and that of *E. amylovora* is 'absent pest eradicated', based on the publication from 2020 which is published in Cyrillic and is currently not accessible (Anonymous, 2020).

EFSA literature search has shown that *E. amylovora* is present in Moldova in *Cydonia* orchards (Samoilova, 2023; Samoilova & Răileanu, 2023).

The compiled pest list (see Microsoft Excel® in Appendices C, D, E) includes all identified pests that use the 12 selected *Prunus* species as a host. 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 implemented risk mitigation measures were listed and evaluated. When evaluating the likelihood of pest freedom at origin, the following types of potential infection sources for the 12 selected *Prunus* species 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 ANSA, Moldova) were evaluated according to the Guidance on uncertainty analysis in scientific assessment (EFSA Scientific Committee, 2018).

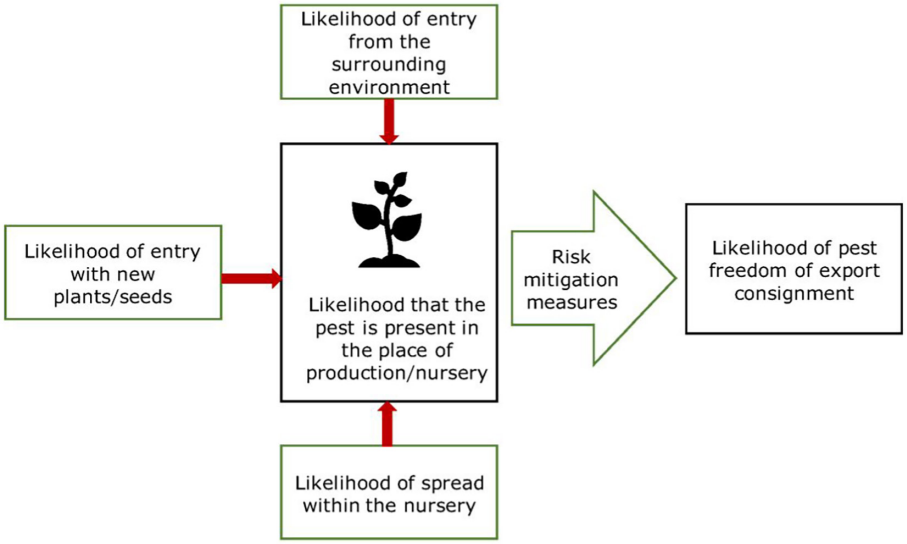

FIGURE 1 Conceptual framework to assess likelihood that plants are exported free from relevant pests. Source EFSA PLH Panel (2019).

Information on the biology, estimates of likelihood of entry of the pest to the nursery 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 commodities, an Expert Knowledge Elicitation (EKE) was performed following EFSA guidance (Annex B.8 of EFSA Scientific Committee, 2018). The specific question for EKE was defined as follows: 'Taking into account (i) the risk mitigation measures listed in the Dossier, and (ii) other relevant information, how many of 10,000 bundles of defoliated bare root plants of one of the 12 *Prunus* species will be infested/infected with the relevant pest when arriving in the EU?'. The risk assessment uses bundles of 10 bare root plants as the most suitable unit. The following reasoning is given:

(i) There is no quantitative information available regarding the clustering of plants during production;
(ii) Plants are grouped in bundles of 10 or 20 plants per bundle after sorting;
(iii) For the pests under consideration, a cross contamination during transport is possible;

The uncertainties associated with the EKE were taken into account and quantified in the probability distribution applying the semi-formal method described in Section 3.5.2 of the EFSA-PLH Guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018). Finally, the results were reported in terms of the likelihood of pest freedom. The lower 5th percentile of the uncertainty distribution reflects the opinion that pest freedom is with 95% certainty above this limit.

Based on the pests known to occur in Moldova, the type of commodity, the description of the risk mitigation measures described in the dossier and the criteria for the selection of regulated and non-regulated pests, three pests were retained for further evaluation.

3 | COMMODITY DATA

3.1 | Description of the commodity

According to the Dossier and the integration of additional information provided, the commodities to be imported are:

1. One- or two-year old (after grafting) bare root grafted plants without leaves of:

- *Prunus armeniaca* (common name: apricot, family: Rosaceae)
- *P. avium* (common name: cherry, family: Rosaceae)
- *P. cerasus* (referred to as *P. vulgaris* in the dossier, common name: sour cherry, family: Rosaceae)
- *P. domestica* (common name: plum, family: Rosaceae)
- *P. dulcis* (common name: almond, family: Rosaceae)
- *P. persica* (common name: peach, family: Rosaceae)
- *P. salicina* (common name: Chinese or Japanese plum, family: Rosaceae)

2. One- or two-year old bare root rootstocks without leaves of:

- *Prunus armeniaca* (common name: apricot, family: Rosaceae)
- *P. avium* (common name: cherry, family: Rosaceae)
- *P. canescens (*common name: greyleaf cherry, family: Rosaceae)
- *P. cerasifera* (common name: cherry plum, family: Rosaceae)
- *P. cerasus* (referred to as *P. vulgaris* in the dossier, common name: sour cherry, family: Rosaceae)
- *P. davidiana* (common name: Chinese wild peach, family: Rosaceae)
- *P. domestica* (common name: plum, family: Rosaceae)
- *P. dulcis* (common name: almond, family: Rosaceae)
- *P. fontanesiana* (common name: –, family: Rosaceae)
- *P. persica* (common name: peach, family: Rosaceae)
- *P. salicina* (common name: Chinese or Japanese plum, family: Rosaceae)
- *P. tomentosa* (common name: Nanking cherry, family: Rosaceae)
- Hybrids between the above species

Depending on age and *Prunus* species, the stem diameter and height of grafted plants vary from 1.2 to 1.7 cm and from 120 to 150 cm, respectively.

According to the additional information provided, grafted plants are grouped in bundles: plants with a crown – bundles of 10 pieces each, plants without a crown – bundles of 20 pieces each. Plants are tied with strings or other materials of similar strength. For the convenience of packaging and transportation, 1-year-old grafted plants can be shortened to the length of the aerial part of 120 cm.

3.2 | Description of the production areas

The production nurseries in Moldova are spread throughout the whole country in north, centre and south areas of Moldova.

3.3 | Production and handling processes

3.3.1 | Production cycle

The plant material intended for export is cultivated outdoors in registered sites/nurseries in soil. Rootstocks are produced from the seed or by layering and grafting takes place in the first or second year.

In the dossier, it is reported that production sites are checked for the presence of virus-transmitting nematodes before planting. However, details concerning the species for which they check, or the methodology used are lacking. In case nematode densities cannot be managed (threshold for intervention was not mentioned in the dossier), the production site is treated or discarded for further cultivation. Soil treatments were not specified. It was reported that mother plantations are also inspected for viruses; however, no other details such as: which viruses or methodology were provided.

The typical cultivation cycle takes at least two consecutive years (Figure 2), which includes 1 year of growth in the field, yielding a plant classified as one year old.

Details were not provided but, based on the information of the dossier and additional information received, it is assumed that after this first year, grafted rootstocks are moved to the second field and are managed as in the first year.

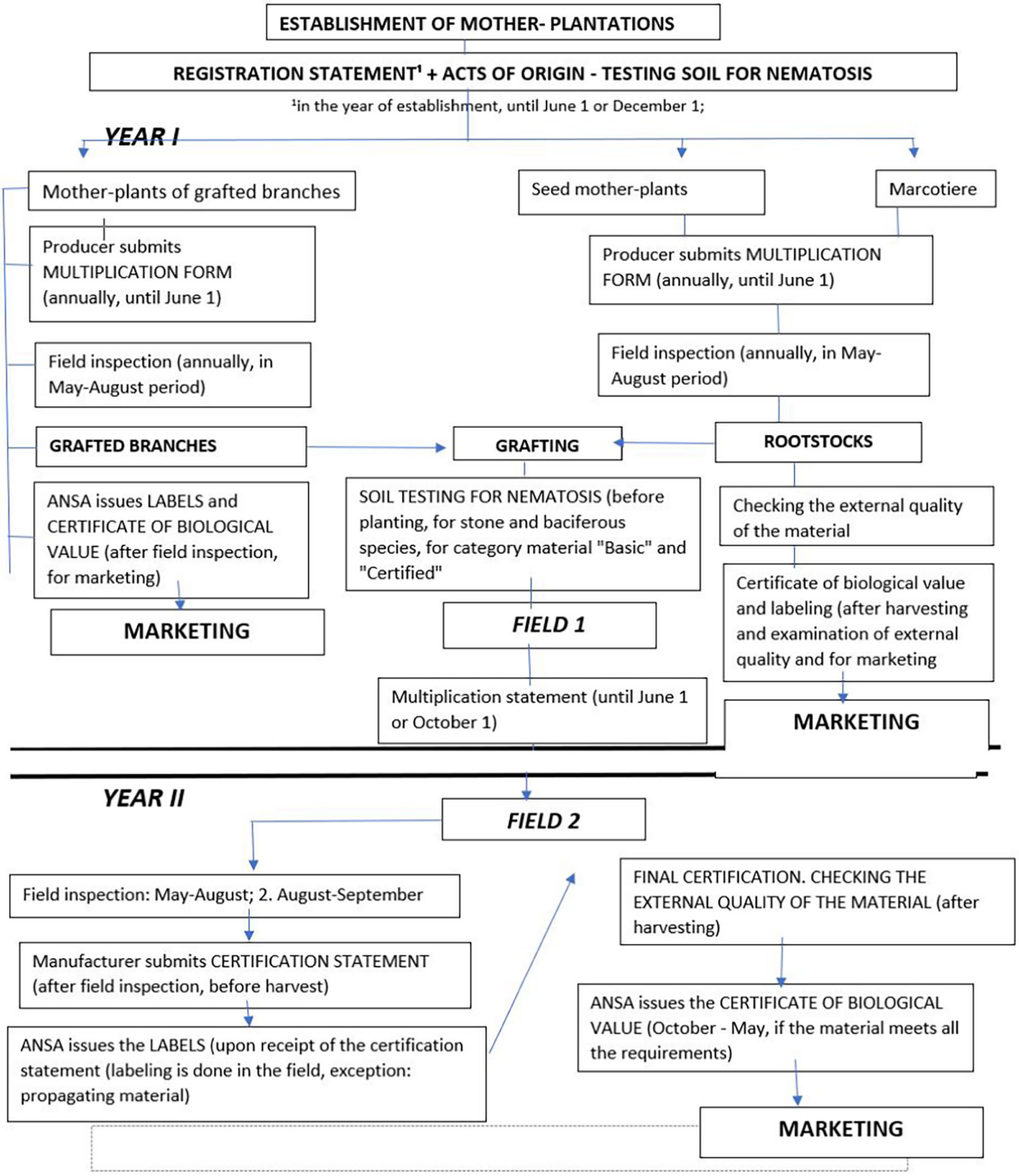

FIGURE 2 Schematic presentation on the production and certification of fruit seedlings at different stages of production provided by ANSA upon EFSA request.

3.3.2 | Source of planting material

According to the additional information, propagation material of stone fruit crops from the group of selected *Prunus* species for export is produced in the horticultural nurseries of the Republic of Moldova. The propagation material (rootstocks and grafts) is mainly of native origin (from the Republic of Moldova), but on the basis of a contract in custom-made Moldovan fruit nurseries, the production of grafted trees of the varieties requested in the EU is allowed. The certification of fruit propagation material is carried out by ANSA.

Plants for planting falling within the phytosanitary categories 'pre-basic', 'basic' and 'certified' are tested by using international standards for freedom from viruses, phytoplasmas or other diseases. Tests are performed in virology accredited laboratories; however, methods used are not specified in the dossier.

Most of the nurseries for production in Moldova cultivate grafted trees that fall under 'regular' category (equivalent to CAC [*Conformitas Agraria Communitatis*] materials), and only a few producers (not specified in the dossier) are able to produce certified material. It is not specified in the dossier whether 'regular' material is tested for the presence of virus or not.

Nurseries producing regular planting material usually have mother plantations for rootstocks and scions that have not been tested for viruses.

3.3.3 | Pest monitoring during production

To keep the production areas free from pests, pathogens and weeds, the producers follow instructions of ANSA authorised laboratories.

The cultivation cycle for certified and regular material is the same, in both cases, there is a field inspection prior to grafting. However, the 'regular' material category can originate from mother plantations (or solitary mother plants) that have been virus-tested or retested or planting material originating from untested mother plantations (or mother plants).

Mother plantations for rootstocks and scions are inspected in the field at least three times a year. After grafting, production fields are inspected twice a year.

Field inspectors also visually inspect the plant material after harvest.

According to the dossier, if the tests (details of testing methods were not provided) demonstrate that the plants are still free of viruses typical of the species, the mother plantation retains its viral certification and the attributed category, however, if test results indicate the presence of viruses, the material is downgraded to the 'regular' category or all the plants that have shown symptoms of viruses or similar diseases during visual inspection or testing are removed.

3.3.4 | Post-harvest processes and export procedure

Plants are uprooted manually. Trees are lifted with a VPN-2 suspended plough, which is fitted with a vibrator that loosens the soil from the roots. After cutting the roots with the plough at a depth of 30–35 cm, the trees are lifted mechanically between end of October and beginning of November. The lifting, sorting and transport of trees are permitted when the air temperature is between +3 and +40°C.

During uprooting, plants may be manually defoliated, though chemical defoliant can be applied 25–30 days before lifting (i.e. chemical defoliant not specified on the dossier).

The Panel assumes that roots are washed with water before export, as the commodity specification states, however, no details are provided on the procedure. Uprooted plants may be treated with pesticides if necessary, however details on the procedure are not specified in the dossier.

Material for export may be stored outside in the field or protected in a warehouse (in a controlled atmosphere at temperatures of 1–20°C and air humidity of 95%–97%). Material for export is covered with a waterproof canvass to prevent exposure to the environment. Bare roots may also be covered to protect them from the environment during storage.

Plants for export are bundled in groups of 10 or 20 and then packaged for export and labelled with an indication of the rootstock and the grafted varieties.

4 | IDENTIFICATION OF PESTS POTENTIALLY ASSOCIATED WITH THE COMMODITY

The search for potential pests associated with the 12 selected *Prunus* species rendered:

- 2777 species for *P. dulcis, P. armeniaca, P. davidiana, P. avium, P. salicina* and *P. tomentosa*,
- 1163 species for *P. domestica, P. cerasus* and *P. cerasifera*.

(See Microsoft Excel® file in Appendices):

1. Appendix C – Excel file with the pest list of *Prunus dulcis, P. persica, P. armeniaca* and *P. davidiana*
2. Appendix D – Excel file with the pest list of *Prunus avium P. salicina, P. tomentosa* and *P. cerasus*
3. Appendix E – Excel file with the pest list of *Prunus domestica, P. cerasus* and *P. cerasifera*.

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.

Ninety-four EU-quarantine species that are reported to use at least one of the 12 selected *Prunus* species as host plants 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 Moldova;
b. one of the *Prunus* species is a host of the pest;
c. one or more life stages of the pest can be associated with the specified commodity.

Of these 94 EU quarantine pests evaluated, three quarantine pests fulfilled the criteria:

1. *Erwinia amylovora* is present in Cydonia orchards in Moldova as reported in a recent conference publication (Samoilova, 2023; Samoilova & Răileanu, 2023).
2. *Xanthomonas arboricola* pv. *pruni* which according to the EPPO Global Database is present and widespread in Moldova and was reported in the submitted dossier as present in the country as *Xanthomonas campestris* pv. *pruni*. However, as indicated in the reply from 23 February 2023, it was not detected by NPPO in plant materials before export, though ANSA has not declared freedom from X. *arboricola* pv. *pruni*.
3. *Xiphinema rivesi* non-EU populations were found to be present in Moldova based on peer-reviewed publications (Poiras, 2012; Poiras et al., 2013, 2014, 2015) and the EPPO Global Database, although the NPPO did not find this nematode during official surveys carried out between 2019 and 2022 (additional information provided on 23 February 2023).

