

ADOPTED: 1 December 2022

doi: 10.2903/j.efsa.2023.7735

Commodity risk assessment of *Prunus persica* and *P. dulcis* plants from Türkiye

EFSA Panel on Plant Health (PLH),
Claude Bragard, Paula Baptista, Elisavet Chatzivassiliou, Paolo Gonthier,
Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod,
Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell,
Roel Potting, Philippe Lucien Reignault, Emilio Stefani, Hans-Hermann Thulke,
Wopke Van der Werf, Antonio Vicent Civera, Lucia Zappalà, Andrea Lucchi, Pedro Gómez,
Gregor Urek, Umberto Bernardo, Giovanni Bubici, Anna Vittoria Carluccio, Michela Chiumenti,
Francesco Di Serio, Elena Fanelli, Agata Kaczmarek, Cristina Marzachì,
Olaf Mosbach-Schulz and Jonathan Yuen

Abstract

The European Commission requested the EFSA Panel on Plant Health to prepare and deliver risk assessments for commodities listed in Commission Implementing Regulation (EU) 2018/2019 as 'High risk plants, plant products and other objects'. This Scientific Opinion covers plant health risks posed by plants of *Prunus persica* and *P. dulcis*, as budwood/graftwood, rooted or grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrids, imported from Türkiye, taking into account the available scientific information, including the technical information provided by Türkiye. All pests associated with the commodity were evaluated against specific criteria for their relevance for this opinion. Four quarantine pests (peach rosette mosaic virus, tomato ringspot virus, *Anoplophora chinensis*, *Scirtothrips dorsalis*) and 14 non-regulated pests (*Hoplolaimus galeatus*, *Lasiodiplodia pseudotheobromae*, *Neoscytalidium dimidiatum*, *Neoscytalidium novaehollandiae*, *Didesmococcus unifasciatus*, *Euzophera semifuneralis*, *Lepidosaphes malicola*, *Lepidosaphes pistaciae*, *Maconellicoccus hirsutus*, *Malacosoma parallela*, *Nipaecoccus viridis*, *Phenacoccus solenopsis*, *Pochazia shantungensis*, *Russellaspis pustulans*) that fulfilled all relevant criteria were selected for further evaluation. For these 18 pests, the risk mitigation measures proposed in the technical Dossier from Türkiye were evaluated taking into account the possible limiting factors. For the selected pests, an expert judgement is given on the likelihood of pest freedom taking into consideration the risk mitigation measures acting on the pest, including uncertainties associated with the assessment. The degree of pest freedom varies among the pests evaluated, with fungi from Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum* and *N. novaehollandiae*) being the pests most frequently expected on the imported plants. The Expert Knowledge Elicitation indicated with 95% certainty that between 9,813 and 10,000 bundles (consisting of 10 or 25 plants each) per 10,000 would be free from the above-mentioned fungi in the Botryosphaeriaceae family.

© 2023 Wiley-VCH Verlag GmbH & Co. KGaA on behalf of the European Food Safety Authority.

Keywords: Peach, almond, European Union, pathway risk assessment, plant health, plant pest, quarantine, rootstock

Requestor: European Commission

Question numbers: EFSA-Q-2020-00218, EFSA-Q-2020-00219 and EFSA-Q-2022-00839

Correspondence: plants@efsa.europa.eu

Panel members: Claude Bragard, Elisavet Chatzivassiliou, Francesco Di Serio, Paula Baptista, Paolo Gonthier, Josep Anton Jaques Miret, Annemarie Fejer Justesen, Alan MacLeod, Christer Sven Magnusson, Panagiotis Milonas, Juan A Navas-Cortes, Stephen Parnell, Roel Potting, Philippe L Reignault, Emilio Stefani, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent, Jonathan Yuen and Lucia Zappalà.

Declarations 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.

Acknowledgements: EFSA wishes to acknowledge the contribution of Patricia Nascimento.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Baptista P, Chatzivassiliou E, Gonthier P, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Stefani E, Thulke H-H, Van der Werf W, Civera AV, Zappalà L, Lucchi A, Gómez P, Urek G, Bernardo U, Bubici G, Carluccio AV, Chiumenti M, Di Serio F, Fanelli E, Kaczmarek A, Marzachi C, Mosbach-Schulz O and Yuen J, 2023. Scientific Opinion on the commodity risk assessment of *Prunus persica* and *P. dulcis* plants from Türkiye. EFSA Journal 2023;21(1):7735, 212 pp. <https://doi.org/10.2903/j.efsa.2023.7735>

ISSN: 1831-4732

© 2023 Wiley-VCH Verlag GmbH & Co. KGaA on behalf of the European Food Safety Authority.

This is an open access article under the terms of the [Creative Commons Attribution-NoDerivs](https://creativecommons.org/licenses/by/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited and no modifications or adaptations are made.

EFSA may include images or other content for which it does not hold copyright. In such cases, EFSA indicates the copyright holder and users should seek permission to reproduce the content from the original source.



The EFSA Journal is a publication of the European Food Safety Authority, a European agency funded by the European Union.



Table of contents

| | |
|--|-----|
| Abstract..... | 1 |
| 1. Introduction..... | 4 |
| 1.1. Background and Terms of Reference as provided by European Commission..... | 4 |
| 1.1.1. Background..... | 4 |
| 1.1.2. Terms of Reference..... | 4 |
| 1.2. Interpretation of the Terms of Reference..... | 4 |
| 2. Data and methodologies..... | 5 |
| 2.1. Data provided by the Ministry of Agriculture and Forestry, Republic of Türkiye..... | 5 |
| 2.2. Literature searches performed by EFSA..... | 7 |
| 2.3. Methodology..... | 8 |
| 2.3.1. Commodity data..... | 8 |
| 2.3.2. Identification of pests potentially associated with the commodity..... | 8 |
| 2.3.3. Listing and evaluation of risk mitigation measures..... | 9 |
| 2.3.4. Expert knowledge elicitation..... | 10 |
| 3. Commodity data..... | 10 |
| 3.1. Description of the commodity..... | 10 |
| 3.2. Production and handling processes..... | 11 |
| 3.2.1. Growing conditions..... | 11 |
| 3.2.2. Source of planting material..... | 11 |
| 3.2.3. Production cycle..... | 12 |
| 3.2.4. Pest monitoring during production..... | 12 |
| 3.2.5. Post-harvest processes and export procedure..... | 12 |
| 3.3. Description of the production areas..... | 13 |
| 4. Identification of pests potentially associated with the commodity..... | 14 |
| 4.1. Selection of relevant EU-quarantine pests associated with the commodity..... | 14 |
| 4.2. Selection of other relevant pests (non-regulated in the EU) associated with the commodity..... | 20 |
| 4.3. Overview of interceptions..... | 20 |
| 4.4. Summary of pests selected for further evaluation..... | 20 |
| 5. Risk mitigation measures..... | 21 |
| 5.1. Possibility of pest presence in the export nurseries..... | 22 |
| 5.2. Risk mitigation measures applied in Türkiye..... | 22 |
| 5.3. Evaluation of the current measures for the selected relevant pests including uncertainties..... | 24 |
| 5.3.1. Overview of the evaluation of <i>Hoplolaimus galeatus</i> | 24 |
| 5.3.2. Overview of the evaluation of peach rosette mosaic virus..... | 25 |
| 5.3.3. Overview of the evaluation of tomato ringspot virus..... | 26 |
| 5.3.4. Overview of the evaluation of <i>Lasiodiplodia pseudotheobromae</i> | 26 |
| 5.3.5. Overview of the evaluation of <i>Neoscytalidium dimidiatum</i> | 27 |
| 5.3.6. Overview of the evaluation of <i>Neoscytalidium novaehollandiae</i> | 28 |
| 5.3.7. Overview of the evaluation of <i>Anoplophora chinensis</i> | 28 |
| 5.3.8. Overview of the evaluation of <i>Didesmococcus unifasciatus</i> | 29 |
| 5.3.9. Overview of the evaluation of <i>Euzophera semifuneralis</i> | 30 |
| 5.3.10. Overview of the evaluation of <i>Lepidosaphes</i> group (<i>Lepidosaphes malicola</i> and <i>Lepidosaphes pistaciae</i>)..... | 31 |
| 5.3.11. Overview of the evaluation of <i>Maconelicoccus hirsutus</i> | 32 |
| 5.3.12. Overview of the evaluation of <i>Malacosoma parallela</i> | 33 |
| 5.3.13. Overview of the evaluation of <i>Nipaecoccus viridis</i> | 34 |
| 5.3.14. Overview of the evaluation of <i>Phenacoccus solenopsis</i> | 34 |
| 5.3.15. Overview of the evaluation of <i>Pochazia shantungensis</i> | 35 |
| 5.3.16. Overview of the evaluation of <i>Russellaspis pustulans</i> | 36 |
| 5.3.17. Overview of the evaluation of <i>Scirtothrips dorsalis</i> | 37 |
| 5.3.18. Outcome of Expert Knowledge Elicitation..... | 37 |
| 6. Conclusions..... | 42 |
| References..... | 44 |
| Abbreviations..... | 46 |
| Glossary..... | 46 |
| Appendix A – Data sheets of pests selected for further evaluation via Expert Knowledge Elicitation..... | 48 |
| Appendix B – Web of Science All Databases Search String..... | 194 |
| Appendix C – List of pests that can potentially cause an effect not further assessed..... | 211 |
| Appendix D – Excel file with the pest list of <i>Prunus persica</i> and <i>P. dulcis</i> and <i>P. armeniaca</i> and <i>P. davidiana</i> | 212 |

1. Introduction

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

1.1.1. Background

The Plant Health Regulation (EU) 2016/2031¹, on the protective measures against pests of plants, has been applied from December 2019. Provisions within the above Regulation are in place for the listing of 'high risk plants, plant products and other objects' (Article 42) on the basis of a preliminary assessment, and to be followed by a commodity risk assessment. A list of 'high risk plants, plant products and other objects' has been published in Regulation (EU) 2018/2019². 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. 178/2002³, 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 *Prunus persica* or *P. dulcis* grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrids from Türkiye taking into account the available scientific information, including the technical dossier provided by the Ministry of Agriculture and Forestry Republic of Türkiye.

1.2. Interpretation of the Terms of Reference

The EFSA Panel on Plant Health (hereafter referred to as 'the Panel') was requested to conduct a commodity risk assessment of *Prunus persica* and *P. dulcis* plants for planting from Türkiye following the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019a).

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 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

¹ Regulation (EU) 2016/2031 of the European Parliament and 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.

for those non-European populations, or isolates, or species: Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (SeveroZapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug), San Marino, Serbia, Switzerland, Türkiye and United Kingdom (except Northern Ireland). Those countries are historically linked to the reference to 'non-European countries' existing in the previous legal framework, Directive 2000/29/EC.

Consequently, for those countries,

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

Pests listed as 'Regulated Non-Quarantine Pest' (RNQP) in Annex IV of the Commission Implementing Regulation (EU) 2019/2072, and deregulated pests (i.e. 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 case a pest is at the same time regulated as an RNQP and as a protected zone quarantine pest, in this opinion, it should be evaluated as quarantine pest.

In its evaluation, the Panel:

- Checked whether the information provided by the applicant Ministry of Agriculture and Forestry Republic of Türkiye 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), hereafter referred to as 'EU quarantine pests') and other relevant pests present in Türkiye and associated with the commodity.
- Assessed whether or not the applicant country implements specific measures for Union quarantine pests for which specific measures are in place for the import of the commodity from the specific country in the relevant legislative texts for emergency measures (https://ec.europa.eu/food/plant/plant_health_biosecurity/legislation/emergency_measures_en); the assessment was restricted to whether or not the applicant country applies those measures. The effectiveness of those measures was not assessed.
- Assessed whether the applicant country implements the special requirements specified in Annex VII (points 1–101) 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 proposed by the Ministry of Agriculture and Forestry.

2. Data and methodologies

2.1. Data provided by the Ministry of Agriculture and Forestry, Republic of Türkiye

The Panel considered all the data and information (hereafter called 'the Dossier') provided by the Ministry of Agriculture and Forestry of Republic of Türkiye in March 2020, including the additional

information provided by the Ministry of Agriculture and Forestry of Republic of Türkiye in June 2020, June 2022 and July 2022, after EFSA's request. The Dossier is managed by EFSA.

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

Table 1: Structure and overview of the submitted Dossier and additional information

| No. | Overview of contents | Filename |
|-----|---|--|
| 1. | Technical Dossier | PEACH Technical Report-29.01.2020.pdf ALMOND Technical Report-29.01.2020 |
| 2. | Additional information provided on 15 June 2020 | PEACH_Technical_report-TR-05.05.2020_V2.pdf ALMOND_Technical_Report-TR-05.05.2020_V2.pdf |
| 3. | Additional information provided on 07 June 2022 | Peach species.docx Almond species.docx |
| 4. | Additional information provided on 22 July 2022 | A. List of harmful organisms and control types in the Plant Health in Fruit and Vine Sapling and Production Materials Directive.docx Annex 1-REGULATION ON THE PLANT PASSPORT SYSTEM AND REGISTRATION OF OPERATORS.docx Annex 2-PRODUCTION, CERTIFICATION AND MARKETING OF FRUIT AND VINE SAPLINGS.docx Annex 3-REGULATION ON THE CERTIFICATION AND MARKETING OF YOUNG FRUIT PLANTS AND PROPAGATION MATERIALS.docx Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine.docx Answers-EFSA-Q-2020-00218-2020-00219-Türkiye_Prunus dulci_Prunus persica_ROI.docx |

The data and supporting information provided by the Ministry of Agriculture and Forestry, of Türkiye formed the basis of the commodity risk assessment.

Table 2 shows the main data sources used by the Ministry of Agriculture and Forestry of Türkiye to compile the Dossier (details on literature searches can be found in Dossier Section 1.1).

Table 2: Database sources used in the literature searches by the Ministry of Agriculture and Forestry of Türkiye

| Acronym/ Short title | Database name and service provider | URL of database | Justification for choosing database |
|----------------------|--|---|---|
| CABI | CABI Invasive Species Compendium (online) | https://www.cabi.org/isc/ | Encyclopaedic resource including science-based information, comprising detailed data sheets on pests, diseases, weeds, host crops and natural enemies on trustable sources. |
| EPPO | Name: EPPO Global Database Provider: European and Mediterranean Plant Protection Organization | https://gd.eppo.int/ | This database provides all pest-specific information on host range, distribution ranges and pest status. |
| | Plant Protection Bulletin (Journal, available online) | https://dergipark.org.tr/en/pub/bitkorb | Provides research articles on biological, ecological, physiological, epidemiological, taxonomic studies and methods of protection in the field of disease, pest and weed and natural enemies that cause damage in plant and plant products. In addition, studies on residue, toxicology and formulations of plant protection products and plant protection machinery are also included. |
| | Fauna Europaea (Online) | https://fauna-eu.org/ | Fauna Europaea is Europe's main zoological taxonomic index. The index was used to verify the taxonomic position of the insects. |

| Acronym/ Short title | Database name and service provider | URL of database | Justification for choosing database |
|-------------------------|--|---|---|
| | Plant Protection Products Database Application (online) | https://bku.tarim.gov.tr/ | This database covers registered Plant Protection Products in Türkiye. It is updated periodically online. This link was used in order to fulfil E1 table content. |
| | International Plant Protection Convention (IPPC, online) | https://www.ippc.int/en/core-activities/standards-setting/ispms/ | The IPPC provides an international framework for plant protection that includes developing International Standards for Phytosanitary Measures (ISPMs) for safeguarding plant resources. |

2.2. Literature searches performed by EFSA

Literature searches in different databases were undertaken by EFSA to complete a list of pests potentially associated with *P. persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana*. The following searches were combined: (i) a general search to identify pests of *P. persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana* in different databases and (ii) a tailored search to identify whether these pests were present or not in Türkiye (the search was done using the former name Turkey) and the EU. The searches were run between 17 May 2021 and 12 July 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 3, 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 3: Databases used by EFSA for the compilation of the pest list associated with *Prunus persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana*

| Database | Platform/Link |
|--|---|
| Aphids on World Plants | http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm |
| CABI Crop Protection Compendium | https://www.cabi.org/cpc/ |
| Database of Insects and their Food Plants | http://www.brc.ac.uk/dbif/hosts.aspx |
| Database of the World's Lepidopteran Hostplants | https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm1 |
| EPPO Global Database | https://gd.eppo.int/ |
| EUROPHYT | https://webgate.ec.europa.eu/europhyt/ |
| Leaf-miners | http://www.leafmines.co.uk/html/plants.htm |
| Nemaplex | http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx |
| Plant Pest Information Network | https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/ |
| Scalenet | http://scalenet.info/associates/ |
| Spider Mites Web | https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php |
| USDA ARS Fungal Database | https://nt.ars-grin.gov/fungaldbases/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 | Web of Science https://www.webofknowledge.com |

| Database | Platform/Link |
|--|---|
| FSTA, KCI-Korean Journal Database, Russian Science Citation Index, MEDLINE SciELO Citation Index, Zoological Record | |
| World Agroforestry | http://www.worldagroforestry.org/treedb2/species/profile.php?Spid=1749 |
| GBIF | https://www.gbif.org/ |
| Fauna Europaea | https://fauna-eu.org/ |
| EFSA Pest Categorization of Non-EU virus and viroids of <i>Prunus</i> L. | https://www.efsa.europa.eu/it/efsajournal/pub/5735 |
| EFSA List of Non-EU viruses and viroids of <i>Cydonia</i> Mill., <i>Fragaria</i> L., <i>Malus</i> Mill., <i>Prunus</i> L., <i>Pyrus</i> L., <i>Ribes</i> L., <i>Rubus</i> L. and <i>Vitis</i> L. | https://www.efsa.europa.eu/it/efsajournal/pub/5501 |

Additional searches, limited to retrieve documents, were run when developing the opinion. The available scientific information, including previous EFSA opinions on the relevant pests and diseases (see pest data sheets in Appendix A) and the relevant literature and legislation (e.g. Regulation (EU) 2016/2031; Commission Implementing Regulations (EU) 2018/2019; (EU) 2018/2018 and (EU) 2019/2072) were taken into account.

2.3. Methodology

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

In the first step, pests potentially associated with the commodity in the country of origin (EU-quarantine pests and other pests) that may require risk mitigation measures were identified. The EU non-quarantine pests not known to occur in the EU were selected based on evidence of their potential impact in the EU. After the first step, all the relevant pests that may need risk mitigation measures were identified.

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

A conclusion on the likelihood of the commodity being free from each of the relevant 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 25 plants.

2.3.1. Commodity data

Based on the information provided by the Ministry of Agriculture and Forestry of Türkiye, the characteristics of the commodity were summarised.

2.3.2. Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of *P. persica* and *P. dulcis*, as budwood/graftwood, rooted or grafted on *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrid rootstocks from Türkiye, a pest list was compiled. The pest list is a compilation of all identified plant pests associated with *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* based on (1) information provided in the PEACH Technical Report and ALMOND Technical Report, (2) additional information provided, (3) as well as on searches performed by the Panel. The search strategy and search syntax were adapted to each of the databases listed in Table 3, according to the options and functionalities of the different databases and CABI keyword thesaurus.

The scientific names of the host plants (i.e. *Prunus persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana*) were used when searching in the EPPO Global database and CABI Crop Protection Compendium. The same strategy (including also the common names i.e. almond, peach, etc.) was applied to the other databases excluding EUROPHYT and Web of Science.

EUROPHYT was consulted by searching for the interceptions associated with commodities imported from Türkiye, at species level, from 1995 to May 2020 and TRACES for interceptions from May 2020 to September 2022. For the pests selected for further evaluation, a search in the EUROPHYT and/or TRACES was performed for the interceptions from the whole world, at species level.

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

The established search strings are detailed in Appendix B and were run between 17 May 2021 and 12 July 2022.

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

The compiled pest list (see Microsoft Excel[®] file in Appendix D) includes all identified pests that use *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* as host. According to the Interpretation of Terms of Reference, Appendix D also includes organisms that are not pests, such as: predators, biocontrol agents, etc.

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

2.3.3. Listing and evaluation of risk mitigation measures

All proposed risk mitigation measures were listed and evaluated. When evaluating the likelihood of pest freedom at origin, the following types of potential infection/infestation sources for *P. persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana* 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 Türkiye) were evaluated with Expert Knowledge Elicitation (EKE) according to the Guidance on uncertainty analysis in scientific assessment (EFSA Scientific Committee, 2018).

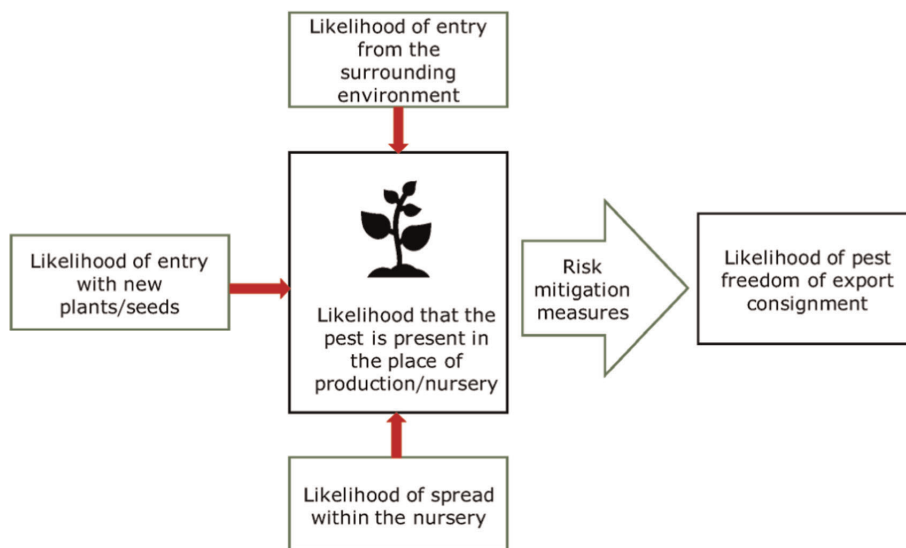


Figure 1: Conceptual framework to assess likelihood that plants are exported free from relevant pests. Source EFSA PLH Panel, 2019b

Information on the biology 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 commodity, an Expert Knowledge Elicitation (EKE) was performed following EFSA guidance (Annex B.8 of EFSA Scientific Committee, 2018). The specific question for EKE was: 'Taking into account (i) the risk mitigation measures in place in the nurseries, and (ii) other relevant information, how many of 10,000 bundles of *Prunus persica* and *P. dulcis*, either as (a) budwood or graftwood, (b) rooted or (c) grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana*, or their hybrids will be infested with the relevant pest when arriving in the EU. The risk assessment uses bundles of 10–25 plants as the most suitable unit. The EKE question was common to all pests for which the pest freedom of the commodity was estimated, except for the nematode *Hoplolaimus galeatus*, where the budwood and graftwood were excluded.

The following reasoning is given:

- i) There is no quantitative information available regarding how clustering of plants takes place during production and packaging;
- ii) Plants are grouped in bundles of 10 or 25 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 5% percentile of the uncertainty distribution reflects the opinion that pest freedom is with 95% certainty above this limit.

3. Commodity data

3.1. Description of the commodity

According to the Dossier (Section 3) and the integration of additional information provided, the commodities to be imported are either budwood/graftwood, or bare-rooted grafted or ungrafted plants of *Prunus persica* (common name: peach, family: Rosaceae) and *Prunus dulcis* (common name: almond, family: Rosaceae).

Our understanding of both dossiers is that Türkiye asks for the derogation for export to the EU of the following commodities:

- budwood/graftwood of *Prunus persica*
- budwood/graftwood of *Prunus dulcis*
- Ungrafted bare-rooted plants of *Prunus persica*
- Ungrafted bare-rooted plants of *Prunus dulcis*
- Bare-rooted grafted plants of *Prunus persica*
- Bare-rooted grafted plants of *Prunus dulcis*

Regarding the specification of rootstocks, we assume that the rootstock for each grafted plant is one of the following:

- *Prunus persica*
- *Prunus dulcis*
- *Prunus armeniaca*
- Hybrids between *P. persica*, *P. dulcis* and *P. armeniaca*
- Nemaguard which according to the University of California rootstock database is a hybrid of *P. persica* and *P. davidiana*

The plants are removed during the dormant period. Based on this information and the photographs in the dossiers, the assessment was performed assuming that the commodities had no leaves when exported.

According to the dossier, there are two types of grafting used in almond and peach, whip and tongue graft or T-budding. Mostly clonal rootstocks are used, which are produced via tissue culture or cuttings.

Sometimes rootstocks are produced from seeds. The diameter of the exported plants depends on the grafting method. For whip and tongue grafting, the size is 1 cm and for T-budding is 1.8 cm. This measurement is taken 5 cm over the graft site.

The assessment performed assumes that the characteristics of the commodity are as described above.

3.2. Production and handling processes

3.2.1. Growing conditions

According to the Dossiers section 3.13, the production of plants is carried out in the soil in the production plots in open fields (Figures 2 and 3). The export from Türkiye is made from production sites in the provinces Adana, İzmir (Ödemiş), Sakarya, Bursa and Balıkesir.



Figure 2: Peach plants for planting in open field in Türkiye as provided by the Ministry of Agriculture and Forestry of Türkiye



Figure 3: Almond plants for planting in open field in Türkiye as provided by the Ministry of Agriculture and Forestry of Türkiye

3.2.2. Source of planting material

According to the additional information submitted in July 2022, propagation materials originate from mother plants in Türkiye (Table 4). Some producers have their own mother plants, some of them are from other sources within Türkiye; however, details were not supplied. All of these plants are

inspected officially one or more times in a year by the Ministry official via visual examination and/or via laboratory analysis in terms of harmful organisms. Then, if they are free from harmful organisms listed in Instruction on Plant Health in Fruit and Vine Saplings and Propagation Materials and in the Quarantine Organisms List, propagation materials are certified. Then, these certified propagation materials are used for the production of plants for planting in Türkiye. During the inspections in the production area, the ministry official checks the documents related to the production as well as the examinations in terms of plant health in the production area. It is obligatory to submit the official certificate of the production material used in the appendix of the production declaration to the Ministry.

3.2.3. Production cycle

Soil is checked before planting to determine the presence of nematodes. The production of plants is carried out in the soil in the production plots in open fields. There are two types of grafting in the almond and peach production: (a) whip and tongue graft and (b) T-budding. The main production method is via clonal rootstocks which are produced using tissue culture. In a minority of cases, seedlings or cuttings are used as rootstocks. No details on their origin were provided.

- a) Clonal rootstocks, produced in tissue culture, are planted at the nursery in autumn or in February–March and grafted in August; young plants are pulled from the soil the following year in November. Young plants are ready for delivery in 19–23 months.
- b) Another production method uses clonal rootstocks which are planted in the nursery in autumn or in February and then grafted in May–June; young plants are pulled from the soil in November of the same year. Young plants are ready for delivery in 9–12 months.

Some producers use seedlings as rootstock. In this way, seeds are sown in February and seedlings are pulled in November. So, seedlings are ready to be grafted in 9 months.

Whether clonal rootstocks or seedlings are used, the subsequent procedures for grafted plant production are similar. Plants are ready for dispatch from 6 to 15 months after grafting, depending on the method of grafting. The time after grafting is 15 months if dormant T-budding is used, and 6 months if whip and tongue grafting are used. No details on defoliation were provided.

3.2.4. Pest monitoring during production

According to the original dossiers, Türkiye is in the accession period to European Union therefore plant health regulations are in line with EU regulations and the pesticides registered in Türkiye are all same with EU. *P. dulcis* and *P. persica* plants producers must be registered according to Turkish regulation (Annex 1-additional information submitted (Table 1)).

To obtain the certification, plants must fulfil the requirements specified in another document 'Special Conditions Requested For The Movement Of Plant And Herbal Products in The Country'. One of the requirements is that plants must be free from harmful organisms listed in another official document submitted by Turkish authority (Table 1) (Annex 2) as well as in the 'Quarantine Organisms List' provided by General Directorate of Food and Control in Türkiye.

Inspections of the plants are carried out by the technical teams of the Provincial Directorate, in accordance with the legislation stated above. According to the additional information provided by Turkish authority methods used for the target population, sampling strategy, sample size, detection methods and results are in line with EPPO standards.

Mother plants are inspected officially once or, if required, more times in a year by visual and/or laboratory analysis.

Control activities for pest and diseases are recommended in Annex IV. This also includes 'Plant Protection Products to be Used Against Diseases, Pests and Weeds in the Peach and Nectarine Integrated Control Program'.

In addition, the sale of plants for planting is regulated by specific legislation (Annex 3).

At least once per year documents of registered operators are checked. Operators are required to keep documents related to registration and plant passports, as well as records related to plants, plant products and other items that are grown or sold.

3.2.5. Post-harvest processes and export procedure

Before the export, the plants are washed with water and their roots are cleaned from soil. Washed plants are grouped into bundles of 10 or 25 and labelled. Bundles are treated with a fungicide

(Thiram) and then loaded for export. Commodity is stored and transported in refrigerated trucks with the temperature between 2°C and 4°C and 85% and 95% relative humidity. This takes place in the provinces of Adana, İzmir (Ödemiş), Sakarya, Bursa and Balıkesir.

3.3. Description of the production areas

According to the dossier and additional information provided, *P. persica* nurseries are located in 30 provinces in Türkiye. They are mainly concentrated in İzmir, Bursa, Canakkale, Mersin, Isparta and Adana provinces. İzmir is the main province for production (Figure 4).

Prunus dulcis nurseries are located in 27 provinces in Türkiye, mainly concentrated in Sanliurfa, Mersin, Adana, İzmir and Adiyaman provinces. Sanliurfa is the main province for almond production (Figure 5).

For materials to be marketed within Türkiye or abroad, the isolation distance of the production areas of *P. dulcis* or *P. persica* from fruit orchards and other production areas is the same (Table 4).

Table 4: Isolation distances from other areas of preliminary basic, basic and certified productions in almond and peach species (Dossier Section 3.3)

| Plant group | Pre-basic and basic production material | Certified and standard production material | Production nurseries |
|-------------------|---|---|---|
| <i>P. persica</i> | It should be established in screen house. | It must be at least 300 m away from material other than certification. It should be at least 2 km away from the plum pox virus (PPV) infected material. | It must be at least 15 m away from the certification. |
| <i>P. dulcis</i> | It should be established in screen house. | It must be at least 300 m away from material other than certification. It should be at least 2 km away from the PPV infected material. | It must be at least 15 m away from the certification. |



Figure 4: Location of the production areas of *Prunus persica* in Türkiye as provided by the Ministry of Agriculture and Forestry of Türkiye



Figure 5: Location of the production areas of *Prunus dulcis* in Türkiye as provided by the Ministry of Agriculture and Forestry of Türkiye

4. Identification of pests potentially associated with the commodity

The search for potential pests associated with either *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* is listed in Appendix D.

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

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

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

- The pest is present in Türkiye;
- At least one of the following species: *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* is a host of the pest;
- One or more life stages of the pest can be associated with the specified commodity.

Pests that fulfilled all criteria were selected for further evaluation.

Eighty-four EU-quarantine species that are reported to use *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* as a host plant were evaluated (Table 5) for their relevance of being included in this opinion. Four species present in Türkiye (peach rosette mosaic virus, tomato ringspot virus, *Anoplophora chinensis* and *Scirtothrips dorsalis*) were selected for further evaluation.

Table 5: Overview of the evaluation of the 84 EU-quarantine pest species known to use *P. persica* or *P. dulcis* or *P. armeniaca* or *P. davidiana* as host plants for their relevance for this opinion

| No. | Pest name according to EU legislation ^(a) | EPPO code | Group | Present in Türkiye | Host <i>P. persica</i> (Pp) or <i>P. dulcis</i> (Pd) or <i>P. armeniaca</i> (Pa) or <i>P. davidiana</i> (P da) | <i>Prunus</i> spp. Host (reference) | Pest can be associated with the commodity | Pest relevant for the opinion |
|-----|---|-----------|-------------|--------------------|--|--|---|-------------------------------|
| 1 | <i>Xanthomonas arboricola</i> pv. <i>pruni</i> | XANTPR | Bacteria | No | Pp, Pd, Pa, P. da | CABI, online; EPPO, online; Farr and Rossman, online | NA | No |
| 2 | <i>Xylella fastidiosa</i> | XYLEFA | Bacteria | No | Pp, Pd, Pa | CABI, online; EPPO, online | NA | No |
| 3 | <i>Erwinia amylovora</i> | ERWIAM | Bacteria | Yes | Pa | CABI, online; EPPO, online | No ^(b) | No |
| 4 | <i>Candidatus Phytoplasma aurantifolia</i> | PHYPAF | Phytoplasma | No | Pp | EPPO, online | NA | No |
| 5 | <i>Candidatus Phytoplasma australiense</i> | PHYPAU | Phytoplasma | No | Pp | CABI, online | NA | No |
| 6 | <i>Candidatus Phytoplasma phoenicium</i> | PHYPPH | Phytoplasma | No | Pp, Pd, Pa | CABI, online; EPPO, online | NA | No |
| 7 | <i>Candidatus Phytoplasma pruni</i> | PHYPPN | Phytoplasma | No | Pp, Pd, Pa | EPPO, online | NA | No |
| 8 | <i>Phytoplasma fraxini</i> | PHYPFR | Phytoplasma | No | Pp | CABI, online | NA | No |
| 9 | <i>Phytoplasma ziziphi</i> | PHYPZI | Phytoplasma | No | Pp | CABI, online | NA | No |
| 10 | <i>Apiosporina morbosa</i> | DIBOMO | Fungi | No | Pp, Pd, Pa | CABI, online; EPPO, online; Farr and Rossman, online | NA | No |
| 11 | <i>Neocosmospora euwallaceae</i> | FUSAEW | Fungi | No | Pd | Farr and Rossman, online | NA | No |
| 12 | <i>Phymatotrichopsis omnivora</i> | PHMPOM | Fungi | No | Pp, Pd, Pa | CABI, online; EPPO, online | NA | No |
| 13 | <i>Acleris minuta</i> | ACLRFMI | Insects | No | Pp | Lepidopteran | NA | No |
| 14 | <i>Aleurocanthus spiniferus</i> | ALECSN | Insects | No | Pp, Pa | EPPO, online | NA | No |
| 15 | <i>Aleurocanthus woglumi</i> | ALECWO | Insects | No | Pp, Pa | CABI, online | NA | No |
| 16 | <i>Anastrepha fraterculus</i> as <i>Anastrepha</i> spp. | ANSTFR | Insects | No | Pp, Pd, Pa | CABI, online; EPPO, online | NA | No |
| 17 | <i>Anastrepha ludens</i> | ANSTLU | Insects | No | Pp | CABI, online; EPPO, online | NA | No |

| No. | Pest name according to EU legislation ^(a) | EPPO code | Group | Present in Türkiye | Host <i>P. persica</i> (Pp) or <i>P. dulcis</i> (Pd) or <i>P. armeniaca</i> (Pa) or <i>P. davidiana</i> (P da) | <i>Prunus</i> spp. Host (reference) | Pest can be associated with the commodity | Pest relevant for the opinion |
|-----|--|-----------|---------|--------------------|--|-------------------------------------|---|-------------------------------|
| 18 | <i>Anastrepha obliqua</i> as <i>Anastrepha</i> spp. | ANSTOB | Insects | No | Pd | CABI, online | NA | No |
| 19 | <i>Anastrepha serpentina</i> as <i>Anastrepha</i> spp. | ANSTSE | Insects | No | Pp | CABI, online | NA | No |
| 20 | <i>Anastrepha striata</i> as <i>Anastrepha</i> spp. | ANSTST | Insects | No | Pp | CABI, online | NA | No |
| 21 | <i>Anastrepha suspensa</i> as <i>Anastrepha</i> spp. | ANSTSU | Insects | No | Pp | CABI, online; EPPO, online | NA | No |
| 22 | <i>Anoplophora chinensis</i> | ANOLCN | Insects | Yes | Pd, Pp, Pa, Pda | EPPO, online | Yes | Yes |
| 23 | <i>Anthonomus quadrigibbus</i> | TACYQU | Insects | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 24 | <i>Toxoptera citricida</i> | TOXOCI | Insects | No | Pd | Blackman and Eastop, online | NA | No |
| 25 | <i>Apriona cinerea</i> | APRICI | Insects | No | Pp, Pa | EPPO, online | NA | No |
| 26 | <i>Aromia bungii</i> | AROMBU | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 27 | <i>Bactrocera cucurbitae</i> as <i>Bactrocera</i> spp. | DACUCU | Insects | No | Pp | CABI, online | NA | No |
| 28 | <i>Bactrocera dorsalis</i> | DACUDO | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 29 | <i>Bactrocera facialis</i> as <i>Bactrocera</i> spp. | BCTRFA | Insects | No | Pp | CABI, online | NA | No |
| 30 | <i>Bactrocera jarvisi</i> as <i>Bactrocera</i> spp. | BCTRJA | Insects | No | Pp | CABI, online | NA | No |
| 31 | <i>Bactrocera kirki</i> as <i>Bactrocera</i> spp. | BCTRKI | Insects | No | Pp | CABI, online | NA | No |
| 32 | <i>Bactrocera neohumeralis</i> as <i>Bactrocera</i> spp. | BCTRNE | Insects | No | Pp | CABI, online | NA | No |
| 33 | <i>Bactrocera psidii</i> as <i>Bactrocera</i> spp. | DACUPS | Insects | No | Pp | CABI, online | NA | No |
| 34 | <i>Bactrocera pyrifoliae</i> as <i>Bactrocera</i> spp. | BCTRPY | Insects | No | Pp | CABI, online; EPPO, online | NA | No |

| No. | Pest name according to EU legislation ^(a) | EPPO code | Group | Present in Türkiye | Host <i>P. persica</i> (Pp) or <i>P. dulcis</i> (Pd) or <i>P. armeniaca</i> (Pa) or <i>P. davidiana</i> (P da) | <i>Prunus</i> spp. Host (reference) | Pest can be associated with the commodity | Pest relevant for the opinion |
|-----|---|-----------|---------|--------------------|--|-------------------------------------|---|-------------------------------|
| 35 | <i>Bactrocera trivialis</i> as <i>Bactrocera</i> spp. | BCTRTV | Insects | No | Pp | CABI, online | NA | No |
| 36 | <i>Bactrocera tryoni</i> as <i>Bactrocera</i> spp. | DACUTR | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 37 | <i>Bactrocera tuberculata</i> as <i>Bactrocera</i> spp. | BCTRTU | Insects | No | Pp | CABI, online | NA | No |
| 38 | <i>Bactrocera zonata</i> | DACUZO | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 39a | <i>Bemisia tabaci</i> (European populations) | BEMITA | Insects | Yes | Pp | CABI, online | No | No |
| 39b | <i>Bemisia tabaci</i> (non-European populations) | BEMITA | Insects | No | Pp | CABI, online | NA | No |
| 40 | <i>Carposina sasakii</i> | CARSSA | Insects | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 41 | <i>Ceratitis cosyra</i> as <i>Ceratitis</i> spp. | CERTCO | Insects | No | Pp | CABI, online; EPPO, online | NA | No |
| 42 | <i>Ceratitis fasciventris</i> as <i>Ceratitis</i> spp. | CERTFA | Insects | No | Pp | EPPO, online | NA | No |
| 43 | <i>Ceratitis quilicii</i> as <i>Ceratitis</i> spp. | CERTQI | Insects | No | Pp | EPPO, online | NA | No |
| 44 | <i>Ceratitis quinaria</i> as <i>Ceratitis</i> spp. | CERTQU | Insects | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 45 | <i>Ceratitis rosa</i> as <i>Ceratitis</i> spp. | CERTRO | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 46 | <i>Choristoneura rosaceana</i> | CHONRO | Insects | No | Pp, Pa | EPPO, online | NA | No |
| 47 | <i>Conotrachelus nenuphar</i> | CONHNE | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 58 | <i>Cuerna costalis</i> | CUERCO | Insects | No | Pp | CABI, online | NA | No |
| 49 | <i>Diabrotica undecimpunctata undecimpunctata</i> | DIABUN | Insects | No | Pp, Pd, Pa | EPPO, online | NA | No |
| 50 | <i>Eurhizococcus brasiliensis</i> | EURHBR | Insects | No | Pp | García Morales et al., online | NA | No |

| No. | Pest name according to EU legislation ^(a) | EPPO code | Group | Present in Türkiye | Host <i>P. persica</i> (Pp) or <i>P. dulcis</i> (Pd) or <i>P. armeniaca</i> (Pa) or <i>P. davidiana</i> (P da) | <i>Prunus</i> spp. Host (reference) | Pest can be associated with the commodity | Pest relevant for the opinion |
|-----|---|-----------|---------|--------------------|--|--|---|-------------------------------|
| 51 | <i>Euwallacea fornicatus sensu lato</i> | XYLBFO | Insects | No | Pp | EPPO, online | NA | No |
| 52 | <i>Graphocephala versuta</i> | GRCPVE | Insects | No | Pp | CABI, online | NA | No |
| 53 | <i>Grapholita inopinata</i> | CYDIIN | Insects | No | Pda | EPPO, online | NA | No |
| 54 | <i>Grapholita packardi</i> | LASPPA | Insects | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 55 | <i>Grapholita prunivora</i> | LASPPR | Insects | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 56 | <i>Helicoverpa zea</i> | HELIZE | Insects | No | Pp | Lepidopteran | NA | No |
| 57 | <i>Homalodisca insolita</i> | HOMLIN | Insects | No | Pp | CABI, online | NA | No |
| 58 | <i>Lycorma delicatula</i> | LYCMDE | Insects | No | Pp, Pa | EPPO, online | NA | No |
| 59 | <i>Homalodisca vitripennis</i> | HOMLTR | Insects | No | Pp, Pd | CABI, online; EPPO, online | NA | No |
| 60 | <i>Margarodes vitis</i> | MARGVI | Insects | No | Pd, Pp, Pa | EPPO, online | NA | No |
| 61 | <i>Naupactus leucoloma</i> | GRAGLE | Insects | No | Pp | EPPO, online | NA | No |
| 62 | <i>Oemona hirta</i> | OEMOHI | Insects | No | Pp, Pd | CABI, online; EPPO, online | NA | No |
| 63 | <i>Oncometopia orbona</i> | ONCMUN | Insects | No | Pp | CABI, online | NA | No |
| 64 | <i>Popillia japonica</i> | POPIJA | Insects | No | Pp, Pa | EPPO, online | NA | No |
| 65 | <i>Rhagoletis fausta</i> as <i>Rhagoletis</i> spp. | RHAGFA | Insects | No | Pd, Pp, Pa | EPPO, online | NA | No |
| 66 | <i>Rhagoletis indifferens</i> as <i>Rhagoletis</i> spp. | RHAGIN | Insects | No | Pp, Pd, Pa | EPPO, online | NA | No |
| 67 | <i>Rhagoletis pomonella</i> | RHAGPO | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 68 | <i>Saperda candida</i> | SAPECN | Insects | No | Pd, Pp, Pa | EPPO, online | NA | No |
| 69 | <i>Scirtothrips dorsalis</i> | SCITDO | Insects | Yes | Pp, Pa | CABI, online | Yes | Yes |
| 70 | <i>Spodoptera frugiperda</i> | LAPHFR | Insects | No | Pp | CABI, online; EPPO, online; Lepidopteran | NA | No |
| 71 | <i>Spodoptera litura</i> | PRODLI | Insects | No | Pp | Natural History Museum, online | NA | No |

| No. | Pest name according to EU legislation ^(a) | EPPO code | Group | Present in Türkiye | Host <i>P. persica</i> (Pp) or <i>P. dulcis</i> (Pd) or <i>P. armeniaca</i> (Pa) or <i>P. davidiana</i> (P da) | <i>Prunus</i> spp. Host (reference) | Pest can be associated with the commodity | Pest relevant for the opinion |
|-----|--|-----------|-----------|--------------------|--|--|---|-------------------------------|
| 72 | <i>Thaumatotibia leucotreta</i> | ARGPLE | Insects | No | Pp, Pa | CABI, online; EPPO, online | NA | No |
| 73 | <i>Trirachys sartus</i> | AELSSA | Insects | No | Pd, Pa | EPPO, online | NA | No |
| 74 | <i>Eotetranychus lewisi</i> | EOTELE | Mites | No | Pp | EPPO, online; Migeon and Dorkeld, online | NA | No |
| 75 | American plum line pattern virus | APLPV0 | Viruses | No | Pd, Pp, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 76 | Cherry rasp leaf virus | CRLV00 | Viruses | No | Pp | CABI, online; EPPO, online | NA | No |
| 77 | Cherry twisted leaf associated virus | CTLAV0 | Viruses | No | Pa | CABI, online | NA | No |
| 78 | Cherry rusty mottle associated virus | CRMAV0 | Viruses | No | Pa | CABI, online | NA | No |
| 79 | Peach mosaic virus | PCMV00 | Viruses | No | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | NA | No |
| 80 | Peach rosette mosaic virus | PRMV00 | Viruses | Yes | Pp, Pd | CABI, online; EPPO, online | Yes | Yes |
| 81 | Tomato ringspot virus | TORSV0 | Viruses | Yes | Pp, Pd, Pa, Pda | CABI, online; EPPO, online | Yes | Yes |
| 82 | <i>Meloidogyne enterolobii</i> | MELGMY | Nematodes | No | Pp | CABI, online | NA | No |
| 83 | <i>Xiphinema americanum sensu stricto</i> | XIPHAA | Nematodes | No | Pp, Pd, Pa | CABI, online | NA | No |
| 84 | <i>Xiphinema rivesi</i> | XIPHRI | Nematodes | No | Pp | CABI, online; Ferris, online | NA | No |

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

(b): *Prunus armeniaca* is a host for *E. amylovora*; however, there is no evidence that young rootstocks can be infected.

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

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

- a) the pest is present in Türkiye;
- b) the pest is (i) absent or (ii) has a limited distribution in the EU;
- c) at least one of the following species, *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana*, 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.

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

Based on the information collected, 18 potential pests known to be associated with *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* were evaluated for their relevance to this opinion. Species were excluded from further evaluation when at least one of the conditions listed above (a-e) was not met. Details can be found in Appendix C (Microsoft Excel[®] file). Of the evaluated pests not regulated in the EU, 14 were selected for further evaluation because they met all the selection criteria. More information on them can be found in the pest datasheets (Appendix A).

4.3. Overview of interceptions

Data on the interception of harmful organisms on plants of *P. persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana* can provide information on some of the organisms that can be present on *P. persica*, *P. dulcis*, *P. armeniaca* and *P. davidiana* despite the current measures taken. According to EUROPHYT, online (accessed on 08 September 2022) and TRACES, online (accessed on 08 September 2022), there were no interceptions of plants for planting of *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* from Türkiye destined to the EU Member States due to the presence of harmful organisms between 1994 and the 23 September 2022.

4.4. Summary of pests selected for further evaluation

The pests identified to be present in Türkiye and having potential impact on *P. persica*, *P. dulcis*, *P. armeniaca* or *P. davidiana* plants destined for export are listed in Table 6.

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

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

- Peach rosette mosaic virus and tomato ringspot virus grouped as 'Viruses' due to similar biology, impact on the commodity, distribution in Türkiye and regulatory status in EU.
- *Lasiodiplodia pseudotheobromae*, *Neoscytalidium dimidiatum* and *Neoscytalidium novaehollandiae* grouped as 'Botryosphaeriaceae family' due to similar biology, taxonomy, impact and regulatory status.
- *Lepidosaphes malicola* and *Lepidosaphes pistaciae* as 'Lepidosaphes group' due to similar biology, taxonomy, impact and regulatory status.
- *Maconellicoccus hirsutus*, *Nipaecoccus viridis*, *Phenacoccus solenopsis* and *Russellaspis pustulans* grouped as 'scales' because of their similar biology, impact, taxonomy and/or regulatory status.

Table 6: List of relevant pests selected for further evaluation

| Number | Current scientific name | EPPO code | Name used in the EU legislation | Taxonomic information | Group | Regulatory status |
|--------|---------------------------------------|-----------|---------------------------------|---|----------|---|
| 1 | <i>Hoplolaimus galeatus</i> | HOLLGA | | Rhabditida Hoplolaimidae | Nematode | Not regulated in the EU |
| 2 | Peach rosette mosaic virus | PRMV00 | Peach rosette mosaic virus | <i>Picornavirales</i> <i>Secoviridae</i> | Virus | EU quarantine pest according to Commission Implementing Regulation (EU) 2019/2072 |
| 3 | Tomato ringspot virus | TORSV0 | Tomato ringspot virus | <i>Picornavirales</i> <i>Secoviridae</i> | Virus | EU quarantine pest according to Commission Implementing Regulation (EU) 2019/2072 |
| 4 | <i>Lasiodiplodia pseudotheobromae</i> | LSDPPS | | Botryosphaerales Botryosphaeriaceae | Fungi | Not regulated in the EU |
| 5 | <i>Neoscytalidium dimidiatum</i> | HENLTO | | Botryosphaerales Botryosphaeriaceae | Fungi | Not regulated in the EU |
| 6 | <i>Neoscytalidium novaeollandiae</i> | | | Botryosphaerales Botryosphaeriaceae | Fungi | Not regulated in the EU |
| 7 | <i>Anoplophora chinensis</i> | ANOLCN | <i>Anoplophora chinensis</i> | Coleoptera Cerambycidae | Insect | EU quarantine pest according to Commission Implementing Regulation (EU) 2019/2072 |
| 8 | <i>Didesmococcus unifasciatus</i> | | | Hemiptera Coccidae | Insect | Not regulated in the EU |
| 9 | <i>Euzophera semifuneralis</i> | EUZOSE | | Lepidoptera Pyrilidae | Insect | Not regulated in the EU |
| 10 | <i>Maconellicoccus hirsutus</i> | PHENHI | | Hemiptera Pseudococcidae | Insect | Not regulated in the EU |
| 11 | <i>Malacosoma parallela</i> | MALAPA | | Lepidoptera, Lasiocampidae | Insect | Not regulated in the EU |
| 12 | <i>Nipaecoccus viridis</i> | NIPAVI | | Hemiptera Pseudococcidae | Insect | Not regulated in the EU |
| 13 | <i>Lepidosaphes malicola</i> | LEPSML | | Hemiptera Diaspididae | Insect | Not regulated in the EU |
| 14 | <i>Lepidosaphes pistaciae</i> | LEPSPI | | Hemiptera Diaspididae | Insect | Not regulated in the EU |
| 15 | <i>Phenacoccus solenopsis</i> | PHENSO | | Hemiptera Pseudococcidae | Insect | Not regulated in the EU |
| 16 | <i>Pochazia shantungensis</i> | POCZSH | | Hemiptera Ricanidae | Insect | Not regulated in the EU |
| 17 | <i>Russellaspis pustulans</i> | ASTLPU | | Hemiptera Asterolecaniidae | Insect | Not regulated in the EU |
| 18 | <i>Scirtothrips dorsalis</i> | SCITDO | <i>Scirtothrips dorsalis</i> | Thysanoptera Thripidae | Insect | EU quarantine pest according to Commission Implementing Regulation (EU) 2019/2072 |

5. Risk mitigation measures

For the 18 selected pests (Table 6), the panel assessed the possibility that it could be present in the nursery and 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 these 18 pests (Table 6), the panel evaluated the likelihood that the pest could be present in the nursery by evaluating the possibility that the plants of the export nursery are infested either by:

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

5.2. Risk mitigation measures applied in Türkiye

With the information provided by Türkiye (submitted Dossier and the additional information provided), the panel summarised the risk mitigation measures (see Table 7) that are applied in the production nurseries.

Table 7: Overview of applied risk mitigation measures for plants of *Prunus persica* and *P. dulcis* plants designated for export to the EU from Türkiye as provided by the Ministry of Agriculture and Forestry of Türkiye

| No. | Risk mitigation measure (name) | Implementation in Türkiye |
|-----|--|--|
| 1 | Certified material | <p>The Ministerial experts and inspectors carry out the phytosanitary control on mother plants in spring, summer and autumn for harmful organisms, and the amount of propagation materials (buds, budwoods, rootstocks, scions, etc.) that can be obtained from mother plants is determined. For the rooted plants, the phytosanitary control is also carried out at the same time, regarding harmful organisms specified in quarantine and plant passports, and certification regulations.</p> <p>Rootstocks from certified plants are grafted with certified budwood or scions in a certified nursery. If free from the harmful organisms, the Ministry issues certificates and labels for the propagation material to be taken from plants in the mother blocks.</p> |
| 2 | Phytosanitary certificates | <p>Export nurseries must obtain special certification from Turkish Authorities before they begin producing plants for planting. Nurseries must notify technical staff members responsible for production to obtain this certificate, which is then used for registration in the Turkish plant certification system.</p> <p>The phytosanitary inspections are done macroscopically. However, if there are signs of disease in the plants or in the immediate vicinity, the inspections are carried out by laboratory analysis.</p> <p>During the production period, official inspection is carried out. After the official approval that the plant is free from the quarantine factor and true to type, its certificate-passport label is issued by the Ministry.</p> <p>The Phytosanitary Certificates/Re-Export Phytosanitary Certificates are issued in exportation of plants and plant products with respect to plant health. In issuing such certificates, the phytosanitary requirements of the importer country are taken into account, in compliance with the ISPM No: 7 and ISPM No: 12 rules.</p> |
| 3 | Cleaning and disinfection of facilities, tools and machinery | Information was not provided |
| 4 | Rouging and pruning | Applied in case of infections/infestations. No further details are available. |
| 5 | Biological and mechanical control | <p>It is advised by General Directorate of Food and Control that producers apply biological and mechanical control according to the 'Technical Guidelines For Integrated Control For Peach and Nectarine' as well as for almond.</p> <p>The mechanical control method that is mostly recommended for orchards in Türkiye is ploughing. Additionally, weeds that remain intra-row and in the crown during tillage and cannot be destroyed by ploughing can be removed by mowing with a scythe or a similar shaping tool.</p> |

| No. | Risk mitigation measure (name) | Implementation in Türkiye |
|-----|---------------------------------|--|
| | | For <i>Prunus persica</i> , 0.03% <i>Agrobacterium radiobacter</i> K1026 is used against <i>Agrobacterium tumefaciens</i> |
| 6 | Pesticide application | <p>In general, the pesticides are applied according to the technical instructions for plant protection and according to the principals of integrated pest management. The plants are sprayed against aphids, thrips, whiteflies, red spider pests, black spot, powdery mildew, root rot diseases and, depending on the situation, to control weeds.</p> <p>Before loading the plants on the trucks for transport, the roots of seedlings are sprayed with a fungicide (Thiram).</p> <p>No specific details were available.</p> |
| 7 | Surveillance and monitoring | <p>Both processes are conducted by Turkish inspectors according to Turkish phytosanitary regulations. According to the dossier, necessary precautions are taken to ensure that there are no plants other than certified plants in the production plot and application areas.</p> <p>Mother plants are inspected once or more times per year if needed. All plants are analysed for 3 consecutive years after the date of placing in the greenhouse, except for suspicious cases, in breeding plants number one and two in a specially protected screen house. Analyses are repeated every 5 years.</p> <p>Plants within and around the production areas are annually inspected to check the presence of quarantine organisms. Visual inspection at least once or twice a year during production or during uprooting of the plants. Visual inspection can be supported by the use of microscope or laboratory analysis if pests are suspected to be present.</p> <p>In the event that these plants are infected/infested with harmful organisms subject to quarantine in Türkiye, these plants are destroyed.</p> |
| 8 | Sampling and laboratory testing | <p>For the identification of viruses, bacteria, fungi and nematodes in the seedlings to be exported, min. 5 and max. 25 seedlings are randomly taken from the plantation in the nursery garden and sealed by the inspector and sent to the laboratory for analysis.</p> <p>Soil samples are taken for laboratory analysis in terms of quarantine organisms, particularly to check if it is free from nematodes. If it is found that the soil is free from nematodes and other quarantine organisms, the production is started.</p> <p>For the identification of viruses, bacteria, fungi and nematodes in the seedlings to be exported, 1 kg sample is taken from growing media in pots as composite sample. Also, samples from leaves, stems, etc. are taken separately by the inspector and send to the laboratory for analysis (Anonymous 2014). The seedlings in the production area are examined macroscopically for the presence of pests. 'Target Population, Sampling Strategy, Sample Size, Detection Methods and Results' are in the line with EPPO standards.</p> |
| 9 | Root washing | Roots are washed to remove the soil. |
| 10 | Refrigeration | The temperature of the storage tanks is between 2°C and 4°C and the relative humidity is 85–95%. Transportation is made with refrigerated trucks with the same conditions. |
| 11 | Pre-consignment inspection | Prior to export, planting material for which a Phytosanitary Certificate is to be issued shall be subjected to phytosanitary inspection. Only certified plants for planting may be exported. Phytosanitary inspectors are responsible for export controls, sampling and issuing certificates. |

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

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

Therefore, the panel assumes that applications are effective in removing the pest to an acceptable level. If there are serious uncertainties or evidence of pest presence despite application of the pesticide (e.g. reports of interception at import), this will be considered in the EKE on the effectiveness of the measures.

All the relevant information including the related uncertainties deriving from the limiting factors used in the evaluation are summarised in a pest data sheet provided in Appendix A. Based on this information, for each selected relevant pest, an expert judgement is given for the likelihood of pest freedom taking into consideration the risk mitigation measures and their combination acting on the pest.

An overview of the evaluation of each relevant pest is given in the sections below (Sections 5.3.1–5.3.17). The outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures is summarised in Sections 5.3.18.

5.3.1. Overview of the evaluation of *Hoplolaimus galeatus*

| Rating of the likelihood of pest freedom | Pest free with few exceptional cases (based on the Median) | | | | |
|--|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free bundles of rooted plants | 9,981 out of 10,000 bundles | 9,985 out of 10,000 bundles | 9,990 out of 10,000 bundles | 9,995 out of 10,000 bundles | 9,999 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles of rooted plants | 1 out of 10,000 bundles | 5 out of 10,000 bundles | 10 out of 10,000 bundles | 15 out of 10,000 bundles | 19 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest/pathogen could enter exporting nurseries <i>Hoplolaimus galeatus</i> is a polyphagous, migratory endoparasitic nematode that occurs in both soil and roots and feeds on the cortical and vascular tissue of host plants. It can also be found as an ectoparasite.</p> <p><i>H. galeatus</i> is a serious pest in native lawns and golf courses and can also be very damaging to many crops, such as cotton, soybeans, alfalfa and corn. It has also been reported as a problem in some orchards (apple, cherry and peach trees) in Michigan, USA.</p> <p>In Türkiye, <i>H. galeatus</i> has been found on sweet chestnut, cowpea, sesame, vegetable, kidney bean, plum, peach, olive, sunflower and apple. According to the available data, the nematode has been detected in four regions (Antalya, Isparta, Sinop, Eskisehir), of which only two (Antalya and Isparta) grow peaches (Kepenekci, 2001, 2002; Kepenekci and Zeki, 2002; Turkish Dossier). So far, no epidemics or economic losses have been reported in Türkiye.</p> <p>The main pathways of this nematode are infested plants for planting, contaminated water, soil and growing media as such or on plants, agricultural machinery, tools and shoes. This nematode can be found in the roots of peach plants or other host plants in the environment and affects the commodity primarily through human-assisted dispersal.</p> <p>Measures taken against the pest/pathogen and their efficacy The relevant proposed measures are: (i) Inspection, certification and surveillance, (ii) Sampling and laboratory testing, (iii) Selection of production sites, (iv) Removal of soil from roots (washing) and (v) Pre-consignment inspection.</p> | | | | |

| | |
|--|---|
| | <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Lance nematodes (<i>Hoplolaimus</i> spp.) are not on the list of harmful organisms systematically monitored or tested for their presence on plants intended for planting in Türkiye. Soil and plants are tested in the laboratory only for the presence of root-knot, reniform and virus vector nematodes, but not for the presence of <i>Hoplolaimus</i> spp. The undetected presence of this nematode during inspections may contribute to the spread of <i>H. galeatus</i> infection. In addition, washing roots prior to export does not reduce the risk of nematode infestation in plants intended for planting that are infested with endoparasitic nematodes.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> The nematode is not specifically monitored; therefore, its presence can be overlooked. |
|--|---|

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

5.3.2. Overview of the evaluation of peach rosette mosaic virus

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Rating of the likelihood of pest freedom | Pest free with few exceptional cases (based on the Median) | | | | |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free bundles | 9,982 out of 10,000 bundles | 9,987 out of 10,000 bundles | 9,992 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,999 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 1 out of 10,000 bundles | 4 out of 10,000 bundles | 8 out of 10,000 bundles | 13 out of 10,000 bundles | 18 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity PRMV has a narrow host range. Its occurrence in Türkiye is restricted to three provinces/regions, where it has been found in a few samples of almonds in 1992–1993. The dispersal range of PRMV infection by natural processes appear to be constrained to the nematode-vector species of the <i>Xiphinema americanum</i> group and <i>Longidorus diadecturus</i> and <i>L. elongatus</i>, which have not been reported to occur in Türkiye.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Surveillance and visual inspection might not be effective.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> The certification process/status of the material. PRMV dispersal by other nematode species is unknown and by other means (seeds or pollen to the mother plant) are unclear in woody plants. The extent of the inspections to detect PRMV infections is unknown. | | | | |

For more details, see relevant pest data sheet on peach rosette mosaic virus (Section A.2 in Appendix A).

5.3.3. Overview of the evaluation of tomato ringspot virus

| | | | | | |
|---|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Rating of the likelihood of pest freedom | Pest free with few exceptional cases (based on the Median) | | | | |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free bundles | 9,982 out of 10,000 bundles | 9,987 out of 10,000 bundles | 9,992 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,999 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 1 out of 10,000 bundles | 4 out of 10,000 bundles | 8 out of 10,000 bundles | 13 out of 10,000 bundles | 18 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity ToRSV has a wide host range, including herbaceous and woody plant species. Its occurrence in Türkiye is restricted to four provinces/regions, where ToRSV has been found in some cultivated plant species. The dispersal range of ToRSV infection by natural processes appears to be constrained, as the nematode-vector species of the <i>Xiphinema americanum</i> group have not been reported to occur in Türkiye.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Surveillance and visual inspection might not be effective.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The certification process/status of the material. • ToRSV dispersal by other nematode species is unknown and by other means (seeds or pollen to the mother plant) are unclear in woody plants. • The extent of the inspections to detect ToRSV infections is unknown. | | | | |

For more details, see relevant pest data sheet on tomato ringspot virus (Section A.3 in Appendix A).

5.3.4. Overview of the evaluation of *Lasiodiplodia pseudotheobromae*

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 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 bundles | 9,813 out of 10,000 bundles | 9,862 out of 10,000 bundles | 9,912 out of 10,000 bundles | 9,957 out of 10,000 bundles | 9,989 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 11 out of 10,000 bundles | 43 out of 10,000 bundles | 88 out of 10,000 bundles | 138 out of 10,000 bundles | 187 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Prunus persica</i> has been reported as host (Endes et al., 2016). Rain splash, wind and insects disperse spores and cause a canker or dieback. It affects older wood and is rarely seen on young plants. Spread by tools, cracks and wounds are other pathways to infection. Most of the young plants could be symptomless and overlooked. It can be detected in the same areas as where the peach and almond</p> | | | | |

| | |
|--|--|
| | <p>are cultivated. It is a very polyphagous with a wide range of hosts. There is a possibility of the presence in the environment. Stressed plants are showing symptoms after grafting and harvesting.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Surveillance and visual inspection might not be effective.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • Not clear information on disinfection of the tools used for pruning. • Pesticides might not be effective. • Inspection could overlook latent infection. |
|--|--|

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

5.3.5. Overview of the evaluation of *Neoscytalidium dimidiatum*

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 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 bundles | 9,813 out of 10,000 bundles | 9,862 out of 10,000 bundles | 9,912 out of 10,000 bundles | 9,957 out of 10,000 bundles | 9,989 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 11 out of 10,000 bundles | 43 out of 10,000 bundles | 88 out of 10,000 bundles | 138 out of 10,000 bundles | 187 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity The pathogen has been reported in other <i>Prunus</i> species such as <i>Prunus armeniaca</i> (Oksal et al., 2020) and <i>Prunus domestica</i> (Hajlaoui et al., 2018). Rain splash, wind and insects disperse spores and cause a canker or dieback. It affects older wood and is rarely seen on young plants. In <i>Prunus</i> spp., symptoms of <i>N. dimidiatum</i> on young plants were seen as secretion of gummosis at the grafting area (Ezra et al., 2015). It is a very polyphagous with a wide range of hosts. Possibility of the presence in the environment. Stressed plants are showing symptoms after grafting, harvesting.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Surveillance and visual inspection might not be effective.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • Not clear information on disinfection of the tools, pruning could be not good enough. • Pesticides might not be effective. • Inspection could overlook latent infection. | | | | |

For more details, see relevant pest data sheet on *Neoscytalidium dimidiatum* (Section A.5 in Appendix A).

5.3.6. Overview of the evaluation of *Neoscytalidium novaehollandiae*

| 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 bundles | 9,813 out of 10,000 bundles | 9,862 out of 10,000 bundles | 9,912 out of 10,000 bundles | 9,957 out of 10,000 bundles | 9,989 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 11 out of 10,000 bundles | 43 out of 10,000 bundles | 88 out of 10,000 bundles | 138 out of 10,000 bundles | 187 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity In <i>P. dulcis</i>, researchers in Türkiye report that it causes stem cankers and branch dieback (Ören et al., 2020). Symptoms also included yellowing and defoliation of leaves, gummosis, vascular discoloration and tree death. Ören et al. (2022) have also reported similar symptoms on <i>Prunus domestica</i> trees in Türkiye.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Surveillance and visual inspection might not be effective.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • Not clear information on disinfection of the tools, pruning could be not good enough. Pesticides might not be effective. • Inspection could overlook latent infection. | | | | |

For more details, see relevant pest data sheet on *Neoscytalidium novaehollandiae* (Section A.6 in Appendix A).

5.3.7. Overview of the evaluation of *Anoplophora chinensis*

| 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 | 9,992 out of 10,000 bundles | 9,995 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,998 out of 10,000 bundles | 9,999 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 | 5 out of 10,000 bundles | 8 out of 10,000 bundles |

| | |
|---|---|
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Anoplophora chinensis</i> is a polyphagous wood-boring beetle that attacks living trees. It was first found in Istanbul on <i>Acer palmatum</i>, <i>A. saccharum</i> and <i>Salix caprea</i> and it is reported to be 'transient and under eradication' (EPPO, online). Both males and females can fly up to 2 km. <i>Prunus</i> spp. plants are listed as major hosts of <i>A. chinensis</i>. As <i>P. persica</i> and <i>P. dulcis</i> intended to be exported are produced in Marmara region including Istanbul, it cannot be excluded that populations of <i>A. chinensis</i> are present in the neighbouring environment of export nurseries. <i>A. chinensis</i> can enter from the surrounding environment. Oviposition occurs in the bark in the lower part of the stems with diameter larger than 1 cm making the commodity a pathway.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) refrigeration and (v) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Eggs might be overlooked by non-trained personnel. The undetected presence of this pest during inspections may contribute its spread. No details are available on the efficacy of pesticide applications targeting other pests.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The pest is present but under eradication in Türkiye • Eggs might be overlooked by non-trained personnel • No data are provided on pesticide applications in order to evaluate their potential efficacy. |
|---|---|

For more details, see relevant pest data sheet on *Anoplophora chinensis* (Section A.7 in Appendix A).