TABLE 3 Overview of the evaluation of the EU-quarantine pest species known to use selected *Prunus* species as a host plant for their relevance for this opinion.

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in Moldova	Host *P. armeniaca* (Pa) *or P. avium* (Pav) or *P. cerasifera* (Pcf) or *P. cerasus* (Pc) or *P. davidiana* (Pda) or *P. domestica* (Pdo) or *P. dulcis* (Pdu) or *P. persica* (Pp) or *P. salicina* (Ps) or *P. tomentosa* (Pt)	*Prunus* spp. confirmed as a host (reference)	Pest relevant for the opinion
1	*Acleris minuta*	ACLRMI	Insects	**No**	Pp	Lepidopteran	NA
2	*Aleurocanthus spiniferus*	ALECSN	Insects	**No**	Pa, Pav,Pc, Pdo, Pp	EPPO (online)	NA
3	*Aleurocanthus woglumi*	ALECWO	Insects	**No**	Pa, Pp	CABI (online)	NA
4	American plum line pattern virus	APLPV0	Viruses	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
5	*Anastrepha fraterculus as Anastrepha* spp.	ANSTFR	Insects	**No**	Pa, Pav, Pdo, Pdu, Pp, Ps	CABI (online), EPPO (online)	NA
6	*Anastrepha ludens*	ANSTLU	Insects	**No**	Pp	CABI (online), EPPO (online)	NA
7	*Anastrepha obliqua as Anastrepha* spp.	ANSTOB	Insects	**No**	Pdu, Ps	CABI (online)	NA
8	*Anastrepha serpentina as Anastrepha* spp.	ANSTSE	Insects	**No**	Pp	CABI (online)	NA
9	*Anastrepha striata as Anastrepha* spp.	ANSTST	Insects	**No**	Pp	CABI (online)	NA
10	*Anastrepha suspensa as Anastrepha* spp.	ANSTSU	Insects	**No**	Ps, Pp, Pdo	CABI (online), EPPO (online)	NA
11	*Anoplophora chinensis*	ANOLCN	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Ps, Pt, Pp	EPPO (online)	NA
12	*Anthonomus quadrigibbus*	TACYQU	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
13	*Aphis citricidus*	TOXOCI	Insects	**No**	Pdo, Pdu	Aphis on the world	NA
14	*Apiosporina morbosa*	DIBOMO	Fungi	**No**	Pa, Pav, Pc, Pcf, Pda, Pdo, Pdu, Pp, Ps, Pt	EPPO (online), ARS USDA; United States National Fungus Collections Laboratory	NA
15	*Apriona cinerea*	APRICI	Insects	**No**	Pc, Pda, Pp, Pt	EPPO (online)	NA
16	*Aromia bungii*	AROMBU	Insects	**No**	Pa, Pav, Pcf, Pdo Pp, Ps	CABI (online), EPPO (online)	NA
17	*Bactrocera aquilonis as Bactrocera* spp.	BCTRAQ	Insects	**No**	Pdo, Pp	CABI (online)	NA
18	*Bactrocera correcta as Bactrocera* spp.	BCTRCO	Insects	**No**	Pav, Pc, Pp, Ps	EPPO (online)	NA
19	*Bactrocera cucurbitae as Bactrocera* spp.	DACUCU	Insects	**No**	Pp	CABI (online)	NA
20	*Bactrocera dorsalis*	DACUDO	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA

TABLE 3 (Continued)

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in Moldova	Host *P. armeniaca* (Pa) *or P. avium* (Pav) or *P. cerasifera* (Pcf) or *P. cerasus* (Pc) or *P. davidiana* (Pda) or *P. domestica* (Pdo) or *P. dulcis* (Pdu) or *P. persica* (Pp) or *P. salicina* (Ps) or *P. tomentosa* (Pt)	*Prunus* spp. confirmed as a host (reference)	Pest relevant for the opinion
21	*Bactrocera facialis as Bactrocera* spp.	BCTRFA	Insects	**No**	Pp	CABI (online)	NA
22	*Bactrocera jarvisi as Bactrocera* spp.	BCTRJA	Insects	**No**	Pa, Pp	CABI (online)	NA
23	*Bactrocera kirki as Bactrocera* spp.	BCTRKI	Insects	**No**	Pp	CABI (online)	NA
24	*Bactrocera neohumeralis as Bactrocera* spp.	BCTRNE	Insects	**No**	Pa, Pdo, Pp, Ps	CABI (online)	NA
25	*Bactrocera psidii as Bactrocera* spp.	DACUPS	Insects	**No**	Pp	CABI (online)	NA
26	*Bactrocera pyrifoliae as Bactrocera* spp.	BCTRPY	Insects	**No**	Pp	CABI (online), EPPO (online)	NA
27	*Bactrocera trivialis as Bactrocera* spp.	BCTRTV	Insects	**No**	Pp	CABI (online)	NA
28	*Bactrocera tryoni as Bactrocera* spp.	DACUTR	Insects	**No**	Pa, Pav, Pcf, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA
29	*Bactrocera tuberculata as Bactrocera* spp.	BCTRTU	Insects	**No**	Pp	CABI (online)	NA
30	*Bactrocera zonata*	DACUZO	Insects	**No**	Pa, Pdo, Pp	CABI (online), EPPO (online)	NA
31	*Bemisia tabaci* (non-European populations)	BEMITA	Insects	**No**	Pcf, Pp	CABI (online)	NA
32	*Candidatus* Phytoplasma aurantifolia-related strain		Phytoplasma	**No**	Pp	EPPO (online)	NA
33	*Candidatus* Phytoplasma australiense (reference strain)	PHYPAU	Phytoplasma	**No**	Pp	CABI (online)	NA
34	*Candidatus* Phytoplasma phoenicium	PHYPPH	Phytoplasma	**No**	Pa, Pdu, Pp	CABI (online) EPPO (online),	NA
35	*Candidatus* Phytoplasma pyri-related strain		Phytoplasma	**No**	Pp	EPPO (online)	NA
36	*Carposina sasakii*	CARSSA	Insects	**No**	Pa, Pav, Pcf, Pc, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
37	*Ceratitis cosyra as Ceratitis* spp.	CERTCO	Insects	**No**	Pp	CABI (online), EPPO (online)	NA
38	*Ceratitis fasciventris as Ceratitis* spp.	CERTFA	Insects	**No**	Pp	EPPO (online)	NA
39	*Ceratitis quilicii as Ceratitis* spp.	CERTQI	Insects	**No**	Pp	EPPO (online)	NA
40	*Ceratitis quinaria as Ceratitis* spp.	CERTQU	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA

(Continues)

TABLE 3 (Continued)

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in Moldova	Host *P. armeniaca* (Pa) *or P. avium* (Pav) or *P. cerasifera* (Pcf) or *P. cerasus* (Pc) or *P. davidiana* (Pda) or *P. domestica* (Pdo) or *P. dulcis* (Pdu) or *P. persica* (Pp) or *P. salicina* (Ps) or *P. tomentosa* (Pt)	*Prunus* spp. confirmed as a host (reference)	Pest relevant for the opinion
41	*Ceratitis rosa as Ceratitis spp*	CERTRO	Insects	**No**	Pa, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA
42	Cherry rosette virus	CRV00	Viruses	**No**	Pa	EPPO (online)	NA
43	Cherry rasp leaf virus	CRLV00	Viruses	**No**	Pav, Pc, Pdo, Pp	CABI (online), EPPO (online)	NA
44	Cherry rusty mottle associated virus	CRMAV0	Viruses	**NoData**	Pa, Pav, Pc, Pdo, Pp	EFSA Opinion, CABI (online)	NA
45	Cherry twisted leaf associated virus	CTLAV0	Viruses	**NoData**	Pa, Pav, Ps	CABI (online)	NA
46	*Choristoneura rosaceana*	CHONRO	Insects	**No**	Pav, Pp	EPPO (online)	NA
47	*Colletotrichum gossypii*	GLOMGO	Fungi	**No**	Ps		NA
48	*Conotrachelus nenuphar*	CONHNE	Insects	**No**	Pa, Pav, Pc, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA
49	*Cuerna costalis*	CUERCO	Insects	**No**	Pp	CABI (online)	NA
50	*Diabrotica undecimpunctata undecimpunctata*	DIABUN	Insects	**No**	Pa, Pdo, Pdu, Pp	EPPO (online)	NA
51	*Eotetranychus lewisi*	EOTELE	Mites	**No**	Pdo, Pp	EPPO (online)	NA
52	*Erwinia amylovora*	ERWIAM	Bacteria	**Yes**	Pa, Pcf, Pdo, Ps	CABI (online), EPPO (online)	Yes
53	*Euphranta japonica*	RHACJA	Insects	**No**	Pav, Pcf	EPPO (online)	NA
54	*Eurhizococcus brasiliensis*	EURHBR	Insects	**No**	Pdo, Pp	ScaleNet (online), EPPO (online)	NA
55	*Euwallacea fornicatus* sensu *lato*	XYLBFO	Insects	**No**	Pav, Pcf, Pp	EPPO (online)	NA
56	*Graphocephala versuta*	GRCPVE	Insects	**No**	Pp	CABI (online)	NA
57	*Grapholita inopinata*	CYDIIN	Insects	**No**	Pdo, Pda, Ps	EPPO (online)	NA
58	*Grapholita packardi*	LASPPA	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online), Lepidopteran database	NA
60	*Helicoverpa zea*	HELIZE	Insects	**No**	Pc, Pda Pp, Pt	EPPO (online), Lepidopteran	NA
61	*Homalodisca insolita*	HOMLIN	Insects	**No**	Pp	CABI (online)	NA
62	*Homalodisca vitripennis*	HOMLTR	Insects	**No**	Pav, Pdo, Pdu, Pp, Ps	CABI (online), EPPO (online)	NA
63	*Lopholeucaspis japonica*	LOPLJA	Insects	**No**	Pav, Pcf, Pdo	ScaleNet (online)	NA
64	*Lycorma delicatula*	LYCMDE	Insects	**No**	Pa, Pav, Pc, Pp, Ps	EPPO (online)	NA
65	*Margarodes vitis*	MARGVI	Insects	**No**	Pa, Pav, Pcf, Pdo, Pdu, Pp, Ps	EPPO (online)	NA

TABLE 3 (Continued)

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in Moldova	Host *P. armeniaca* (Pa) *or P. avium* (Pav) or *P. cerasifera* (Pcf) or *P. cerasus* (Pc) or *P. davidiana* (Pda) or *P. domestica* (Pdo) or *P. dulcis* (Pdu) or *P. persica* (Pp) or *P. salicina* (Ps) or *P. tomentosa* (Pt)	*Prunus* spp. confirmed as a host (reference)	Pest relevant for the opinion
66	*Meloidogyne chitwoodi*	MELGCH	Nematodes	**No**	Pav		NA
67	*Meloidogyne enterolobii*	MELGMY	Nematodes	**No**	Pp	CABI (online)	NA
68	*Meloidogyne fallax*	MELGFA	Nematodes	**No**	Pav		NA
69	*Naupactus leucoloma*	GRAGLE	Insects	**No**	Pp	EPPO (online)	NA
70	*Neocosmospora euwallaceae*	FUSAEW	Fungi	**No**	Pdu		NA
71	*Oemona hirta*	OEMOHI	Insects	**No**	Pdu, Pp	CABI (online) EPPO (online),	NA
72	*Oligonychus perditus*	OLIGPD	Mites	**No**	Ps		NA
73	*Oncometopia orbona*	ONCMUN	Insects	**No**	Pp	CABI (online)	NA
74	Peach mosaic virus	PCMV00	Viruses	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
75	Peach rosette mosaic virus	PRMV00	Viruses	**No**	Pdu, Pp, Ps	CABI (online), EPPO (online)	NA
76	*Phymatotrichopsis omnivora*	PHMPOM	Fungi	**No**	Pa, Pc, Pdo, Pdu, Pp	EPPO (online) USDA ARS Fungi Database,	NA
77	*Candidatus phytoplasma fraxini*	PHYPFR	Phytoplasma	**No**	Pp	CABI (online)	NA
78	*Candidatus phytoplasma ziziphi*	PHYPZI	Phytoplasma	**No**	Pp, Ps, Pav	CABI (online)	NA
79	*Popillia japonica*	POPIJA	Insects	**No**	Pa, Pav, Pcf, Pc, Pdo, Pp, Ps	EPPO (online)	NA
80	*Rhagoletis fausta* as *Rhagoletis* spp.	RHAGFA	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
81	*Rhagoletis indifferens* as *Rhagoletis* spp.	RHAGIN	Insects	**No**	Pa, Pav, Pcf, Pc, Pdo, Pdu, Pp, Ps	CABI (online), EPPO (online)	NA
82	*Rhagoletis pomonella*	RHAGPO	Insects	**No**	Pa, Pav, Pcf, Pc, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA
83	*Saperda candida*	SAPECN	Insects	**No**	Pa, Pav, Pcf, Pdo, Pdu, Pp, Ps	EPPO (online)	NA
84	*Scirtothrips dorsalis*	SCITDO	Insects	**No**	Pa, Pav, Pp, Ps, Pt	CABI (online)	NA
85	*Spodoptera frugiperda*	LAPHFR	Insects	**No**	Pp	CABI (online), EPPO (online), Lepidopteran database	NA
86	*Spodoptera litura*	PRODLI	Insects	**No**	Pdo, Pp		NA
87	*Thaumatotibia leucotreta*	ARGPLE	Insects	**No**	Pa, Pdo, Pp, Ps	CABI (online), EPPO (online)	NA
88	Tobacco ringspot virus	TRSV00	Viruses	**No**	Pa, Pav	EPPO (online)	NA

(Continues)

TABLE 3 (Continued)

No.	Pest name according to EU legislation[a]	EPPO code	Group	Pest present in Moldova	Host *P. armeniaca* (Pa) *or P. avium* (Pav) or *P. cerasifera* (Pcf) or *P. cerasus* (Pc) or *P. davidiana* (Pda) or *P. domestica* (Pdo) or *P. dulcis* (Pdu) or *P. persica* (Pp) or *P. salicina* (Ps) or *P. tomentosa* (Pt)	*Prunus* spp. confirmed as a host (reference)	Pest relevant for the opinion
89	Tomato ringspot virus	TORSV0	Viruses	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online)	NA
90	*Trirachys sartus*	AELSSA	Insects	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	EPPO (online)	NA
91	*Xanthomonas arboricola* pv. *pruni*		Bacteria	**Yes**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps, Pt	CABI (online), EPPO (online), ARS USDA	Yes
92	*Xiphinema americanum* sensu stricto	XIPHAA	Nematodes	**No**	Pa, Pav, Pc, Pdo, Pdu, Pp, Ps	Nemaplex (online), CABI (online)	NA
93	*Xiphinema rivesi* (non-EU populations)	XIPHRI	Nematodes	**Yes**	Pav, Pdo, Pp, Ps	CABI (online)	Yes
94	*Xylella fastidiosa*	XYLEFA	Bacteria	**No**	Pa, Pav, Pcf, Pc, Pda, Pdo, Pdu, Pp, Ps	CABI (online), EPPO (online)	NA

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

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

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

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

Based on the information collected, potential pests (non-EU quarantine) known to be associated with the species commodity were evaluated for their relevance to this Opinion.

The 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 Appendices C, D and E (Microsoft Excel® file). None of the evaluated EU non-quarantine pests was selected for further evaluation.

The system used to identify which pests are present in the applicant country depends on publications that are accessed by the relevant databases. If an applicant country does not produce a sufficient volume of publications, the number of pests identified could be underestimated. In the case of Moldova, there is uncertainty as to whether all the relevant pests present in the country have been identified. Some extremely common (cosmopolitan) fungi (such as *Botrytis cinerea*) are flagged in the search as 'not present' since no publication from Moldova has been found that confirms their presence in that country.

This lack of information in the relevant databases, in turn, raises questions as to whether the search using these sources is sufficient to identify all the pests present in a country.