5.3.8. Overview of the evaluation of *Didesmococcus unifasciatus*

| Rating of the likelihood of pest freedom | Pest free with some exceptional cases (based on the Median) | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | 5% | 25% | Median | 75% | 95% |
| Percentile of the distribution | | | | | |
| Proportion of pest-free bundles | 9,973 out of 10,000 bundles | 9,980 out of 10,000 bundles | 9,987 out of 10,000 bundles | 9,993 out of 10,000 bundles | 9,998 out of 10,000 bundles |
| Percentile of the distribution | | | | | |
| Proportion of infested bundles | 2 out of 10,000 bundles | 7 out of 10,000 bundles | 13 out of 10,000 bundles | 20 out of 10,000 bundles | 27 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Didesmococcus unifasciatus</i> is bisexual and univoltine insect. In Lebanon, young adults of both sexes appear and mate during the last week of April. Fertilised females double their size between the end of April when copulation occurs and the oviposition period in mid-June. A female lays between 1500 and 2400 eggs in 3–5 days under its body, and egg hatching occurs some 4–5 days later. The scale passes through three nymphal instars. Winter is passed in the second nymphal instar. <i>D. unifasciatus</i> does not seem to have a true diapause period in Lebanon. This species has a large number of natural enemies that keep it under control. Where contact insecticides are regularly used, a great reduction in populations of its natural enemies occurs.</p> | | | | |

| | |
|--|--|
| | <p>Infestation by this scale results in the death of almond trees within a period of 3–5 years after the start of an infestation.</p> <p>Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves), but the presence of mealybugs on the plants could be observed for the presence of wax, honeydew and ants.</p> <p>Possible pathways of entry for <i>D. unifasciatus</i> are plants for planting, cut flowers, fruits and natural spread (EPPO, 2003). Aerial dispersal of crawlers (1st instar nymphs) is possible.</p> <p>Measures taken against the pest and their efficacy</p> <p>The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> <p>Interception records</p> <p>There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures</p> <p><i>D. unifasciatus</i> is not on the list of harmful organisms monitored or tested for their presence on plants intended for planting in Türkiye. The undetected presence of this pest during inspections may contribute its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>D. unifasciatus</i>; however, no details are available on the timing and number of treatments.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The species is not specifically monitored so its presence can be overlooked, especially crawlers (first nymphal instar). • No data are provided on the timing and number of pesticide applications. |
|--|--|

For more details, see relevant pest data sheet on *Didesmoccocus unifasciatus* (Section A.8 in Appendix A).

5.3.9. Overview of the evaluation of *Euzophera semifuneralis*

| | | | | | |
|---|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Rating of the likelihood of pest freedom | Pest free with few exceptional cases (based on the Median) | | | | |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free bundles | 9,982 out of 10,000 bundles | 9,988 out of 10,000 bundles | 9,992 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,999 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 1 out of 10,000 bundles | 4 out of 10,000 bundles | 8 out of 10,000 bundles | 12 out of 10,000 bundles | 18 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity</p> <p><i>Prunus dulcis</i>, <i>P. persica</i> and other <i>Prunus</i> species are reported as hosts of <i>Euzophera semifuneralis</i> (Biddinger and Howitt, 1992).</p> <p>The pest is reported from the provinces of Adana and Osmaniye on pomegranate. Due to its polyphagous nature, the pest can be present in the surrounding environment of the nurseries, especially if pomegranate is present. Plants are grown in the open field. The pest can enter the production fields by flying. <i>E. semifuneralis</i> overwinters as mature larva in a typical white silken cocoon under the bark. Young trees may also be infested.</p> | | | | |

| | |
|--|--|
| | <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) official surveillance and monitoring, (ii) pesticide treatment, (iii) defoliation, (iv) sorting and selection of export material, (v) storage temperature.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures <i>E. semifuneralis</i> eggs and early first-instar larvae are not easy to spot and might be overlooked. There is no clear indication of a pesticides scheme or any other risk mitigation measures in place in the exporting nurseries and surroundings, effective against <i>E. semifuneralis</i> on <i>Prunus dulcis</i> or <i>Prunus persica</i>.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The presence of the pest in the surrounding environment of the nurseries is uncertain. • No data are provided on pesticide applications in order to evaluate their potential efficacy. |
|--|--|

For more details, see relevant pest data sheet on *Euzophera semifuneralis* (Section A.9 in Appendix A).

5.3.10. Overview of the evaluation of *Lepidosaphes* group (*Lepidosaphes malicola* and *Lepidosaphes pistaciae*)

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 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 bundles | 9,982 out of 10,000 bundles | 9,988 out of 10,000 bundles | 9,992 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,999 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 1 out of 10,000 bundles | 4 out of 10,000 bundles | 8 out of 10,000 bundles | 12 out of 10,000 bundles | 18 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Prunus armeniaca</i> is reported as host of <i>Lepidosaphes malicola</i> (Kaydan et al., 2013) and <i>L. pistaciae</i> (Watson, 2002). <i>Prunus persica</i> is reported host of <i>L. malicola</i>. Both species complete two generations per year and can overwinter on 2- to 3-year-old shoots (Özgen and Karsavuran, 2011).</p> <p>In Iran, <i>L. pistaciae</i> is injurious to commercial pistachio trees (Mehrnejad, 2020). <i>L. malicola</i> injures fruits, shade trees and shrubs, and is the most common pest of apple fruits in Iran (Nazari et al., 2020). Heavy infestations cause death of branches or even entire trees; infestation of fruits causes red spotting (Danzig, 1993). For both species, crawlers are the primary dispersal stage and move to new areas of the plant or are dispersed by wind or animal contact (Özgen and Karsavuran, 2011; Nazari et al., 2020).</p> <p>Possible pathways of entry are plants for planting, fruits, plant materials of any kind (crawlers hiding in a protected site, on the bark wounds, roots, stems, leaves), human transportation, animals.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> | | | | |

| | |
|--|--|
| | <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures <i>Lepidosaphes pistaciae</i> and <i>L. malicola</i> are not on the list of harmful organisms monitored or tested for their presence on plants intended for planting in Türkiye. The undetected presence of this pest during inspections may contribute its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>Lepidosaphes pistaciae</i> and <i>L. malicola</i>; however, no details are available on the timing and number of treatments.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The species is not specifically monitored so its presence can be overlooked, especially crawlers. • No data are provided on the timing and number of pesticide applications. |
|--|--|

For more details, see relevant pest data sheet on *Lepidosaphes* group (Section A.10 in Appendix A).

5.3.11. Overview of the evaluation of *Maconellicoccus hirsutus*

| | | | | | |
|---|--|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Rating of the likelihood of pest freedom | Pest free with some exceptional cases (based on the median) | | | | |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free plants | 9,906 out of 10,000 plants | 9,931 out of 10,000 plants | 9,958 out of 10,000 plants | 9,981 out of 10,000 plants | 9,997 out of 10,000 plants |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested plants | 3 out of 10,000 plants | 19 out of 10,000 plants | 42 out of 10,000 plants | 69 out of 10,000 plants | 94 out of 10,000 plants |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Prunus persica</i> is reported as host of <i>Maconellicoccus hirsutus</i> (Chang and Miller, 1996; Chong et al., 2015; EFSA PLH Panel, 2022). <i>M. hirsutus</i> was collected on citrus plants from Türkiye between 2013 and 2015 (Karacaoğlu et al., 2016). It is listed as 'present' in Türkiye with no details in CABI (online) and EPPO (online).</p> <p><i>M. hirsutus</i> has a high reproductive rate and can produce up to 15 generations per year (EPPO, 2005). In warm climates, the mealybugs stay active and reproduce all year long (Berry, 2014).</p> <p>Crawlers are the main dispersal life stage. They can also be transported by water, wind or animal agents. Crawlers settle in cracks and crevices, usually on new growth which becomes severely stunted and distorted, in which densely packed colonies develop. Eggs and adults of <i>M. hirsutus</i> overwinter in the soil or on the host plants. The main symptom of <i>M. hirsutus</i> infestation is a large amount of honeydew and black mould developed on the leaves and fruits covered by it. Infestations can cause leaf curling, and malformation, bunchy top appearance.</p> <p>The main pathway of this pest is infested plants for planting. Being the species polyphagous, it can be present on other host plants in the environment and infest the commodity through human-assisted and natural dispersal.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> | | | | |

| | |
|--|--|
| | <p>Shortcomings of current measures/procedures</p> <p><i>M. hirsutus</i> is not on the list of harmful organisms monitored or tested for their presence on plants intended for planting in Türkiye. The undetected presence of this pest during inspections may contribute to its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>M. hirsutus</i>; however, no details are available on the timing and number of treatments.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The species is not specifically monitored so its presence can be overlooked, especially crawlers (first-instar nymphs). • No data are provided on the timing and number of pesticide applications. |
|--|--|

For more details, see relevant pest data sheet on *Maconellicoccus hirsutus* (Section A.11 in Appendix A).

5.3.12. Overview of the evaluation of *Malacosoma parallela*

| | | | | | |
|---|---|---------------------------------------|---------------------------------------|---------------------------------------|--|
| 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 bundles | 9,991 out of 10,000 bundles | 9,994 out of 10,000 bundles | 9,996 out of 10,000 bundles | 9,998 out of 10,000 bundles | 10,000 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 0 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 | <p>Possibility that the pest could become associated with the commodity</p> <p><i>Prunus</i> spp. and <i>Prunus dulcis</i> are listed as host and major host, respectively (EPPO, online). <i>Malacosoma parallela</i> is present in Türkiye, with no further details on its distribution (CABI, online; EPPO, online). The moth is extremely polyphagous and causes most damage in its native range to <i>Quercus</i> spp., <i>Prunus</i> spp. and <i>Malus</i> spp. Adult moths of <i>M. parallela</i> can spread by flying. All stages of the life cycle can be transported on host plants moving in trade, particularly plants for planting and cut branches. Eggs, larvae and pupae (cocoons) may be associated with wood carrying bark and may be present as contaminants on other commodities.</p> <p>Measures taken against the pest and their efficacy</p> <p>The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) natural biological control, (vi) refrigeration and (vii) pre-consignment inspection.</p> <p>Interception records</p> <p>There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures</p> <p>Egg masses might be overlooked by non-trained personnel. The undetected presence of this pest during inspections may contribute its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>M. parallela</i>; however, no details are available on the timing and number of treatments. Low temperatures can slow down its development but not kill the insect.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The pest is reported in Türkiye with no details on its distribution. • Egg masses might be overlooked by non-trained personnel. • No data are provided on the timing and number of pesticide applications. | | | | |

For more details, see relevant pest data sheet on *Malacosoma parallela* (Section A.12 in Appendix A).

5.3.13. Overview of the evaluation of *Nipaeococcus viridis*

| 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 plants | 9,906 out of 10,000 plants | 9,931 out of 10,000 plants | 9,958 out of 10,000 plants | 9,981 out of 10,000 plants | 9,997 out of 10,000 plants |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested plants | 3 out of 10,000 plants | 19 out of 10,000 plants | 42 out of 10,000 plants | 69 out of 10,000 plants | 94 out of 10,000 plants |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>N. viridis</i> is a polyphagous North American mealybug that has not been reported in the EU. It prefers the upper parts of the plants, young shoots or branches carrying fruitlets (Spodek et al., 2018). Large populations of this mealybug can cause general weakening, distortion, defoliation, dieback and death of susceptible plants (Malumphy et al., 2013). Plants become covered in a sooty mould that develops on the honeydew produced by the mealybug.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures <i>N. viridis</i> is not on the list of harmful organisms monitored or tested for their presence on plants intended for planting in Türkiye. The undetected presence of this pest during inspections may contribute to its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>N. viridis</i>; however, no details are available on the timing and number of treatments.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The species is not specifically monitored so its presence can be overlooked, especially crawlers (first-instar nymph). • No data are provided on the timing and number of pesticide applications. | | | | |

For more details, see relevant pest data sheet on *Nipaeococcus viridis* (Section A.13 in Appendix A).

5.3.14. Overview of the evaluation of *Phenacoccus solenopsis*

| 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 plants | 9,906 out of 10,000 plants | 9,931 out of 10,000 plants | 9,958 out of 10,000 plants | 9,981 out of 10,000 plants | 9,997 out of 10,000 plants |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |

| Proportion of infested plants | 3 out of 10,000 plants | 19 out of 10,000 plants | 42 out of 10,000 plants | 69 out of 10,000 plants | 94 out of 10,000 plants |
|---|--|----------------------------|----------------------------|----------------------------|----------------------------|
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>Prunus dulcis</i> is reported as a host plant by Spodek et al. (2018). It was first found in Türkiye in 2012 on ornamental plants in the city centre of Adana (EPPO, online). <i>P. solenopsis</i> is highly polyphagous and can complete about 8–12 generations in a year (Fand and Suroshe, 2015). The females lay approximately 150–600 eggs in a white, waxy ovisac (Fand and Suroshe, 2015). The crawlers (first-instar nymphs) disperse to other parts of the same plant or get carried by the wind or other means (machinery, workers, animals) to other areas (Hodgson et al., 2008). Adult females can live for up to 3 months (Gerson and Aplebaum, online). In winter, <i>P. solenopsis</i> populations were found on the stems, branches and root collar of hibiscus plants (Spodek et al., 2018). <i>P. solenopsis</i> prefers the upper parts of the plants, young shoots or branches carrying fruitlets (Spodek et al., 2018). Large populations of this mealybug can cause general weakening, distortion, defoliation, dieback and death of susceptible plants (Malumphy et al., 2013). Plants become covered in a sooty mould that develops on the honeydew produced by this mealybug.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures <i>P. solenopsis</i> is not on the list of harmful organisms monitored or tested for their presence on plants intended for planting in Türkiye. The undetected presence of this pest during inspections may contribute its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling <i>P. solenopsis</i>; however, no details are available on the timing and number of treatments.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • The species is not specifically monitored, so its presence can be overlooked, especially crawlers (first-instar nymph). • No data are provided on the timing and number of pesticide applications. | | | | |

For more details, see relevant pest data sheet on *Phenacoccus solenopsis* (Section A.14 in Appendix A).

5.3.15. Overview of the evaluation of *Pochazia shantungensis*

| 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 bundles | 9,926 out of 10,000 bundles | 9,945 out of 10,000 bundles | 9,965 out of 10,000 bundles | 9,982 out of 10,000 bundles | 9,996 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 4 out of 10,000 bundles | 18 out of 10,000 bundles | 35 out of 10,000 bundles | 55 out of 10,000 bundles | 74 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>P. shantungensis</i> is present in Türkiye near nurseries producing <i>P. persica</i> (Bursa) and due to its polyphagous nature, host plants are widely available in the surrounding environment. <i>P. shantungensis</i> could go through two generations per</p> | | | | |

year as reported for China and one generation/year in South Korea. Adults can spread by flying. Plants are grown in the open field. This pest directly causes damage by sucking plant saps and laying eggs. Indirect damage could be related to sooty mould occurrence on the honeydew produced by the pest, with consequent tree vigour decline (Choi et al., 2011). Besides, 1-year-old twigs in which eggs are laid may die as phloem and xylem are destroyed by the ovipositing female. As eggs are mostly laid on young branches, wood is unlikely to be a pathway while they may be associated with cut plant material and may be present as contaminants on other commodities.

Measures taken against the pest and their efficacy

The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) natural biological control, (vi) refrigeration and (vii) pre-consignment inspection.

Interception records

There are no records of interceptions from Türkiye.

Shortcomings of current measures/procedures

Eggs might be overlooked by non-trained personnel. The undetected presence of this pest during inspections may contribute to its spread. The pesticides listed in the additional information provided by the third country though targeting other pests may be effective in controlling *P. shantungensis*; however, no details are available on the timing and number of treatments. Low temperatures can slow down its development but not kill the insect.

Main uncertainties

- The pest is reported in Türkiye.
- Eggs might be overlooked by non-trained personnel.
- No data are provided on the timing and number of pesticide applications.

For more details, see relevant pest data sheet on *Pochazia shantungensis* (Section A.15 in Appendix A).

5.3.16. Overview of the evaluation of *Russellaspis pustulans*

| | | | | | |
|---|--|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 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 plants | 9,906 out of 10,000 plants | 9,931 out of 10,000 plants | 9,958 out of 10,000 plants | 9,981 out of 10,000 plants | 9,997 out of 10,000 plants |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested plants | 3 out of 10,000 plants | 19 out of 10,000 plants | 42 out of 10,000 plants | 69 out of 10,000 plants | 94 out of 10,000 plants |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity The pest is present around the nursery on different host plants and can spread to and within the nursery. <i>Prunus</i> spp. is one of the hosts plant for the pest and it can be colonised in the nursery.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) pesticide application, (v) refrigeration and (vi) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> | | | | |

| | |
|--|---|
| | <p>Shortcomings of current measures/procedures Eggs might be overlooked by non-trained personnel. The undetected presence of this pest during inspections may contribute to its spread. No details are available on the efficacy of pesticide applications targeting other pests. Low temperatures can slow down its development but not kill the insect.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • Crawlers might be overlooked by non-trained personnel. • No data are provided on pesticide applications in order to evaluate their potential efficacy. |
|--|---|

For more details, see relevant pest data sheet on *Russellaspis pustulans* (Section A.16 in Appendix A).

5.3.17. Overview of the evaluation of *Scirtothrips dorsalis*

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 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 plants | 9,891 out of 10,000 bundles | 9,921 out of 10,000 bundles | 9,948 out of 10,000 bundles | 9,971 out of 10,000 bundles | 9,992 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested plants | 8 out of 10,000 bundles | 29 out of 10,000 bundles | 52 out of 10,000 bundles | 79 out of 10,000 bundles | 109 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity <i>S. dorsalis</i> is highly polyphagous. It can move actively and passively between and within the nurseries. <i>S. dorsalis</i> was reported in provinces of Türkiye where there is high density of peach production.</p> <p>Measures taken against the pest and their efficacy The relevant proposed measures are: (i) inspection, certification and surveillance, (ii) roguing and pruning, (iii) sampling and laboratory testing, (iv) refrigeration and (v) pre-consignment inspection.</p> <p>Interception records There are no records of interceptions from Türkiye.</p> <p>Shortcomings of current measures/procedures Eggs might be overlooked by non-trained personnel. The undetected presence of this pest during inspections may contribute to its spread. No details are available on the efficacy of pesticide applications targeting other pests. Low temperatures can slow down its development but not kill the insect.</p> <p>Main uncertainties</p> <ul style="list-style-type: none"> • Eggs might be overlooked by non-trained personnel. • No data are provided on pesticide applications in order to evaluate their potential efficacy. | | | | |

For more details, see relevant pest data sheet on *Scirtothrips dorsalis* (Section A.17 in Appendix A).

5.3.18. Outcome of Expert Knowledge Elicitation

Table 8 and Figure 6 show the outcome of the EKE regarding pest freedom after the evaluation of the proposed risk mitigation measures for all the evaluated pests.

Figure 7 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for bundles of plants of *Prunus persica* or *P. dulcis*, as budwood/graftwood, rooted or grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrids, designated for export to the EU for *Hoplolaimus*

galeatus (excluding budwood/grafwood), peach rosette mosaic virus, tomato ringspot virus, *Lasiodiplodia pseudotheobromae*, *Neoscytalidium dimidiatum*, *Neoscytalidium novaehollandiae*, *Anoplophora chinensis*, *Didesmococcus unifasciatus*, *Euzophera semifuneralis*, *Lepidosaphes malicola*, *Lepidosaphes pistaciae*, *Maconellicoccus hirsutus*, *Malacosoma parallela*, *Nipaecoccus viridis*, *Phenacoccus solenopsis*, *Pochazia shantungensis*, *Russellaspis pustulans*, *Scirtothrips dorsalis*.

Table 8: Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against *Hoplolaimus galeatus*, peach rosette mosaic virus, tomato ringspot virus *Lasiodiplodia pseudotheobromae*, *Neoscytalidium dimidiatum*, *Neoscytalidium novaehollandiae*, *Anoplophora chinensis*, *Didesmococcus unifasciatus*, *Euzophera semifuneralis*, *Lepidosaphes malicola*, *Lepidosaphes pistaciae*, *Maconellicoccus hirsutus*, *Malacosoma parallela*, *Nipaecoccus viridis*, *Phenacoccus solenopsis*, *Pochazia shantungensis*, *Russellaspis pustulans*, *Scirtothrips dorsalis* on *Prunus persica* and *P. dulcis* and *P. armeniaca* and *P. davidiana* plants designated for export to the EU. In panel A, the median value for the assessed level of pest freedom for each pest is indicated by 'M', the 5% percentile is indicated by L and the 95% percentile is indicated by U. The percentiles together span the 90% uncertainty range regarding pest freedom. The pest freedom categories are defined in Panel B of the table

| Number | Group* | Pest species | Sometimes pest free | More often than not pest free | Frequently pest free | Very frequently pest free | Extremely frequently pest free | Pest free with some exceptional cases | Pest free with few exceptional cases | Almost always pest free |
|--------|-----------|---------------------------------------|---------------------|-------------------------------|----------------------|---------------------------|--------------------------------|---------------------------------------|--------------------------------------|-------------------------|
| 1 | Nematodes | <i>Hoplolaimus galeatus</i> | | | | | | L | M | U |
| 2 | Viruses | Peach rosette mosaic virus | | | | | | L | M | U |
| 3 | Viruses | Tomato ringspot virus | | | | | | L | M | U |
| 4 | Fungi | <i>Lasiodiplodia pseudotheobromae</i> | | | | L | M | U | | |
| 5 | Fungi | <i>Neoscytalidium dimidiatum</i> | | | | L | M | U | | |
| 6 | Fungi | <i>Neoscytalidium novaehollandiae</i> | | | | L | M | U | | |
| 7 | Insects | <i>Anoplophora chinensis</i> | | | | | | | L | MU |
| 8 | Insects | <i>Didesmococcus unifasciatus</i> | | | | | | LM | | U |
| 9 | Insects | <i>Euzophera semifuneralis</i> | | | | | | L | M | U |
| 10 | Insects | <i>Lepidosaphes malicola</i> | | | | | | L | M | U |
| 11 | Insects | <i>Lepidosaphes pistaciae</i> | | | | | | L | M | U |
| 12 | Insects | <i>Maconellicoccus hirsutus</i> | | | | | L | M | | U |
| 13 | Insects | <i>Malacosoma parallela</i> | | | | | | | L | MU |

| 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 |
|--------|---------|-------------------------------|---------------------|-------------------------------|----------------------|---------------------------|--------------------------------|---------------------------------------|--------------------------------------|-------------------------|
| 14 | Insects | <i>Nipaecoccus viridis</i> | | | | | L | M | | U |
| 15 | Insects | <i>Phenacoccus solenopsis</i> | | | | | L | M | | U |
| 16 | Insects | <i>Pochazia shantungensis</i> | | | | | L | M | | U |
| 17 | Insects | <i>Russellaspis pustulans</i> | | | | | L | M | | U |
| 18 | Insects | <i>Scirtothrips dorsalis</i> | | | | L | M | | U | |

PANEL A

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

Legend of pest freedom categories

| | |
|----------|--|
| L | Pest freedom category includes the elicited lower bound of the 90% uncertainty range |
| M | Pest freedom category includes the elicited median |
| U | Pest freedom category includes the elicited upper bound of the 90% uncertainty range |

PANEL B

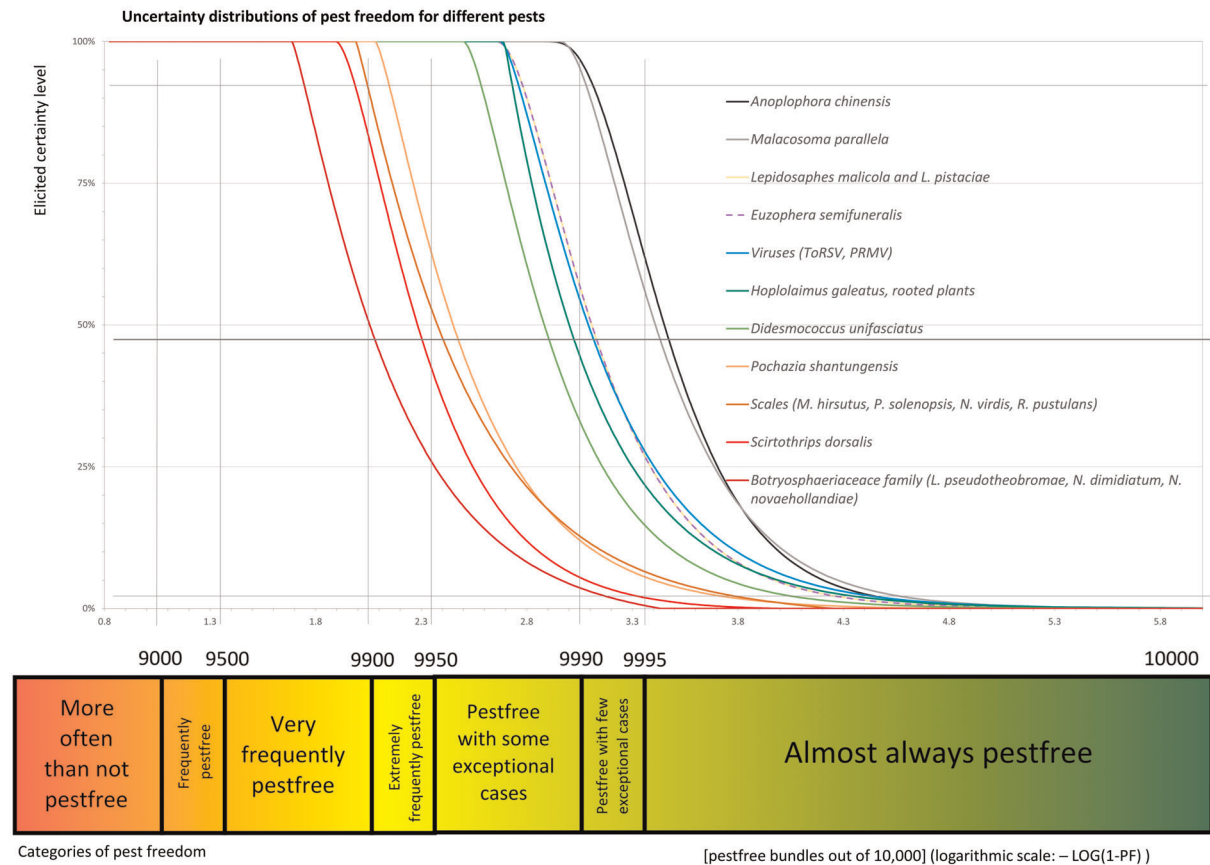


Figure 6: Elicited certainty (y-axis) of the number of pest-free *Prunus persica* and *P. dulcis*, as budwood/graftwood, bare-rooted or grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrids bundles (x-axis; log-scaled) out of 10,000 plants designated for export to the EU from Türkiye for all evaluated pests visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%). The Panel is 95% confident that 9,992, 9,991, 9,982, 9,982, 9,982, 9,973, 9,926, 9,906, 9,891, 9,813 or more bundles per 10,000 will be free from *A. chinensis*, *M. parallela*, *Lepidosaphes* group (*L. malicola* and *L. pistaciae*), *E. semifuneralis*, Viruses (PRMV and ToRSV), *H. galeatus*, *D. unifasciatus*, *P. shantungensis*, scales (*M. hirsutus*, *N. viridis*, *P. solenopsis*, *R. pustulans*, *S. dorsalis*), Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*), respectively

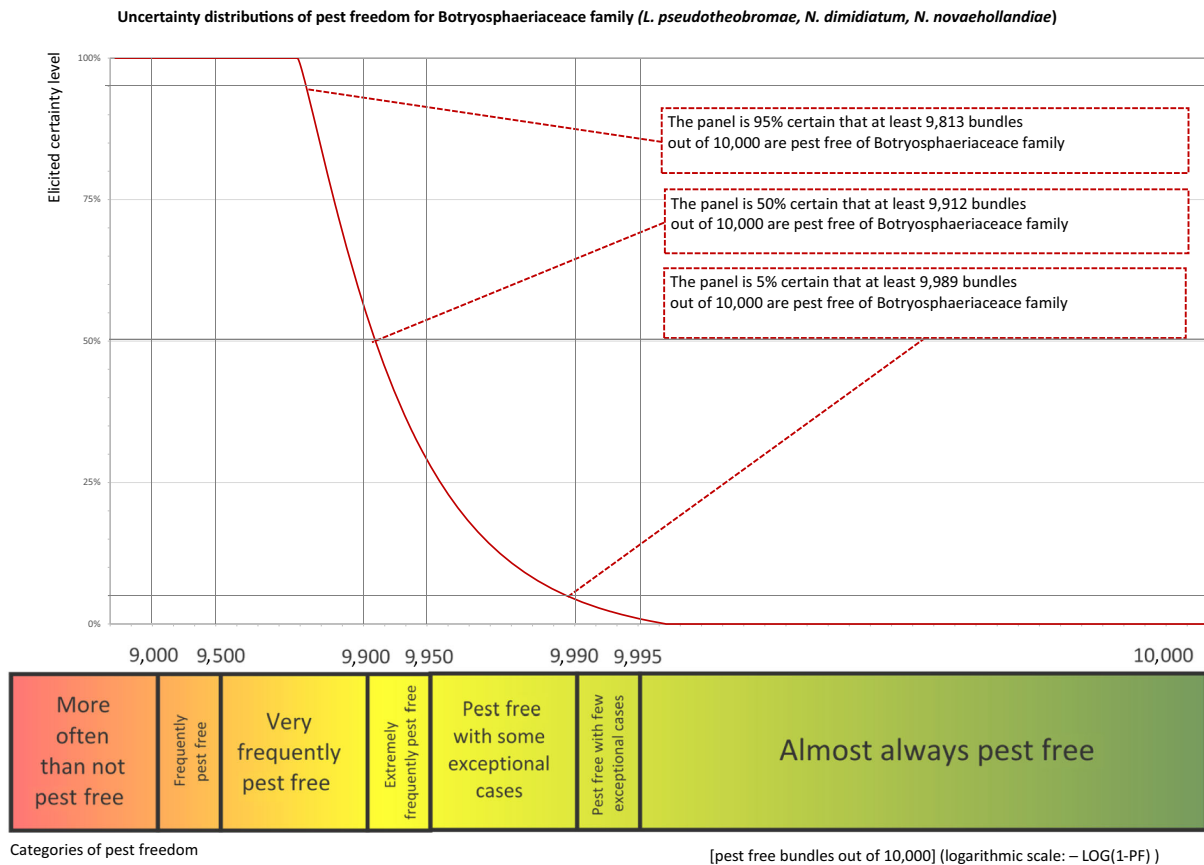


Figure 7: Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for plants designated for export to the EU based on the example of Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)

6. Conclusions

There are 18 pests identified to be present in Türkiye and considered to be potentially associated with plants of *Prunus persica* and *P. dulcis*, as budwood/graftwood, rooted or grafted on rootstocks of either *P. persica*, *P. dulcis*, *P. armeniaca*, *P. davidiana* or their hybrids imported from Türkiye and relevant for the EU.

For the 18 actionable pests (*Hoplolaimus galeatus*, *Lasiodiplodia pseudotheobromae*, *Neoscytalidium dimidiatum*, *Neoscytalidium novaehollandiae*, *Didesmococcus unifasciatus*, *Euzophera semifuneralis*, *Lepidosaphes malicola*, *Lepidosaphes pistachio*, *Maconellicoccus hirsutus*, *Malacosoma parallela*, *Nipaecoccus viridis*, *Phenacoccus solenopsis*, *Pochazia shantungensis*, *Russellaspis pustulans*), the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for plants of *Prunus persica* and *P. dulcis*; as budwood/graftwood, rooted or grafted on designated rootstocks for export to the EU was estimated.

For *Hoplolaimus galeatus*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with few exceptional cases' with the 90% uncertainty range reaching from 'Pest free with some exceptional cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,981 and 10,000 units per 10,000 will be free from *Hoplolaimus galeatus*.

For peach rosette mosaic virus, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with few exceptional cases' with the 90% uncertainty range reaching from 'Pest free with few exceptional cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,982 and 10,000 units per 10,000 will be free from peach rosette mosaic virus.

For tomato ringspot virus, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90%

uncertainty range reaching from 'Pest free with few exceptional cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,982 and 10,000 units per 10,000 will be free from tomato ringspot virus.

For *Lasiodiplodia pseudotheobromae*, 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 some exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,813 and 10,000 units per 10,000 will be free from *Lasiodiplodia pseudotheobromae*.

For *Neoscytalidium dimidiatum*, 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 some exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,813 and 10,000 units per 10,000 will be free from *Neoscytalidium dimidiatum*.

For *Neoscytalidium novaehollandiae*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated 'Extremely frequently pest free' with the 90% uncertainty range reaching from 'Very frequently pest free' to 'Pest free with some exceptional cases'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,813 and 10,000 units per 10,000 will be free from *Neoscytalidium novaehollandiae*.

For *Anoplophora chinensis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Almost always pest free' with the 90% uncertainty range reaching from 'Pest free with few exceptional cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,992 and 10,000 units per 10,000 will be free from *Anoplophora chinensis*.

For *Didesmococcus unifasciatus*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Pest free with some exceptional' cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,973 and 10,000 units per 10,000 will be free from *Didesmococcus unifasciatus*.

For *Euzophera semifuneralis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Pest free with some exceptional' cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,982 and 10,000 units per 10,000 will be free from *Euzophera semifuneralis*.

For *Lepidosaphes malicola* or *Lepidosaphes pistaciae*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Pest free with some exceptional' cases' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,982 and 10,000 units per 10,000 will be free from *Lepidosaphes malicola* and *Lepidosaphes pistaciae*.

For *Maconellicoccus hirsutus*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Extremely frequently pest free' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,906 and 10,000 units per 10,000 will be free from *Maconellicoccus hirsutus*.

For *Malacosoma parallela*, 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 9,991 and 10,000 units per 10,000 will be free from *Malacosoma parallela*.

For *Nipaecoccus viridis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Extremely frequently pest free' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,906 and 10,000 units per 10,000 will be free from *Nipaecoccus viridis*.

For *Phenacoccus solenopsis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Extremely frequently pest free' to 'Almost always pest free'. The

Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,906 and 10,000 units per 10,000 will be free from *Phenacoccus solenopsis*.

For *Pochazia shantungensis*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Extremely frequently pest free' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,926 and 10,000 units per 10,000 will be free from *Pochazia shantungensis*

For *Russellaspis pustulans*, the likelihood of pest freedom following evaluation of current risk mitigation measures was estimated as 'Pest free with some exceptional cases' with the 90% uncertainty range reaching from 'Extremely frequently pest free' to 'Almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that between 9,906 and 10,000 units per 10,000 will be free from *Russellaspis pustulans*.

For *Scirtothrips dorsalis*, 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 9,891 and 10,000 units per 10,000 will be free from *Scirtothrips dorsalis*.

References

- Berry JA, 2014. Generic Pest Risk Assessment: Armoured Scale Insects (Hemiptera: Coccoidea: Diaspididae) on the Fresh Produce Pathway. Ministry for Primary Industries, Wellington. 76 p.
- Biddinger DJ and Howitt AJ, 1992. The food plants and distribution of the American plum borer (Lepidoptera: Pyralidae). *The Great Lakes Entomologist*, 25, 149–158.
- Blackman RL and Eastop VF, online. Aphis on the world's plants. Available online: http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm?LMCL=ZcODD7 [Accessed: 23 September 2022].
- CABI (Centre for Agriculture and Bioscience International), online. CABI Crop Protection Compendium. Available online: <https://www.cabi.org/cpc/> [Accessed: 23 September 2022].
- Chang LWH and Miller CE, 1996. Pathway Risk Assessment: Pink Mealybug from the Caribbean. Animal and Plant Health Inspection Service, U.S, Department of Agriculture. 61 p.
- Choi YS, Hwang IS, Kang TJ, Lim JR and Choe KR, 2011. Oviposition characteristics of *Ricania* sp. (Homoptera: Ricaniidae), a new fruit pest. *Korean Journal of Applied Entomology*, 50, 367–372. <https://doi.org/10.5656/ksae.2011.09.0.49>
- Chong JH, Aristizábal LF and Arthurs SP, 2015. Biology and management of *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae) on ornamental plants. *Journal of Integrated Pest Management*, 6, 5. <https://doi.org/10.1093/jipm/pmv004>
- Danzig EM, 1993. Fauna of Russia and neighbouring countries. Rhynchota, Volume X: suborder scale insects (Coccinea): families Phoenicococcidae and Diaspididae. 'Nauka' Publishing House, St. Petersburg. 452 p.
- EFSA PLH Panel (EFSA Panel on Plant Health), 2018. Guidance on quantitative pest risk assessment. *EFSA Journal* 2018;16(8):5350, 86 pp. <https://doi.org/10.2903/j.efsa.2018.5350>
- EFSA PLH Panel (EFSA Panel on Plant Health), 2019a. Guidance on commodity risk assessment for the evaluation of high risk plants dossiers. *EFSA Journal* 2019;17(4):5668, 20 pp. <https://doi.org/10.2903/j.efsa.2019.5668>
- EFSA PLH Panel (EFSA Panel on Plant Health), 2019b. Commodity risk assessment of black pine (*Pinus thunbergii* Parl.) bonsai from Japan. *EFSA Journal* 2019;17(5):5667, 184 pp. <https://doi.org/10.2903/j.efsa.2019.5667>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Baptista P, Chatzivassiliou E, Di Serio F, Gonthier P, Jaques Miret JA, Justesen AF, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Stefani E, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Gregoire J-C, Malumphy C, Antonatos S, Kertesz V, Maiorano A, Papachristos D and MacLeod A, 2022. Scientific Opinion on the pest categorisation of *Maconellicoccus hirsutus*. *EFSA Journal* 2022;20(1):7024, 45 pp. <https://doi.org/10.2903/j.efsa.2022.7024>
- EFSA Scientific Committee, 2018. Scientific Opinion on the principles and methods behind EFSA's Guidance on Uncertainty Analysis in Scientific Assessment. *EFSA Journal* 2018;16(1):5122, 235 pp. <https://doi.org/10.2903/j.efsa.2018.5122ISSN:1831-4732>
- Endes A, Kayım M and Eskalen A, 2016. First report of *Lasiodiplodia theobromae*, *L. pseudotheobromae*, and *Diplodia seriata* causing bot canker and gummosis of nectarines in Turkey. *Plant Disease*, 100, 2321. <https://doi.org/10.1111/ppa.13209>
- EPPO (European and Mediterranean Plant Protection Organization), 2003. Report of a Pest Risk Management: *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin. Available online: <https://pra.eppo.int/pr/56a01431-a11b-43a6-abb3-76e4f6a6f33d>
- EPPO (European and Mediterranean Plant Protection Organization), 2005. Data sheets on quarantine pests *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin, 35, 413–415.

- EPPO (European and Mediterranean Plant Protection Organization), online. EPPO Global Database. Available online: <https://www.eppo.int/> [Accessed: 23 September 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions – EUROPHYT. Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 08 August, 08 and 23 September 2022].
- Ezra D, Simanski E, Antman S, Shulhani R, Borenstein M, Golani M, Hershovich M, Liarzi O and Shtienberg D, 2015. Botryosphaeria in deciduous trees: determination of the causal agent and disease development in young trees. In Abstracts of presentations at the 36th Congress of the Israeli Phytopathological Society. *Phytoparasitica*, 43, 369–381. <https://doi.org/10.1007/s12600-015-0466-1>
- Fand B and Suroshe S, 2015. The invasive mealybug *Phenacoccus solenopsis* Tinsley, a threat to tropical and subtropical agricultural and horticultural production systems - a review. *Crop Protection*, 69, 34–43. <https://doi.org/10.1016/j.cropro.2014.12.001>
- FAO (Food and Agriculture Organization of the United Nations), 1995. ISPM (International standards for phytosanitary measures) No 4. Requirements for the establishment of pest free areas. Available online: <https://www.ippc.int/en/publications/614/>
- FAO (Food and Agriculture Organization of the United Nations), 2017. ISPM (International standards for phytosanitary measures) No. 5. Glossary of phytosanitary terms. FAO, Rome. Available online: <https://www.ippc.int/en/publications/622/>
- Farr DF and Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: <https://nt.ars-grin.gov/fungaldatabases> [Accessed: 23 September 2022].
- Ferris H, online. Nemaplex (The Nematode-Plant Expert Information System). Available online: <http://nemaplex.ucdavis.edu/> [Accessed: 23 September 2022].
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y and Hardy NB, online. ScaleNet: A literature-based model of scale insect biology and systematics. Available online: <http://scalenet.info/catalogue/> [Accessed: 23 September 2022].
- Gerson U and Aplebaum S, online. Plant Pests of the Middle East, *Nipaecoccus viridis* (Newstead). Available online: http://www.agri.huji.ac.il/mepests/pest/Nipaecoccus_viridis/ [Accessed: 23 September 2022].
- Hajlaoui MR, Nouri MT, Hamrouni N, Trouillas FP, Yahmed NB, Eddouzi J and Mnari-Hattab M, 2018. First record of dieback and decline of plum caused by *Neoscytalidium dimidiatum* in Tunisia. *New Disease Reports*, 38, 20. <https://doi.org/10.5197/j.2044-0588.2018.038.020>
- Hodgson C, Abbas G, Arif MJ, Saeed S and Karar H, 2008. *Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Coccoidea: Pseudococcidae), an invasive mealybug damaging cotton in Pakistan and India, with a discussion on seasonal morphological variation. *Zootaxa*, 1913, 1–35. <https://doi.org/10.11646/zootaxa.1913.1.1>
- Karacaoglu M, Kaydan MB and Satar S, 2016. Detected mealybug species from *Citrus* plantations in Aegean and Mediterranean Regions. In: Abstract. Turkey 6th Plant Protection Congress with International Participation, at Konya, Turkey. Available online: https://www.researchgate.net/publication/308722044_Detected_Mealybug_Species_From_Citrus_Plantations_in_Aegean_and_Mediterranean_Regions
- Kaydan M, Ülgentürk S and Erkiş L, 2013. Checklist of Turkish Coccoidea (Hemiptera: Sternorrhyncha) species. *Türkiye Entomoloji Bülteni*, 3, 157–182. Available online: <https://dergipark.org.tr/en/download/article-file/64148>
- Kepeneci I, 2001. Plant parasitic nematodes of Tylenchida (Nematoda) associated with stone fruits (apricots and peaches) in Southern Turkey. *Pakistan Journal of Nematology*, 19, 49–61.
- Kepeneci I, 2002. Plant parasitic nematode species of Tylenchida (Nematoda) associated with sesame (*Sesamum indicum* L.) growing in the Mediterranean region of Turkey. *Turkish Journal of Agriculture and Forestry*, 26, 323–330. <https://doi.org/10.1007/bf03039997>
- Kepeneci I and Zeki C, 2002. Nematodes of Tylenchida (Nematoda) associated with apple in Turkey. *Pakistan Journal of Nematology*, 20, 61–63.
- Malumphy C, Baker R and Anderson H, 2013. Rapid Pest Risk Analysis for *Phenacoccus solenopsis* (cotton mealybug) and the Closely Related *P. defectus* and *P. solani*. FERA (The Food and Environment Research Agency), UK. 8 p.
- Mehrnejad MR, 2020. Arthropod pests of pistachios, their natural enemies and management. *Plant Protection Science*, 56, 231–260.
- Migeon A and Dorkeld F, online. Spider Mites Web. Available online: <https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php> [Accessed: 23 September 2022].
- Natural History Museum, online. HOSTS - a Database of the World's Lepidopteran Hostplants. Available online: <https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm1> [Accessed: 23 September 2022].
- Nazari P, Poorjavand N and Izadi H, 2020. Simultaneous occurrence of diapause and cold hardiness in overwintering eggs of the apple oystershell scale, *Lepidosaphes malicola* Borchsenius (Hem.: Diaspididae). *Zoological Studies*, 59, e25.
- Oksal E, Yiğit T and Özer G, 2020. First report of *Neoscytalidium dimidiatum* causing shoot blight, dieback and canker of apricot in Turkey. *Journal of Plant Pathology*, 102, 579–580. <https://doi.org/10.1007/s42161-019-00467-4>

- Ören E, Koca G, Gencer R and Bayraktar H, 2020. First report of *Neoscytalidium novaehollandiae* associated with stem canker and branch dieback of almond trees. *Australasian Plant Disease Notes*, 15, 17. <https://doi.org/10.1007/s13314-020-00386-9>
- Ören E, Palacıoğlu G, Ozan GN and Bayraktar H, 2022. First report of *Neoscytalidium novaehollandiae* associated with branch dieback and stem cankers on plum in Turkey. *Journal of Plant Pathology*, 104, 1167. <https://doi.org/10.1007/s42161-022-01143-w>
- Özgen İ and Karsavuran Y, 2011. The population fluctuations of *Lepidosaphes pistaciae* (Archangeskaya) (Homotrera: Diaspididae) pest of pistachio trees in Siirt province of Turkey. *Munis Entomology and Zoology*, 6, 977–982.
- Spodek M, Ben-Dov Y, Mondaca L, Protasov A, Erel E and Mendel Z, 2018. The cotton mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) in Israel: pest status, host plants and natural enemies. *Phytoparasitica*, 46, 45–55. <https://doi.org/10.1007/s12600-018-0642-1>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 August, 08 and 23 September 2022].
- Watson GW, 2002. *Arthropods of Economic Importance: Diaspididae of the World*. (Series Title: World Biodiversity Database). ETI Information Services (Expert Center for Taxonomic Identification) Amsterdam, Netherlands.

Abbreviations

| | |
|-------|--|
| CABI | Centre for Agriculture and Bioscience International |
| EKE | Expert Knowledge Elicitation |
| EPPO | European and Mediterranean Plant Protection Organization |
| FAO | Food and Agriculture Organization |
| ISPM | International Standards for Phytosanitary Measures |
| PLH | Plant Health |
| PRA | Pest Risk Assessment |
| RNQPs | Regulated Non-Quarantine Pests |

Glossary

| | |
|-------------------------------|--|
| Control (of a pest) | Suppression, containment or eradication of a pest population (FAO, 1995, 2017). |
| Entry (of a pest) | Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017). |
| Establishment (of a pest) | Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017). |
| Impact (of a pest) | The impact of the pest on the crop output and quality and on the environment in the occupied spatial units. |
| Introduction (of a pest) | The entry of a pest resulting in its establishment (FAO, 2017). |
| Measures | Control (of a pest) is defined in ISPM 5 (FAO, 2017) as 'Suppression, containment or eradication of a pest population' (FAO, 1995). Control measures are measures that have a direct effect on pest abundance. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk mitigation measures that do not directly affect pest abundance. |
| Pathway | Any means that allows the entry or spread of a pest (FAO, 2017). |
| Phytosanitary measures | Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2017). |
| Protected zone | A Protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union. |
| Quarantine pest | A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017). |
| Regulated non-quarantine pest | A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable |

| | |
|-------------------------|--|
| Risk mitigation measure | <p>impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017).</p> <p>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.</p> |
| Spread (of a pest) | <p>Expansion of the geographical distribution of a pest within an area (FAO, 2017).</p> |

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

A.1. *Hoplolaimus galeatus* (Lance nematode)

A.1.1. Organism information

| | |
|--|---|
| Taxonomic information | Current valid scientific name: <i>Hoplolaimus galeatus</i> (Cobb, 1913) Thorne, 1935 Synonyms: – Name used in the EU legislation: – Order: Rhabditida Family: Hoplolaimidae Common name: lance nematode Name used in the Dossier: <i>Hoplolaimus galeatus</i> |
| Group | Nematoda |
| EPPO code | HOLLGA |
| Regulated status | <u>EU status:</u> Not regulated in the EU <u>Non- EU:</u> A1 list: Argentina (2019) (EPPO, online) |
| Pest status in Türkiye | Present (Kepenekci, 2001a,b; Kepenekci, 2002) |
| Pest status in the EU | Present in Spain (de Jong, online) |
| Host status on <i>Prunus</i> spp. | Peach is recorded as a host of lance nematode <i>Hoplolaimus galeatus</i> (Eisenback, 2018; Ferris, online) |
| PRA information | No Pest Risk Assessment is currently available |

Other relevant information for the assessment

| | | |
|-----------------|--|--|
| Biology | <p><i>Hoplolaimus galeatus</i> is a polyphagous, migratory endoparasite that occurs in both soil and roots and feeds on the cortical and vascular tissue of host plants. It may also occur as an ectoparasite. This nematode is widely distributed in the United States and parasitises various field crops, grasses and woody plants (Siddiqi, 2000). It has also been reported from Canada, Sumatra, India, Tanzania, Central and South America (Pokharel, 2011), Pakistan (CABI, online), Australia (Nambiar et al., 2008), Spain (de Jong, online) and Türkiye (Kepenekci, 2001a,b; Kepenekci, 2002).</p> <p><i>H. galeatus</i> is considered an economically important pest of turfgrasses in Florida (Mac Gowan and Dunn, 1998; Crow and Brammer, 2001; Ferris, online) and can also be very damaging to many other crops, such as cotton, soybean, alfalfa and corn (Siddiqi, 2000; Ye, 2018).</p> <p>As a parasite on the roots of grasses, <i>H. galeatus</i> can destroy the root system. The damaged roots are dark, necrotic and have dead root tips; small feeder roots are absent. Destruction of the root system causes yellowing and desiccation of the grass.</p> <p><i>H. galeatus</i> not only causes individual damage, but also interacts with other soil-dwelling microorganisms (bacteria and fungi) to cause plant disease complexes. It has been reported that <i>H. galeatus</i> in combination with <i>Fusarium oxysporum</i> affects peach seedling growth more than a single pathogen (Wehunt and Weaver, 1972). <i>H. galeatus</i> has also been reported to increase the incidence of <i>Fusarium</i> root rot in peach seedlings (Wehunt, 1984).</p> | |
| Symptoms | Main type of symptoms | <p>Aboveground symptoms caused by <i>H. galeatus</i> are not easily recognised and may be confused with other plant stresses. On turfgrasses, symptoms may include irregular patterns throughout the turf stand. Slow growth, turf thinning, wilting, poor response to adequate fertilisation and irrigation, and premature decay may also be observed.</p> <p><i>H. galeatus</i> causes large necrotic lesions on the roots. A heavily infested root system may lack feeder roots. Root tips appear to be dead and new roots grow behind the injured tips. These new roots are usually damaged as well.</p> |

| | | |
|---|--|---|
| | <p>Presence of asymptomatic plants</p> | <p>In general, damage by plant-parasitic nematodes (including <i>H. galeatus</i>) is greater when plants are under stress due to lack of water or nutrients or are damaged by other diseases or insects.</p> <p>Aboveground symptoms may vary depending on the severity of the infestation. In general, symptoms caused by <i>Hoplolaimus</i> spp. on plants are inconspicuous when the nematode population is low and can be easily overlooked.</p> <p>In Türkiye (see Turkish Dossier), roots are examined macroscopically only for the presence of root galls caused by root-knot nematodes (<i>Meloidogyne</i> spp.). Necrotic lesions caused by other nematodes are not monitored.</p> |
| | <p>Confusion with other pests</p> | <p>Aboveground symptoms depend on the severity of the infestation. Symptoms of severe infestation, which include patches of stunted, chlorotic or wilted plants, are not easily recognised and can often be confused with symptoms of nutrient and water deficiency. Symptoms can also be confused with symptoms caused by other soil-dwelling pests and diseases, such as root-knot nematodes and other root rot pathogens.</p> |
| <p>Host plant range</p> | <p><i>Pinus clausa</i>, <i>P. echinata</i>, <i>P. ellioti</i>, <i>P. nigra</i>, <i>P. palustris</i>, <i>P. taeda</i>, <i>Betula populifolia</i> (birch), <i>Ligustrum ovalifolium</i> (oval-leaved ligustrum), <i>Ulmus americana</i> (American elm), <i>Ginkgo biloba</i> (bilobed ginkgo), <i>Cornus florida</i> (flowering dogwood), <i>Quercus falcata</i> (sickle-shaped oak), <i>Q. palustris</i> (marsh oak), <i>Q. rubra</i> (red oak), <i>Q. velutina</i> (velvet oak), <i>Picea abies</i> (European spruce), <i>P. glauca</i> (Canadian spruce), <i>P. pungens</i> (prickly spruce), <i>Cedrus libani</i> (Lebanon cedar), <i>Pseudotsuga menziesii</i> (Menzies pseudotsuga), <i>Larix leptolepis</i> (fine-scaled larch), <i>Platanus occidentalis</i> (western sycamore), <i>Rhododendron catawbiense</i> (rhododendron), <i>R. maximum</i>, <i>Taxus baccata</i> (berry yew), <i>T. cuspidata</i> (cusped-leaved yew), <i>Populus heterophylla</i> (variegated-leaved poplar), <i>Tsuga canadensis</i> (Canadian tsuga), <i>Thuja occidentalis</i> (western thuja), <i>Acer negundo</i> (ash-leaved maple), <i>A. palmatum</i> (palmate maple), <i>A. plantanoides</i> (plantainlike maple), <i>A. rubrum</i> (red maple), <i>Castanea mollissima</i> (soft chesnut), <i>Franklinia alata</i> (franklinia), <i>Hibiscus syriacus</i> (Syrian hibiscus), <i>Liquidambar styraciflua</i> (amber tree), <i>Morus alba</i> (mulberry), Chinese holly, <i>Armeniaca vulgaris</i> (apricot), apple, grape, <i>Prunus serotina</i> (late bird cherry), <i>P. virginiana</i> (Virginian bird cherry), <i>Prunus persica</i> (peach), profusely fruiting blueberries, cranberry, bananas, peanuts, peas, beans, soybean, sweet potatoes, wheat, <i>Vicia sativa</i> (vetch), grasses such as <i>Zoysia</i> spp., creeping bentgrass, creeping grasses, <i>Agrostis palustris</i> (marshy bent grass), <i>Dactylis glomerata</i>, <i>Cynodon dactylon</i> (bermuda grass), <i>Digitaria sanguinalis</i> (bloodlike crab grass), <i>Festuca arundinacea</i> (tall fescue), <i>Lolium multiflorum</i> (Italian ryegrass), <i>Stenotaphrum secundatum</i> (augustine grass), <i>Cymbopogon citratus</i> (lemon sorghum), <i>Saccharum officinarum</i> (sugarcane), boxwood, cabbage, <i>Zea mays</i> (corn), clover, alfalfa, lespedeza, vetch, cotton, ornamentals (opuntia, amaryllis, carnations, chrysanthemums,) and many others (Krall, 1978; Kepenekci, 2001b; Mac Gowan and Dunn, 1989; Ye, 2018; Eisenback, 2018; Ferris, online).</p> | |
| <p>Reported evidence of impact</p> | <p>In cotton, it can cause significant damage to cortex and vascular tissue; without adequate moisture, cotton plants are susceptible to stunting, yellowing and defoliation. In pines, cortex of infested roots may be destroyed; pine seedlings may die by up to 50%. In sycamores, this nematode can cause extensive root necrosis and a marked decrease in fresh weight (Fortuner, 1991; Ferris, online). According to Bird and Melakeberhan (1993), <i>H. galeatus</i> is also a problem in some orchards (apple, cherry and peach) in Michigan, USA.</p> | |
| <p>Pathways and evidence that the commodity is a pathway</p> | <p>Pathways:</p> <ul style="list-style-type: none"> – Plants, plants for planting (roots). – Soil and growing media as such or attached to plants, soil and growing media attached to machinery, tools, packaging materials, etc. | |
| <p>Surveillance information</p> | <p>To identify plant pests and diseases in planting material of <i>P. persica</i> to be exported from Türkiye, 1 kg sample is taken from the growing media in pots as a composite sample. Samples of leaves, stems, etc., are also taken separately by the inspector and sent to the laboratory for analysis.</p> | |

| |
|--|
| Analysis is done in spring or autumn once before planting, if soil analysis and harvesting do not take place at the growing site, analysis is done at most every 4 years. At harvest, the roots are visually inspected for the presence of symptoms caused by root-knot nematodes. |
|--|

A.1.2. Possibility of pest presence in the nursery

A.1.2.1. Possibility of entry from the surrounding environment

In Türkiye, *H. galeatus* was found on sweet chestnut, cowpea, sesame, vegetable, kidney bean, plum, peach, olive, sunflower and apple. According to the available data, the nematode has been detected in four regions (Antalya, Isparta, Sinop, Eskisehir), of which only two (Antalya and Isparta) grow peaches (Kepenekci, 2001b, 2002; Kepenekci and Zeki, 2002; Turkish Dossier). So far, no epidemics or economic losses have been reported in Türkiye.

If *H. galeatus* is present in the environment, it can enter *Prunus persica* growing areas with planting materials, water, soil and growing medium attached to agricultural machinery, tools and shoes.

Active spread of *H. galeatus* is effective only over short distances. Transmission from the environment to the cultivated area is possible by passive means, through the spread of infected plants, contaminated soil and rainwater run-off.

Uncertainties:

- *Hoplolaimus galeatus* occurs in Türkiye. It has been reported from peach orchards, but there is no clear information on its distribution and abundance in the *Prunus persica* growing area.
- The lack of data from official monitoring surveys and reports on problems caused by this nematode in peach production in Türkiye leads to uncertainty. This may be related to the fact that the nematode is either absent or has not been detected in peach orchards.
- It is uncertain how many orchards in peach production areas in Türkiye are infested with *H. galeatus*. There is uncertainty about the possible infestation of weeds/grasses in surrounding areas, which are also considered hosts for this nematode.

Based on the above evidence and uncertainties, the panel concludes that it is possible that the nematode is present in the environment and that it may enter the *Prunus persica* nursery with planting materials or other human activities.

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

Infested plants intended for planting and originating from production sites where the nematode is present are considered an important pathway for the introduction of this nematode to a new area/field.

Uncertainties:

- Lack of data to monitor the occurrence of *H. galeatus* in nurseries from which *P. persica* is sourced for planting creates uncertainties.
- When *H. galeatus* infestations are low in the roots of host plants, symptoms are not very pronounced and often go undetected. In addition, aboveground symptoms are often general signs of root stress in the plant. Therefore, the presence of *H. galeatus* in peach roots may not be detected by visual inspection.

Given the above evidence and uncertainties, the panel considers it possible that infestations may be overlooked and that the nematode may be introduced into nurseries/orchards with new plants.

A.1.2.3. Possibility of spread within the nursery

The active movement of *H. galeatus* is effective only over short distances. Therefore, the human-assisted dispersal route is the most important mode of nematode dispersal. The nematode can be spread with planting material from infested production sites and by soil movement – with soil as such or with soil associated with tools and machinery, and with contaminated rainwater and irrigation water.

Uncertainties:

- If the nematode is present, it is very likely to spread within the production field.

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

A.1.3. Information from interceptions

No interceptions of *Hoplolaimus galeatus* from Türkiye to the EU have been reported so far (EUROPHYT, online; TRACES-NT, online).

A.1.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | No | |
| 2 | Phytosanitary certificates and plant passport | Yes | <p><u>Evaluation:</u> <i>Hoplolaimus</i> spp. is not on the list of harmful organisms systematically monitored or tested for the presence on plants intended for planting in Türkiye.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Details of the inspection and monitoring have not been described. • Information on the distribution and abundance of <i>H. galeatus</i> in the <i>Prunus persica</i> growing area is unreliable. |
| 3 | Rouging and pruning | No | |
| 4 | Biological and mechanical control | No | |
| 5 | Pesticide application | No | |
| 6 | Surveillance and monitoring | Yes | <p><u>Evaluation:</u> Details of the surveillance and monitoring during the production cycle are not provided. <i>H. galeatus</i> is not on the list of harmful organisms systematically monitored or tested for the presence on plants intended for planting in Türkiye.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Details of the surveillance and monitoring have not been described. • Information on the distribution and abundance of <i>H. galeatus</i> in the <i>Prunus persica</i> growing area is unreliable. |
| 7 | Sampling and laboratory testing | Yes | <p><u>Evaluation:</u> Soil and plants are tested in the laboratory only for the presence of root-knot, reniform and virus vector nematodes, but not for the presence of <i>H. galeatus</i>.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Presence of <i>H. galeatus</i> cannot be detected. |
| 8 | Root washing | Yes | <p><u>Evaluation:</u> Root washing does not reduce the risk of nematode infestation in plants intended for planting that are infested with root lesion nematodes (migratory endoparasites).</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Because <i>H. galeatus</i> occurs in both soil and roots, root washing does not reduce the risk of nematodes infestation in plants intended for planting. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|--------------------------------|--------------------|---|
| 9 | Refrigeration | No | |
| 10 | Pre-consignment inspection | Yes | <p><u>Evaluation:</u> As for nematodes, inspectors pay particular attention to the presence of galls caused by root-knot nematodes. Symptoms caused by <i>H. galeatus</i> cannot be detected.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Even if inspectors examined plants for the presence of <i>H. galeatus</i>, it might initially go undetected because the nematodes are microscopic root parasites and symptoms are not very pronounced when there is a little nematode infestation in the roots of host plants. |

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 peach is considered to be a secondary host.
- Certified peach nurseries are located mainly in the part of the country, where *H. galeatus* has not been reported.
- Effective weed control, crop rotation and field hygiene limit peach infestations.
- Regular inspections by phytosanitary authorities are effective and further help to reduce infection pressure by this nematode.
- Root washing is an effective tool against ectoparasitic stage of this nematode.

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

- The peach is considered an important host.
- Certified peach nurseries are mainly located in the part of the country, where *H. galeatus* is widely distributed.
- Similar pest pressure exists throughout the country and most peach plants are expected to be infested with nematodes.
- Weed control, crop rotation and field sanitation are ineffective and do not help reduce infestations of peaches with this nematode.
- Visual selection of apple plants for planting and visual inspections prior to export without laboratory testing are not effective and result in high infestations.
- Washing the roots after harvest is not effective against endoparasitic stage of this nematode.

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

The value of the median is estimated based on:

- Uncertainties about pest pressure in Türkiye.
- The information on infections of *H. galeatus* on peach plants in Türkiye is missing.
- The lack reported problems within the peaches production area in Türkiye.
- The likelihood of introduction into peaches production sites by natural means and human activities.

A.1.5.4. 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 peach roots can be overlooked and cannot be detected by visual inspection.

A.1.5.5. Elicitation outcomes of the assessment of the pest freedom for *Hoplolaimus galeatus* on crop

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 *Hoplolaimus galeatus* *i* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Elicited values | 0 | | | | | 5 | | 10 | | 15 | | | | | 20 |
| EKE | 0.209 | 0.515 | 1.02 | 2.02 | 3.36 | 5.01 | 6.66 | 9.98 | 13.3 | 15.0 | 16.7 | 18.1 | 19.1 | 19.7 | 20.0 |

The EKE results are the BetaGeneral (1.0142, 1.035, 0, 20.25) distribution fitted with @Risk version 7.6.

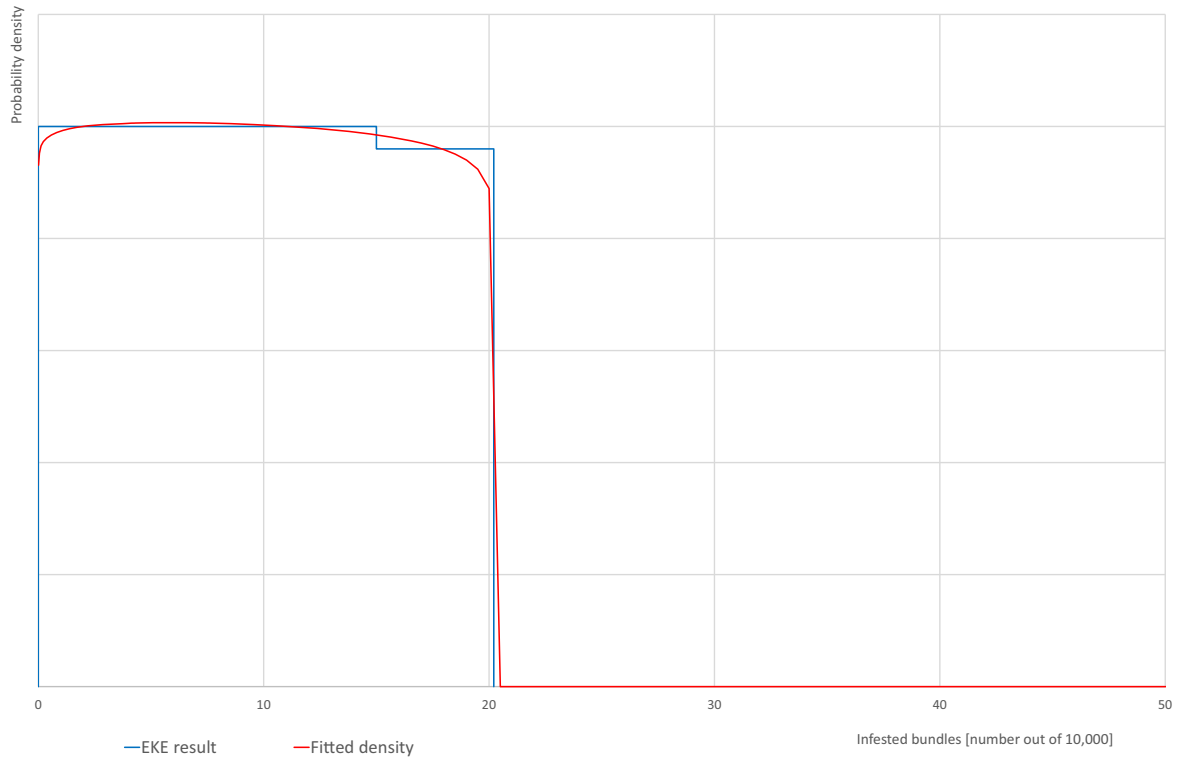
Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.2.