4.3 | Overview of interceptions

Data on the interception of harmful organisms from the export country on plants of the 12 *Prunus* species can provide information about the presence of pests on this commodity despite the current measures taken. According to EUROPHYT, online and TRACES, online (both accessed on 3 July 2023), there were only interceptions of plants for planting of selected *Prunus* species from Moldova destinated to the EU Member States due to the presence of Plum pox virus between the years 1995 and 2023.

4.4 | Summary of pests selected for further evaluation

Three pests were selected for further evaluation. These pests were reported to be present in Moldova based on EPPO peer-reviewed publications, EPPO Global database and submitted dossier, thorough monitoring carried out by the NPPO of Moldova did not confirm their presence. Both pests have the potential for association with at least one of the 12 selected species of *Prunus* plants destined for export and are listed in Table 4. The effectiveness of the risk mitigation measures applied to the commodity was evaluated for the selected pests.

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	*Erwinia amylovora*	ERWIAM	*Erwinia amylovora*	Enterobacterales Erwiniaceae	Bacteria	EU: PZ Quarantine pest (Annex III), RNQP (Annex IV and Annex V), according to Commission Implementing Regulation (EU) 2019/2072
	Xanthomonas arboricola pv. *pruni*	XANTPR	*Xanthomonas arboricola* pv. *pruni*	Lysobacterales Lysobacteraceae	Bacteria	EU: PZ Quarantine pest (Annex III) and RNQP (Annex IV), according to Commission Implementing Regulation (EU) 2019/2072
2	*Xiphinema rivesi* (non-EU populations)	XIPHRI	*Xiphinema rivesi*	Dorylaimida Xiphinematidae	Nematode	EU: A1 Quarantine pest (Annex II A), according to Commission Implementing Regulation (EU) 2019/2072

5 | RISK MITIGATION MEASURES APPLIED IN APPLICANT COUNTRY

For the selected pests (Table 4), the Panel assessed the possibility of presence in nursery producing at least one of the 12 *Prunus* species 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

For each selected pest, the Panel evaluated the likelihood that it could be present in nurseries by evaluating the possibility that plants of at least one of the 12 *Prunus* species in the export nurseries are infested/infected by at least one of the following:

- 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 Moldova

With the information provided by ANSA (Dossier and responses to specific questions), the Panel summarised the risk mitigation measures (Table 5) that are implemented in the production nurseries.

TABLE 5 Overview of implemented risk mitigation measures for plants of the 12 *Prunus* species designated for export to the EU from Moldova.

Number	Risk mitigation measure	Implementation in Moldova
1	Registration of production sites	Nurseries producing material for export are registered following the Moldovan legislation
2	Certification of propagation material	Nurseries produce material under different certification schemes. Plants for planting under the certified category are tested for freedom from viruses, viroids, phytoplasmas and other pathogens 'Regular' material (CAC) category originates from: (1) mother plantations (or solitary mother plants) that have not been virus-tested or retested; (2) mother plantations (or solitary mother plants) that have been virus-tested or retested
3	Sanitation and inspection of field sites for virus–vector nematodes	One year before planting, the soil is tested for the presence of virus nematode vectors by the virology laboratory accredited for the detection of nematode vectors of viruses. Following a corresponding analysis, the laboratory draws up a document on the examination of the soil for the presence of nematode vectors. If virus nematode vectors are detected in the soil intended for the future planting of virus-free material, the soil is disinfected, or a different site is chosen
4	Surveillance, monitoring and sampling	Mother plantations for rootstocks and scions are inspected in the field at least three times a year. After grafting, production fields are inspected twice a year. Field inspectors also visually inspect the plant material after harvest. The plant pest monitoring plan is adopted by ANSA on an annual basis. According to additional information provided diagnostic protocols follow EPPO standards, however no details on these were provided in the dossier
5	Forecasting of pest and diseases incidence and warning	ANSA monitors and communicates information regarding pest outbreaks. During the vegetation period, inspectors of ANSA's local subsections perform the–diagnosis, forecast and monitoring of pests, alerting agricultural producers and natural and legal persons to their occurrence and development. However, no specific details were provided as to how this affects the production of plants for planting
6	Application of phytosanitary products (pesticides)	Several pesticides are registered in Moldova and are applied during the production cycle to manage pests Details on application procedures provided were very general
7	Field sanitation	Removal, cutting and destruction of symptomatic or infested/infected material (shoots, leaves, fruits)
8	Postharvest treatments	Defoliation of plant material Root washing. Application of pesticides if necessary
9	Sorting and storage	Material for export is sorted, labelled and packed before export Material for export may be stored outside in the field or protected in a warehouse (in a controlled atmosphere at temperatures of 1–20°C and air humidity of 95%–97%). Material for export is covered with a waterproof canvass to prevent exposure to the environment. Bare roots may also be covered to protect them from the environment during storage
10	Transport	If trees are shipped over long distances, it is recommended that the transport is refrigerated

5.3 | Evaluation of the current measures for the selected relevant pest including uncertainties

For the evaluated pest, the relevant risk mitigation measures acting on it 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, 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 5.3.1–5.3.3). The outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures is summarised in Section 5.3.4.

5.3.1 | Overview of the evaluation of *Erwinia amylovora*

Rating of the likelihood of pest freedom	**Extremely frequently pest free** (based on the median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free	***9823*** out of 10,000 bundles	***9880*** out of 10,000 bundles	***9925*** out of 10,000 bundles	***9963*** out of 10,000 bundles	***9992*** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested bundles	***8*** out of 10,000 bundles	***37*** out of 10,000 bundles	***75*** out of 10,000 bundles	***120*** out of 10,000 bundles	***177*** out of 10,000 bundles
Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** *Erwinia amylovora* may overwinter in buds, which then become source of inoculum. Bacteria can enter host plants through natural openings such as nectaries or stomata, and, after multiplication in these organs, bacteria can invade peduncles, shoots, leaves and immature fruits. Plants for planting, especially grafted rootstocks, might be latently infected by the pathogen and become the main source of introduction of fire blight in pathogen-free areas (EFSA PLH Panel, 2014) **Measures taken against the pest/pathogen and their efficacy** Prevention and control as provided by ANSA spraying with copper-based products before flowering is recommended for *Xanthomonas arboricola* pv. *pruni* which could also be effective against *E. amylovora* **Interception records** There are no records of interceptions from Moldova **Shortcomings of current measures/procedures** *Erwinia amylovora* is present in all countries surrounding Moldova and EFSA literature search has shown that *E. amylovora* is present in *Cydonia* orchards also (Samoilova, 2023; Samoilova & Răileanu, 2023). It is uncertain if monitoring takes place and whether control measures are recommended and applied It is also uncertain if any surveys have taken place since the one that was reported in 2020 **Main uncertainties** • The pest pressure in the surrounding area of the nurseries is unknown. • Latent infections may be present since they would not be detected by visual inspections. • In case diagnostics of symptomatic samples are carried out, it is not clear how the sampling is done, and which diagnostic protocol is used.				

5.3.2 | Overview of the evaluation of *Xanthomonas arboricola* pv. *pruni*

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	***9866*** out of 10,000 bundles	***9904*** out of 10,000 bundles	***9936*** out of 10,000 bundles	***9964*** out of 10,000 bundles	***9990*** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested bundles	***10*** out of 10,000 bundles	***36*** out of 10,000 bundles	***64*** out of 10,000 bundles	***96*** out of 10,000 bundles	***134*** out of 10,000 bundles

(Continues)

(Continued)

Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** According to the dossier, *X. arboricola* pv. *pruni (*referred as *X. campestris* pv. *pruni)* is present in Moldova. *Prunus* spp. are natural hosts of *X. arboricola* pv. *pruni*. The pest is present only in some restricted areas of the EU, whereas its host plants are widely distributed; moreover, it can have a severe direct impact on crops (losses in yield and quality). Primary inoculum of the pathogen might be latently present in association with plant material such as rootstocks, scions, bud chips and dormant buds (Dhavantari, 1971, 1973; Shepard & Zehr, 1994) Several interceptions have been reported on asymptomatic plant material entering Spain, confirming that importing plant material is a major pathway for pathogen introduction and spread (Palacio-Bielsa et al., 2014) **Measures taken against the pest/pathogen and their efficacy** Prevention and control: as provided by ANSA spraying with copper-based products before flowering is recommended. Chemical treatment should also be applied after leaf fall using a copper-based product. Crop hygiene measures during the trees' rest period play an important role in controlling this disease. Attacked shoots are carefully removed and fallen leaves under trees are burned **Interception records** There are no records of interceptions from Moldova **Shortcomings of current measures/procedures** According to the dossier, *X. arboricola* pv. *pruni* is present but regulated by control measures in accordance with agrotechnical recommendations and according to climate conditions and planting of resistant varieties. However, details of these measures and the threshold for intervention were not provided **Main uncertainties** • The pest pressure in the surrounding area is unknown. • According to the supplementary information provided, it appears that samples are not taken from asymptomatic plants; therefore, detection of latent infections is not possible. • There is a possibility for latent infections to remain unnoticed even after visual inspections. • In case diagnostics of symptomatic samples are carried out, it is not clear how the sampling is done and which diagnostic protocol is used.

5.3.3 | Overview of the evaluation of *Xiphinema rivesi* non-EU populations

Rating of the likelihood of pest freedom	**Extremely frequently pest free** (based on the median)				
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of pest free	***9991*** out of 10,000 bundles	***9994*** out of 10,000 bundles	***9996*** out of 10,000 bundles	***9998*** out of 10,000 bundles	***9999*** out of 10,000 bundles
Percentile of the distribution	5%	25%	Median	75%	95%
Proportion of infested bundles	***1*** out of 10,000 bundles	***2*** out of 10,000 bundles	***4*** out of 10,000 bundles	***6*** out of 10,000 bundles	***9*** out of 10,000 bundles

Summary of the information used for the evaluation	**Possibility that the pest/pathogen could enter exporting nurseries** *Xiphinema rivesi* is a polyphagous, free-living ectoparasite that occurs in the soil in association with a number of plant species. It has a worldwide distribution and has been reported from several continents. The nematode transmits several economically important nepoviruses that are included in the EU and EPPO lists of quarantine organisms (TRSV, ToRSV, PRMV and CRLV). The introduction into the EU of non-EU populations of *X. rivesi* from third countries may lead to the introduction of viruses that can be transmitted by nematode species already present in the EU (e.g. *X. rivesi* EU populations). In Moldova, *Xiphinema rivesi* has been reported from several fruit crops (apple, raspberry, strawberry, currant) (Poiras, 2012; Poiras et al., 2013, 2014, 2015). So far, no TRSV, ToRSV, PRMV and CRLV that can be nematode transmitted have been reported in Moldova, but uncertainties exist due to lack of data from official monitoring surveys and reports of problems caused by this nematode in Moldovan apple production areas The main pathways of this nematode are plants for planting, contaminated water, soil and growing media as such or attached to plants, agricultural machinery, tools and shoes. This nematode can occur in the *rhizosphere* of *host plants* and infest the commodity mainly due to human activities **Measures taken against the pest/pathogen and their efficacy** The relevant proposed measures are (i) certification of propagation material; (ii) sanitation and inspection of field sites for virus–vector nematodes; (iii) surveillance, monitoring and sampling; and (iv) removal of soil from roots (root washing) **Interception records** There are no records of interceptions from Moldova **Shortcomings of current measures/procedures** Nurseries shall be inspected for the presence of virus-transmitted nematodes prior to planting and, if necessary, treated or discarded for production if nematode density or presence cannot be controlled. However, details of these measures and the threshold for intervention were not provided Pre-export, root washing reduces the risk of nematode infestation in plants intended for planting, but it is uncertain how precise root washing is carried out in Moldovan nurseries **Main uncertainties** • Symptoms caused by *X. rivesi* can be misidentified and may be overlooked. • The detection of the presence of *X. rivesi* is difficult and depends on incidence, distribution and analysis methods. • Root washing may not completely reduce the risk of nematode infestation in plants intended for planting.

5.3.4 | Outcome of expert knowledge elicitation

Table 6 and Figure 3 show the outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures for the evaluated pests.

Figure 4 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for the selected *Prunus* species plants designated for export to the EU for *Erwinia amylovora*.

TABLE 6 Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against *Erwinia amylovora*, *Xanthomonas arboricola* pv. *pruni* and *Xiphinema rivesi* non-EU populations on *Prunus* plants designated for export to the EU. In panel A, the median value for the assessed level of pest freedom 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	Bacteria	*Erwinia amylovora*				L	M		U	
2	Bacteria	*Xanthomonas arboricola* pv. *pruni*				L	M	U		
3	Nematodes	*Xiphinema rivesi non-EU* populations							L	MU

Panel A

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

Panel B

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

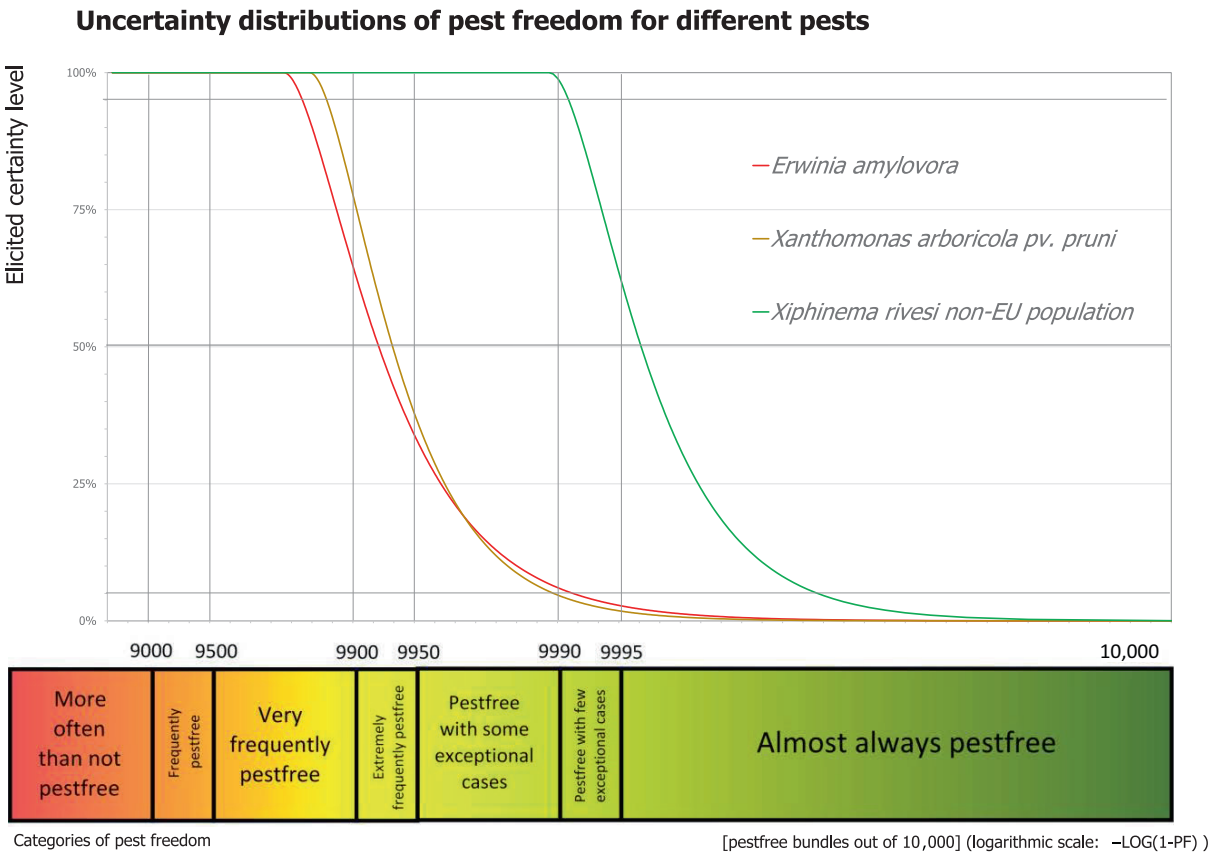

FIGURE 3 Elicited certainty (*y*-axis) of the number of pest-free *Prunus* bundles (*x*-axis; log-scaled) out of 10,000 plants designated for export to the EU from Moldova for the evaluated pest visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%). The Panel is 95% confident that 9823 or more bundles per 10,000 will be free from *Erwinia amylovora*, *9866* or more bundles per 10,000 will be free from *Xanthomonas arboricola* pv. *pruni* and *9991* or more bundles per 10,000 will be free from *Xiphinema rivesi* – non-EU populations.