Table A.2: The uncertainty distribution of bundles free of *Hoplolaimus galeatus* 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 | 9980 | | | | | 9985 | | 9990 | | 9995 | | | | | 10000 |
| EKE results | 9980 | 9980 | 9981 | 9982 | 9983 | 9985 | 9987 | 9990 | 9993 | 9995 | 9997 | 9998 | 9999.0 | 9999.5 | 9999.8 |

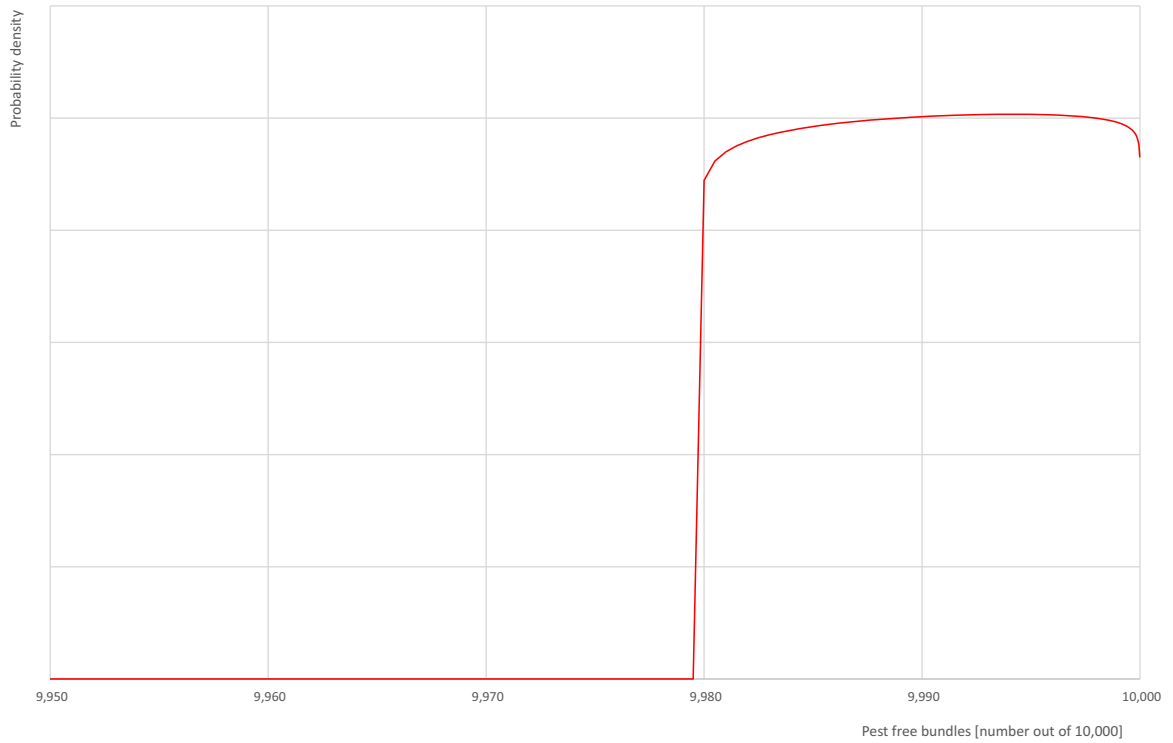
The EKE results are the fitted values.

Hoplolaimus galeatus, rooted plants

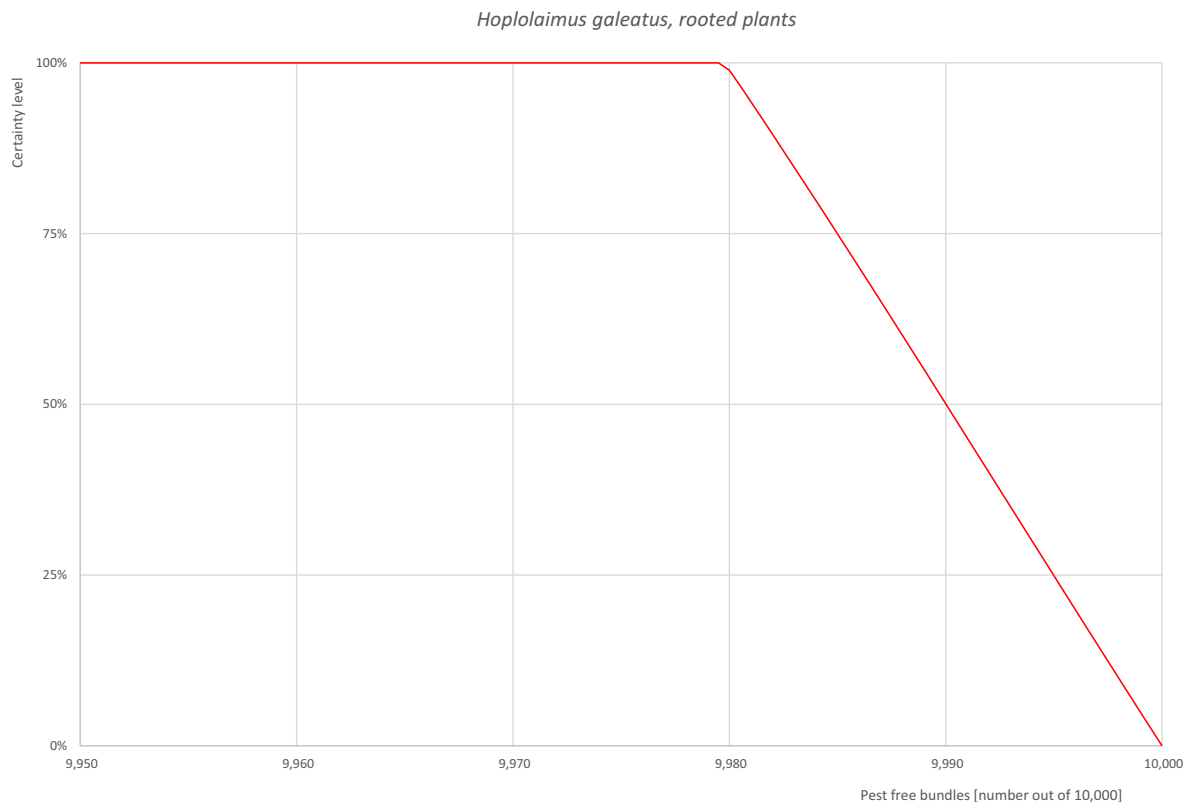


(a)

Hoplolaimus galeatus, rooted plants



(b)



(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. References list

- Bird GW and Melakeberhan H, 1993. Avoidance and management of nematode problems in tree fruit production in Michigan. Cooperative Extension Service, Michigan State University, Extension Bulletin. 20 pp.
- CABI (Centre for Agriculture and Bioscience International), online. *Hoplolaimus galeatus*. Available online: <https://www.cabidigitallibrary.org/doi/10.1079/cabicompendium.27520> [Accessed: 11 October 2022].
- Crow WT and Brammer AS, 2001. Lance Nematode, *Hoplolaimus galeatus* (Cobb, 1913) Thorne, 1935 (Nematoda: Secernentea: Tylenchida: Tylenchoidea: Hoplolaimidae). University of Florida IFAS Extension. Available online: https://entnemdept.ufl.edu/creatures/nematode/lance_nematode.htm
- de Jong Y, et al., online. Fauna Europaea - all European animal species on the web. Biodiversity Data Journal. Available online: <https://fauna-eu.org/> [Accessed: 11 October 2022].
- Eisenback JD, 2018. Plant parasitic nematodes of Virginia and West Virginia. In: Subbotin SA and Chitasmbar JJ (eds.). Plant parasitic nematodes in sustainable agriculture of North America. Springer. pp. 277–304. https://doi.org/10.1007/978-3-319-99588-5_11
- EPPO (European and Mediterranean Plant Protection Organization), online. *Hoplolaimus galeatus* (HOLLGA), Categorization. Available online: <https://gd.eppo.int/taxon/HOLLGA/categorization> [Accessed: 11 October 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions – EUROPHYT. Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Ferris H, online. Nemaplex (The Nematode-Plant Expert Information System). Available online: <http://nemaplex.ucdavis.edu/> [Accessed: 11 October 2022].
- Fortuner R, 1991. The Hoplolaiminae. In: Nickle WR (ed.). Manual of agricultural nematology. CRC Press. pp. 669–720. <https://doi.org/10.1201/9781003066576-15>

- Kepebekci I, 2001a. Plant parasitic nematodes of Tylenchida (Nematoda) associated with walnuts (*Juglans regia* L.) and chestnuts (*Castanea sativa* Miller) orchards in the Black Sea region. *Tarım Bilimleri Dergisi*, 7, 101–105. https://doi.org/10.1501/tarimbil_0000000631
- Kepebekci I, 2001b. Plant parasitic nematodes of Tylenchida (Nematoda) associated with stone fruits (apricots and peaches) in Southern Turkey. *Pakistan Journal of Nematology*, 19 (1 and 2), 49–61.
- Kepebekci I, 2002. Plant parasitic nematode species of Tylenchida (Nematoda) associated with sesame (*Sesamum indicum* L.) growing in the Mediterranean region of Turkey. *Turkish Journal of Agriculture and Forestry*, 26, 323–330. <https://doi.org/10.1007/bf03039997>
- Kepebekci I and Zeki C, 2002. Nematodes of Tylenchida (Nematoda) associated with apple in Turkey. *Pakistan Journal of Nematology*, 20, 61–63.
- Krall EL, 1978. Root parasitic nematodes, family Hoplolaimidae. Nauka Publishers, Leningrad Branch. Amerind Publishing Co. Pvt. Ltd., New Delhi, 1985 – Published for the US Department of Agriculture and the National Publishing, 580 pp.
- Mac Gowan JB and Dunn RA, 1989. *Hoplolaimus galeatus*: lance nematode on St. Augustine grass from Florida. Nematology Circular No. 161, Florida Department of Agriculture & Consumer Services, Division of Plant Industry, Contribution No. 371, Bureau of Nematology, 4 pp.
- Nambiar L, Quader M and Nobbs JM, 2008. First record of *Hoplolaimus galeatus* in Australia. *Australasian Plant Disease Notes*, 3, 145–146. <https://doi.org/10.1071/dn08056>
- Pokharel R, 2011. Importance of plant parasitic nematodes in Colorado. Fact Sheet No. 2.952. Crops Colorado State University, Western Colorado Research Center. 6 pp. Available online: <https://extension.colostate.edu/docs/pubs/crops/02952.pdf>
- Siddiqi MR, 2000. Tylenchida: parasites of plants and insects, 2nd Edition. CABI Publishing, Wallingford, UK, 833 pp. <https://doi.org/10.1079/9780851992020.0000>
- TRACES-NT, online. TRAdE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 8 September 2022]
- Ye W, 2018. Nematodes of agricultural importance in North and South Carolina. In: Subbotin SA and Chitambar JJ (eds.). Plant parasitic nematodes in sustainable agriculture of North America. pp. 247–276. https://doi.org/10.1007/978-3-319-99588-5_10
- Wehnt EJ, 1984. Nematode parasites of peach and other tree crops. In: Nickle WR (ed.). Plant and insect nematodes. Marcel Dekker Inc., pp. 435–456.
- Wehnt EJ and Weaver DJ, 1972. Effect of nematodes and *Fusarium oxysporum* on the growth of peach seedlings in the greenhouse. *Journal of Nematology*, 4, 236.

A.2. Peach rosette mosaic virus

A.2.1. Organism information

| | |
|------------------------------|--|
| Taxonomic information | <p>Current valid scientific name: Peach rosette mosaic virus Synonyms: PRMV, Peach rosette mosaic nepovirus. Name used in the EU legislation: Peach rosette mosaic virus [PRMV] Category: Virus</p> <p>Order: <i>Picornavirales</i> Family: <i>Secoviridae</i></p> <p>Common name: rosette mosaic of peach Name used in the Dossier: Peach rosette mosaic virus (PRMV)</p> |
| Group | Virus and Viroids |
| EPPO code | PRMV00 |
| Regulated status | <p>PRMV is listed as EU quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072); pests not known to occur in the EU Union territory (2019).</p> <p>Quarantine pest: Morocco (2018), Tunisia (2012), Canada (2019), Mexico (2018), Israel (2009), Moldova (2017) (EPPO, online_a).</p> <p>A1 list: Brazil (2018), Chile (2019), Bahrain (2003), Jordan (2013), Kazakhstan (2017), Georgia (2018), Russia (2014), Türkiye (2016), Ukraine (2019), United Kingdom (2020) (EPPO, online_a).</p> <p>A2 list: Egypt (2018) (EPPO, online_a).</p> |

| | |
|--|---|
| Pest status in Türkiye | Present, restricted distribution (CABI, 2001; EPPO, online_b). It was reported on commercial nursery plantations of almond in 1992–1993 in Western Anatolia (Aydın, Balıkesir and İzmir) region. |
| Pest status in the EU | Absent, no pest record (EPPO, online_b). |
| Host status on <i>Prunus</i> spp. | <i>Prunus dulcis</i> and <i>P. persica</i> are both reported as hosts for PRMV in the EPPO Global Database (EPPO, online_c,d). |
| PRA information | Available pest risk assessment: <ul style="list-style-type: none"> Scientific Opinion on the pest categorisation of non-EU viruses and viroids of <i>Prunus</i> L. (EFSA PLH Panel, 2019). |

Other relevant information for the assessment

| | | |
|--|---|---|
| Biology | PRMV is a bipartite single-stranded positive-sense RNA virus, with isometric particles and belonging to the <i>Secoviridae</i> family, <i>Nepovirus</i> genus. PRMV infects perennial crops including stone fruit, grape and blueberry, in addition to several weeds (Ramsdell and Myers, 1978). The most common symptom of PRMV infection is the delaying foliation, leaf malformation and chlorotic mottling, with shortening of the internodes. PRMV is soil-borne and can be transmitted by different species of the nematode <i>Xiphinema americanum</i> group and also by <i>Longidorus diadecturus</i> and <i>L. elongatus</i> (Eveleigh and Allen, 1982; Allen et al., 1984; Martelli and Uyemoto, 2011; EFSA PLH Panel, 2019). Additionally, PRMV has been experimentally shown to be seed-borne in grapevine, and in <i>Taraxacum officinale</i> and <i>Chenopodium quinoa</i> (Dias and Cation, 1976; Ramsdell and Myers, 1978). | |
| Symptoms | Main type of symptoms | PRMV causes shortened internodes, rosetting and mosaic of leaves in peaches (Martelli and Uyemoto, 2011). Infected trees are stunted and produce little or no fruits (Ramsdell, 1995). In <i>Prunus domestica</i> virus infection causes leaf deformation, such as strap-shaped to dwarf-thickened leaves; in <i>P. salicina</i> × <i>P. simonii</i> symptoms are small leaves and shoot rosette (Martelli and Uyemoto, 2011; EFSA PLH Panel, 2019). In grapevines, the virus causes a decline disease, leaf malformation, shortening of cane internodes and crooked cane growth (Ramsdell and Myers, 1978; Mannini and Digiario, 2017). Symptoms on <i>Vaccinium corymbosum</i> are mainly on the leaves, which are deformed and strap-like (Ramsdell and Gillet, 1998). |
| | Presence of asymptomatic plants | An asymptomatic phase of PRMV infection has not been described, but symptoms can appear few months or years after infection. |
| | Confusion with other pests | |
| Host plant range | PRMV occurs in grapevine, peach and blueberry, including some weeds, e.g. <i>Taraxacum officinale</i> , <i>Solanum carolinense</i> and <i>Rumex crispus</i> (Ramsdell and Myers, 1978). Additionally, other experimental herbaceous are also hosts, such as some species of <i>Chenopodiaceae</i> , <i>Cucurbitaceae</i> , <i>Fabaceae</i> and <i>Solanaceae</i> which can be infected by mechanical inoculation with sap. | |
| Reported evidence of impact | Not relevant, PRMV is listed as EU quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072). | |
| Pathways and evidence that the commodity is a pathway | Plants for planting of <i>Prunus</i> are potential host commodities for PRMV (EPPO, online_e). Thus, plants for planting coming from a country where PRMV occurs can be the main pathway of entry (EFSA PLH Panel, 2019). | |
| Surveillance information | According to the EPPO and CABI, PRMV has a restricted presence in Türkiye, with few occurrences, based on information dated on 1999 and 2001 (CABI/EPPO, 2001). This is in accordance with the information provided in the Dossier, where PRMV has been reported on almond nursery trees in west Anatolia in 1992–1993 (Azeri and Cıcek, 1997). To date, PRMV has not been detected in the official controls of the plants for planting within certification and plant passport regulations. | |

PRMV is included in Annex-1/A list of the Regulation on plant quarantine, there is official sampling strategy for the detection of PRMV, which information is provided in 'Regulation on Plant Quarantine' and 'Plant Quarantine Sampling Instruction by Republic of Türkiye Ministry of Agriculture and Forestry General Directorate of Food and Control' (Anonymous, 2011a,b).

From the information provided in the dossier, only the production of varieties which are registered in fruit and vine variety list is permitted, Production Material Certificate or Sapling Certificate is issued only for them as a result of controls. The places of production and the processing or treatment procedures for growing media are inspected, monitored or approved (in according to ISPM 40), ensuring that phytosanitary import requirements are met and the growing media are analysed to be free from pests.

From the information provided in the almond technical report, for the identification of PRMV in the seedlings to be exported, among 5 and 25 seedlings are randomly taken from the plantation in the nursery and sealed by the inspector, and then, sent to the laboratory for analysis (Anonymous, 2014). From the peach technical report, samples from leaves, stems, etc. are separately taken by the inspector and send to the laboratory for analysis. The seedlings are examined macroscopically in the production area, and apart from Turkish quarantine pests, a 2% tolerance is allowed. In case of suspected the virus detection, samples are taken again for analysis. They are sent to the laboratory for diagnosis. When the seedlings are exported in a different province, they are transported to the export point by plant passport. EU requires a document stating that the Consignment complies with Annex VII points 3 a, 3 b, 4 a, 7b.b, 45 of Commission Implementing Regulation (EU) 2019/2072. – and that no symptoms of diseases caused by non-European viruses have been observed on the plants at the place of production since the beginning of the last complete cycle of vegetation. The plants have been: (a) Officially certified under a certification scheme requiring them to be derived in direct line from material which has been maintained under appropriate conditions and subjected to official testing for at least peach rosette mosaic virus using appropriate indicators or equivalent methods and has been found free, in these tests, from those pests. (b) No symptoms of diseases caused by peach rosette mosaic virus have been observed on plants at the place of production, or on susceptible plants in its immediate vicinity, since the beginning of the last complete cycle of vegetation.

A.2.2. Possibility of pest presence in the nursery

A.2.2.1. Possibility of entry from the surrounding environment

PRMV host range is rather narrow, the American grape species being the main host. PRMV occurrence in Türkiye is restricted to three districts of Western Anatolia (Aydın, Balıkesir and İzmir), where it has been found in a few samples of almonds from commercial nursery plantations in 1992–1993 (Azeri and Çöcek, 1997). Western Anatolia produces 25% of total Turkish production. Based on the dossier information, there is a set of standard precautions to ensure that no plants other than certified plants are present in the production areas. But there is no specific information on the cultivated and non-cultivated plant species in the nursery surroundings. Also, there is no information about measures to control weeds and wild plants around the production areas, and PRMV could infect certain weed hosts, such as *Taraxacum officinale*. PRMV is primarily soil-borne, and the dispersal range of PRMV infection appears to be constrained to the nematode-vector species of the *Xiphinema americanum* group, *Longidorus diadecturus* and *L. elongatus* (Allen et al., 1984; Martelli and Uyemoto, 2011; EFSA PLH Panel, 2019), and these potential nematode vectors appear not to be established in Türkiye.

Uncertainties:

- There is a lack of information about the particular plant species in the surrounding of nurseries.
- It is unknown whether there are other mechanisms of spread.

Taking into consideration the above evidence and uncertainties, the panel considers that the possibility of entry into the nursery infecting *Prunus* plants from surrounding orchards may be unlikely.

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

Only certified class plant material is used at the production areas, and quarantine practices are carried out in accordance with the 'Seedling Certification Regulation' and 'Regulation on the Registration of Plant Passports and Operators'. PRMV symptoms can appear in 2–3 years after infection, but usually *Prunus* trees show symptoms easily to visualise during the surveys (Martelli and Uyemoto, 2011). PRMV is mainly transmitted by nematode vectors, although in laboratory conditions, it has also been shown to be seed-borne in grapevine and herbaceous (*Taraxacum* and *Chenopodium*) species (Dias and Cation, 1976; Ramsdell and Myers, 1978).

Uncertainties:

- There is a lack of information related to the virus-free material certification, including the presence and sanitary status of alternative plant species for PRMV that are grown in the nursery.
- It is unclear to what extent the detection and sampling strategies are effective to detect latent infections.
- It is unclear the extent of seed transmission in *Prunus* trees and mother plants.

Taking into consideration the above evidence and uncertainties, the panel considers that the possibility of entry with *Prunus* spp. and other cultivated plants and ornamental material must be considered.

A.2.2.3. Possibility of spread within the nursery

According to the information provided, plants are monitored and inspected during the vegetation period. In case of nematode vector presence, the virus spread from infection foci appears to be at the rate of 1 m per year radially. Alternatively, PRMV has been experimentally transmitted in some species of *Chenopodiaceae*, *Cucurbitaceae*, *Fabaceae* and *Solanaceae* by mechanical sap inoculation (Klos et al., 1967). PRMV can be transmitted via clonal propagation of infected mother plants.

Virus transmission via seed has not been investigated in woody trees.

Uncertainties:

- It is unknown whether PRMV could be transmitted by seed.

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

A.2.3. Information from interceptions

There are no records of interceptions of *P. dulcis* and *P. persica* plants for planting from Türkiye due to the presence of PRMV between 1995 and August 2022 (EUROPHYT, online; TRACES-NT, online).

A.2.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure | Effect on pest | Evaluation and uncertainties |
|-----|-------------------------|----------------|---|
| 1 | Certified material | Yes | Practices for inspections and detections are applied according to the Turkish regulations and guidelines. <u>Uncertainties:</u> <ul style="list-style-type: none"> • There is a lack of details for the certification process, such as survey protocols and laboratory methodologies for virus detection. |

| No. | Risk mitigation measure | Effect on pest | Evaluation and uncertainties |
|-----|-----------------------------------|----------------|---|
| 2 | Phytosanitary certificates | Yes | The certificates relate to the compliance of material specified by the Turkish Authorities. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Specific figures on the intensity of survey (sampling effort) are not provided. • There is a lack of details for the certification process, in addition to the surveillance and monitoring during production cycle. |
| 3 | Rouging and pruning | Yes | Identifying and removing suspicious plants could be effective to prevent viral spread. <u>Uncertainties:</u> <ul style="list-style-type: none"> • The presence of latent infections. |
| 4 | Biological and mechanical control | No | |
| 5 | Pesticide application | No | |
| 6 | Surveillance and monitoring | Yes | Visual inspections may be effective to delay viral spread. <u>Uncertainties:</u> <ul style="list-style-type: none"> • It is unclear the effectivity of visual inspections to detect early infections, including the presence of latent infections. |
| 7 | Sampling and laboratory testing | Yes | Laboratory analysis is available, and there is a monitoring of plant material randomly selected. <u>Uncertainties:</u> <ul style="list-style-type: none"> • There is a lack of details for the analysis methodology, and it is uncertain to what extent the inspection of this material and number of plant material are effective to detect infected plants. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Not relevant, but low temperatures may reduce the multiplication of the virus but will not eliminate it. |
| 10 | Pre-consignment inspection | Yes | The inspection and provision of certified material are appropriate. <u>Uncertainties:</u> <ul style="list-style-type: none"> • There is a lack of details for the phytosanitary inspections at this stage. |

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

- Registration and certification of propagation material ensure virus-free production.
- Most of nurseries are placed in areas where the virus has not been reported.
- PRMV has not been reported in peach trees in Türkiye.
- Nematode vectors are the only efficient way to get within the nurseries, and they are absent in the production areas.
- No other vectors are known to be present, human activities or plant material may spread the virus
- Visual inspections are under official regulation, and virus symptoms seem easy to detect in diseased plants.

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

- PRMV was reported in almond trees in Türkiye.
- The adherence to registration and certification criteria of propagation material for this pest is inappropriate and may increase the risk of entry.
- Unidentified virus outbreaks are present in the surrounding of *Prunus* production areas or the nurseries are placed in areas close to places where the PRMV is present.
- Nematode vectors may be present and unidentified in the production areas.
- Pest can enter by unknown mechanisms.
- Visual inspection will not detect early stages of infections or asymptomatic plants.

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

- PRMV has been reported in almond trees and not reported in peach in Türkiye.
- Presence of the known vectors is very unlikely.
- Introduction of the virus from the surrounding areas or from propagation material within the nurseries is very unlikely.

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

Transmission efficiency by other potential nematode vectors species is not well documented

- Status of the virus in the surrounding areas is unknown

A.2.5.5. Elicitation outcomes of the assessment of the pest freedom for peach rosette mosaic virus

The elicited and fitted values for peach rosette mosaic virus agreed by the Panel are shown in Tables A.3 and A.4 and in Figure A.2.

Table A.3: Elicited and fitted values of the uncertainty distribution of pest infestation by peach rosette mosaic virus 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 | | | | | 4 | | 8 | | 13 | | | | | 20 |
| EKE | 0.176 | 0.422 | 0.820 | 1.60 | 2.64 | 3.95 | 5.28 | 8.10 | 11.2 | 12.9 | 14.8 | 16.6 | 18.3 | 19.3 | 20.1 |

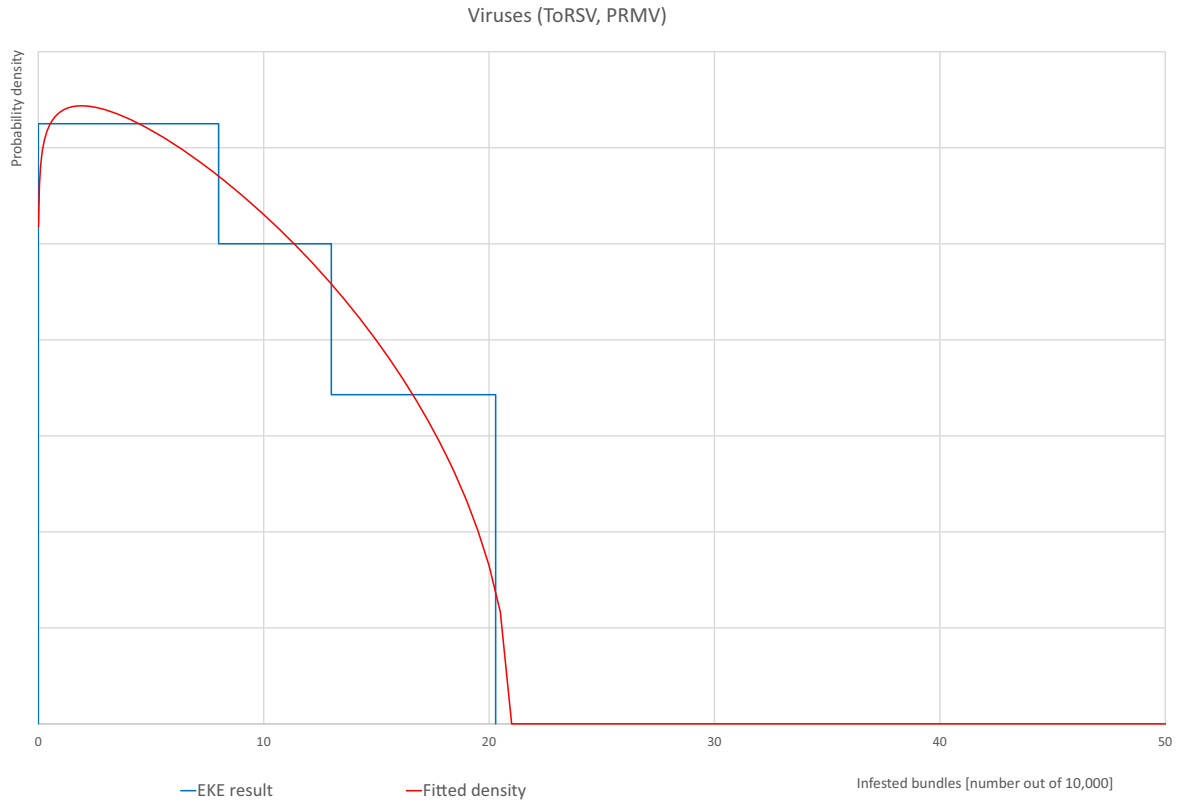
The EKE results are the BetaGeneral (1.0504, 1.5023, 0, 21) distribution fitted with @Risk version 7.6.

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

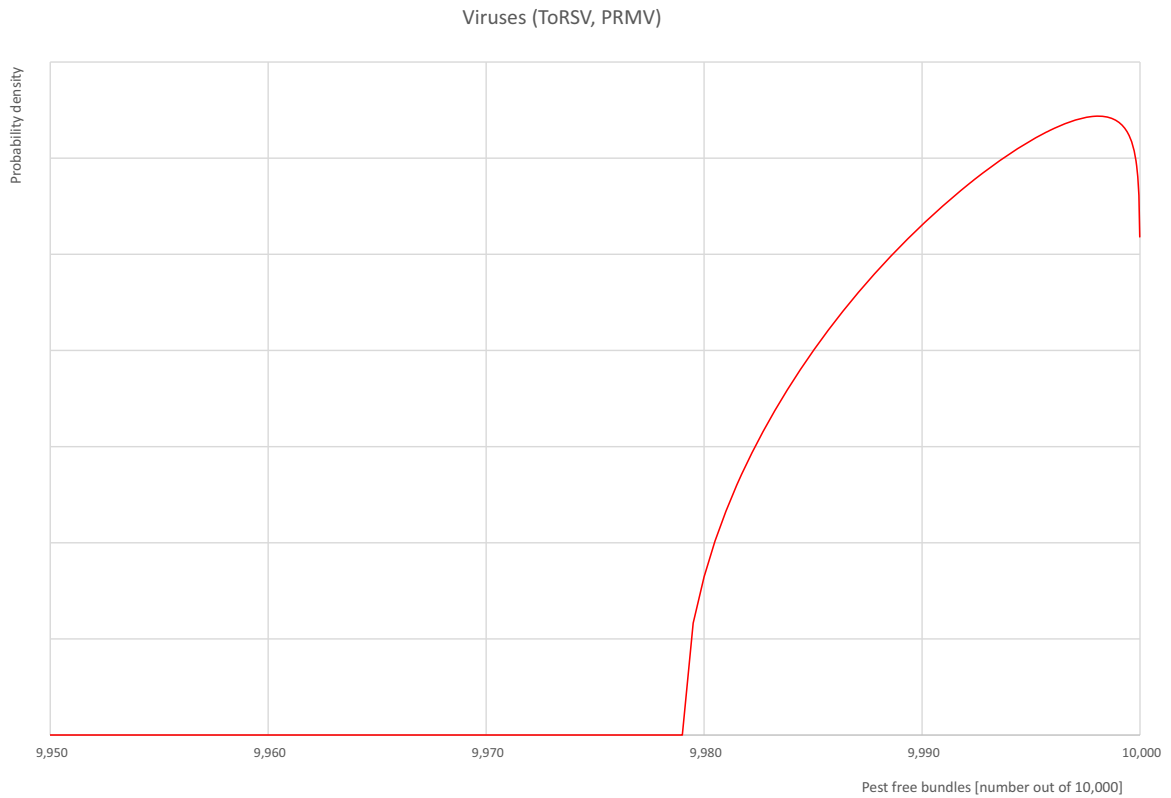
Table A.4: The uncertainty distribution of bundles free of peach rosette mosaic virus per 10,000 bundles calculated by Table A.1

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|--------|
| Values | 9980 | | | | | 9987 | | 9992 | | 9996 | | | | | 10000 |
| EKE results | 9980 | 9981 | 9982 | 9983 | 9985 | 9987 | 9989 | 9992 | 9995 | 9996 | 9997 | 9998 | 9999.2 | 9999.6 | 9999.8 |

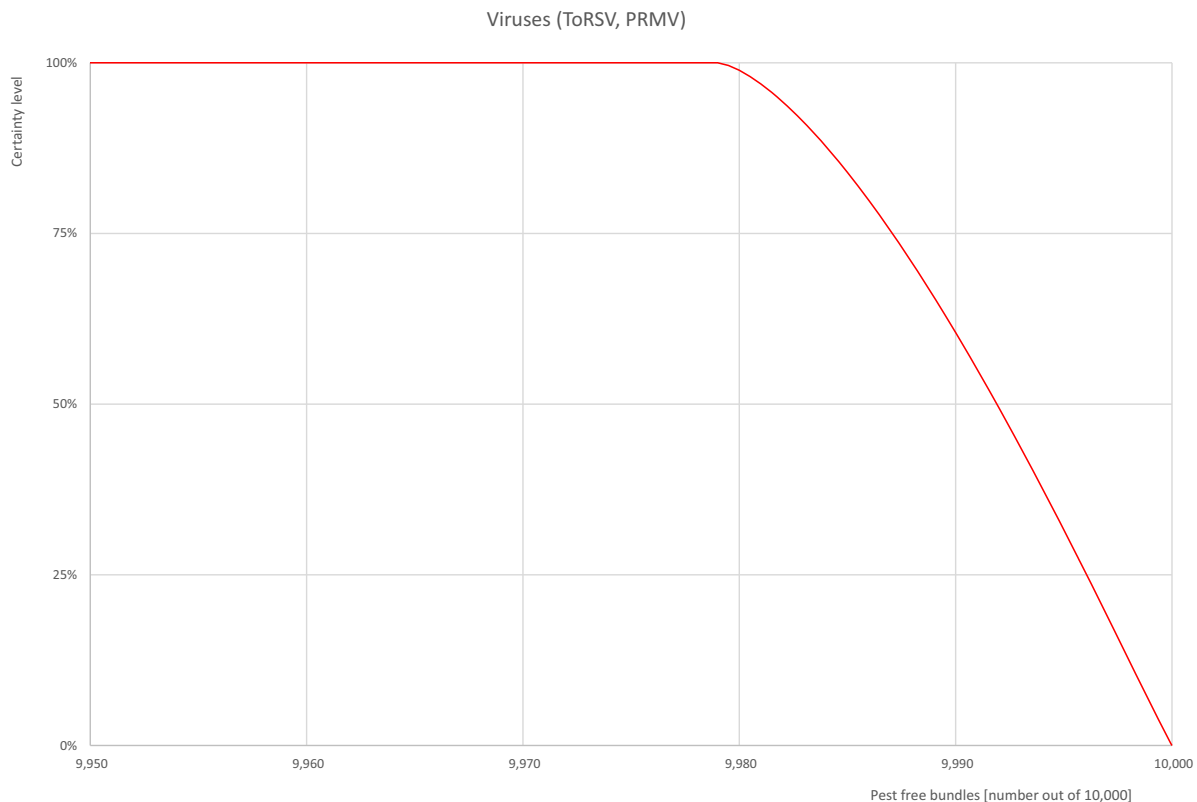
The EKE results are the fitted values.



(a)



(b)



(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

A.2.6. References list

- Allen WR, Van Schagen JG and Ebsary BA, 1984. Comparative transmission of the peach rosette mosaic virus by Ontario populations of *Longidorus diadecturus* and *Xiphinema americanum* (Nematoda: Longidoridae). *Canadian Journal of Plant Pathology*, 6, 29–32. <https://doi.org/10.1080/07060668409501587>
- Anonymous, 2011a. Available online: <http://www.resmigazete.gov.tr/eskiler/2011/01/20110112-2.htm>. [Accessed: 25 June 2022].
- Anonymous, 2011b. Available online: <http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.15548&sourceXmlSearch=&MevzuatIliski=0> [Accessed: 25 June 2022].
- Anonymous, 2014. Bitki Karantinası Numune Alma Talimatı. Available online: <https://zkm.tarimorman.gov.tr/antalya/Sayfalar/Detay.aspx?SayfaId=6> [Accessed: 25 June 2022].
- Azerý T and Çýcek Y, 1997. Detection of virus diseases affecting almond nursery trees in Western Anatolia (Turkey). *Bulletin OEPP/EPPO Bulletin* 27, 547–550. <https://doi.org/10.1111/j.1365-2338.1997.tb00682.x>
- CABI/EPPO, 2001. Peach rosette mosaic virus. *Distribution Maps of Plant Diseases*, Map No. 829. Wallingford, UK: CAB International.
- Dias HF and Cation D, 1976. The characterization of a virus responsible for peach rosette mosaic and grape decline in Michigan. *Canadian Journal of Botany*, 54, 1228–1239. <https://doi.org/10.1139/b76-133>
- EFSA PLH Panel (EFSA Plant Health Panel), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Bosco D, Chiumenti M, Di Serio F, Kaluski T, Minafra A and Rubino L, 2019. Pest categorisation of non-EU viruses and viroids of *Prunus* L. *EFSA Journal* 2019;17(9):5735, 84 pp. <https://doi.org/10.2903/j.efsa.2019.5735>

- EPPO (European and Mediterranean Plant Protection Organization), online_a. Peach rosette mosaic virus (PRMV00), Categorization. Available online: <https://gd.eppo.int/taxon/PRMV00/categorization> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. Peach rosette mosaic virus (PRMV00), Distribution. Available online: <https://gd.eppo.int/taxon/PRMV00/distribution> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Prunus dulcis* (PRNDU), Pests. Available online: <https://gd.eppo.int/taxon/PRNDU/pests> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_d. *Prunus persica* (PRNPS), Pests. Available online: <https://gd.eppo.int/taxon/PRNPS/pests> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_d. Peach rosette mosaic virus (PRMV00), Host Commodities. Available online: <https://gd.eppo.int/taxon/PRMV00/pathwayshosts> [Accessed: 25 June 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Eveleigh ES and Allen WR, 1982. Description of *Longidorus diadecturus* n.sp. (Nematoda: Longidoridae), a vector of the peach rosette mosaic virus in peach orchards in southwestern Ontario, Canada. Canadian Journal of Zoology, 60, 112–115. <https://doi.org/10.1139/z82-014>
- Klos EJ, Fronck F, Knierem A and Cation D, 1967. Peach rosette mosaic transmission and control studies. Michigan Agricultural Experiment Station Quarterly Bulletin, 49, 287–293.
- Mannini F and Digiario M, 2017. The effects of viruses and viral diseases on grapes and wine. Grapevine Viruses: Molecular Biology, Diagnostics and Management. Springer. pp. 453–482. https://doi.org/10.1007/978-3-319-57706-7_23
- Martelli G and Uyemoto J, 2011. Nematode-borne viruses of stone fruits. In: Hadidi A, Barba M, Candresse T and Jelkmann W (eds.). Virus and Virus-Like Diseases of Pome and Stone Fruits. APS Press/American Phytopathological Society. pp 161–170. <https://doi.org/10.1094/9780890545010.032>
- Ramsdell DC, 1995. Peach rosette mosaic virus. In: Ogawa JM, Zehr EI, Bird GW, Ritchie DF, Uriu K, Uyemoto JK (eds.). Compendium of Stone Fruit Diseases. St. Paul, USA: American Phytopathological Society Press, 98 pp.
- Ramsdell DC and Myers RL, 1978. Epidemiology of Peach Rosette Mosaic Virus in a Concord grape vineyard. Phytopathology, 68, 447–450. <https://doi.org/10.1094/phyto-68-447>
- Ramsdell DC and Gillet JM, 1998. Peach Rosette Mosaic Virus. CMI/AAB Descriptions of Plant Viruses, 364, 4 pp. Available online: <https://www.dpvweb.net/dpv/showdpv/?dpvno=364>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.3. Tomato ringspot virus

A.3.1. Organism information

| | |
|------------------------------|--|
| Taxonomic information | <p>Current valid scientific name: Tomato ringspot virus Synonyms: ToRSV, Tomato ringspot, <i>Tomato ringspot nepovirus</i>. Name used in the EU legislation: <i>Tomato ringspot virus</i> [ToRSV]</p> <p>Category: Virus Order: <i>Picornavirales</i> Family: <i>Secoviridae</i></p> <p>Common name: ringspot of tomato, union necrosis of apple, chlorosis mosaic of raspberry, chlorosis of pelargonium, stem pitting of <i>Prunus</i>, yellow vein of grapevine. Name used in the Dossier: Tomato ringspot virus (ToRSV)</p> |
| Group | Virus and Viroids |
| EPPO code | ToRSV0 |
| Regulated status | <p>ToRSV is listed as EU quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072); pests not known to occur in the EU Union territory (2019).</p> <p>Quarantine pest: Morocco (2018), Tunisia (2012), Canada (2019), Mexico (2018), Israel (2009), Moldova (2017), Norway (2012) (EPPO, online_a).</p> |

| | |
|--|---|
| | <p>A1 list: Egypt (2018), Argentina (2019), Brazil (2018), Paraguay (1995), Uruguay (1995), Bahrain (2003), China (1993), Kazakhstan (2017), Georgia (2018), Ukraine (2019), APPPC (1993) (EPPO, online_a).</p> <p>A2 list: Jordan (2013), Russia (2014), Türkiye (2016), EAEU (2016), EPPO (1975) (EPPO, online_a).</p> |
| Pest status in Türkiye | Present, restricted distribution (EPPO, online_b) or few occurrences (CABI, online). According to the additional information provided by Türkiye, ToRSV has been reported on almond and cultivated plants (tomato, pepper, cucumber, grapevine, strawberry and blackberry) in four (Hakkari, Mugla, Hatay and west Anatolia) regions. |
| Pest status in the EU | Present, no details (France, Lithuania, Poland). Few occurrences (Croatia). Transient under eradication (Germany and Netherlands) (EPPO, online_b). |
| Host status on <i>Prunus</i> spp. | <i>Prunus dulcis</i> and <i>P. persica</i> are both reported as hosts for ToRSV in the EPPO Global Database (EPPO, online_c). |
| PRA information | <p>Available pest risk assessment:</p> <ul style="list-style-type: none"> – Rapid pest risk analysis for <i>Xiphinema americanum</i> s.l. (European populations) (FERA, 2014); – Rapid pest risk analysis (PRA) for: Tomato ringspot virus (ToRSV) (DEFRA, 2018); – Pest categorisation of non-EU viruses and viroids of <i>Cydonia</i> Mill., <i>Malus</i> Mill. and <i>Pyrus</i> L. (EFSA PLH Panel, 2019a); – Pest categorisation of non-EU viruses and viroids of <i>Prunus</i> L. (EFSA PLH Panel, 2019b); – Pest categorisation of non-EU viruses and viroids of <i>Vitis</i> L. (EFSA PLH Panel, 2019c); – Pest categorisation of non-EU viruses of <i>Fragaria</i> L. (EFSA PLH Panel, 2019d); – Pest categorisation of non-EU viruses of <i>Ribes</i> L. (EFSA PLH Panel, 2019e); – Pest categorisation of non-EU viruses of <i>Rubus</i> L. (EFSA PLH Panel, 2020). |

Other relevant information for the assessment

| | | |
|-----------------|--|--|
| Biology | ToRSV is a bipartite positive-sense RNA virus, with isometric particles in <i>Secoviridae</i> family, <i>Nepovirus</i> genus (Sanfaçon et al., 2006). ToRSV has a wide range of hosts, infecting primarily perennial plants such as tomato, tobacco, cucumber, pepper, peach, apple, grape, cherry, strawberry, raspberry, plum, geranium, walnut and ornamental plants (Stace-Smith, 1984). Experimentally, its host diversity is also very high and about 35 families are susceptible to this virus (Zindović et al., 2014). ToRSV is naturally spread by different species of the nematode <i>Xiphinema americanum</i> group, and can also be transmitted via seed, pollen and vegetative propagation (Bitterlin et al., 1987; Pinkerton et al., 2008). | |
| Symptoms | Main type of symptoms | <p>The most common symptom of ToRSV infection is the presence of annular spots on the leaves. Although symptom expression varies according to the plant species, virus isolate, the age of the plant at the time of infection and environmental conditions.</p> <p>In general, infected plants show typical symptoms as a shock reaction. Plants can be seen as pale yellow and showing pale green spots on the leaves that develop along the major side veins, causing systemic chlorotic or necrotic ring stains, as well as deformation of the fruit growth. Chronically infected plants usually exhibit no obvious symptoms but show a general decline in productivity (Stace-Smith, 1984; Gonsalves, 1988; EPPO, 2013).</p> <p>Major diseases caused by ToRSV on fruit crops include vein yellowing in grapevines, and yellow bud mosaic in peach and almond which cause pale-green to pale-yellow blotches to develop along the main vein or large lateral veins of leaves (EPPO, 2005).</p> |

| | | |
|--|--|---|
| | | <p>In apple plants, ToRSV causes a delay in foliation; the leaves are small and sparse, showing a vein yellowing and pale green colour. Terminal shoot growth is reduced, the stem internodes are short. And commonly, there is a partial or complete separation of the graft union on severely affected trees (EPPO, 2013).</p> <p>In stone fruit, there can be severe pitting of the scion, rootstock or both on either side of the graft union. The graft union can show various degrees of necrosis. Foliage symptoms slowly spread throughout the canopy as the virus moves up into scion wood and there is a general decline.</p> |
| | Presence of asymptomatic plants | In certain cases, ToRSV disease could be asymptomatic. |
| | Confusion with other pests | Note that geographical distribution, natural host range and vector relations of ToRSV are closely parallel to Tobacco ringspot virus (TRSV) (EPPO/CABI, 1996). |
| Host plant range | <p>In nature, ToRSV occurs mostly in vegetable and perennial crops, including ornamental and woody plants, such as <i>Lycopersicon esculentum</i> Mill. (tomato), <i>Cucumis sativus</i> (cucumber), <i>Nicotiana tabacum</i> (tobacco), <i>Solanum tuberosum</i> (potato), <i>Vitis vinifera</i> (grapevine), <i>Vaccinium corymbosum</i> (blueberry), <i>Fragaria vesca</i> (strawberry), <i>Pelargonium domesticum</i> (geranium), <i>Rubus idaeus</i> (raspberry), <i>Rubus fruticosus</i>, <i>Rubus</i> sp. (blackberry), <i>Malus</i> sp. (apple), <i>Hosta</i> sp., <i>Aquilegia vulgaris</i>, <i>Delphinium</i> sp., <i>Fragaria ananassa</i>, <i>Fraxina americana</i>, <i>Gladiolus</i> sp., <i>Heleborus foetidus</i>, <i>Hydrangea macrophylla</i>, <i>Iris</i> sp., <i>Punica granatum</i>, <i>Phaseolus vulgaris</i>, <i>Prunus persica</i>, <i>Prunus</i> sp., <i>Rosa</i> sp., <i>Trifolium</i> sp., <i>Vigna unguiculata</i> and <i>Viola cornuta</i> (Samuitienė and Navalinskienė, 2001; Sanfaçon et al., 2006; EPPO, 2013).</p> <p>Additionally, other uncultivated hosts, such as <i>Taraxacum officinale</i>, <i>Rumex acetosella</i>, <i>Stellaria</i> spp., among other 21 species can be infected by ToRSV (Mountain et al., 1983; Powell et al., 1984).</p> | |
| Reported evidence of impact | <p>ToRSV causes severe decline in productivity. Trees grown on peach, almond, cherry and plum rootstocks become unproductive (Uyemoto and Scott, 1992; Adaskaveg and Caprile, 2009).</p> <p>ToRSV is listed as EU quarantine pest (Annex II, Part A of Commission Implementing Regulation (EU) 2019/2072).</p> | |
| Pathways and evidence that the commodity is a pathway | Plants for planting of <i>Malus</i> , <i>Pelargonium</i> , <i>Prunus</i> and <i>Rubus</i> are potential host commodities for ToRSV (EPPO, online_c). Thus, plants for planting coming from a country where ToRSV occurs can be the main pathway of entry (EFSA PLH Panel, 2019). | |
| Surveillance information | <p>According to the EPPO and CABI, ToRSV has a restricted presence in Türkiye, with few occurrences, based on information dated on 2010 and 2015 (CABI, online; EPPO, online_b). This is in accordance with the information provided by the Ministry of Agriculture and Forestry (MAF) of Türkiye in the requested additional information (Dossier Section 3), where ToRSV has been reported on different cultivated plants in four Turkish regions. In particular, ToRSV was detected on tomato, pepper, cucumber and grapevine symptomatic samples in Hakkari province in 2014 and 2015 (Akdura and Şevik, 2021), also on tomato, pepper and cucumber in Muğla (Fidan, 1995), including strawberry in Aegean region (Yeşilçöllü et al., 2011; Yorgancı and Sekin, 1984), on blackberry in Hatay (Sertkaya, 2010) and on almond nursery trees in west Anatolia in 1992 and 1993 (Azerý and Çycek, 1997).</p> <p>To date, ToRSV has not been detected in the official controls of the plants for planting within certification and plant passport regulations.</p> <p>ToRSV is included in Annex-1/A list of the Regulation on plant quarantine, there is official sampling strategy for the detection of ToRSV, which information is provided in 'Regulation on Plant Quarantine' and 'Plant Quarantine Sampling Instruction by Republic of Türkiye Ministry of Agriculture and Forestry General Directorate of Food and Control' (Anonymous, 2014; Anonymous, 2019). The inspection and monitoring</p> | |

are performed according to the information provided in 'Instruction for Phytosanitary Standards in Production Materials of Fruit and Grapevine' (Anonymous, 2006).

From the information provided in the almond technical report, for the identification of ToRSV in the seedlings to be exported, among 5 and 25 seedlings are randomly taken from the plantation in the nursery and sealed by the inspector, and then, sent to the laboratory for analysis (Anonymous, 2014). From the peach technical report, samples from leaves, stems, etc. are separately taken by the inspector and send to the laboratory for analysis. The seedlings are examined macroscopically in the production area, and apart from quarantine pests, a 2% tolerance is allowed. The seedlings in the production area are examined macroscopically aspect pests. In case of suspected the virus detection, samples are taken again for analysis. It is sent to the laboratory for diagnosis. When the seedlings are exported in a different province, they are transported to the export point by plant passport. At the control stage, the plant passport is given to the inspector.

Once all processes have been completed, the EU have requested that 'Consignment complies with Annex VII points 3 a, 3 b 4 a, 45, 46 a(i), 46 b Option of Annex VII of Commission Implementing Regulation (EU) 2019/2072. That no symptoms of diseases caused by non-European viruses been observed on the plants at the place of production since the beginning of the last complete cycle of vegetation. The plants have been: (i) Officially certified under a certification scheme requiring them to be derived in direct line from material which has been maintained under appropriate conditions and subjected to official testing for at least Tomato ringspot virus using appropriate indicators or equivalent methods and has been found free, in these tests, from those pests. (b) No symptoms of diseases caused by Tomato ringspot virus have been observed on plants at the place of production, or on susceptible plants in its immediate vicinity, since the beginning of the last complete cycle of vegetation (Anonymous 2019).

A.3.2. Possibility of pest presence in the nursery

A.3.2.1. Possibility of entry from the surrounding environment

ToRSV has a wide natural host range. ToRSV occurrence in Türkiye is restricted to three districts of Western Anatolia (Aydın, Balıkesir and İzmir), where it was found in a few samples of almonds from commercial nursery plantations in 1992 and 1993 (Azeri and Çyçek, 1997). Western Anatolia produces 25% of total Turkish production. ToRSV was also detected in tomato, pepper, cucumber and strawberry in the production area of Izmir (Fidan, 1995; Yeşilçöllü et al., 2011; Yorgancı and Sekin, 1984). Based on the dossier information, there is a set of standard precautions to ensure that no plants other than certified plants are present in the production facilities. There is no specific information on the cultivated and non-cultivated plant species in the nursery surroundings, neither about the measures to control weeds and wild plants around the production areas. Nevertheless, ToRSV is primarily soil-borne, and the dispersal range of ToRSV infection appear to be constrained to nematode transmission, in particular to the nematode-vector species of the *Xiphinema americanum* group, which appears not to be established in Türkiye. Seed transmission has been also reported in a range of test species (soybean, strawberry, raspberry and pelargonium) and pollen transmission in pelargonium (Kahn, 1956; Mellor and Stace-Smith, 1963; Braun and Keplinger, 1973; Scarborough and Smith, 1977), with unknown factors associated to its transmission.

Uncertainties:

- There is a lack of information about the particular plant species in the surrounding of nurseries.
- It is unknown whether there are other mechanisms of spread.

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

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

Only certified class plant material is used at the production areas, and quarantine practices are carried out in accordance with the 'Seedling Certification Regulation' and 'Regulation on the

Registration of Plant Passports and Operators'. Despite ToRSV disease can be symptomless, infected symptomatic trees are usually easy to visualise during the surveys (Stace-Smith, 1984; Gonsalves, 1988; EPPO, 2013). ToRSV can establish via seed/pollen transmission in soybean, strawberry, raspberry and pelargonium plants (Kahn, 1956; Mellor and Stace-Smith, 1963; Braun and Keplinger, 1973; Scarborough and Smith, 1977).

Uncertainties:

- There is a lack of information related to the virus-free material certification, including the presence and sanitary status of alternative plant species for ToRSV that are grown in the nursery.
- It is unclear to what extent the detection and sampling strategies are effective to detect asymptomatic infections.
- It is unclear the extent of seed and pollen transmission in *Prunus* trees and mother plants.

Taking into consideration the above evidence and uncertainties, the panel considers that the possibility of entry with other cultivated plants and ornamental material must be considered.

A.3.2.3. Possibility of spread within the nursery

Prunus fruit-tree propagating materials are produced under the certification scheme in nurseries (Anonymous, 2010), and the plant materials are monitored and inspected during the vegetation period. ToRSV can be readily transmitted via clonal propagation of infected mother plants. Virus transmission via seed has not been reported in *Prunus*.

Uncertainties:

- It is unknown whether ToRSV could be transmitted by seed in *Prunus*.

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

A.3.3. Information from interceptions

There are no records of interceptions of *P. dulcis* and *P. persica* plants for planting from Türkiye due to the presence of ToRSV between 1995 and September 2022 (EUROPHYT, online; TRACES-NT, online).

A.3.4. Evaluation of the risk reduction options

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

| No. | Risk mitigation measure | Effect on pest | Evaluation and uncertainties |
|-----|----------------------------|----------------|---|
| 1 | Certified material | Yes | Practices for inspections and detections are applied according to the Turkish regulations and guidelines. <u>Uncertainties:</u> <ul style="list-style-type: none"> • There is a lack of details for the certification process, such as survey protocols and laboratory methodologies for virus detection. |
| 2 | Phytosanitary certificates | Yes | The certificates relate to the compliance of material specified by the Turkish Authorities. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Specific figures on the intensity of survey (sampling effort) are not provided. • There is a lack of details for the certification process, in addition to the surveillance and monitoring during production cycle. |

| No. | Risk mitigation measure | Effect on pest | Evaluation and uncertainties |
|-----|-----------------------------------|----------------|---|
| 3 | Rouging and pruning | Yes | Identifying and removing suspicious plants could be effective to decrease the virus spread and prevent further viral infections. <u>Uncertainties:</u> <ul style="list-style-type: none"> It is unclear the effectivity of visual inspections to detect early infections, including the presence of latent infections. |
| 4 | Biological and mechanical control | No | |
| 5 | Pesticide application | No | |
| 6 | Surveillance and monitoring | Yes | Visual inspections may be effective to delay viral spread. <u>Uncertainties:</u> <ul style="list-style-type: none"> The effectivity of visual inspections to detect early infections, including the presence of latent infections is questionable. |
| 7 | Sampling and laboratory testing | Yes | Laboratory analysis is convenient, and there is a monitoring of plant material (5 to 25) randomly selected. <u>Uncertainties:</u> <ul style="list-style-type: none"> There is a lack of details for the analysis methodology, and it is uncertain to what extent the inspection of this material and number of plant material are effective to detect infected plants. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Not relevant, but low temperatures may reduce the multiplication of the virus but will not eliminate it. |
| 10 | Pre-consignment inspection | Yes | The inspection and provision of certified material are appropriated. <u>Uncertainties:</u> <ul style="list-style-type: none"> There is a lack of details for the phytosanitary inspections at this stage. |

A.3.5. Overall likelihood of pest freedom

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

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

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

- The adherence to registration and certification criteria of propagation material for this pest is inappropriate and may increase the risk of entry.
- Unidentified virus outbreaks are present in the surrounding of *Prunus* production areas, or the nurseries are places in areas close to places where the ToRSV is present.
- Nematode vectors may be unidentified and present in the production areas.
- Pest can enter by unknown mechanisms.
- Visual inspection will not detect early stages of infections or asymptomatic plants.

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

- ToRSV has been reported in almond and other plant host species.
- Presence of the primary vectors is very unlikely.
- Introduction of the virus from the surrounding areas or from propagation material within the nurseries is very unlikely.

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

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

A.3.5.5. Elicitation outcomes of the assessment of the pest freedom for tomato ringspot virus

The elicited and fitted values for tomato ringspot virus agreed by the Panel are shown in Tables A.5 and A.6 and in Figure A.3.

Table A.5: Elicited and fitted values of the uncertainty distribution of pest infestation by tomato ringspot virus 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 | | | | | 4 | | 8 | | 13 | | | | | 20 |
| EKE | 0.176 | 0.422 | 0.820 | 1.60 | 2.64 | 3.95 | 5.28 | 8.10 | 11.2 | 12.9 | 14.8 | 16.6 | 18.3 | 19.3 | 20.1 |

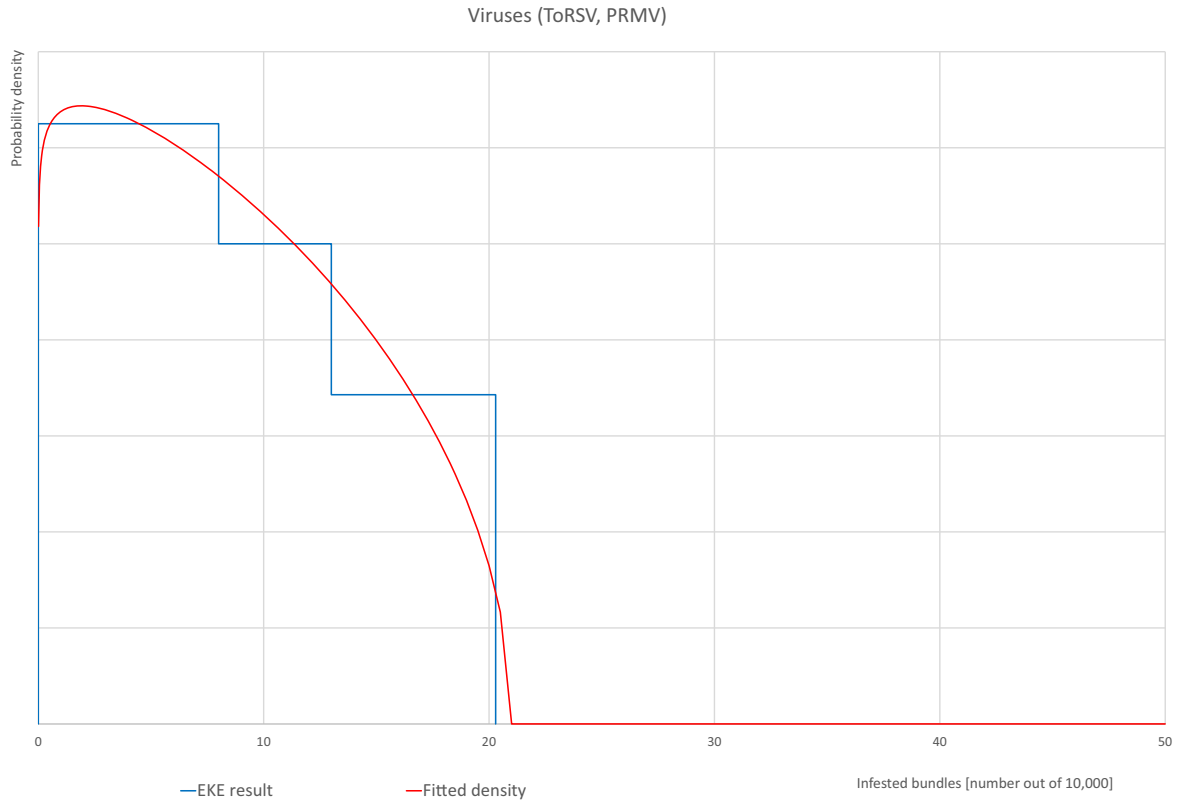
The EKE results are the BetaGeneral (1.0504, 1.5023, 0, 21) distribution fitted with @Risk version 7.6.

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

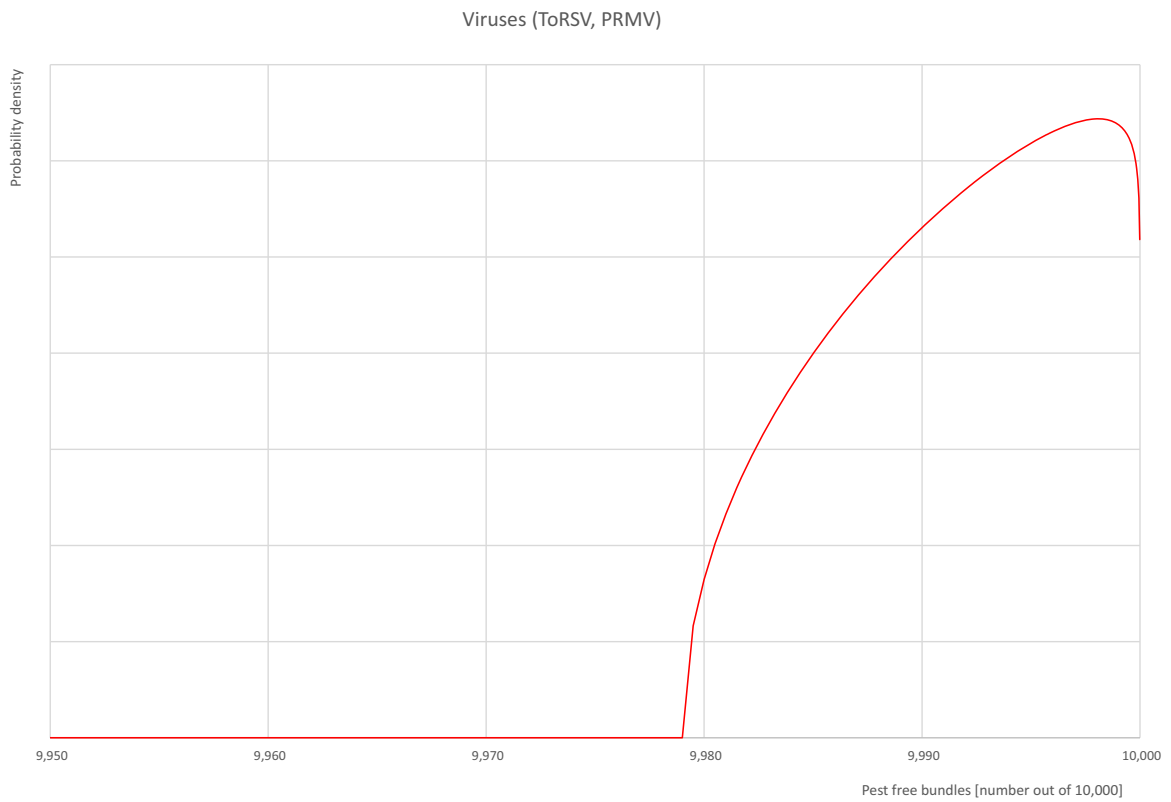
Table A.6: The uncertainty distribution of bundles free of tomato ringspot virus per 10,000 bundles calculated by Table A.5

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|--------|
| Values | 9980 | | | | | 9987 | | 9992 | | 9996 | | | | | 10000 |
| EKE results | 9980 | 9981 | 9982 | 9983 | 9985 | 9987 | 9989 | 9992 | 9995 | 9996 | 9997 | 9998 | 9999.2 | 9999.6 | 9999.8 |

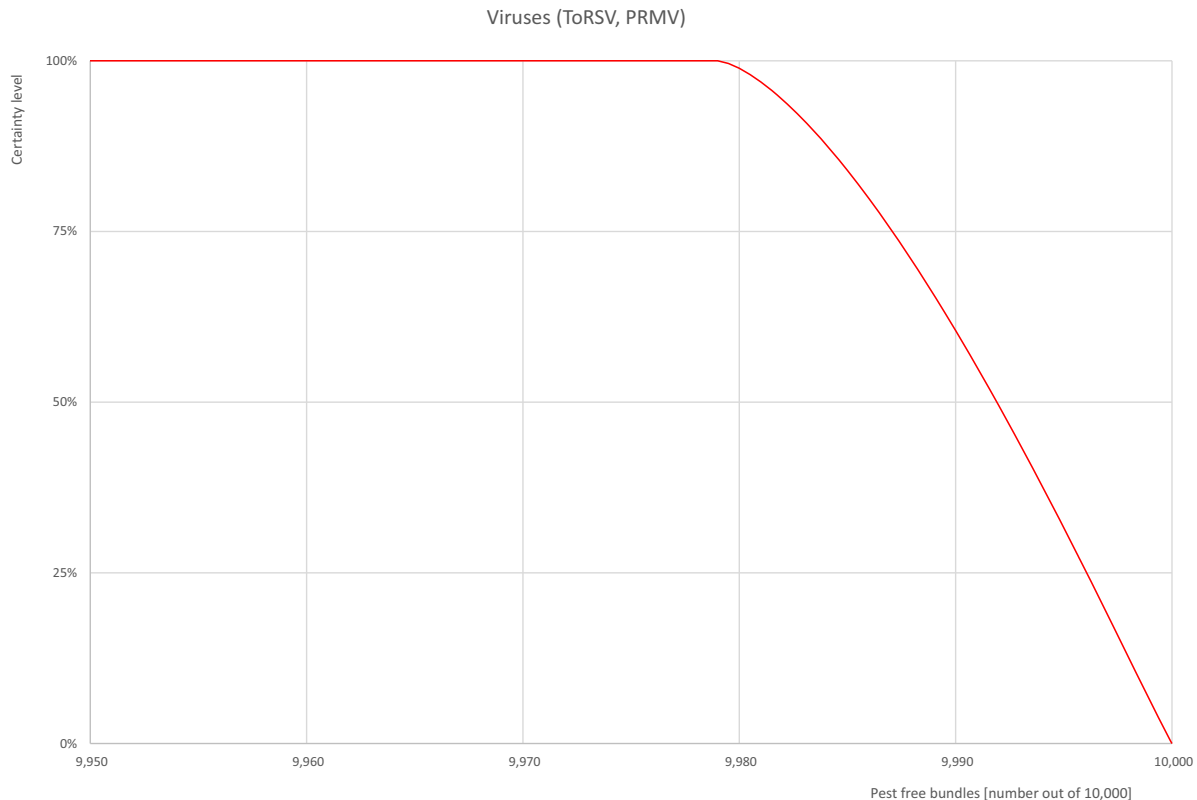
The EKE results are the fitted values.



(a)



(b)



(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

A.3.6. References list

- Adaskaveg JE and Caprile JL, 2009. UC Pest Management Guidelines. Tomato Ringspot Virus. <http://ipm.ucanr.edu/PMG/r105102811.html> [Accessed: 25 June 2022].
- Akdura N and Şevik M, 2021. Molecular characterization of partial RdRp genes of Tomato Ringspot Virus isolates from Turkey. *Avrupa Bilim ve Teknoloji Dergisi*, 21, 74–82. <https://doi.org/10.31590/ejosat.813438>
- Anonymous, 2006. Meyve/Asma Fidan Ve Üretim Materyali Sertifikasyonu Ve Pazarlaması Yönetmeliği. (Instruction for Phytosanitary Standards in Production Materials of Fruit and Grapevine). Available online: <https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Yonetmelikler/Meyve.pdf> [Accessed: 25 June 2022].
- Anonymous, 2010. Available online: https://www.tarimorman.gov.tr/Belgeler/Mevzuat/Talimatlar/BUGEM/Bitki_Sagligi_Talimati.pdf [Accessed: 25 June 2022].
- Anonymous, 2014. Bitki Karantinası Numune Alma Talimatı. Available online: <https://zkm.tarimorman.gov.tr/antalya/Sayfalar/Detay.aspx?SayfaId=6> [Accessed: 25 June 2022].
- Anonymous, 2019. Regulation on Plant Quarantine. Available online: <https://www.tarimorman.gov.tr/Sayfalar/EN/Mevzuat.aspx?OgeId=15> [Accessed: 25 June 2022].
- Azeri T and Çyçek Y, 1997. Detection of virus diseases affecting almond nursery trees in Western Anatolia (Turkey). *Bulletin OEPP/EPPO Bulletin* 27, 547–550. <https://doi.org/10.1111/j.1365-2338.1997.tb00682.x>
- Bitterlin MW, Gonsalves D and Scorza R, 1987. Improved mechanical transmission of tomato ringspot virus to *Prunus* seedlings. *Phytopathology*, 77, 560–563. <https://doi.org/10.1094/phyto-77-560>
- Braun AJ and Keplinger JA, 1973. Seed transmission of tomato ringspot virus in raspberry. *Plant Disease Reporter*, 57, 431–432.
- CABI (Centre for Agriculture and Bioscience International), online. Tomato ringspot virus (ringspot of tomato). Available online: <https://www.cabidigitallibrary.org/doi/10.1079/cabicompendium.54076> [Accessed: 11 October 2022].