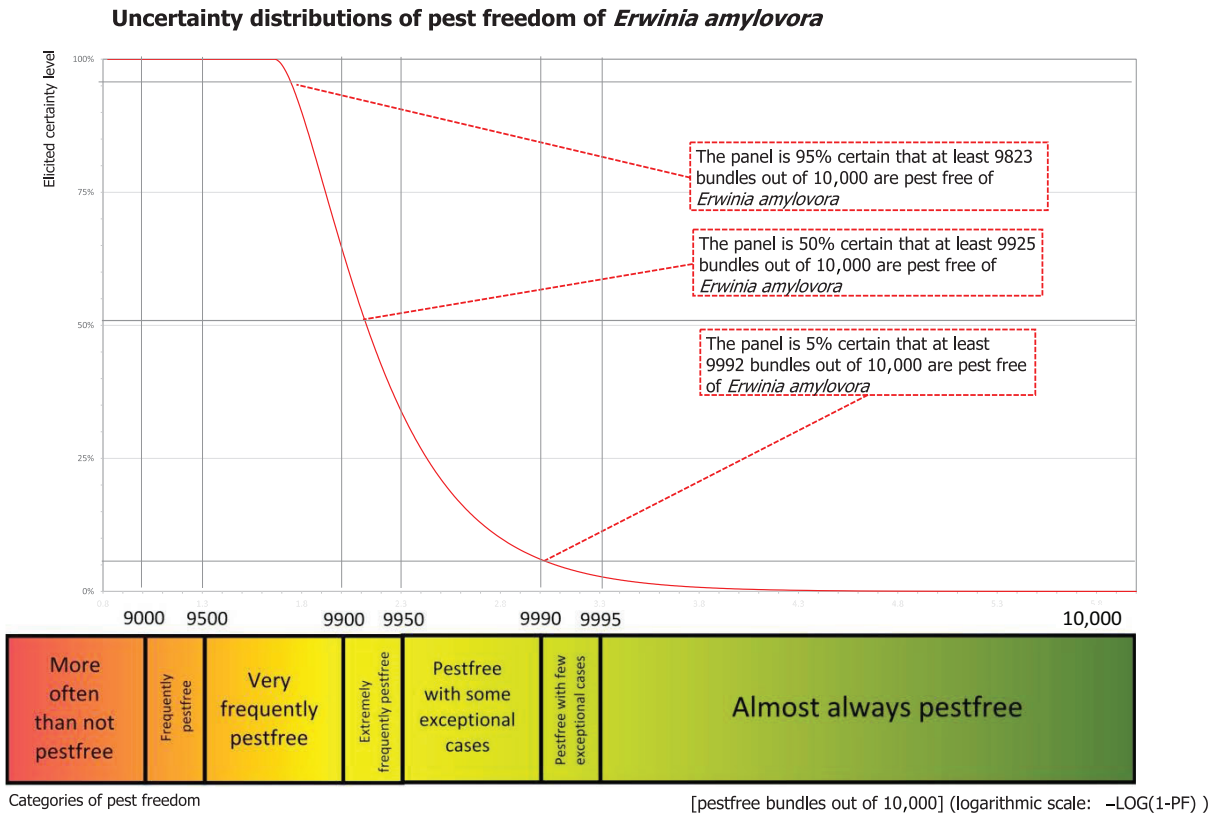

FIGURE 4 Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for plants designated for export to the EU based on the example of *Erwinia amylovora*.

6 | CONCLUSIONS

There are three pests whose presence in Moldova is uncertain and considered to be potentially associated with defoliated and dormant bare root plants of 12 selected *Prunus* species imported from Moldova and relevant for the EU.

For *Erwinia amylovora*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Extremely frequently pest free' with the 90% uncertainty range reaching from 'Very frequently pest free' to 'Pest free with few exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9823 and 10,000 units per 10,000 will be free from *Erwinia amylovora*.

For *Xanthomonas arboricola* pv. *pruni*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Extremely frequently pest free' with the 90% uncertainty range reaching from 'Very frequently pest free' to 'Pest free with few exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9886 and 10,000 units per 10,000 will be free from *Xanthomonas arboricola* pv. *pruni*.

For *Xiphinema rivesi* non -EU populations, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Almost always pest free' with the 90% uncertainty range reaching from 'Pest free with some exceptional cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9991 and 10,000 units per 10,000 will be free from *Xiphinema rivesi* non -EU populations.

The methodology used to establish pest presence depends in part on published literature. The limited number of publications from Moldova can lead to an underestimation of the number of pests present. A limited number of pest surveys may also lead to underestimation of the number of pests present. Thus, there is uncertainty as to whether all relevant pests have been identified.

ABBREVIATIONS

ANSA	Plant Protection Department of the National Food Safety Agency
CABI	Centre for Agriculture and Bioscience International
CAC	*Conformitas Agraria Communitatis*
EKE	Expert Knowledge Elicitation
EPPO	European and Mediterranean Plant Protection Organisation
FAO	Food and Agriculture Organisation
FUN	Fungi
INS	Insect
ISPM	International Standards for Phytosanitary Measures
NEM	Nematode
PLH	Plant Health
PRA	Pest Risk Assessment
RNQPs	Regulated Non-Quarantine Pests

GLOSSARY

Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2023).
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, 2023).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2023).
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, 2023).
Measures	Control (of a pest) is defined in ISPM 5 (FAO, 2023) 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, 2023).
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, 2023).
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, 2023).
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, 2023).

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, 2023).

ACKNOWLEDGEMENTS

EFSA wishes to acknowledge the contribution of Selam Alemu.

CONFLICT OF INTEREST

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

REQUESTOR

European Commission

QUESTION NUMBERS

EFSA-Q-2020-00533, EFSA-Q-2020-00776, EFSA-Q-2020-00777, EFSA-Q-2020-00778, EFSA-Q-2020-00779, EFSA-Q-2023-00679, EFSA-Q-2023-00680, EFSA-Q-2023-00681, EFSA-Q-2023-00682, EFSA-Q-2023-00683, EFSA-Q-2023-00684, EFSA-Q-2023-00685.

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SUPPORTING INFORMATION

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

How to cite this article: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard, C., Baptista, P., Chatzivassiliou, E., Gonthier, P., Jaques Miret, J. A., Justesen, A. F., MacLeod, A., Magnusson, C. S., Milonas, P., Navas-Cortes, J. A., Parnell, S., Potting, R., Reignault, P. L., Stefani, E., Thulke, H.-H., Van der Werf, W., Vicent Civera, A., Zappalà, L., … Yuen, J. (2024). Commodity risk assessment of plants of 12 selected *Prunus* species from Moldova. *EFSA Journal*, *22*(3), e8647. https://doi.org/10.2903/j.efsa.2024.8647

APPENDIX A

Data sheets of pests selected for further evaluation via Expert Knowledge Elicitation

A.1 | *ERWINIA AMYLOVORA*

A.1.1 | Organism information

Taxonomic information	Current valid scientific name: *Erwinia amylovora* (Burrill 1882) Winslow et al., 1920	
Group	Synonyms: *Bacillus amylovorus* (Burrill) Trevisan, 1889, Bacterium amylovorum Chester, 1901, *Erwinia amylovora* f.sp. rubi Starr et al., 1951, *Micrococcus amylovorus* Burrill, 1882	
EPPO code	Name used in the EU legislation: *Erwinia amylovora* (Burrill) Winslow et al	
Regulated status	**EU status:** The pest is listed in Annex III (Protected Zone Quarantine Pest–PZQP), Annex IV (regulated non-quarantine pests – RNQP of Regulation (EU) 2019/2072 and Annex V as *Erwinia amylovora*) **Non- EU:** A1 list: Argentina (2019), Azerbaijan (2007), Bahrain (2003), Brazil (2018), Chile (2019), China (1993), East Africa (2001), Georgia (2018), Moldova (2006), Paraguay (1992), Southern Africa (2001), Uruguay (1992), Uzbekistan (2008) A2 list: Jordan (2013), Kazakhstan (2017), Russia (2014), Türkiye (2016), Ukraine (2010) Quarantine pest: Belarus (1994), Moldova (2017), Morocco (2018), Norway (2012), Tunisia (2012), (EPPO)	
Pest status in Moldova	The conclusion is that the presence of the pest in Moldova is uncertain According to ANSA and EPPO Global Database: The pest was present but eradicated based on information from 2020 that is currently not accessible (Anonymous, 2020; EPPO, online). In 2002, however, the pest was widespread (Nicolaev et al., 2002), and present in apple orchards (Samoilova, 2016). Recent publications investigating different control methods (Samoilova, 2023; Samoilova and Răileanu, 2023) refer to natural infection in *Cydonia* orchards. These studies indicate that the pest may be present in Moldova, given the difficulty in managing the disease *Erwinia amylovora* is present in all countries surrounding Moldova	
Pest status in the EU	Present, widespread: Bulgaria, Cyprus, Greece, Netherlands, Romania Present, restricted distribution: Austria, Belgium, Croatia, Czechia, Denmark, France, Germany, Greece, Hungary, Italy, Luxembourg, Norway, Poland, Portugal, Slovenia, Spain, Sweden Present, few occurrences: Ireland, Italy (Sicily), Latvia, Lithuania, Slovakia (CABI, EPPO)	
Host status on selected *Prunus* species	*Prunus armeniaca, P. cerasifera, P. domestica* and *P. salicina* are reported as a host plants for the *E. amylovora* in the EPPO Global Database (EPPO, online) and CABI Crop Protection Compendium (CABI CPC, online)	
PRA information	EFSA Scientific Opinion on pest categorisation of *E. amylovora* (EFSA PLH Panel, 2014)	
Other relevant information for the assessment		
Biology	The first infections occur in spring, from the inoculum from the previous year from the same orchard or surrounding areas. Bacterial cells may overwinter in buds or cankers, which then become a source of inoculum *Erwinia amylovora* enters its host plants through natural openings such as nectaries or stomata, and, after multiplication in these organs, bacteria can invade peduncles, shoots, leaves and immature fruits. The most susceptible stages of the host plant are the flowering and active vegetative growth periods. Secondary flowers that may be produced in late spring or summer are more prone to infections than the flowers produced during the main bloom, because warm temperatures favour pathogen multiplication. The optimal environmental conditions for the pest infection are temperatures from 18°C to 29°C, high relative humidity (90%–95%) and wet plant surfaces, e.g. following rain. During the bloom period, temperatures as low as 12°C, are also favourable for infection (Bonn, 1978; van der Zwet and Beer, 1995; van der Zwet et al., 2012)	
Symptoms	**Main type of symptoms**	The basic symptom of fire blight is the necrosis or death of tissues An important symptom is droplets of ooze on infected tissues (CABI CPC, online) Flowers (the most susceptible organ to *E. amylovora*) – Water-soaked, darker green – Spurs start collapsing and turning brown to black (within 5–30 days) (EFSA PLH Panel, 2014) Shoots – Turn brown to black from the tip, 'shepherd-crook' shape Leaves & Fruits – Discoloration and consequently collapse. – Necrotic areas and wilting. – Exudation of milky, sticky liquid or ooze containing bacteria (during wet, humid weather) – Mummification (on fruits) Twigs, larger branches, trunk – Darker colour than usual – Inner tissues water-soaked, in some cases with reddish streaks and later tissues turn dark brown to black – Canker (usually appear in summer or autumn) Trees with rootstock – Liquid bleeding from the crown or below the graft union – Yellow to red foliage, a month before normal autumn coloration Dieback after the 1st year of infection (CABI CPC, online)

(Continued)

	Presence of asymptomatic plants	*Erwinia amylovora* can be present in asymptomatic plants and its detection may be difficult due to low bacterial cell numbers
	Confusion with other pathogens/pests	Symptoms of fire blight can be confused with: *Pseudomonas syringae pv. syringae* (blister spot of apple), *E. pyrifoliae*, *E. piriflorinigrans, E. uzenensis, Nectria cinnabarina* (fungi) causing Nectria twig blight, *Nectria galligena* (fungi) causing European canker, *Phomopsis tanakae* (fungi) causing European pear dieback, *Phomopsis mali* or *Sphaeropsis malorum* causing fungal cankers, *Polycaon confertus*, twig borer beetle, causing *Polycaon confertus*, *Jasnus compresus* and *Zeuzera pyrina* (insects) (EFSA PLH Panel, 2014; Kim et al., 1999; López et al., 2011; Matsuura et al., 2012; Roberts et al., 2008)
Host plant range	*Erwinia amylovora* occurs in members of the Rosaceae family (CABI CPC, online). According to the list published in the CABI website, main hosts are *Cotoneaster, Crataegus* (hawthorns), *Cydonia oblonga* (quince), *Eriobotrya, Eriobotrya japonica* (loquat), *Malus* (ornamental species apple), *Malus domestica* (apple), *Prunus salicina* (Japanese plum), *Pyracantha* (Firethorn), *Pyrus* (pears), *Pyrus communis* (European pear) Other hosts are *Amelanchier* (serviceberries), *Amelanchier alnifolia* (saskatoon serviceberry), *Amelanchier canadensis* (thicket serviceberry), *Cotoneaster horizontalis* (wall-spray), *Chaenomeles sinensis*, *Fragaria* (strawberry), *Malus floribunda*, *Mespilus* (medlar), *Photinia davidiana* (Chinese stranvaesia), *Prunus armeniaca* (apricot), *Prunus cerasifera* (myrobalan plum), *Prunus domestica* (plum), *Pyrus communis var. pyraster* (poirier sauvage), *Pyrus pyrifolia* (Oriental pear tree), *Rosa canina* (Dog rose), *Rosa rugosa* (rugosa rose), *Rubus* (blackberry, raspberry), *Rubus fruticosus* (blackberry), *Sorbus* (rowan), *Spiraea prunifolia*.	
Evidence that the commodity can be a pathway	'Propagating plant material is the main source of introduction of fire blight in pathogen-free areas. Plants for planting, especially grafted rootstocks, might be latently infected by the pathogen and are the most important pathway for its introduction and spread, since they may harbour the pathogen both endophytically and in buds.' (EFSA PLH Panel, 2014)	
Surveillance information	According to EPPO Global Database, 'current pest situation evaluated by EPPO on the basis of information dated 2020: Absent, pest eradicated' EFSA literature search, however, has shown that *E. amylovora* is present in *Cydonia* orchards (Samoliova, 2023; Samoliova and Răileanu, 2023) It is uncertain if monitoring takes place and whether control measures are recommended and applied It is also uncertain if any surveys have taken place since the one that was reported in 2020	

A.1.2 | Possibility of pest presence in the nursery

A.1.2.1 | Possibility of entry from the surrounding environment

Natural spread is very likely through wind, water, rain, insects (especially pollinating insects), birds, aerosols and aerial strands (Keil et al., 1972). Infection takes place through flowers and later in the season, through small wounds (by winds, hail, insects) in young leaves and at the tips of growing shoots (CABI CPC, Online). *Erwinia amylovora* also can survive on other healthy plant surfaces, such as leaves and branches, for limited periods (weeks), but colony establishment and epiphytic growth on these surfaces do not occur. Cells of *E. amylovora* excrete large amounts of an extracellular polysaccharide (a major component of bacterial ooze), which creates a matrix that protects the pathogen on plant surfaces (Johnson, 2000). Once established, the transport of inoculum is possible through rain and wind. *E. amylovora* can survive for several weeks in pollen, nectar and 8 days inside of digestive track of *C. capitata*, the Mediterranean fruit fly (Ordax et al., 2010).

Additionally, human factors pose a high risk in *E. amylovora* dispersion through machineries, equipment, pruning, spraying tools, shoes, clothes, etc. (VKM, 2007).