- DEFRA (Department for Environment, Food & Rural Affairs), 2018. Rapid Pest Risk Analysis (PRA) for: Tomato ringspot virus (ToRSV). Available online: <https://planthealthportal.defra.gov.uk/assets/pras/ToRSV-PRA4.pdf>
- EFSA PLH Panel (EFSA Plant Health Panel), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Chiumenti M, Di Serio F, Kaluski T, Minafra A and Rubino L, 2019a. Scientific Opinion on the pest categorisation of non-EU viruses and viroids of *Cydonia* Mill., *Malus* Mill. and *Pyrus* L. EFSA Journal 2019;17(9):5590, 81 pp. <https://doi.org/10.2903/j.efsa.2019.5590>
- EFSA PLH Panel (EFSA Plant Health Panel), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Bosco D, Chiumenti M, Di Serio F, Kaluski T, Minafra A and Rubino L, 2019b. Pest categorisation of non-EU viruses and viroids of *Prunus* L. EFSA Journal 2019;17(9):5735, 84 pp. <https://doi.org/10.2903/j.efsa.2019.5735>
- EFSA PLH Panel (EFSA Plant Health Panel), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Martelli GP, Winter S, Bosco D, Chiumenti M, Di Serio F, Kaluski T, Minafra A and Rubino L, 2019c. Scientific Opinion on the pest categorisation of non-EU viruses and viroids of *Vitis* L. EFSA Journal 2019;17(9):5669, 94 pp. <https://doi.org/10.2903/j.efsa.2019.5669>
- EFSA PLH Panel (EFSA Panel on Plant Health) Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Bosco D, Chiumenti M, Di Serio F, Kaluski T, Minafra A and Rubino L, 2019d. Scientific Opinion on the pest categorisation of non-EU viruses of *Fragaria* L. EFSA Journal 2019;17(9):5766, 69 pp. <https://doi.org/10.2903/j.efsa.2019.5766>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Civera AV, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Bosco D, Chiumenti M, Di Serio F, Ferilli F, Kaluski T, Minafra A and Rubino L, 2019e. Scientific Opinion on the pest categorisation of non-EU viruses of *Ribes* L. EFSA Journal 2019;17(11):5859, 48 pp. <https://doi.org/10.2903/j.efsa.2019.5859>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Candresse T, Chatzivassiliou E, Finelli F, Winter S, Bosco D, Chiumenti M, Di Serio F, Ferilli F, Kaluski T, Minafra A and Rubino L, 2020. Scientific Opinion on the pest categorisation of non-EU viruses of *Rubus* L. EFSA Journal 2020;18(1):5928, 69 pp. <https://doi.org/10.2903/j.efsa.2020.5928>
- EPPO (European and Mediterranean Plant Protection Organization), 2005. Tomato ringspot nepovirus. PM 7/49(1). Bulletin OEPP/EPPO Bulletin, 35, 313–318. <https://doi.org/10.1111/j.1365-2338.2005.00831.x>
- EPPO (European and Mediterranean Plant Protection Organization), 2013. Tomato ringspot virus in fruit trees and grapevine: inspection. Phytosanitary procedures. PM3/32 (2). Bulletin OEPP/EPPO Bulletin 43(3): 397 <https://doi.org/10.1111/epp.12073>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. Tomato ringspot virus (TORSV0), Categorization. Available online: <https://gd.eppo.int/taxon/TORSV0/categorization> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. Tomato ringspot virus (TORSV0), Distribution. Available online: <https://gd.eppo.int/taxon/TORSV0/distribution> [Accessed: 25 June 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. Tomato ringspot virus (TORSV0), Host plants. Available online: <https://gd.eppo.int/taxon/TORSV0/hosts> [Accessed: 25 June 2022].
- EPPO/CABI, 1996. Data Sheets on Quarantine Pests: Tobacco ringspot nepovirus. Available online: https://gd.eppo.int/download/file/714_datasheet_TRSV00.pdf [Accessed: 25 June 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- FERA (The Food and Environment Research Agency), 2014. Rapid pest risk analysis for *Xiphinema americanum* s.l. (European populations). Available online: <https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/downloadExternalPra.cfm?id=4175>

- Fidan U, 1995. Virus diseases of vegetables in greenhouses in Izmir and Mugla. *Journal of Turkish Phytopathology*, 24, 7–14.
- Gonsalves D, 1988. Tomato ringspot virus decline; tobacco ringspot virus decline. In: Pearson RC and Goheen AC (eds.). *Compendium of grape diseases*. American Phytopathological Society, St. Paul, USA. pp. 49–51.
- Kahn RP, 1956. Seed transmission of the tomato ringspot virus in the Lincoln variety of soybeans. *Phytopathology*, 46, 295.
- Mellor FC and Stace-Smith R, 1963. Reaction of strawberry to a ringspot virus from raspberry. *Canadian Journal of Botany*, 41, 865–870.
- Mountain W, Powell C, Forer L and Stouffer R, 1983. Transmission of Tomato ringspot virus from dandelion via seed and dagger nematodes. *Plant Disease*, 67, 867–868. <https://doi.org/10.1094/pd-67-867>
- Pinkerton JN, Kraus J, Martin RR and Schreiner RP, 2008. Epidemiology of *Xiphinema americanum* and Tomato ringspot virus on red raspberry, *Rubus idaeus*. *Plant Disease*, 92, 364–371. <https://doi.org/10.1094/pdis-92-3-0364>
- Powell C, Forer L, Stouffer R, Cummins J, Gonsalves D, Rosenberger D, Hoffman J and Lister R, 1984. Orchard weeds as hosts of Tomato ringspot and Tobacco ringspot viruses. *Plant Disease*, 68, 242–244. <https://doi.org/10.1094/pd-69-242>
- Samuitienė M and Navalinskienė M, 2001. Nepoviruses and their influence on field floriculture. *Biologija*, 4, 43–45.
- Sanfaçon H, Zhang G, Chisholm J, Jafarpour B and Jovel J, 2006. Molecular biology of Tomato ringspot nepovirus, a pathogen of ornamentals, small fruits and fruit trees. *Floriculture, Ornamental and Plant Biotechnology*, 540–547.
- Scarborough BA and Smith SH, 1977. Effects of tobacco- and tomato ringspot viruses on the reproductive tissues of *Pelargonium X hortorum*. *Phytopathology*, 67, 292–297. <https://doi.org/10.1094/phyto-67-292>
- Sertkaya G, 2010. Tomato ringspot nepovirus (ToRSV) in wild blackberry (*Rubus fruticosus* L.) in Hatay province of Turkey. 21st International Conference on Virus and other Graft Transmissible Diseases of Fruit Crops, 201–203.
- Stace-Smith R, 1984. Tomato ringspot virus, CMI/AAB Descriptions of Plant Viruses, No. 290, AAB, Wellesbourne (GB).
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Uyemoto JK and Scott SW, 1992. Important diseases of *Prunus* caused by viruses and other graft-transmissible pathogens in California and South Carolina. *Plant Disease*, 76, 5–11. <https://doi.org/10.1094/pd-76-0005>
- Yeşilçöllü S, Gümüş M and Paylan IC, 2011. Studies on the detection of viruses in strawberry growing areas in Aegean region. *Journal of Turkish Phytopathology*, 40, 13–20.
- Yorgancı Ü and Sekin S, 1984. Spread of virus diseases of tobacco in the aegan region. Biological serological and electron microscopic studies. *Journal of Turkish Phytopathology*, 13, 91–101.
- Zindović J, Marn VM and Pleško IM, 2014. Phytosanitary status of grapevine in Montenegro. *EPPO Bulletin*, 44, 60–64. <https://doi.org/10.1111/epp.12084>

A.4. *Lasiodiplodia pseudotheobromae*

A.4.1. Organism information

| | |
|-------------------------------|---|
| Taxonomic information | <p><i>Current valid scientific name:</i> <i>Lasiodiplodia pseudotheobromae</i> A.J.L. Phillips, A. Alves & Crous 2008</p> <p>Synonyms: –</p> <p>Name used in the EU legislation: –</p> <p>Category: Fungi</p> <p>Family: Botryosphaeriaceae</p> <p>Common name: post-harvest fruit rot disease, stem canker and branch dieback</p> <p>Name used in the Dossier: –</p> |
| Group | Fungi |
| EPPO code | – |
| Regulated status | – |
| Pest status in Türkiye | Present (Awan et al., 2016; Endes et al., 2016; Endes and Kayım, 2022). |
| Pest status in the EU | Present in the Netherlands (Phillips et al., 2013) and Spain (López-Moral et al., 2020). |

| | | |
|--|--|--|
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> has been reported as host (Endes et al., 2016). | |
| PRA information | No Pest Risk Assessment is currently available. | |
| Other relevant information for the assessment | | |
| Biology | <p>Species of <i>Botryosphaeriaceae</i> cause cankers, gummosis syndrome and fruit rots and they survive as saprophyte, parasites and even as endophytes in symptomless tissues (McDonald and Eskalen, 2011).</p> <p><i>L. pseudotheobromae</i> overwinters in the soil or in twigs. The pycnidia or fruiting bodies of the fungus are produced near the canker. In the summer, conidia are spread by wind, rain or insects. Conidia are produced all year round, but the disease spreads more rapidly during summer when the temperature is around or even higher than 30°C. The pathogen enters the plant through wounds (usually by pruning) which is the main reason for spreading (Liang et al., 2020).</p> | |
| Symptoms | Main type of symptoms | <p>Symptoms in <i>Prunus</i> are shoot-dieback, gummosis, and sunken necrotic bark lesions, which progress into the trunk and may result in the death of large sections of the tree (Endes et al., 2016).</p> <ul style="list-style-type: none"> Other species from the Botryosphaeriaceae family may cause the same symptoms |
| | Presence of asymptomatic plants | According to de Silva et al. (2019), one endophytic and 2 saprobic isolates of <i>L. pseudotheobromae</i> were identified on asymptomatic leaves of <i>Magnolia candolii</i> . |
| | Confusion with other pathogens/pests | <i>L. pseudotheobromae</i> has similar colony features as <i>L. theobromae</i> but they differ in the size, shape of their conidia and paraphyses. It is close to <i>L. crassispora</i> but the pseudoparaphyses of <i>L. crassispora</i> are mostly septate, while in <i>L. pseudotheobromae</i> they are mostly aseptate (Munirah et al., 2017). |
| Host plant range | <i>L. pseudotheobromae</i> has been reported from more than 80 host species including <i>Prunus persica</i> and <i>P. salicina</i> (Endes et al., 2016; Endes and Kayım, 2022; Farr and Rossman, online). | |
| Reported evidence of impact | <i>Lasiodiplodia pseudotheobromae</i> is known to be one of the main causes of post-harvest fruit rot in longan fruits in Thailand (Pipattanapuckdee et al., 2019) and damaging persimmons in Brazil before and after harvest (Júnior et al., 2017). It also causes post-harvest rot in <i>Citrus</i> sp. in China and Türkiye (Awan et al., 2016; Chen et al., 2021). It is known to cause pre-harvest fruit rot in <i>Mangifera indica</i> in Malaysia (Munirah et al., 2017), stem canker and significant damage in <i>Celtis sinensis</i> seedlings in China (Liang et al., 2020), <i>Acacia mangium</i> in Venezuela (Castro-Medina et al., 2014), <i>Citrus reticulata</i> in Pakistan (Ahmed et al., 2020) and <i>Malus pumilain</i> in China (Xue et al., 2019). It is known to cause dieback in <i>Ormosa pinnata</i> in China (Li et al., 2020), in <i>Mangi feraindica</i> (Kwon et al., 2017) and dieback and gummosis in <i>Prunus salicina</i> in Türkiye (Endes and Kayım, 2022). | |
| Pathways and evidence that the commodity is a pathway | <p>Pathways:</p> <ul style="list-style-type: none"> By tools used for grafting or/and pruning. Through propagation material: scions, seedlings and young plantations (Shtienberg et al., 2015). <p>The spread of conidia and conidiomata is facilitated by wind, rain and insects (Liang et al., 2020). Overwintering takes place in soil and twigs (Liang et al., 2020).</p> | |
| Surveillance information | <i>L. pseudotheobromae</i> has been reported from the Adana and Mersin provinces of Türkiye (Awan et al., 2016; Endes and Kayım, 2022). | |

A.4.2. Possibility of pest presence in the nursery

A.4.2.1. Possibility of entry from the surrounding environment

In addition to *Prunus* species, *L. pseudotheobromae* has a wide host range.

The major source of inoculum is from infected plant material, which can be leaves, twigs, fruit and cankers on larger branches of the affected plant species. Dispersal of conidia can take place by rain,

wind or insects. Therefore, the presence of host species in the environment of the nurseries with *P. dulcis* and *P. persica* is an important factor for the possible migration of inoculum into the nursery.

Uncertainties:

- No information about the plant species growing in the surroundings of the nurseries is provided.
- It is uncertain whether other plant species are grown within the nurseries.

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

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

The source of the planting material to produce *Prunus* grafting material and some rootstocks for export is from approved mother plants in an approved nursery.

Some rootstocks are plants of *P. armeniaca* grown from seed from an approved source and therefore entry via this pathway is not likely.

Uncertainties:

- Latent infections might be present in the grafting material and the grafted plants.
- Latent infections or endophytic presence of *L. pseudotheobromae* in the scions may be undetectable by the visual inspections.

Taking the above evidence and uncertainties into consideration, the Panel considers it is unlikely that the pathogen could enter the nursery with new plants/seeds or grafting material with latent infections.

A.4.2.3. Possibility of spread within the nursery

If *L. pseudotheobromae* is present within the nursery, it can spread when scions with endophytic or latent infections are used for grafting. Contamination of grafting tools with spores or mycelium may also contribute to the spread of the disease. Conidia can spread by wind, rain or insects. The fungus overwinters in the twigs or in the soil. If other potential host plants are present within the nursery, *L. pseudotheobromae* may spread to *P. persica* and *P. dulcis* from these. Use of contaminated seeds (of other plant species) may also contribute to the spread of the disease.

Endophytic or latent infections (de Silva et al., 2019) can be overlooked by visual inspections and lead to an unintentional spread of the disease.

Uncertainties:

- *L. pseudotheobromae* has a wide host range. In the Dossier, there is no information on whether other host plant species are present within the nursery from which *L. pseudotheobromae* could potentially spread to the *Prunus* plants.
- The infection potential of endophytic presence of the pathogen is unknown.

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

A.4.3. Information from interceptions

Considering imports of *Prunus* plants from Türkiye to the EU, between 1995 and 2022, there are no records of interceptions of *L. pseudotheobromae* (EUROPHYT, online; TRACES-NT, online).

A.4.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on pathogen | Evaluation and uncertainties |
|-----|--|--------------------|---|
| 1 | Certified material | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> • Details of the certification process are not given. • Due to the potential endophytic or latent presence of <i>L. pseudotheobromae</i>, the visual inspection might be insufficient. |
| 2 | Phytosanitary certificates | Yes | The procedure for obtaining the phytosanitary certificate is not described. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Due to the potential endophytic or latent presence of <i>L. pseudotheobromae</i>, the pathogen may not be detected by macroscopic inspections and therefore laboratory analysis will not be carried out. |
| 3 | Cleaning and disinfection of facilities, tools and machinery | Yes | Details about disinfection are not given. |
| 4 | Rouging and pruning | Yes | The effect of pruning is unclear. |
| 5 | Biological and mechanical control | | |
| 6 | Pesticide application | Yes | Details on fungicide applications are not given. |
| 7 | Surveillance and monitoring | Yes | Latent or endophytic presence of the fungus may not be detected |
| 8 | Sampling and laboratory testing | Yes | Details of sampling procedure and detection methods for fungi are not provided. |
| 9 | Root washing | No | |
| 10 | Refrigeration | No | |
| 11 | Pre-consignment inspection | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> • Due to the potential endophytic or latent presence of <i>L. pseudotheobromae</i>, the visual inspection might be insufficient. |

A.4.5. Overall likelihood of pest freedom

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

- Nurseries are located in the area where the pathogen is not present
- Outbreaks will be recognised, and infected plants removed from the nursery
- Pesticide application is effective and prevents from spreading the pathogen

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

- Latent infections could be overlooked by non-trained personnel
- Young plants could be symptomless

Not clear information on disinfection of the tools, pruning is not sufficient.

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

- Median is slightly shifted to the left side (lower infestation rate) because of the low likelihood of pressure of the pest from source material from an approved source.

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

- The first and third quartiles describe the highest uncertainty that reflects uncertainty on most of the information available

A.4.5.5. Elicitation outcomes of the assessment of the pest freedom for *Lasiodiplodia pseudotheobromae* on crop

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

Table A.7: Elicited and fitted values of the uncertainty distribution of pest infestation by *Lasiodiplodia pseudotheobromae* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-------|-----|
| Elicited values | 5 | | | | | 45 | | 85 | | 140 | | | | | 200 |
| EKE | 5.04 | 7.19 | 10.9 | 18.7 | 29.4 | 43.3 | 57.6 | 87.9 | 121 | 138 | 157 | 173 | 187 | 195 | 200 |

The EKE results are the BetaGeneral (0.95736, 1.2214, 3.7, 205) distribution fitted with @Risk version 7.6.

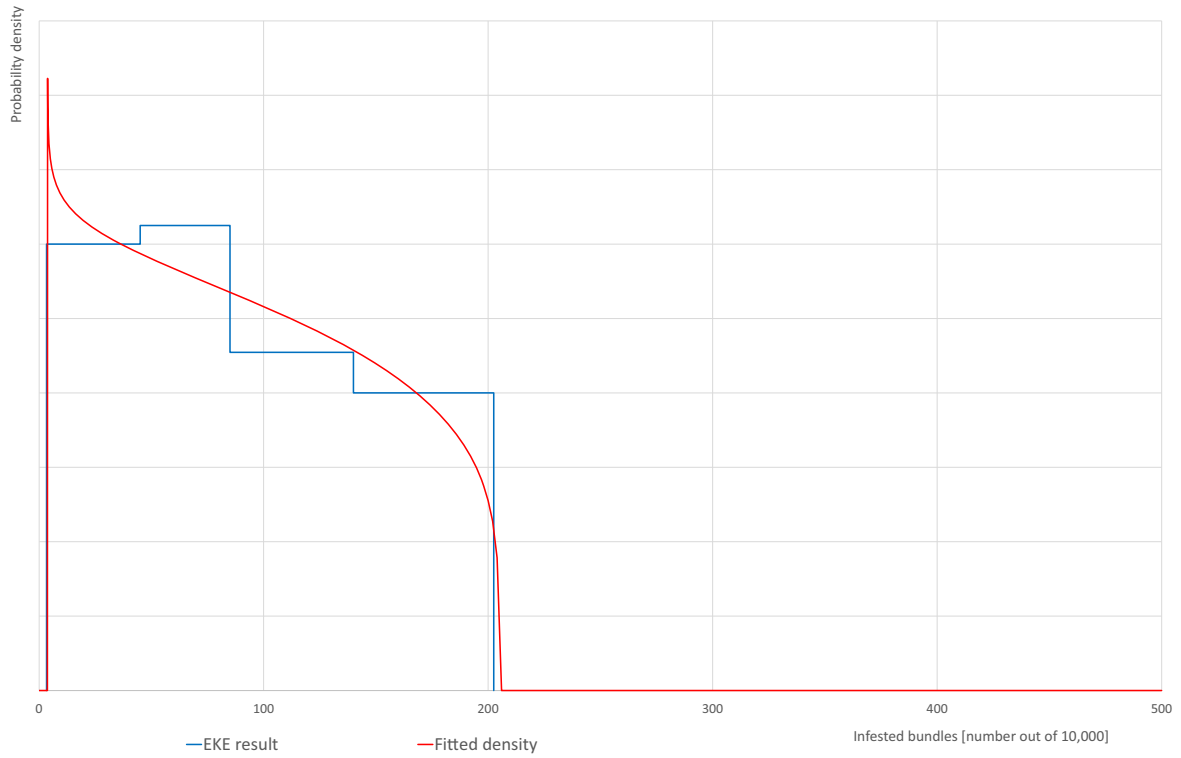
Based on the numbers of estimated infested bundles the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.8.

Table A.8: The uncertainty distribution of bundles free of *Lasiodiplodia pseudotheobromae* per 10,000 plants calculated by Table A.7

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9800 | | | | | 9860 | | 9915 | | 9955 | | | | | 9995 |
| EKE results | 9800 | 9805 | 9813 | 9827 | 9843 | 9862 | 9879 | 9912 | 9942 | 9957 | 9971 | 9981 | 9989 | 9993 | 9995 |

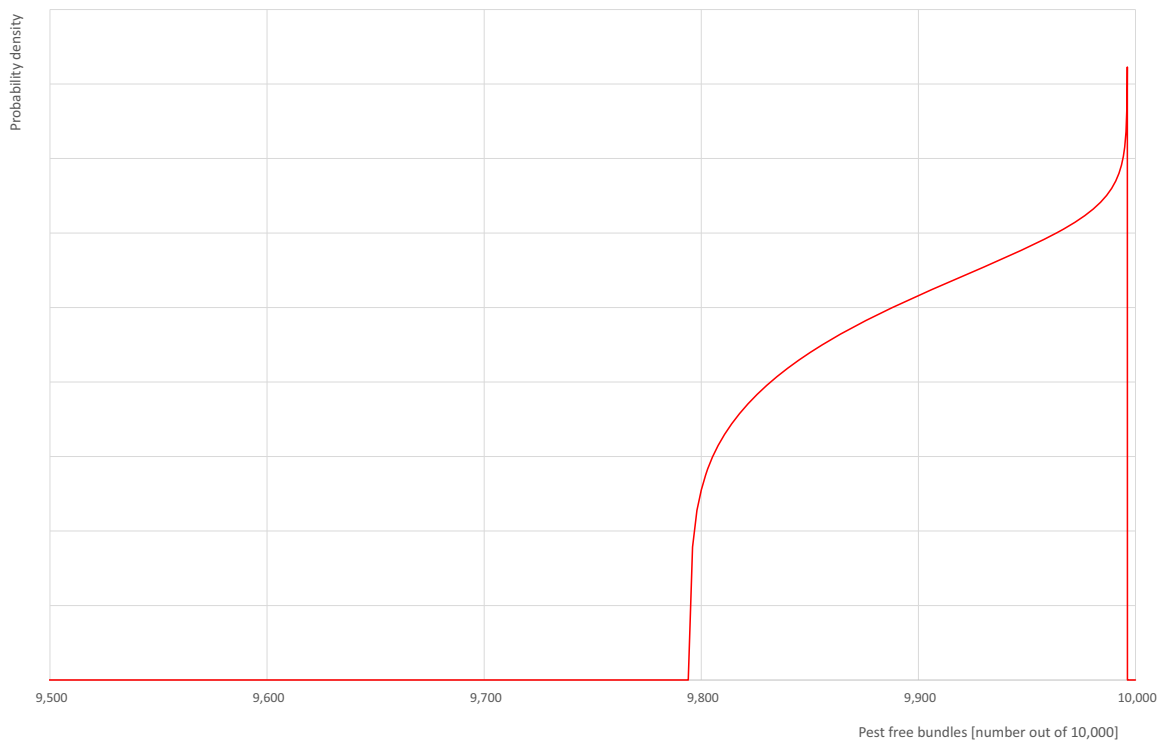
The EKE results are the fitted values.

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)

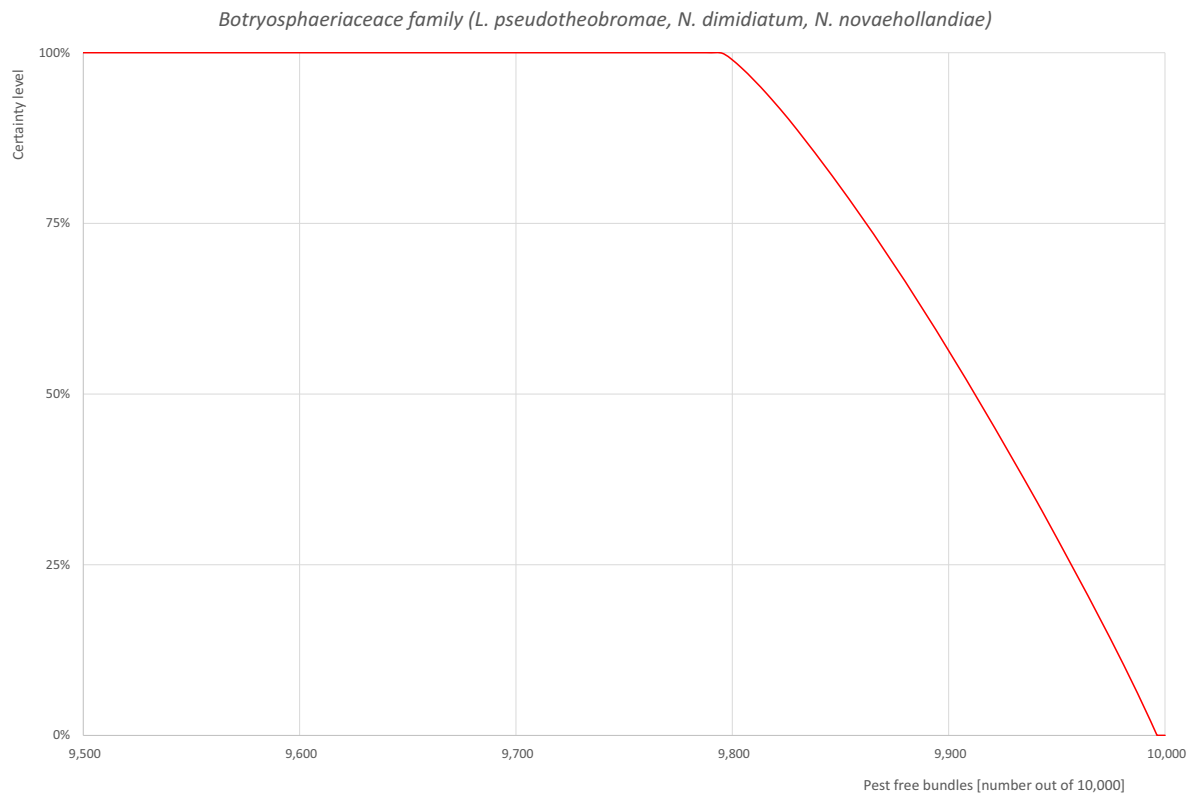


(a)

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)



(b)



(c)

Figure A.4: (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.4.6. References list

- Ahmed MZ, Shafique MS, Anwaar HA, Sarfraz S, Tufail MR, Fayyaz A, Muntaha S, Haque K, Ghuffar S and Amrao L, 2020. First report of *Lasiodiplodia pseudotheobromae* causing trunk cankers in *Citrus reticulata* in Pakistan. *Plant Disease*, 104, 2522. <https://doi.org/10.1094/pdis-12-19-2683-pdn>
- Awan QN, Akgül DS and Unal G, 2016. First report of *Lasiodiplodia pseudotheobromae* causing postharvest fruit rot of lemon in Turkey. *Plant Disease*, 100, 2327. <https://doi.org/10.1094/pdis-04-16-0512-pdn>
- Castro-Medina F, Mohali SR, Urbez-Torres JR and Gubler WD, 2014. First report of *Lasiodiplodia pseudotheobromae* causing trunk cankers in *Acacia mangium* in Venezuela. *Plant Disease*, 98, 686. <https://doi.org/10.1094/pdis-02-13-0160-pdn>
- Chen J, Zhu Z, Fu Y, Cheng J, Xie J and Lin Y, 2021. Identification of *Lasiodiplodia pseudotheobromae* causing fruit rot of *Citrus* in China. *Plants*, 10, 202. <https://doi.org/10.3390/plants10020202>
- Endes A and Kayım A, 2022. Morphological and molecular characterization of *Botryosphaeriaceae* species associated with dieback and gummosis on plum trees in Turkey. *Proceedings of the Bulgarian Academy of Sciences*, 75, 295–302. <https://doi.org/10.7546/crabs.2022.02.16>
- Endes A, Kayım M and Eskalen A, 2016. First report of *Lasiodiplodia theobromae*, *L. pseudotheobromae*, and *Diplodia seriata* causing bot canker and gummosis of nectarines in Turkey. *Plant Disease*, 100, 2321. <https://doi.org/10.1111/ppa.13209>
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Farr DF and Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: <https://nt.ars-grin.gov/fungaldatabases/> [Accessed: 14 June 2022].
- Júnior AN, Santos R, Pagenotto A and Spósito M, 2017. First report of *Lasiodiplodia pseudotheobromae* causing fruit rot of persimmon in Brazil. *New Disease Reports*, 36, 1. <https://doi.org/10.5197/j.2044-0588.2017.036.001>

- Kwon J-H, Choi O, Kang B, Lee Y, Park J, Kang D-W, Han I and Kim J, 2017. Identification of *Lasiodiplodia pseudotheobromae* causing mango dieback in Korea. *Canadian Journal of Plant Pathology*, 39, 241–245. <https://doi.org/10.1080/07060661.2017.1329231>
- Li L, Lei M, Wang H, Yang X, Andargie M and Huang S, 2020. First report of dieback caused by *Lasiodiplodia pseudotheobromae* on *Ormosia pinnata* in China. *Plant Disease*, 104, 2551–2555. <https://doi.org/10.1094/pdis-03-20-0647-re>
- Liang L, Li H, Zhou L and Chen F, 2020. *Lasiodiplodia pseudotheobromae* causes stem canker of Chinese hackberry in China. *Journal of Forestry Research*, 31, 2571–2580. <https://doi.org/10.1007/s11676-019-01049-x>
- López-Moral A, del Carmen Raya M, Ruiz-Blancas C, Medialdea I, Lovera M, Arquero O, Trapero A and Agustí-Brisach C, 2020. Aetiology of branch dieback, panicle and shoot blight of pistachio associated with fungal trunk pathogens in southern Spain. *Plant Pathology*, 69, 1237–1269. <https://doi.org/10.1111/ppa.13209>
- McDonald V and Eskalen A, 2011. Botryosphaeriaceae species associated with avocado branch cankers in California. *Plant Disease*, 95, 1465–1473. <https://doi.org/10.1094/pdis-02-11-0136>
- Munirah MS, Azmi AR, Yong SYC and Nur Ain Izzati MZ, 2017. Characterization of *Lasiodiplodia theobromae* and *L. pseudotheobromae* causing fruit rot on pre-harvest mango in Malaysia. *Plant Pathology and Quarantine*, 7, 202–213. <https://doi.org/10.5943/ppq/7/2/14>
- Phillips AJL, Alves A, Abdollahzadeh J, Slippers B, Wingfield MJ, Groenewald JZ and Crous PW, 2013. The Botryosphaeriaceae: genera and species known from culture. *Studies in Mycology*, 76, 51–167. <https://doi.org/10.3114/sim0021>
- Pipattanapuckdee A, Boonyakait D, Tiayon C, Seehanam P and Ruangwong OU, 2019. *Lasiodiplodia pseudotheobromae* causes postharvest fruit rot of longan in Thailand. *Australasian Plant Disease Notes*, 14, 21. <https://doi.org/10.1007/s13314-019-0350-9>
- Shtienberg D, Simanski E, Shulhani R, Borenstein M, Golani M, Okon-Levy N, Sharon M and Freeman S, 2015. Mortality of young avocado plants: identification of the causal agent and development of means for management. In Abstracts of presentations at the 36th Congress of the Israeli Phytopathological Society. *Phytoparasitica*, 43, 369–381. <https://doi.org/10.1007/s12600-015-0466-1>
- de Silva NI, Phillips AJ, Liu JK, Lumyong S and Hyde KD, 2019. Phylogeny and morphology of *Lasiodiplodia* species associated with *Magnolia* forest plants. *Scientific reports*, 9, 1–11. <https://doi.org/10.1038/s41598-019-50804-x>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Xue D, Meng L, Li G, Li B and Wang C, 2019. First report of *Lasiodiplodia pseudotheobromae* causing canker and shoot dieback on apple in China. *Plant Disease*, 103, 1–2. <https://doi.org/10.1094/pdis-01-19-0182-pdn>

A.5. *Neoscytalidium dimidiatum*

A.5.1. Organism information

| | |
|-------------------------------|--|
| Taxonomic information | Current valid scientific name: <i>Neoscytalidium dimidiatum</i> (Penz.) Crous & Slippers, In Crous, Slippers, Wingfield, Ruediger, Marasas, Phillips, Alves, Burgess, Barber & Groenewald 2006 Synonyms: <i>Fusicoccum dimidiatum</i> ; <i>Hendersonula toruloidea</i> ; <i>Neoscytalidium dimidiatum</i> var. <i>hyalinum</i> ; <i>Neoscytalidium hyalinum</i> ; <i>Scytalidium dimidiatum</i> ; <i>Scytalidium hyalinum</i> ; <i>Torula dimidiata</i> Name used in the EU legislation: – Order: Botryosphaeriales Family: Botryosphaeriaceae Common name: sooty canker and branch wilt Name used in the Dossier: – |
| Group | Fungi |
| EPPO code | HENLTO |
| Regulated status | Not regulated in the EU. Egypt: A2 list (EPPO, online). Mexico: Quarantine Pest (EPPO, online). |
| Pest status in Türkiye | Present mainly in the South East Anatolia region (Oksal et al., 2019, 2020, Türkölmez et al., 2019a,b). |

| | | |
|--|---|--|
| Pest status in the EU | Limited distribution (Polizzi et al., 2009). | |
| Host status on <i>Prunus</i> spp. | <i>N. dimidiatum</i> has been reported to cause canker, shoot blight and fruit rot of almond in California (Nouri et al., 2018). The pathogen has been reported in other <i>Prunus</i> species such as <i>Prunus armeniaca</i> (Oksal et al., 2020) and <i>Prunus domestica</i> (Hajlaoui et al., 2018). | |
| PRA information | No Pest Risk Assessment is currently available. | |
| Other relevant information for the assessment | | |
| Biology | Species belonging to Botryosphaeriaceae generally infects through wounds or natural openings (Slippers and Wingfield, 2007). For <i>N. dimidiatum</i> , it has also been reported that it infects juvenile dragon fruit cladodes via appressorium formation and direct penetration (Fullerton et al., 2018). | |
| | <i>Neoscytalidium</i> spp. can grow between 15 and 40°C. Optimum temperature for mycelial growth is 30–35°C (Mayorquin et al., 2016). | |
| | Conidia are the most important means of dispersal and infection. They are released from pycnidia during wet weather and spread by rain splash and wind (Adesemoye et al., 2014; Fullerton et al., 2018). | |
| Symptoms | Main type of symptoms | <i>Neoscytalidium</i> spp. are reported to cause branch wilt, dieback, canker, leaf blight, gummosis, tree death, fruit rot and canker. Cankers are observed near pruning wounds or other wounds (Hajlaoui et al., 2018). In <i>Prunus</i> spp., symptoms of <i>N. dimidiatum</i> on young plants were seen as secretion of gummosis at the grafting area (Ezra et al., 2015). Symptoms are detectable but may be difficult to detect in young plants as latent infections causing symptoms later in the growing cycle may occur (Ezra et al., 2015). |
| | Presence of asymptomatic plants | Botryosphaeriaceae species are known to be able to exist in the host as endophytes (Slippers and Wingfield, 2007). Disease expression is almost exclusively associated with some form of stress or non-optimal growth conditions of trees (Slippers and Wingfield, 2007). For <i>Prunus</i> spp. it has in some cases been seen that development of the disease caused by <i>N. dimidiatum</i> is delayed and expressed later e.g. when plants are transferred from nurseries to orchards (Ezra et al., 2015). |
| | Confusion with other pathogens/pests | Several other fungi belonging to Botryosphaeriaceae may cause the same symptoms. |
| Host plant range | Primarily reported from woody plants such as <i>Prunus</i> spp. (California, Hajlaoui et al., 2018; Türkiye, Oksal et al., 2020; Israel, Ezra et al., 2015), Citrus spp. (Italy, Polizzi et al., 2009; California, Adesemoye et al., 2014), <i>Ficus</i> spp. (Egypt, Al-Bedak et al., 2018), Walnut (<i>Juglans regia</i>) (Türkiye, Derviş et al., 2019), Mango (<i>Mangifera indica</i>) (Australia, Ray et al., 2010), grapevine <i>Vitis vinifera</i> (Türkiye, Oksal et al., 2019), <i>Pinus</i> spp. (Türkiye, Türkölmez et al., 2019a), but also from Tomato (<i>Solanum lycopersicum</i>) (Türkiye, Türkölmez et al., 2019b) and potato (<i>Solanum tuberosum</i>) (Türkiye, Derviş et al., 2020). | |
| Pathways and evidence that the commodity is a pathway | Detailed information on the infection pathway of <i>Neoscytalidium dimidiatum</i> has not been studied, but other fungi in the Botryosphaeriaceae rely on the following: <ul style="list-style-type: none"> – Via spores released from infected plants and plant material in the soil – Through wounds caused by pruning and grafting – Via latently infected grafting material e.g. scions – Contaminated grafting tools | |
| Surveillance information | Plants within and around the production areas are annually inspected to check the presence of quarantine organisms. Visual inspection at least once or twice a year during production or during uprooting of the plants. Visual inspection can be supported by the use of microscope or laboratory analysis if pests are suspected to be present. | |

Reports of *N. dimidiatum* in Türkiye are mainly from the Southeast Anatolia Region (Derviş et al., 2019, 2020; Türkölmez et al., 2019a,b; Oksal et al., 2019; Oksal et al., 2020).