Uncertainties:

- It is unclear if any surveillance for the disease takes place.
- It is unknown whether there are any host plants in the surrounding areas.
- Pest pressure in the surrounding areas is unknown.
- Latent infections may be present since they would not be detected by visual inspections.

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.

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

There are two possible pathways for the spread of the disease, introductions from other countries via infected/infested material and reintroductions and spread within the country. The main long-distance pathway is mainly the import of infected/infested nursery stock and propagative material (Roberts et al., 2008) since the pathogen may be latent or can live as an epiphyte or an endophyte in buds and shoots (EFSA Scientific Opinion, 2014).

According to the Dossier, the majority of the production material is in the 'regular category' (CAC); thus, the status with regard to pathogen presence is based only on a visual inspection. *Erwinia amylovora* may be present and widespread. The

plants for planting specified in the dossier are also produced by grafting from material produced in other local nurseries, again, it cannot be excluded the introduction of the pathogen with plant material grown in Moldova.

Uncertainties:

- The nursery producing the *Prunus* spp. trees also produces other fruit trees and there is a possibility that the bacteria could be introduced on propagating material of other tree species such as apple or quince.
- Unknown if any monitoring for the disease takes place.

Taking into consideration the above evidence and uncertainties, the panel considers that it is possible that the pathogen could enter the nursery with new plant material or growing media.

A.1.2.3 | Possibility of spread within the nursery

High level of soil moisture (by rain or irrigation), wind and air temperature between 18°C and 30°C can lead to rapid disease development (VKM, 2007). *Erwinia amylovora* can retain its pathogenic potential at temperatures ranging from 4°C (sometimes even lower) to 37°C (Santander et al., 2017). Movement of machineries/equipment and even pruning is a significant pathway (VKM, 2007).

Grafting could be a possible pathway since in propagation nurseries, cells of *E. amylovora* surviving on woody surfaces can initiate disease when scions and rootstocks are wounded during grafting. Bacteria can also reside as an endophyte within apparently healthy plant tissue, such as branches, limbs and budwood. Migration of the pathogen through xylem is one mechanism by which floral infections can lead to rootstock infections near the graft union (Johnson, 2000), though it is uncertain if this pathway exists for *Prunus* spp. Moreover, dispersion is highly likely also through insects (especially pollinating), birds (Keil et al., 1972) and human factors (CABI CPC, Online).

Uncertainties:

- Latent infections in hosting trees within nursery may spread to mother and production areas.
- Although the steps in production of the different plant material are explained in the dossier, the specific management of plants in the nursery is not detailed, and therefore, there are uncertainties on to what extent common management practices could favour the spread of the disease.
- There are uncertainties on the effectiveness of chemical and other treatments to deal with insect pests. As we do not know population sizes of phytophagous or pollinating insects going from tree to tree in the nurseries, there are uncertainties on likelihood of spread within the nursery.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pathogen within the nursery is possible. As explained above, *E. amylovora* can be spread by means of abiotic factors (water, wind) and also by insects (especially pollinators) and given the fact that the bacteria may be present in Moldova and the close proximity among the nurseries in the production areas, spread of the bacteria can occur easily under favourable environmental conditions. Also, in farm management, e.g. the use of bee-hives and pollinators in apple and plum production areas, or the use of machinery and tools can also spread the disease, and therefore, there is a theoretical risk of spreading within these production areas that cannot be neglected.

A.1.3 | Information from interceptions

Considering imports of *Prunus* spp. plants from the Moldova to the EU, between 1994 and 2023 (until November), there are no records of interceptions of *E. amylovora* (EUROPHYT, TRACES, online).

A.1.4 | Evaluation of the risk reduction options

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

No.	Risk mitigation measure (name)	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	Unclear how registration checks for the presence of the bacteria
2	Certification of propagation material	Yes	Evaluation: The presence of viruses is checked before planting, but criteria for determining the presence of bacteria are not described Uncertainties: • Details of the inspection and monitoring have not been described.
3	Sanitation and inspection of field sites for virus–vector nematodes	No	
4	Surveillance, monitoring and sampling	Yes	Evaluation: The presence of infected plants in nurseries is checked before planting. However, there is no information on how sampling and laboratory testing are carried out in Moldova Uncertainties: • The details of inspection, monitoring and sampling, and laboratory testing have not been described.
5	Forecasting of pest and diseases incidence and warning	No	–
6	Application of phytosanitary products (pesticides)	Yes	Copper-based chemicals may have some effect on the bacteria, but other fungicides are not expected to have an effect
7	Field sanitation	Yes	Removal of diseased leaves and shoots can reduce the amount of inoculum present in the production area
8	Postharvest treatments	Yes	Defoliation can reduce the amount of inoculum, but root washing is not expected to have an effect
9	Sorting and storage	No	–
10	Transport	Yes	Low temperatures may reduce spread of the bacteria between transported bundles

A.1.5 | Overall likelihood of pest freedom

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

- The pest was not detected on *Prunus* spp. in Moldova.
- Resistant *Prunus* species.
- Infection would show visible symptoms.
- Nurseries are located in pest-free areas.
- There are no other hosts plants in the surrounding areas (flowering fruit plants).
- The surrounding area is inspected effectively.
- Mother plants, rootstocks and budwood/graftwood are free of *Erwinia amylovora* due to regular handling.
- Different production areas are isolated.
- Nursery is free of wild plants.
- Regular pesticide treatments (i.e. Bordeaux mixture) are effective.
- Handling deselects infected plants.
- Inspections and surveillance are effective.

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

- Unknown distribution within Moldova.
- Total eradication from widespread occurrence of the pest is impossible.
- The pathogen is present in the regions with selected *Prunus* species production (the nurseries are in the infected area).
- Nurseries get planting material from infested regions.
- The species and variety of *Prunus* spp. grown is more susceptible.
- There are host plants in the surroundings of the nursery of mother plants, e.g. shrubs.
- Rootstocks and buds may be infected but without symptoms.
- Regular inspections are not effective, might overlook latent infections or initial infections immediately before export.
- Inspections and surveillance are not effective, might overlook infections in private gardens.
- Treatments are only applied in case of possible infections.
- Pesticide treatments are not effective.
- Materials used (e.g. tools) are not disinfected and lead to further infections due to wounds.

A.1.5.3 | Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

- High uncertainty in spread of the bacteria.
- Inspections are effective and the disease is easy to detect.

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

- Pest pressure in the production area is uncertain.
- Data on efficacy of inspection are not provided.

A.1.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Erwinia amylovora* on *Prunus* spp.

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

TABLE A.1 Elicited and fitted values of the uncertainty distribution of pest infestation by *Erwinia amylovora* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					37		75		120					200
EKE	1.98	4.50	8.39	15.8	25.3	37.1	49.2	74.7	104	120	139	158	177	189	200

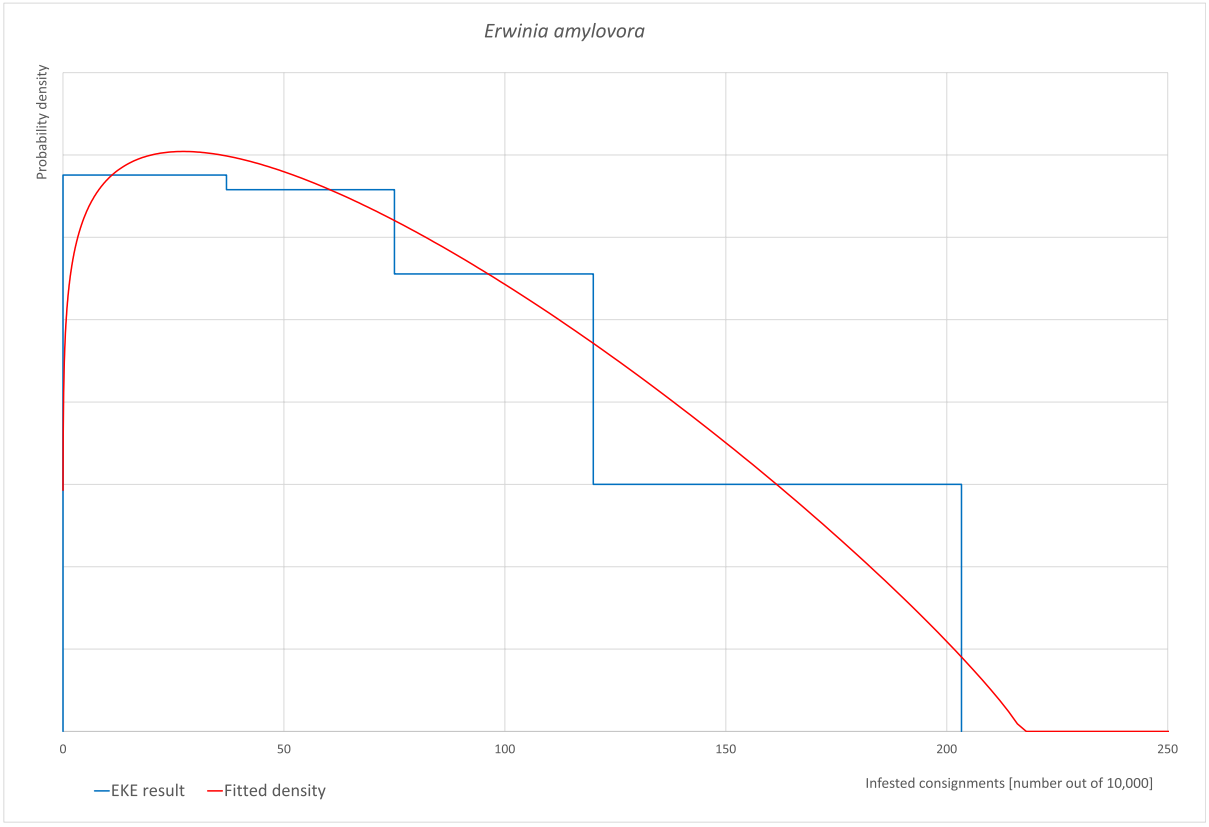
Note: The EKE results are the *BetaGeneral (1.1258, 1.8764, 0, 217)* distribution fitted with @Risk version 7.6.

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

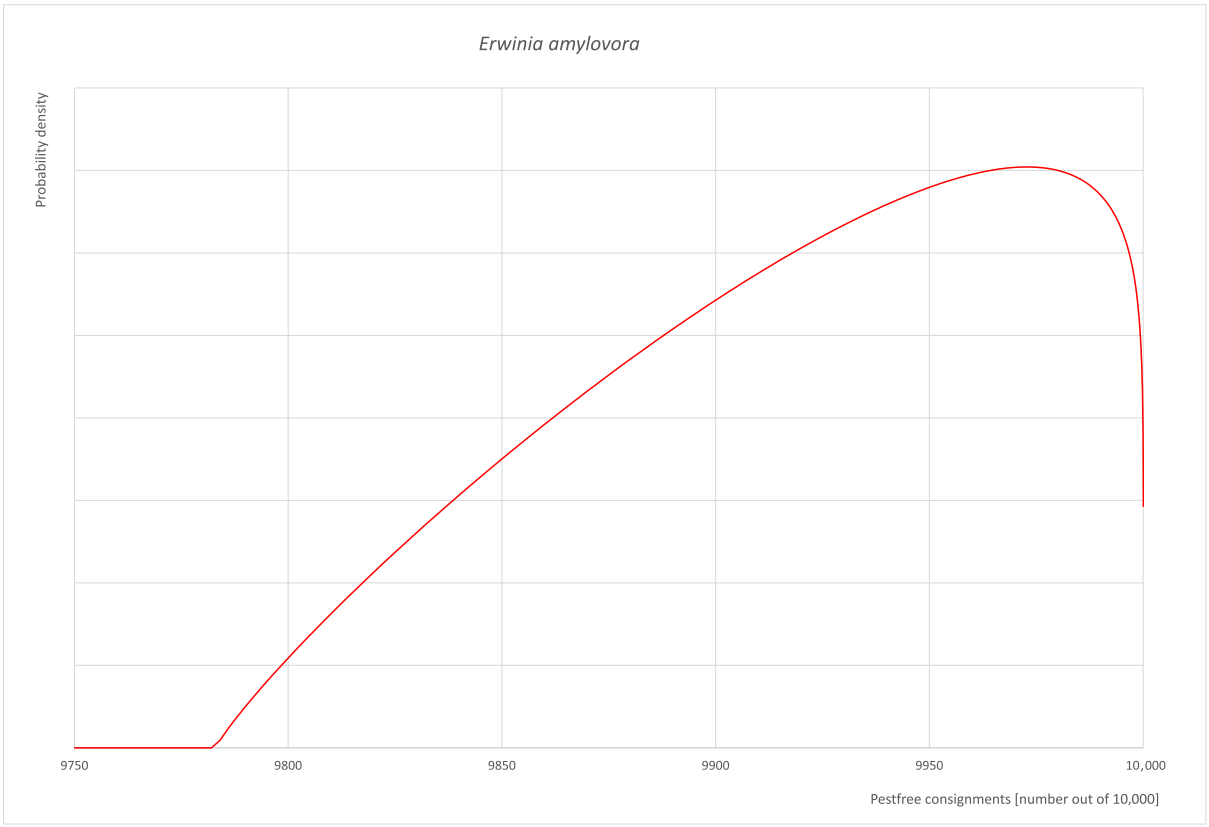
TABLE A.2 The uncertainty distribution of plants free of *Erwinia amylovora* per 10,000 bundles calculated by Table A.1.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9800					9880		9925		9963					10,000
EKE results	9800	9811	9823	9842	9861	9880	9896	9925	9951	9963	9975	9984	9992	9996	9998

Note: The EKE results are the fitted values.

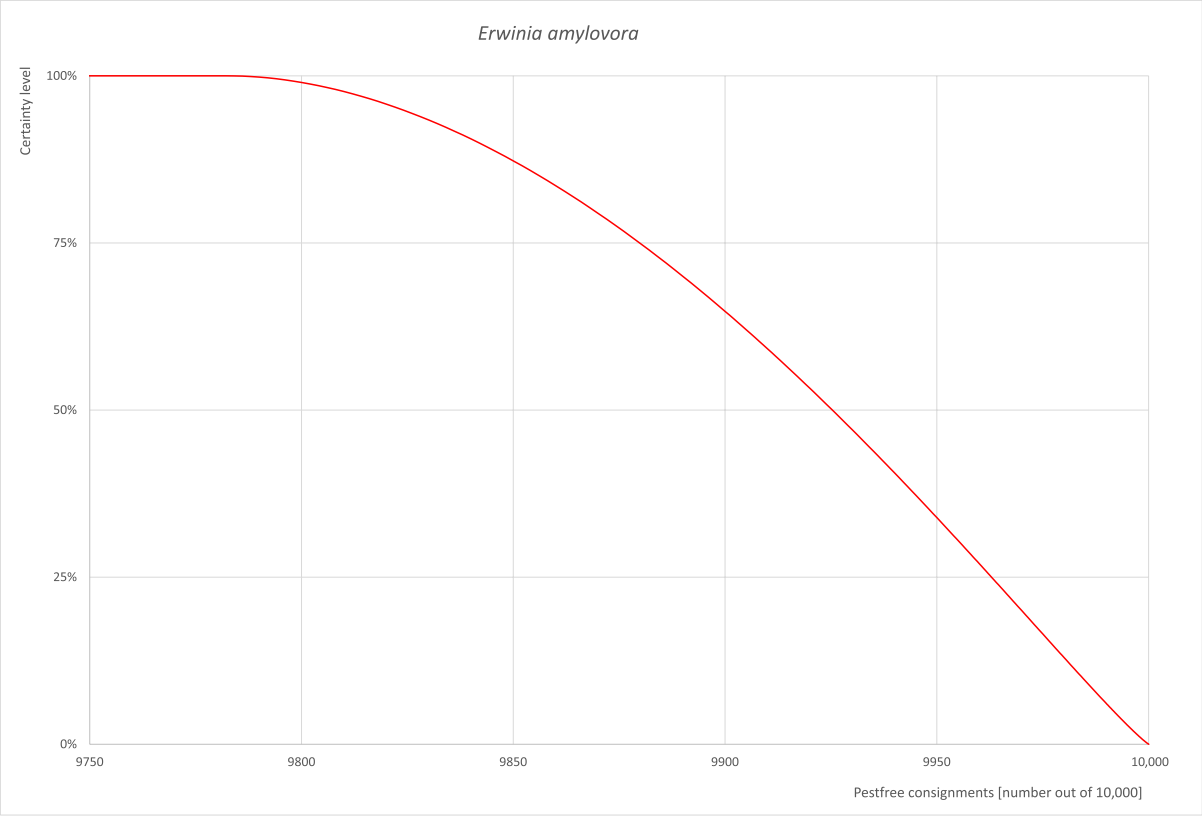


(A)



(B)

FIGURE A.1 (Continued)



(C)

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

A.1.6 | Reference list

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A.2 | *XANTHOMONAS ARBORICOLA* PV. *PRUNI*

A.2.1 | Organism information

Taxonomic information	Current valid scientific name: *Xanthomonas arboricola* pv. *pruni*, (Smith) **Synonyms:** *Pseudomonas pruni, Xanthomonas campestris* pv. *pruni*, *Xanthomonas pruni* Order: Lysobacterales Family: Lysobacteraceae Common name: bacterial canker of stone fruits Name used in the dossier: *Xanthomonas campestris* pv. *pruni*	
Group	Bacteria	
EPPO code	XANTPR	
Regulated status	**EU status:** The pest is listed in Annex III (Protected Zone Quarantine Pest–PZQP) and in Annex IV (Regulated Non-Quarantine pests) – RNQP of Regulation (EU) 2019/2072 as *Xanthomonas arboricola* pv. *pruni* **Non-EU:** Africa: Egypt (A1 list, 2018); Morocco (Quarantine pest, 2018); Tunisia (Quarantine pest, 2012) America: Chile (A1 list, 2019); Mexico (Quarantine pest, 2018) Asia: Israel (Quarantine pest, 2009); Jordan (A2 list, 2013) Europe: Georgia (A1 list, 2018); Norway (Quarantine pest, 2012); Russia (Regulated non-quarantine pest, 2014); Switzerland (Regulated non-quarantine pest, 2019); Türkiye (A1 list, 2016); Ukraine (Regulated non-quarantine pest, 2019); United Kingdom (A1 list, 2020) EPPO (A2 list, 1975)	
Pest status in Moldova	Present, no details (EPPO global database) According to the dossier, *X. arboricola* pv. *pruni* is present in Moldova	
Pest status in the EU	Present, protected zone quarantine pest	
Host status on selected *Prunus* species	*Prunus* spp. are natural hosts of *X. arboricola* pv. *pruni*. Some of the major hosts are: *Prunus salicina, P. persica, P. armeniaca, P. dulcis*. Other hosts include *P. domestica, P. avium, P. cerasus* and *P. davidiana* (EFSA PLH Panel, 2014)	
PRA information	Scientific Opinion on the risks to plant health posed by *Xanthomonas arboricola* pv. *pruni* for the EU territory (EFSA PLH Panel, 2014)	
Other relevant information for the assessment		
Biology	Primary inoculum of the pathogen might be latently present in association with plant material such as rootstocks, scions, bud chips and dormant buds (Dhavantari, 1971, 1973; Shepard & Zehr, 1994). Frequently, bacterial cells infect and overwinter in the vascular tissue around leaf scars (Feliciano and Daines, 1970; Gasperini et al., 1984). A minor source of primary inoculum is to be found in plant and leaf residues present in the field, especially in autumn and winter (Zaccardelli et al., 1998). No experimental evidence is available regarding fruit as a source of inoculum. In affected orchards, *X. arboricola* pv. *pruni* overwinters in woody cankers present on trunks or branches or twigs (Anderson, 1953; Foster and Petersen, 1954). Secondary inocula are produced during the growing season: They originate inside lesions and may allow the pathogen to spread	
Symptoms	**Main type of symptoms**	Despite the name given to the disease, symptoms are observed not only on leaves but also on fruit, twigs, branches and trunks (Anderson, 1953; Foster and Petersen, 1954). On leaves, lesions are initially small, angular, water-soaked spots, later necrotising and coalescing. Affected leaves on peach become chlorotic and there will be considerable leaf drop, whereas on plum, cherry and cherry laurel, affected leaves remain on the tree and develop a shot-hole appearance. On fruit, symptoms appear 3–5 weeks after petal fall and may develop until the skin colour changes. They are initially tiny, circular, water-soaked spots, later coalescing and necrotising. As the fruit increases in size, the necrotic tissue cracks and suberises. On branches, cankers may develop, especially on plum, frequently starting from a leaf scar. On plum and almond, cankers are perennial, whereas perennial cankers are not reported for peach. Large, developing cankers may result in the death of whole branches and, finally, in the death of the tree (Gasperini et al. 1984)
	Presence of asymptomatic plants	Bacteria overwinter in cankers on trees, but symptoms might not be present on the host plants, they can be associated with buds or leaf scars (EFSA PLH Panel, 2014) Several interceptions have been reported on asymptomatic plant material, confirming that importing plant material is a major pathway for pathogen introduction and spread (Palacio-Bielsa et al., 2014)
	Confusion with other pathogens/pests	Possibility to confuse the symptoms with the shot-hole disease caused by the fungus *Stigmina carpophila*

(Continues)

(Continued)

Host plant range	Only *Prunus* spp. are natural hosts of *X. arboricola* pv. *pruni*. Some of the major hosts are *Prunus salicina, P. persica, P. armeniaca, P. dulcis*. Other hosts include *P. domestica, P. avium, P. cerasus* and *P. laurocerasus*, Japanese apricot (*P. mume*), Chinese wild peach (*P. davidiana*), *P. buergeriana, P. crassipes* and *P. donarium* (EFSA PLH Panel, 2014)
Evidence that the commodity can be a pathway	*X. arboricola* pv. *pruni* can spread over long or short distances by several types of plant material (rootstocks, budwood, grafted plants), which can be contaminated by the pathogen allowing the pest's introduction and spread of *X. arboricola* pv. *pruni* into new areas. (Anonymous, 2013; EFSA PLH Panel, 2014, Palacio-Bielsa et al., 2014)
Surveillance information	Surveillance information was not provided According to the NPPO of Moldova, *X. arboricola* pv. *pruni* has not been found in the plants for export

A.2.2 | Possibility of pest presence in the nursery

A.2.2.1 | Possibility of entry from the surrounding environment

In the main dossier, it was stated 'this disease is widespread and harmful in our country and in America and Europe, severely affecting all plum plantations'. *Xanthomonas arboricola* pv. *pruni* could spread from the surrounding areas, via rain showers and hailstorms. Plant material in the surrounding area (could be contaminated by the pathogen).

Uncertainties:

- The pest pressure in the surrounding area is unknown.
- According to the supplementary information provided, it appears that samples are not taken from asymptomatic plants; therefore, detection of latent infections in the surrounding environment is not possible.
- In case diagnostics of symptomatic samples are carried out, it is not clear how the sampling is done, and which diagnostic protocol is used.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pathogen to enter the nursery from the surrounding area. Although there are inspections in production areas, details of monitoring of the surrounding areas were not provided.

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

There are two possible pathways for entry of the pathogen: introductions from other countries via infected material and reintroductions and spread within the country.

According to the Dossier, the majority of the production material is in the 'regular category'; thus, the status with regard to pathogen presence is based only on a visual inspection. The plants for planting specified in the dossier are also produced by grafting from material produced in other local nurseries, again, it cannot be excluded the introduction of the pathogen with plant material grown in Moldova.

Uncertainties:

- It is unclear whether nurseries producing the trees of the 12 selected *Prunus* species also produce other fruit trees and there is a possibility that the bacteria could be introduced on propagating material of other tree species.

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

A.2.2.3 | Possibility of spread within the nursery

Short-distance spread occurs easily within the orchards during rain showers and hailstorms. The *Prunus* planting material production process in Moldova includes grafting, pruning, irrigation, pest control, soil cultivation, mechanical defoliation, uprooting and root shaking and washing, packaging, delivery, which would affect spread of *X. arboricola* pv. *pruni*.

Uncertainties:

- Latent infections in trees in the nursery may spread bacteria to mother plants and production sites.
- Although the steps in production of the different plant material are explained in the dossier, the specific management of plants in the nursery is not detailed, and therefore, there are uncertainties on to what extent common management practices in the cultivation could favour the spread of the bacteria.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pathogen within the nursery is possible. Given the fact that the pathogen is present in Moldova and the close proximity among the

nurseries in the production areas, spread of the bacteria can occur easily under favourable environmental conditions. Also, in farm management, e.g. the use of machinery and tools can also spread the pathogen, and therefore, there is a theoretical risk of spread within these production areas that cannot be neglected.

A.2.3 | Information from interceptions

Considering imports of *Prunus* spp. plants from the Moldova to the EU, between 1994 and 2023 (until July), there are no records of interceptions of *X. arboricola* pv. *pruni* (EUROPHYT, TRACES, online).

A.2.4 | Evaluation of the risk reduction options

In the table below, all the RROs currently applied in the Moldova are summarised and an indication of their effectiveness on *X. arboricola* pv. *pruni* is provided. The description of the risk mitigation measures currently applied in Moldova is provided in Table 5.

No	Risk mitigation measure (name)	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	Yes	Uncertainties: Unclear how registration checks for the presence of the bacteria
2	Certification of propagation material	Yes	Evaluation: The presence of viruses is checked before planting, but criteria for determining the presence of bacteria are not described Uncertainties: • Details of the inspection and monitoring have not been described.
3	Sanitation and inspection of field sites for virus–vector nematodes	No	
4	Surveillance, monitoring and sampling	Yes	Evaluation: The presence of infected plants in nurseries is checked before planting. However, there is no information on how sampling and laboratory testing are carried out in Moldova. Uncertainties: • The details of inspection, monitoring and sampling and laboratory testing have not been described.
5	Forecasting of pest and diseases incidence and warning	No	–
6	Application of phytosanitary products (pesticides)	Yes	Copper-based chemicals may have some effect on the bacteria, but other fungicides are not expected to have an effect
7	Field sanitation	Yes	Removal of diseased leaves and shoots can reduce the amount of inoculum present in the production area
8	Post-harvest treatments	Yes	Defoliation can reduce the amount of inoculum, but root washing is not expected to have an effect
9	Sorting and storage	No	–
10	Transport	Yes	Low temperatures may reduce the spread of the bacteria between transported bundles

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

- The pest is only present in some areas/under official control/has a restricted distribution.
- Nurseries are located in pest-free areas.
- Infection would show visible symptoms.
- There are no other hosts plants in the surrounding areas (flowering fruit plants).
- The surrounding area is inspected effectively.
- Mother plants, rootstocks and budwood/graftwood are free of *X. arboricola* pv. *pruni* due to regular handling.
- Different production areas are isolated.
- Nursery is free of wild plants.
- Regular pesticide treatments (i.e. Bordeaux mixture) are effective.
- Handling deselects infected plants.
- Inspections and surveillance are effective.
- Symptoms when are present on plants are easily spotted.
- The species and varieties of *Prunus* grown are less susceptible.
- Tools used are disinfected.

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

- The pathogen is present in the regions with selected *Prunus* species production (the nurseries are in the infected area).
- Nurseries get planting material from infested regions.
- The species and varieties of *Prunus* grown are more susceptible.
- There are host plants in the surroundings of the nursery of mother plants, e.g. shrubs.
- Rootstocks and buds may be infected but without symptoms.
- Regular inspections are not effective, might overlook latent infections or initial infections immediately before export.
- Treatments are only applied in case of possible infections.
- Pesticide treatments are not effective.
- Materials used (e.g. tools) are not disinfected and lead to further infections due to wounds.
- Infections on dormant infected plants are difficult to detect/Handling can further spread the bacteria.

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

- Inspections are effective and the disease is easy to detect.

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

- Pest pressure in the production area is uncertain.
- Data on efficacy of inspection are not provided.
- Details provided on the pesticide application are very general.

A.2.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Xanthomonas arboricola* pv. *pruni* on *Prunus* spp.

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

TABLE A.3 Elicited and fitted values of the uncertainty distribution of pest infestation by *X. arboricola* pv. *pruni* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	1					35		65		95					150
EKE	3.22	6.27	10.4	17.5	25.9	35.6	45.0	63.9	84.4	95.9	109	122	134	143	150

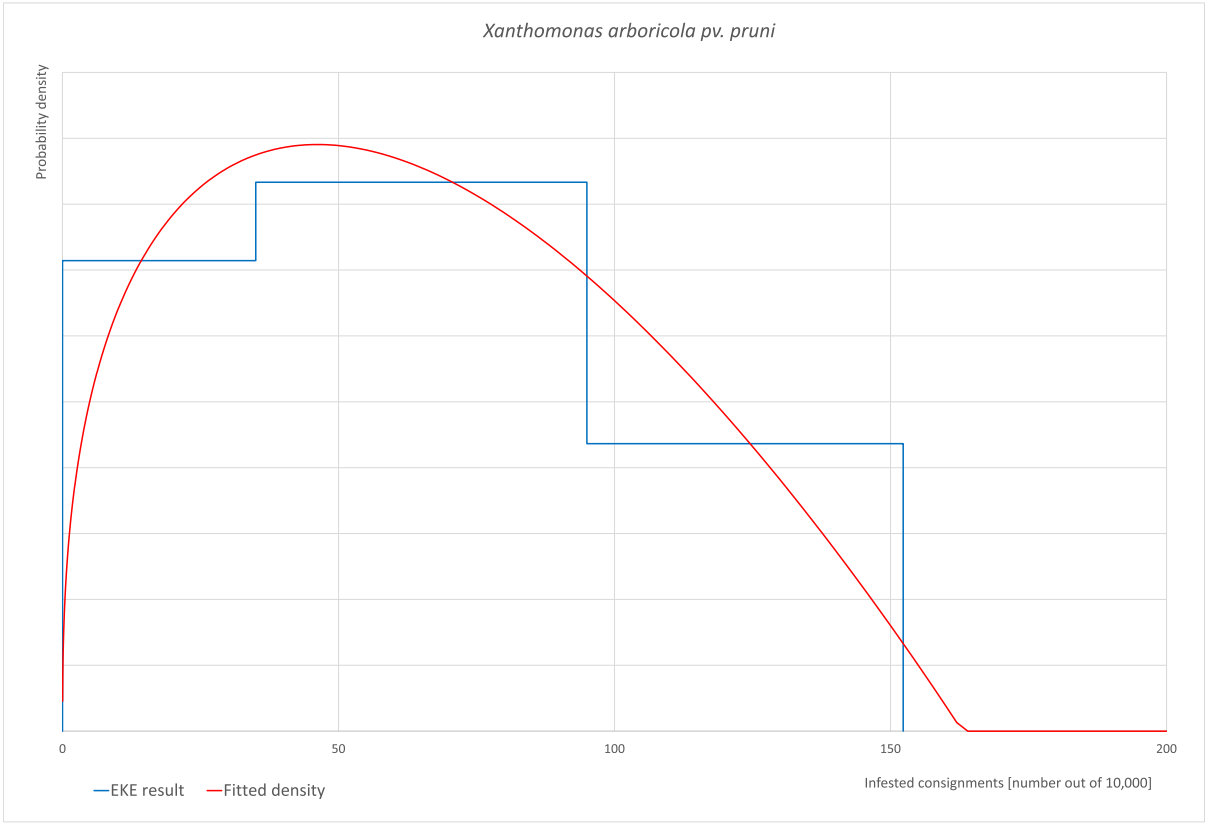
Note: The EKE results are the *BetaGeneral (1.3916, 1.9912, 0, 163)* distribution fitted with @Risk version 7.6.

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

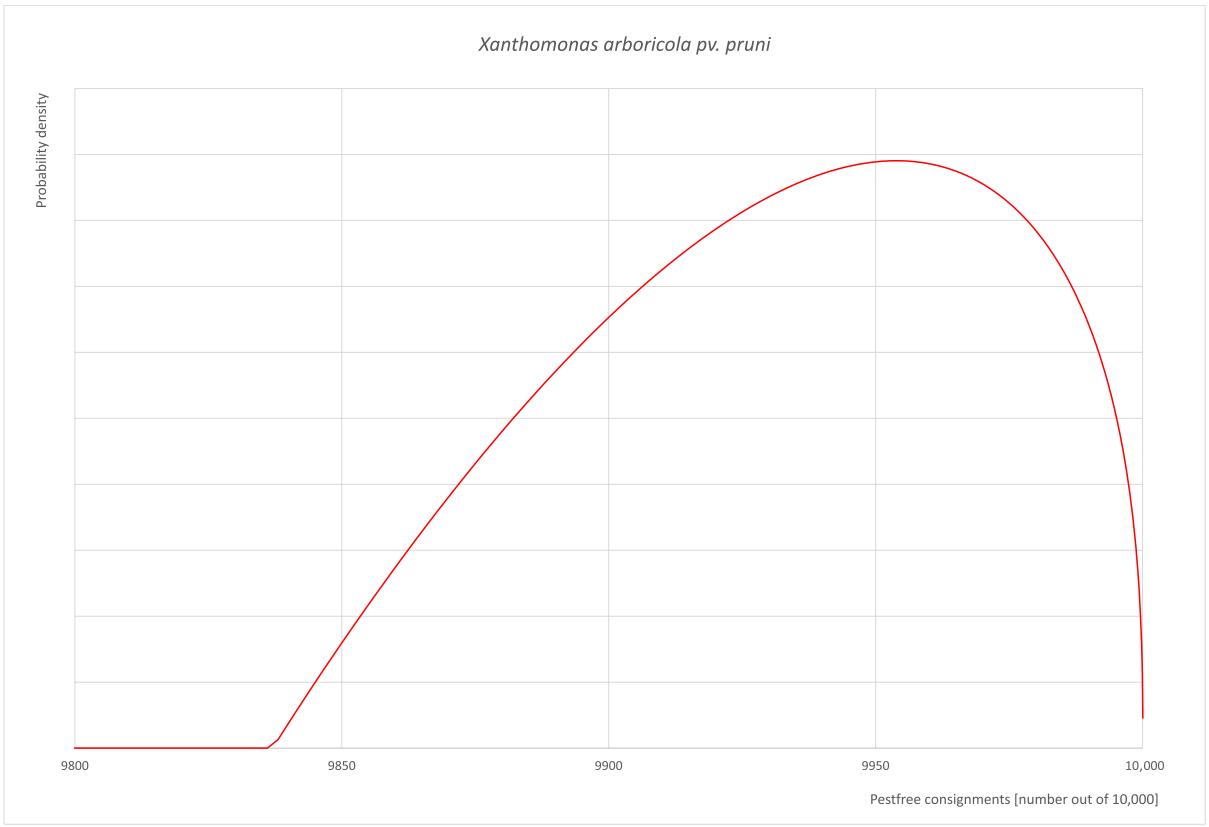
TABLE A.4 The uncertainty distribution of plants free of *X. arboricola* pv. *pruni* per 10,000 bundles calculated by Table A.3.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9850					9905		9935		9965					9999
EKE results	9850	9857	9866	9878	9891	9904	9916	9936	9955	9964	9974	9982	9990	9994	9997

Note: The EKE results are the fitted values.

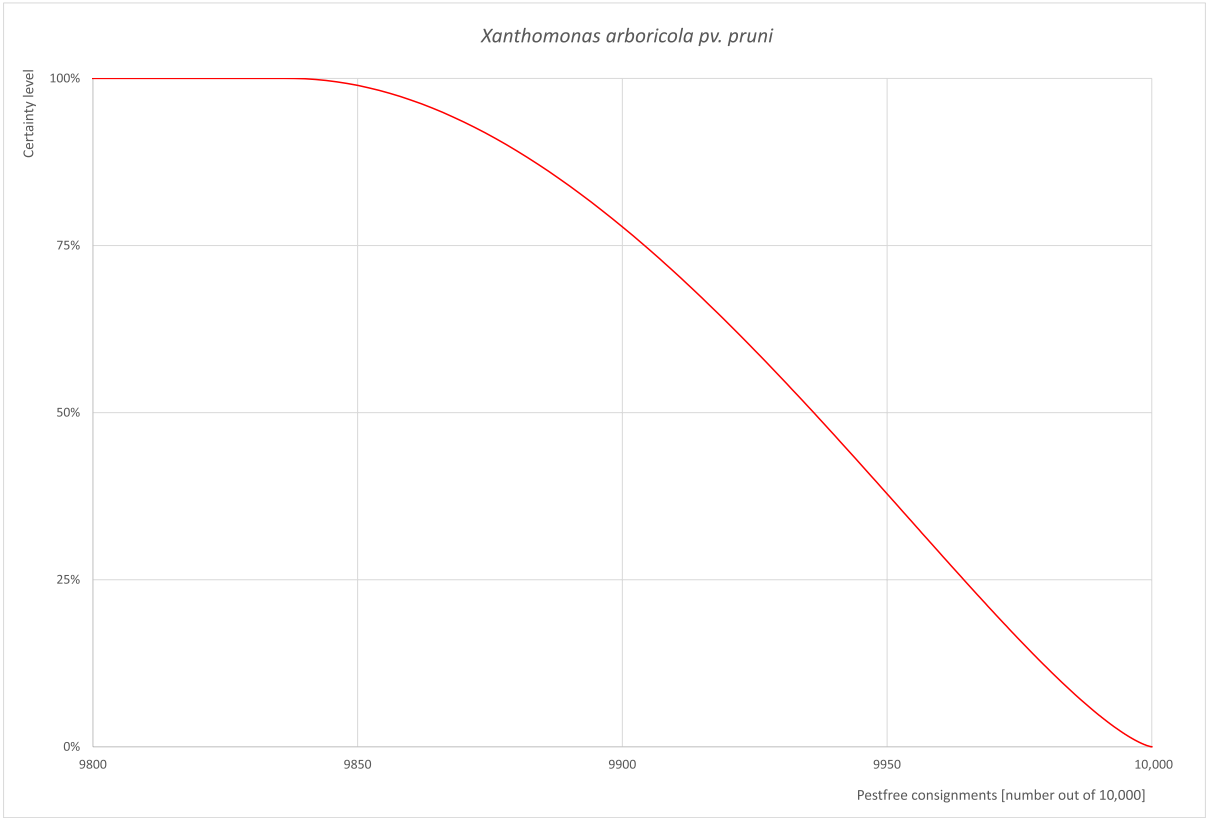


(A)



(B)

FIGURE A.2 (Continued)



(C)

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

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A.3 | *XIPHINEMA RIVESI* NON-EU POPULATIONS

A.3.1 | Organism information

Taxonomic information	Current valid scientific name: *Xiphinema rivesi* Dalmasso, 1969 **Synonyms:** - Name used in the EU legislation: *Xiphinema rivesi* (non-EU populations) Name used in the dossier: Not mentioned in the dossier Order: Dorylaimida Family: Xiphinematidae	
Group	Nematoda	
EPPO code	XIPHRI	
Regulated status	**EU status:** A1 Quarantine pest (Annex II A) – *X. rivesi* (non-EU populations) **Non- EU:** Africa: Egypt (A1 list, 2018); Morocco (Quarantine pest; 2018) America: Brazil (A1 list, 2018); Mexico (Quarantine pest, 2018) Europe: Georgia (A1 list, 2018); Switzerland (A1 list, 2019); Türkiye (A1 list, 2016); United Kingdom (A1 list, 2020)	
Pest status in Moldova	According to EPPO Global Database, the pest is present in Moldova (EPPO, online; Poiras, 2012; Poiras et al., 2013, 2014, 2015)	
Pest status in the EU	Absent as non-EU populations. (EU populations of *X. rivesi* are reported in Croatia, France, Germany, Italy, Portugal, Slovenia, Spain, Slovakia) (EPPO, online; CABI online)	
Host status on selected *Prunus* species	*Prunus* spp. (*P. persica, P. domestica, P. avium, P. salicina*) are known hosts of *Xiphinema rivesi* (CABI–Plantwise Knowledge Bank, online; Nemaplex, online)	
PRA information	Pest risk analysis for *Xiphinema americanum* s.l., 2010. Plant Protection Service, the Netherlands, version no.: 1 Rapid pest risk analysis for *Xiphinema americanum* s.l. (European populations), 2014. The Food and Environmental Research Agency (Author: Derek Tomlinson), Version no.: 2 Pest categorisation of *Xiphinema americanum* sensu lato (EFSA PLH Panel 2018)	
Other relevant information for the assessment		
Biology	*Xiphinema rivesi* belongs to the *X. americanum* species complex, a group of morphologically very similar nematode species. The nematode is a polyphagous root ectoparasite that parasitizes a number of plant species. It feeds on the root tips or sides of the roots of suitable host plants. In search of a suitable host, the nematode moves freely in the soil during its life cycle. When it attacks the roots, *X. rivesi* penetrates the plant cells with its long odontostyle and secretes enzymes that cause hypertrophy and thickening of the cells. The feeding process on a particular part of the plant root can take several hours to several days. Through their feeding, dagger nematodes cause direct damage, often resulting in reduced numbers of lateral feeder roots that may be swollen and necrotic with swollen, necrotic root tips. During feeding, juveniles and adults can acquire and transmit viruses that can persist for several months and up to 2 years (Bitterlin and Gonsalves, 1987; EFSA, 2018) The life cycle of the dagger nematode *X. rivesi* consists of six stages: the egg, four juvenile stages and the adult female (males are extremely rare) and lasts at least 1 year. Females are believed to produce eggs parthenogenetically. The optimal temperature for reproduction is 20–24°C All stages of the dagger nematode have been found to survive and mature in the soil in the absence of a host, but the population does not reproduce. The nematode does not survive long in frozen soil, and in areas with low winter temperatures, it overwinters mainly in the egg stage. Where the soil is not frozen, all stages can survive the winter (EFSA, 2018)	
Symptoms	**Main type of symptoms**	Above-ground symptoms of *X. rivesi* infestation are not very clear and are manifested by a general reduction in growth, which is easily confused with other plant stresses caused by water or nutrient deficiencies. Direct damage may occur only at high population densities, indicated by characteristic depressed growth patches that correspond to the highest concentration of nematodes (CABI, online) Swelling, stunting and destroyed tips can be observed on the roots The most commonly recognised symptoms due to this pest are those resulting from the transmission of the associated plant viruses
	Presence of asymptomatic plants	In general, symptoms caused by *X. rivesi* on plants are inconspicuous and can be easily overlooked. *X. rivesi* may also go undetected when nematode infestation in the roots of host plants is low. The nematode may therefore not be detected by existing phytosanitary procedures and export controls, including laboratory tests
	Confusion with other pathogens/pests	*X. rivesi* may be confused with other species in the group of *X. americanum* sensu lato. Differentiation of species from the *X. americanum* sensu lato group is based on morphological and morphometric analyses, but species differentiation is extremely difficult due to only minor differences (EFSA, 2018). Identification of *X. rivesi* is only possible for experienced nematologists Due to the difficulties in distinguishing the species of *X. americanum* sensu lato based on their morphology, the use of molecular approaches is recommended (Brown et al., 1995; EFSA, 2018; Lamberti et al., 2000). However, there is currently no reliable molecular test for routine diagnosis. Such a molecular diagnostic method is available on the Q-Bank website but has not yet been included in the relevant IPPC and EPPO diagnostic protocols (EFSA, 2018; EPPO, 2017; FAO, 2016) It is not possible to distinguish EU populations of *X. rivesi* from non-EU populations

(Continued)

Host plant range	*X. rivesi* is a highly polyphagous nematode species that has been found associated with a wide range of herbaceous and woody host plants, including citrus trees, grape, apple, peach, plum, Japanese plum, sweet cherry, raspberry, walnut, oak, elms, hackberry, blueberries, alfalfa, corn, cottonwood, potato, garlic, cucumber, mango, sorghum and others (CABI–Plantwise Knowledge Bank, online; Nemaplex, online)
Pathways	– Plants, plants for planting – Soil and growing media as such from areas where the nematode occurs. – Soil and growing media attached to machinery, tools, packing materials etc.
Surveillance information	Plants for planting of selected *Prunus* species are produced in Moldova in registered production nurseries under different certification schemes. Production nurseries are inspected for the presence of virus vector nematodes prior to planting. If nematodes are detected, a sanitation measure can be implemented, but detailed information on sanitation measures and soil decontamination is not provided

A.3.2 | Possibility of pest presence in the nursery

A.3.2.1 | Possibility of entry from the surrounding environment

When *X. rivesi* is present in the environment, it can enter *Prunus* spp. production sites with planting materials, agricultural machinery, tools, shoes, and runoff water.

Xiphinema rivesi can actively move from plant to plant, but only over short (< 1 m) distances. Transmission from the surrounding area to the production field is mainly passive through the spread of contaminated soil (attached to roots of planting material, agricultural machinery, tools, shoes) and runoff rainwater.

Uncertainties:

According to Poiras (2012) and Poiras et al. (2013, 2014, 2015) *Xiphinema rivesi* occurs in Moldova, but there is no information on its distribution and abundance in the *Prunus* growing area.

The lack of data from official monitoring and the absence of reports on problems caused by this nematode in *Prunus* spp. production in Moldova leads to uncertainties. This is related to the fact that the nematode is either absent or has not been detected in *Prunus* spp. orchards.

It is uncertain how many orchards in *Prunus* spp. production areas in Moldova are infested with *X. rivesi*. There is uncertainty about the possible infestation of other host plants of *X. rivesi* in the vicinity, which are also considered hosts for this nematode.

Given the above evidence and uncertainties, the Panel considers it possible that the nematode is present in the environment and could invade *Prunus* spp. nurseries with soil and growing media, new plants for planting or other human activities.

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

Plants without soil are not a pathway. Only plants with soil attached to the roots are important for nematode transmission. Plants for planting, originating from production sites where the nematode is present may be infested and overlooked. Above-ground symptoms are similar to those caused by water and nutrient deficiencies. Therefore, the presence of *X. rivesi* in selected *Prunus* species roots cannot be detected by visual inspection.

Uncertainties:

Uncertainties exist regarding the lack of data to monitor the presence of *X. rivesi* in nurseries from which selected *Prunus* species are sourced for planting.

Considering the above evidence and uncertainties, the Panel concludes it is possible that the nematode could be introduced into nurseries/orchards with new plants, machinery and other human activities.

A.3.2.3 | Possibility of spread within the nursery

Xiphinema rivesi actively moves only short (< 1 m) distances (EFSA, 2018). The nematode never penetrates plant tissue (except by piercing root cells with its stylet). The main route of spread of this nematode within the nursery or production field is usually human assisted. The nematode can be spread with moist soil or growing media (soil as such or soil attached to plants, machinery, tools, shoes, animals, packing material) or run-off water, but not through plants without soil.

Uncertainties:

- The presence of nematode in the nursery is unknown.

In view of the above evidence and uncertainties, the Panel considers that the nematode, if present in the field, can be transmitted from one host plant to another.

A.3.3 | Information from interceptions

No interceptions of *Xiphinema rivesi* from Moldova to the EU have been reported so far.

A.3.4 | Evaluation of the risk mitigation options

In the table below, all the RROs currently applied in Moldova are summarised and an indication of their effectiveness on *Xiphinema rivesi* is provided. The description of the risk mitigation measures currently applied in Moldova is provided in Table 5.

No.	Risk mitigation measure (name)	Effect on the pest	Evaluation and uncertainties
1	Registration of production sites	No	–
2	Certification of propagation material	Yes	Evaluation: The presence of virus–vector nematodes in nurseries is checked before planting. Uncertainties: • Details of the inspection and monitoring have not been described.
3	Sanitation and inspection of field sites for virus–vector nematodes	Yes	Evaluation: Nurseries are checked for the presence of virus-transmitted nematodes before planting and if necessary treated or discarded for production if nematode densities/presence cannot be managed. Uncertainties: • Details of this measure were not provided. • Threshold for intervention was not mentioned in the dossier.
4	Surveillance, monitoring and sampling	Yes	Evaluation: The presence of virus–vector nematodes in nurseries is checked before planting. However, there is no information on how sampling and laboratory testing are carried out in Moldova. There is also no information on whether virus–vector nematodes are systematically monitored in Moldova. Uncertainties: • The details of inspection, monitoring and sampling and laboratory testing have not been described.
5	Forecasting of pest and diseases incidence and warning	No	–
6	Application of phytosanitary products (pesticides)	No	
7	Field sanitation	No	–
8	Post-harvest treatments	Yes	Evaluation: Root washing can effectively reduce the risk of nematode infestation in plants intended for planting. Uncertainties: • It is uncertain how effectively root washing is carried out in nurseries in Moldova.
9	Sorting and storage	No	–

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

- *Xiphinema rivesi* was not recorded on *Prunus* spp. in Moldova and the growing areas are mainly in that part of the country where *X. rivesi* has not been reported.
- Regular inspections by phytosanitary authorities are effective and help to reduce the infestation pressure of this nematode.
- Root washing is effective against this nematode.
- Transmission of this nematode through human activity is negligible.

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

- *Prunus* spp. are considered the main hosts of this nematode.
- A similar pest pressure exists throughout the country.
- The nematode is widespread in *Prunus*-growing areas and its infestation is homogeneous.

- Visual selection of *Prunus* plants for planting and visual inspections before export without laboratory test are not effective and result in high infestation.
- Washing the roots after harvest is only partially effective against this pest.

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

- Uncertainties about the occurrence of the pest in Moldova.
- The information on infestation of *X. rivesi* on *Prunus* plants in Moldova is lacking.
- The absence of reports of problems related to viruses that can be transmitted with this nematode within the *Prunus* spp. growing area in Moldova.
- The likelihood of introduction into nurseries through human activities.

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

- The main uncertainty is the absence of nematode-induced symptoms, so that the presence of the nematode in the *Prunus* spp. roots can be overlooked.

A.3.5.5 | Elicitation outcomes of the assessment of the pest freedom for *Xiphinema rivesi* non-EU population on *Prunus* spp.

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

TABLE A.5 Elicited and fitted values of the uncertainty distribution of pest infestation by *Xiphinema rivesi* per 10,000 bundles.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Elicited values	0					2		4		6					10
EKE	0.147	0.306	0.535	0.944	1.45	2.05	2.65	3.90	5.29	6.08	7.00	7.92	8.82	9.46	10.0

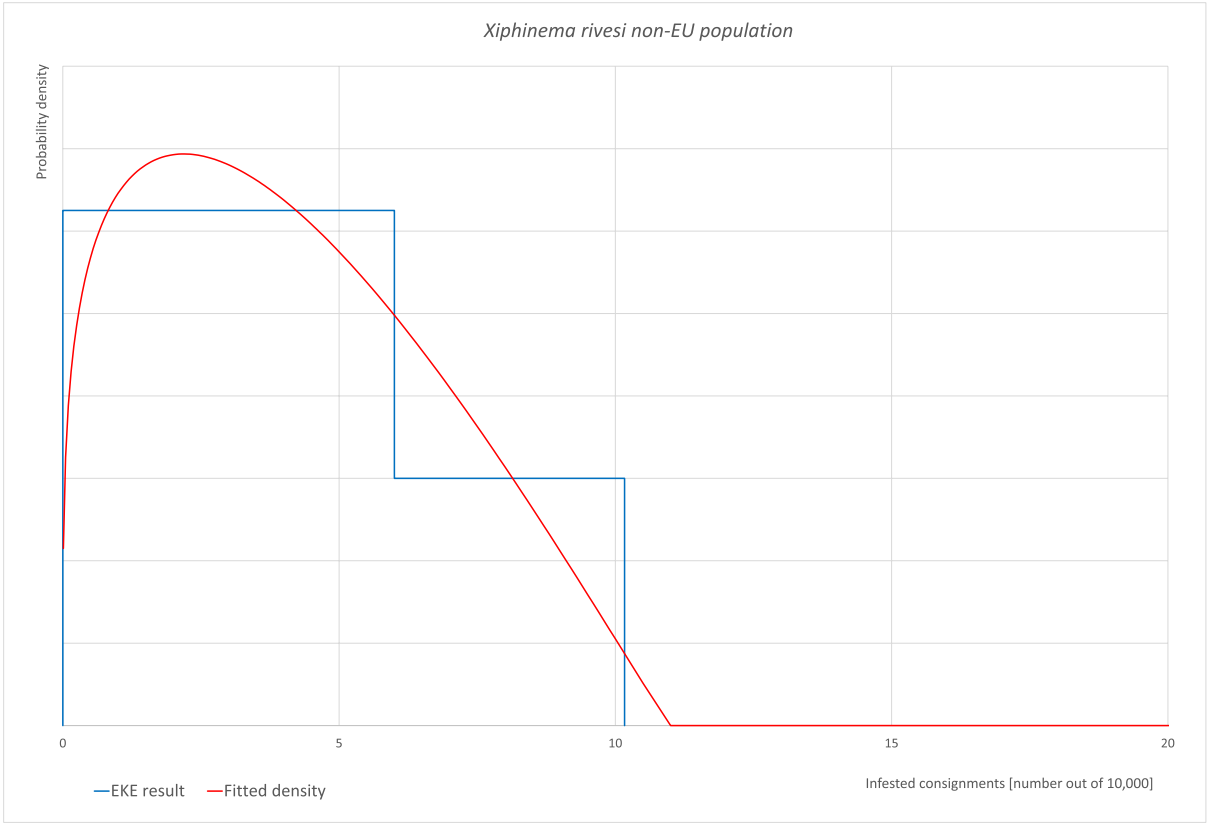
Note: The EKE results are the *BetaGeneral (1.2604, 2.0485, 0, 11)* distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested 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 *Xiphinema rivesi* per 10,000 bundles calculated by Table A.5.

Percentile	1%	2.5%	5%	10%	17%	25%	33%	50%	67%	75%	83%	90%	95%	97.5%	99%
Values	9990					9994		9996		9998					10,000
EKE results	9990	9991	9991	9992	9993	9994	9995	9996	9997.3	9997.9	9998.5	9999.1	9999.5	9999.7	9999.9

Note: The EKE results are the fitted values.



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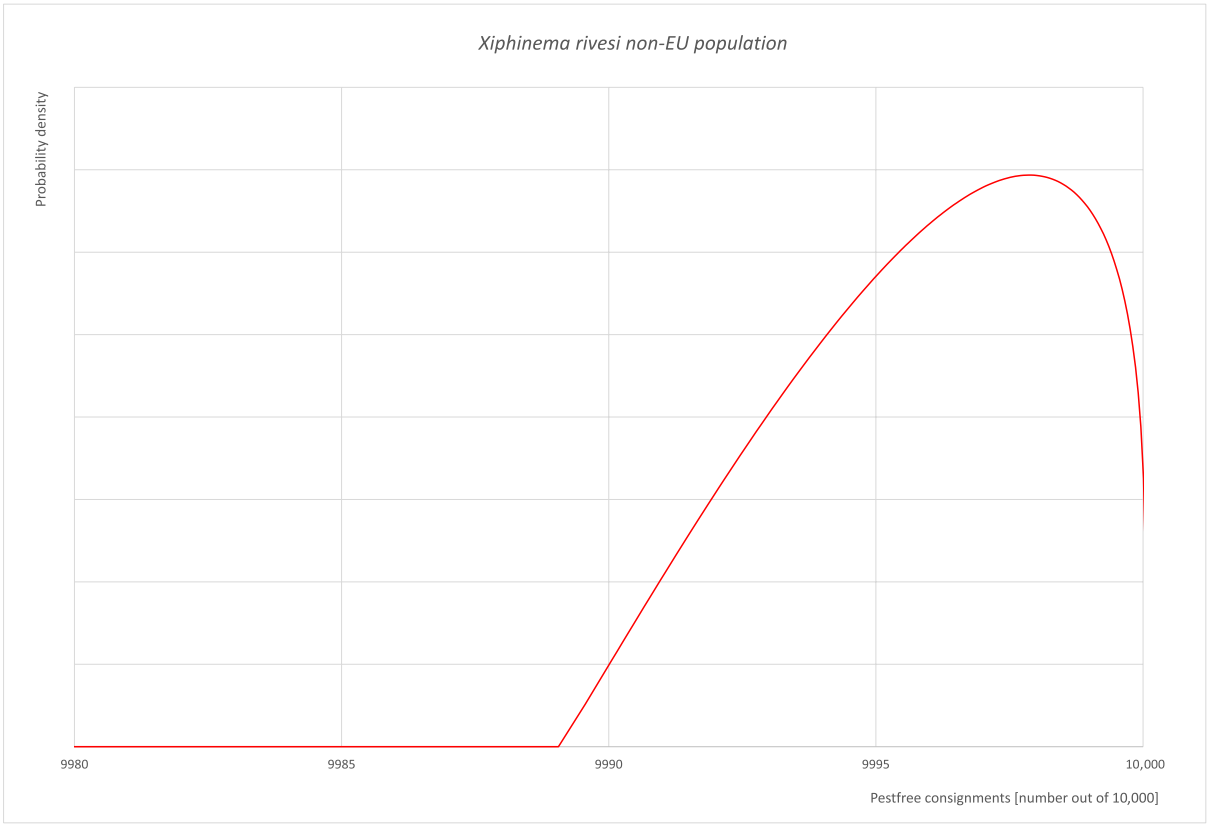
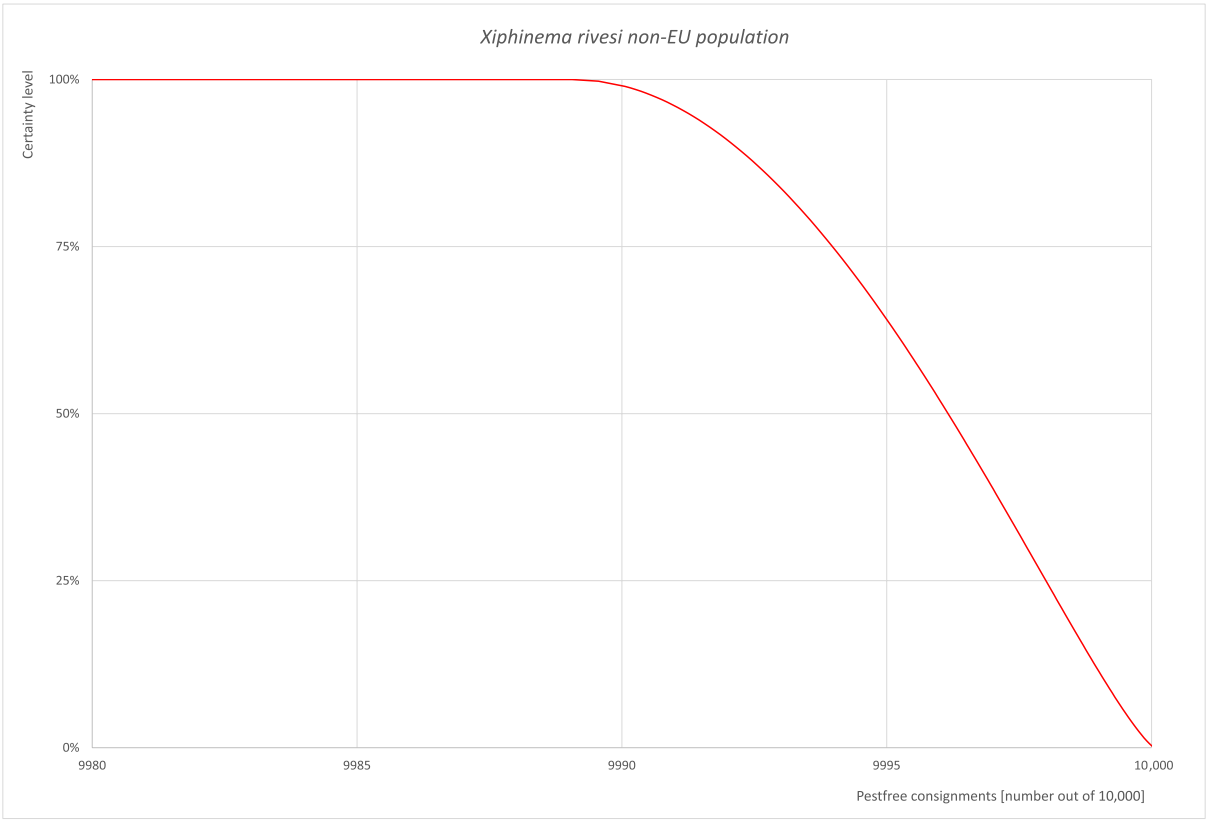


(B)

FIGURE A.3 (Continued)



(C)

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

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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, 4442 papers were retrieved. Titles and abstracts were screened, and 1402 pests were added to the list of pests (see Appendices C,D,E).

Web of Science All databases	*TOPIC*: (*"Prunus domestica" OR "P. Domestica" OR "European plum"*); ("Prunus salicina" OR "P. salicina" OR "Japanese plum$"); ("Prunus armeniaca" OR "P. armeniaca" OR "apricot tree$"); ("Prunus persica" OR "P. persica" OR "peach tree$"); ("Prunus avium" OR "P. avium" OR "sweet cherry tree$"); ("Prunus davidiana" OR "P. davidiana" OR "David's peach"); ("Prunus cerasus" OR "P. cerasus" OR "Cerasus tomentosa" OR "C. tomentosa" OR "sour cherry"); ("Prunus tomentosa" OR "P. tomentosa" OR "Nanking cherry"); ("Prunus dulcis" OR "P. dulcis" OR "almond tree$"); ("Prunus cerasifera" OR "P. cerasifera" OR "Myrobalan"); ("Prunus canescens" OR "P. canescens" OR "Prunus fontanesiana" OR "P. fontanesiana" OR "Prunus vulgaris" OR "P. vulgaris") *AND* *TOPIC*: (pathogen* OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR disease$ OR infecti* OR damag* OR symptom* OR pest$ OR host plant$ OR host-plant$ OR host OR decline$ OR dieback* OR die back* OR die-back* OR wilt$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR nematod* OR vector 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 virus* OR viroid* OR disease$ OR infecti* OR infestation$ OR damage$ OR virosis OR canker OR blister$ OR mosaic OR "leaf curl" OR "latent" OR "fung*" OR "oomycet*" OR "myce*" OR "root lesion$" OR "scab$" OR "rot" OR "rots" OR "rotten" OR "damping off" OR "damping-off" OR "smut" OR "mould" OR "mold" 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 "root feeder$" OR caterpillar$ 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*

Appendix B.1–Search string for *Prunus armeniaca*
Appendix B.2–Search string for *Prunus avium*
Appendix B.3–Search string for *Prunus canescens*, *P. fontanesiana* and *P. vulgaris*
Appendix B.4–Search string for *Prunus cerasifera*
Appendix B.5–Search string for *Prunus cerasus*
Appendix B.6–Search string for *Prunus davidiana*
Appendix B.7–Search string for *Prunus domestica*
Appendix B.8–Search string for *Prunus dulcis*
Appendix B.9–Search string for *Prunus salicina*
Appendix B.10–Search string for *Prunus persica*
Appendix B.11–Search string for *Prunus tomentosa*

Appendices B.1–B.11 can be found in the online version of this output (in the 'Supporting information' section): https://doi.org/10.2903/j.efsa.2024.8647.

APPENDIX C

Excel file with the pest list of *Prunus dulcis*, *P. persica*, *P. armeniaca* and *P. davidiana*

APPENDIX D

Excel file with the pest list of *Prunus avium P. salicina, P. tomentosa and P. cerasus*

APPENDIX E

Excel file with the pest list of *Prunus domestica, P. cerasus and P. cerasifera*

Appendices C, D, E can be found in the online version of this output (in the 'Supporting information' section): https://doi.org/10.2903/j.efsa.2024.8647.