A.5.2. Possibility of pest presence in the nursery

A.5.2.1. Possibility of entry from the surrounding environment

In addition to the *Prunus* spp., *N. dimidiatum* has a wide host range.

The major source of inoculum is from infected plant material, which can be leaves, twigs, fruit and cankers on larger branches of the affected plant species. Dispersal of conidia can take place by rain, wind or insects. Therefore, the presence of host species in the environment of the nurseries with *Prunus* plants is an important factor for the possible migration of inoculum into the nursery.

Uncertainties:

- No information about the plant species growing in the surroundings of the nurseries is provided.

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.5.2.2. Possibility of entry with new plants/seeds

The source of the planting material to produce *Prunus* grafting material and some rootstocks for export is from approved mother plants in a supervised nursery. Some rootstocks are plants of *P. armeniaca* grown from seed from an approved source and therefore entry via this pathway is not likely.

Uncertainties:

- Latent infections might be present in the grafting material and the grafted plants.
- Latent infections or endophytic presence of *Neoscytalidium dimidiatum* in the scions may be undetectable by the visual inspections.

Taking the above evidence and uncertainties into consideration, the Panel considers it is unlikely that the pathogen could enter the nursery with new plants/seeds or grafting material with latent infections.

A.5.2.3. Possibility of spread within the nursery

If *N. dimidiatum* is present within the nursery, it can spread when scions with endophytic or latent infections are used for grafting. Contamination of grafting tools with spores or mycelium may also contribute to the spread of the disease. Conidia can spread by wind, rain or insects. The fungus overwinters in the twigs or in the soil. If other potential host plants are present within the nursery, *N. dimidiatum* may spread to *Prunus* plants from these.

Endophytic or latent infections (de Silva et al., 2019) can be overlooked by visual inspections and lead to an unintentional spread of the disease.

Uncertainties:

- The infection potential of endophytic presence is not known

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

A.5.3. Information from interceptions

Considering imports of, *Prunus persica* and *Prunus dulcis* plants from Türkiye to the EU, between 1995 and 2022, there are no records of interceptions of *N. dimidiatum* (EUROPHYT, online; TRACES-NT, online).

A.5.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on pathogen | Evaluation and uncertainties |
|-----|--|--------------------|--|
| 1 | Certified material | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> Details of the certification process are not given. Due to the potential endophytic or latent presence of <i>N. dimidiatum</i> the visual inspection might be insufficient. |
| 2 | Phytosanitary certificates | Yes | The procedure for obtaining the phytosanitary certificate is not described <u>Uncertainties:</u> <ul style="list-style-type: none"> Due to the potential endophytic or latent presence of <i>N. dimidiatum</i>, the pathogen may not be detected by macroscopic inspections and therefore laboratory analysis will not be carried out. |
| 3 | Cleaning and disinfection of facilities, tools and machinery | Yes | Details about disinfection are not given. |
| 4 | Rouging and pruning | Yes | The effect of pruning is unclear. |
| 5 | Biological and mechanical control | | |
| 6 | Pesticide application | Yes | Details on fungicide applications are not given. |
| 7 | Surveillance and monitoring | Yes | Latent or endophytic presence of the fungus may not be detected. |
| 8 | Sampling and laboratory testing | Yes | Details of sampling procedure and detection methods for fungi are not provided. |
| 9 | Root washing | No | |
| 10 | Refrigeration | No | |
| 11 | Pre-consignment inspection | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> Due to the potential endophytic or latent presence of <i>N. dimidiatum</i> the visual inspection might be insufficient. |

A.5.5. Overall likelihood of pest freedom

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

- Nurseries are located in the area where the pathogen is not present.
- Outbreaks will be recognised, and infected plants removed from the nursery.
- Pesticide application is effective and prevents from spreading the pathogen.

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

- Latent infections could be overlooked by non-trained personnel.
- Young plants could be symptomless.

Not clear information on disinfection of the tools, pruning is not sufficient.

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

- Median is slightly shifted to the left side (lower infestation rate) because of the low likelihood of pressure of the pest from source material from an approved source.

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

- The first and third quartiles describe the highest uncertainty that reflects uncertainty on most of the information available.

A.5.5.5. Elicitation outcomes of the assessment of the pest freedom for *Neoscytalidium dimidiatum* on crop

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

Table A.9: Elicited and fitted values of the uncertainty distribution of pest infestation by *Neoscytalidium dimidiatum* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-------|-----|
| Elicited values | 5 | | | | | 45 | | 85 | | 140 | | | | | 200 |
| EKE | 5.04 | 7.19 | 10.9 | 18.7 | 29.4 | 43.3 | 57.6 | 87.9 | 121 | 138 | 157 | 173 | 187 | 195 | 200 |

The EKE results are the BetaGeneral (0.95736, 1.2214, 3.7, 205) distribution fitted with @Risk version 7.6.

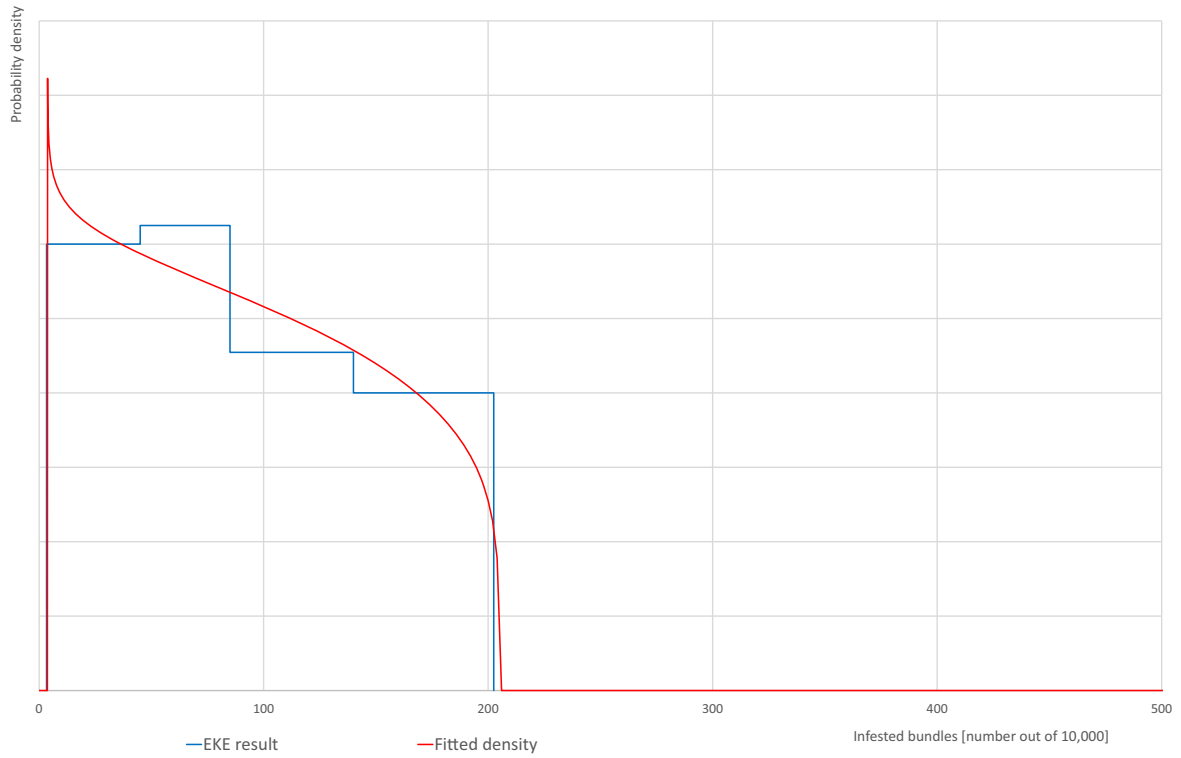
Based on the numbers of estimated infested bundles the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.10.

Table A.10: The uncertainty distribution of bundles free of *Neoscytalidium dimidiatum* per 10,000 plants calculated by Table A.9

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9800 | | | | | 9860 | | 9915 | | 9955 | | | | | 9995 |
| EKE results | 9800 | 9805 | 9813 | 9827 | 9843 | 9862 | 9879 | 9912 | 9942 | 9957 | 9971 | 9981 | 9989 | 9993 | 9995 |

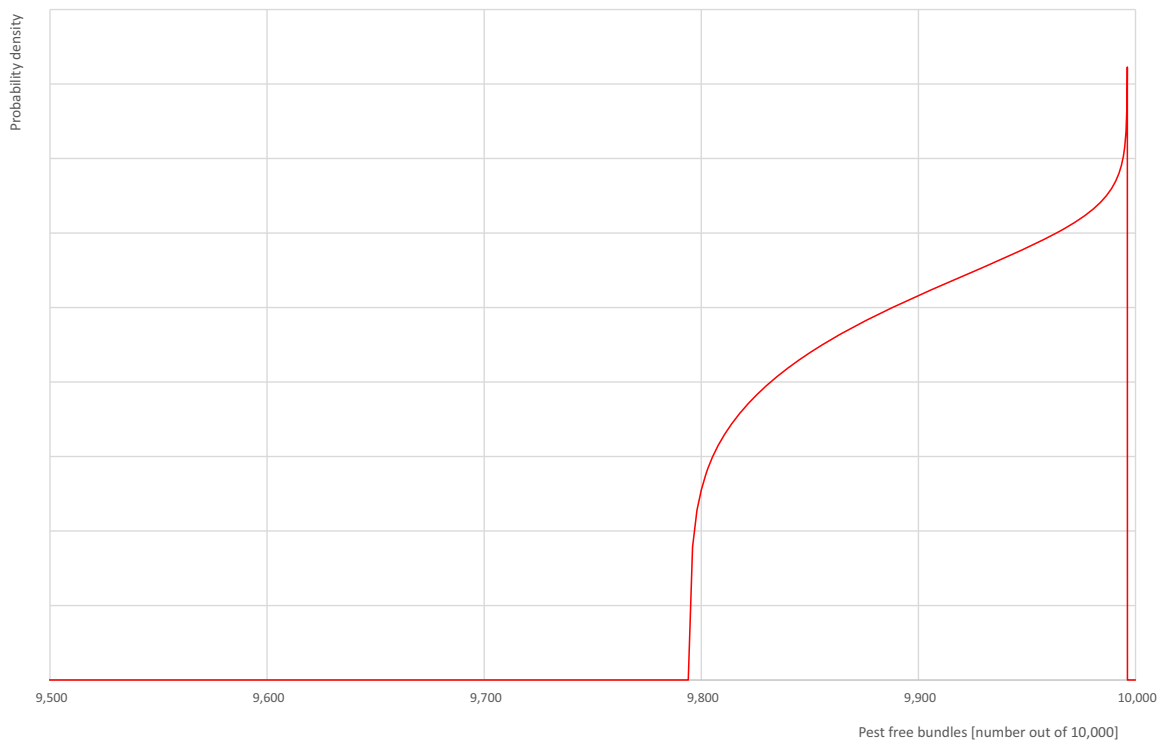
The EKE results are the fitted values.

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)

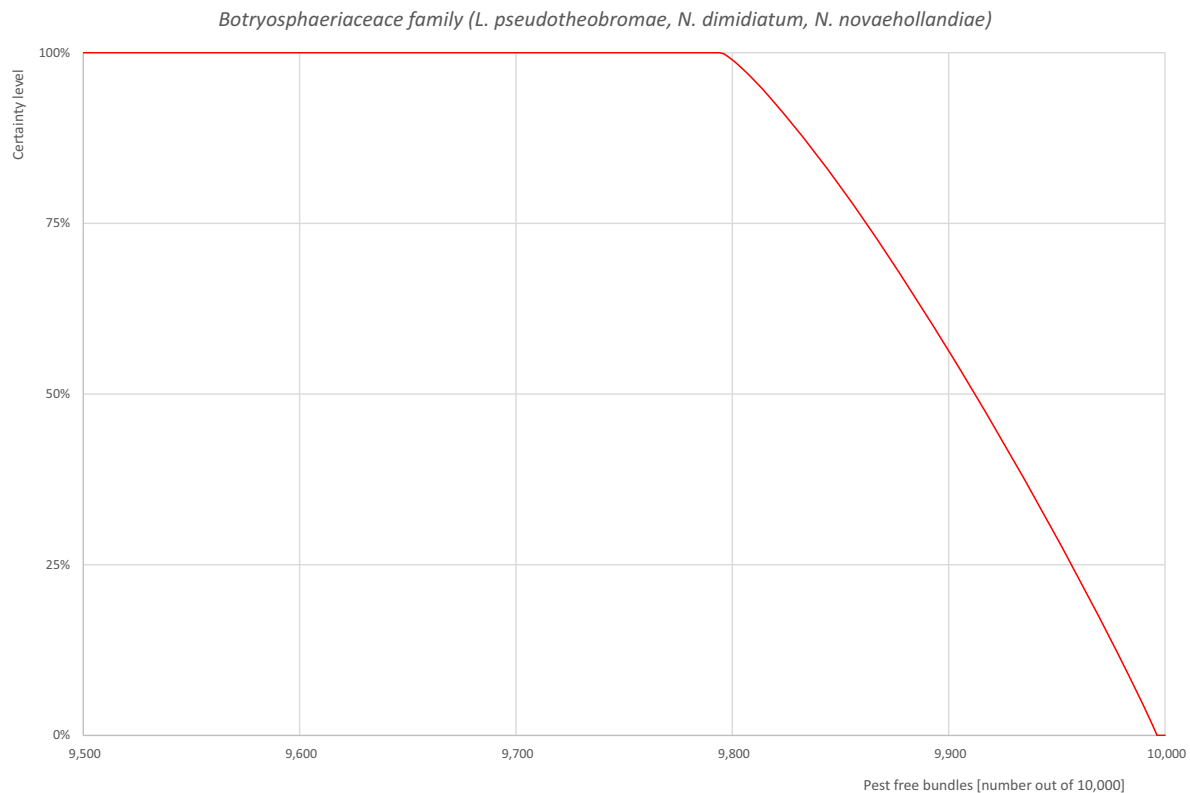


(a)

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)



(b)



(c)

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

A.5.6. References list

- Adesemoye AO, Mayorquin JS, Wang DH, Twizeyimana M, Lynch SC and Eskalen A, 2014. Identification of species of *Botryosphaeriaceae* causing bot gummosis in citrus in California. *Plant Disease*, 98, 55–61. <https://doi.org/10.1094/pdis-05-13-0492-re>
- Al-Bedak OA, Mohamed RA and Seddek NH, 2018. First detection of *Neoscytalidium dimidiatum* associated with canker disease in Egyptian *Ficus* trees. *Forest Pathology*, 48, e12411. <https://doi.org/10.1111/efp.12411>
- Derviş S, Türkölmez Ş, Çiftçi O, Ulubaş Serçe Ç and Dikilitas M, 2019. First report of *Neoscytalidium dimidiatum* causing black canker and root rot of walnut in Turkey. *Plant Disease*, 103, 2129–2129. <https://doi.org/10.1094/pdis-02-19-0306-pdn>
- Derviş S, Özer G and Türkölmez Ş, 2020. First report of *Neoscytalidium dimidiatum* causing tuber rot of potato in Turkey. *Journal of Plant Pathology*, 102, 1295–1296. <https://doi.org/10.1007/s42161-020-00575-6>
- EPPO (European and Mediterranean Plant Protection Organization), online. *Neoscytalidium dimidiatum* (HENLTO), Categorization. Available online: <https://gd.eppo.int/taxon/HENLTO/categorization> [Accessed: 11 October 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Ezra D, Simanski E, Antman S, Shulhani R, Borenstein M, Golani M, Hershovich M, Liarzi O and Shtienberg D, 2015. *Botryosphaeria* in deciduous trees: determination of the causal agent and disease development in young trees. In Abstracts of presentations at the 36th Congress of the Israeli Phytopathological Society. *Phytoparasitica*, 43, 369–381. <https://doi.org/10.1007/s12600-015-0466-1>
- Fullerton RA, Sutherland PA, Rebstock RS, Hieu NT, Thu NNA, Linh DT, Thanh NTK and Van Hoa N, 2018. The life cycle of dragon fruit canker caused by *Neoscytalidium dimidiatum* and implications for control. *Dragon Fruit Regional Network Initiation Workshop*, 71–80. Available online: https://www.ffmpeg.org.tw/upload/files/activities/20180713134846/Paper_Dr_Bob_Fullerton.pdf

- Hajlaoui MR, Nouri MT, Hamrouni N, Trouillas FP, Yahmed NB, Eddouzi J and Mnari-Hattab M, 2018. First record of dieback and decline of plum caused by *Neoscytalidium dimidiatum* in Tunisia. *New Disease Reports*, 38, 20–20. <https://doi.org/10.5197/j.2044-0588.2018.038.020>
- Mayorquin JS, Wang DH, Twizeyimana M and Eskalen A, 2016. Identification, distribution and pathogenicity of Diatrypeaceae and Botryosphaeriaceae associated with Citrus Branch Canker in the Southern California Desert. *Plant Disease*, 100, 2402–2413. <https://doi.org/10.1094/pdis-03-16-0362-re>
- Nouri MT, Lawrence DP, Yaghmour MA, Michailides TJ and Trouillas FP, 2018. *Neoscytalidium dimidiatum* causing canker, shoot blight and fruit rot of almond in California. *Plant Disease*, 102, 1638–1647. <https://doi.org/10.1094/pdis-12-17-1967-re>
- Oksal E, Çelik Y and Özer G, 2019. *Neoscytalidium dimidiatum* causes canker and dieback on grapevine in Turkey. *Australasian Plant Disease Notes*, 14, 33. <https://doi.org/10.1007/s13314-019-0363-4>
- Oksal E, Yiğit T, Özer G, 2020. First report of *Neoscytalidium dimidiatum* causing shoot blight, dieback and canker of apricot in Turkey. *Journal of Plant Pathology*. 102, 579–580. <https://doi.org/10.1007/s42161-019-00467-4>
- Polizzi G, Aiello D, Vitale A, Giuffrida F, Groenewald JZ and Crous PW, 2009. First report of shoot blight, canker, and gummosis caused by *Neoscytalidium dimidiatum* on *Citrus* in Italy. *Plant Disease*, 93, 1215. <https://doi.org/10.1094/pdis-93-11-1215a>
- Ray JD, Burgess T and Lanoiselet VM, 2010. First record of *Neoscytalidium dimidiatum* and *N. novaehollandiae* on *Mangifera indica* and *N. dimidiatum* on *Ficus carica* in Australia. *Australasian Plant Disease Notes*, 5, 48–50. <https://doi.org/10.1071/dn10018>
- de Silva NI, Phillips AJ, Liu JK, Lumyong S and Hyde KD, 2019. Phylogeny and morphology of *Lasiodiplodia* species associated with *Magnolia* forest plants. *Scientific reports*, 9, 1–11. <https://doi.org/10.1038/s41598-019-50804-x>
- Slippers B and Wingfield MJ, 2007. Botryosphaeriaceae as endophytes and latent pathogens of woody plants: diversity, ecology and impact. *Fungal Biology Reviews*, 21, 90–106. <https://doi.org/10.1016/j.fbr.2007.06.002>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Türkölmez S, Dervis S, Ciftci O and Dikilitas M, 2019a. First report of *Neoscytalidium dimidiatum* causing shoot and needle blight of pines (*Pinus* spp.) in Turkey. *Plant Disease*, 103, 2960–2961. <https://doi.org/10.1094/pdis-05-19-0964-pdn>
- Türkölmez S, Derviş S, Çiftçi O, Serçe CU and Dikilitas M, 2019b. New disease caused by *Neoscytalidium dimidiatum* devastates tomatoes (*Solanum lycopersicum*) in Turkey. *Crop Protection*, 118, 21–30. <https://doi.org/10.1016/j.cropro.2018.12.004>

A.6. *Neoscytalidium novaehollandiae*

A.6.1. Organism information

| | |
|--|---|
| Taxonomic information | Current valid scientific name: <i>Neoscytalidium novaehollandiae</i> Pavlic, Burges, M.J. Wingfield In Pavlic, Wingfield, Barger, Slippers, Hardy & Burgess 2008t Synonyms: – Name used in the EU legislation: – Order: Botryosphaerales Family: Botryosphaeriaceae Common name: sooty canker and branch wilt Name used in the Dossier: – |
| Group | Fungi |
| EPPO code | – |
| Regulated status | Neither regulated in the EU nor anywhere in the world. |
| Pest status in Türkiye | Present (Ören et al., 2020; Ören et al., 2022a,b). |
| Pest status in the EU | No records found. |
| Host status on <i>Prunus</i> spp. | <i>N. novaehollandiae</i> has been detected in <i>Prunus domestica</i> , <i>P. dulcis</i> , <i>P. persica</i> and <i>P. avium</i> (Ören et al., 2020; Ören et al., 2022a,b). |
| PRA information | No Pest Risk Assessment is currently available. |

| Other relevant information for the assessment | | |
|--|---|---|
| Biology | Species belonging to Botryosphaeriaceae generally infects through wounds or natural openings (Slippers and Wingfield, 2007). <i>N. novaehollandiae</i> was first reported from asymptomatic <i>Adansonia</i> (baobab) trees but has also been associated with cankers on a wide variety of woody plants. It has also been reported as the fungus behind a case of fingernail onychomycosis (Shokoohi et al., 2020). <i>Neoscytalidium</i> spp. can grow between 15 and 40°C. Optimum temperature for mycelial growth is 30–35°C (Mayorquin et al., 2016). Pycniospores are the most important means of dispersal and infection. They are released from pycnidia during wet weather and spread by rain splash and wind (Adesemoye et al., 2014; Fullerton et al., 2018). | |
| Symptoms | Main type of symptoms | <i>Neoscytalidium</i> spp. are reported to cause branch wilt, dieback, canker, leaf blight, gummosis, tree death, fruit rot and canker. In <i>P. dulcis</i> , researchers in Türkiye report that it causes stem cankers and branch dieback (Ören et al., 2020). Symptoms also included yellowing and defoliation of leaves, gummosis, vascular discoloration, and tree death. Ören et al. (2022a) has also reported similar symptoms on <i>Prunus domestica</i> trees in Türkiye. Symptoms are detectable, but it is possible that they may elude detection. Latent infections are known for other species of <i>Neoscytalidium</i> (Ezra et al., 2015) |
| | Presence of asymptomatic plants | Botryosphaeriaceae species are known to be able to exist in the host as endophytes (Slippers and Wingfield, 2007). Disease expression is almost exclusively associated with some form of stress or non-optimal growth conditions of trees (Slippers and Wingfield, 2007). <i>Neoscytalidium novaehollandiae</i> was first described from asymptomatic plants (Pavlic et al., 2008) and can clearly survive as an endophyte. For <i>Prunus</i> spp. it has in some cases been seen that development of the disease caused by the closely related species <i>N. dimidiatum</i> is delayed and expressed later e.g. when plants are transferred from nurseries to orchards (Ezra et al., 2015) |
| | Confusion with other pests | Several other fungi belonging to Botryosphaeriaceae may cause the same symptoms. |
| Host plant range | Primarily reported from woody plants such as <i>Adansonia</i> spp. (Australia, Pavlic et al., 2008), grapevine (Türkiye, Akgül et al., 2019), almond (Türkiye, Ören et al., 2020), plum (Ören et al., 2022a), pear (Türkiye, Oksal and Özer, 2021), <i>Pinus eldarica</i> (Iran, Alizadeh et al., 2022), pistachio (Türkiye, Kurt et al., 2019), <i>Ficus carica</i> and <i>Mangifera indica</i> (Australia, Ray et al., 2010), <i>Quercus brantii</i> (Iran, Sabernasab et al., 2019), but also from tomato (Türkiye, Derviş et al., 2020) and sage (Türkiye, Derviş et al., 2021). | |
| Reported evidence of impact | In <i>P. dulcis</i> , researchers in Türkiye report that it causes stem cankers and branch dieback (Ören et al., 2020). | |
| Pathways and evidence that the commodity is a pathway | Detailed information on the infection pathway of <i>Neoscytalidium novaehollandiae</i> has not been studied, but other fungi in the Botryosphaeriaceae rely on the following: <ul style="list-style-type: none"> – Via spores released from infected plants and plant material in the soil. – Through wounds caused by pruning and grafting. – Via latently infected grafting material e.g. scions. – Contaminated grafting tools. | |
| Surveillance information | <i>Neoscytalidium novaehollandiae</i> has been detected in <i>Prunus</i> species in several provinces of Türkiye (Ören et al., 2020; Ören et al., 2022a,b). | |

A.6.2. Possibility of pest presence in the nursery

A.6.2.1. Possibility of entry from the surrounding environment

In addition to the *Prunus dulcis*, *Neoscytalidium novaehollandiae* has a wide host range.

The major source of inoculum is from infected plant material, which can be leaves, twigs, fruit and cankers on larger branches of the affected plant species. Dispersal of conidia can take place by rain, wind or insects. Therefore, the presence of host species in the environment of the nurseries with *Prunus* spp. plants is an important factor for the possible migration of inoculum into the nursery.

Uncertainties:

- No information about the plant species growing in the surroundings of the nurseries is provided.

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

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

The source of the planting material to produce *Prunus* grafting material and some rootstocks for export is from approved mother plants in a supervised nursery.

Uncertainties:

- Latent infections might be present in the grafting material and the grafted plants.
- Latent infections or endophytic presence of *Neoscytalidium novaehollandiae* in the scions may be undetectable by the visual inspections.

Taking the above evidence and uncertainties into consideration, the Panel considers it is unlikely that the pathogen could enter the nursery with new plants/seeds or grafting material with latent infections.

A.6.2.3. Possibility of spread within the nursery

If *N. novaehollandiae* is present within the nursery, it can spread when scions with endophytic or latent infections are used for grafting. Contamination of grafting tools with spores or mycelium may also contribute to the spread of the disease. Conidia can spread by wind, rain or insects. The fungus overwinters in the twigs or in the soil. If other potential host plants are present within the nursery, *N. novaehollandiae* may spread to the relevant *Prunus* spp. from these host plants. Use of contaminated seeds (of other plant species) may also contribute to the spread of the disease.

Endophytic or latent infections (de Silva et al., 2019) can be overlooked by visual inspections and lead to an unintentional spread of the disease.

Uncertainties:

- The infection potential of endophytic presence is not known.

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

A.6.3. Information from interceptions

Considering imports of *Prunus* spp. plants from Türkiye to the EU, between 1995 and 2022, there are no records of interceptions of *N. novaehollandiae* (EUROPHYT, online; TRACES-NT, online).

A.6.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on pathogen | Evaluation and uncertainties |
|-----|--|--------------------|---|
| 1 | Certified material | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> • Details of the certification process are not given. • Due to the potential endophytic or latent presence of <i>N. novaehollandiae</i>, the visual inspection might be insufficient. |
| 2 | Phytosanitary certificates | Yes | The procedure for obtaining the phytosanitary certificate is not described <u>Uncertainties:</u> <ul style="list-style-type: none"> • Due to the potential endophytic or latent presence of <i>N. novaehollandiae</i>, the pathogen may not be detected by macroscopic inspections and therefore laboratory analysis will not be carried out. |
| 3 | Cleaning and disinfection of facilities, tools and machinery | Yes | Details about disinfection are not given. |
| 4 | Rouging and pruning | Yes | The effect of pruning is unclear. |
| 5 | Biological and mechanical control | No | No |
| 6 | Pesticide application | Yes | Details on fungicide applications are not given. |
| 7 | Surveillance and monitoring | Yes | Latent or endophytic presence of the fungus may not be detected. |
| 8 | Sampling and laboratory testing | Yes | Details of sampling procedure and detection methods for fungi are not provided. |
| 9 | Root washing | No | |
| 10 | Refrigeration | No | |
| 11 | Pre-consignment inspection | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> • Due to the potential endophytic or latent presence of <i>N. novaehollandiae</i>, the visual inspection might be insufficient |

A.6.5. Overall likelihood of pest freedom

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

- Nurseries are located in the area where the pathogen is not present
- Outbreaks will be recognised, and infected plants removed from the nursery
- Pesticide application is effective and prevents from spreading the pathogen

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

- Latent infections could be overlooked by non-trained personnel
- Young plants could be symptomless

Not clear information on disinfection of the tools, pruning is not sufficient.

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

- Median is slightly shifted to the left side (lower infestation rate) because of the low likelihood of pressure of the pest from source material from an approved source.

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

- The first and third quartiles describe the highest uncertainty that reflects uncertainty on most of the information available.

A.6.5.5. Elicitation outcomes of the assessment of the pest freedom for *Neoscytalidium novaehollandiae* on crop

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

Table A.11: Elicited and fitted values of the uncertainty distribution of pest infestation by *Neoscytalidium novaehollandiae* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-------|-----|
| Elicited values | 5 | | | | | 45 | | 85 | | 140 | | | | | 200 |
| EKE | 5.04 | 7.19 | 10.9 | 18.7 | 29.4 | 43.3 | 57.6 | 87.9 | 121 | 138 | 157 | 173 | 187 | 195 | 200 |

The EKE results are the BetaGeneral (0.95736, 1.2214, 3.7, 205) distribution fitted with @Risk version 7.6.

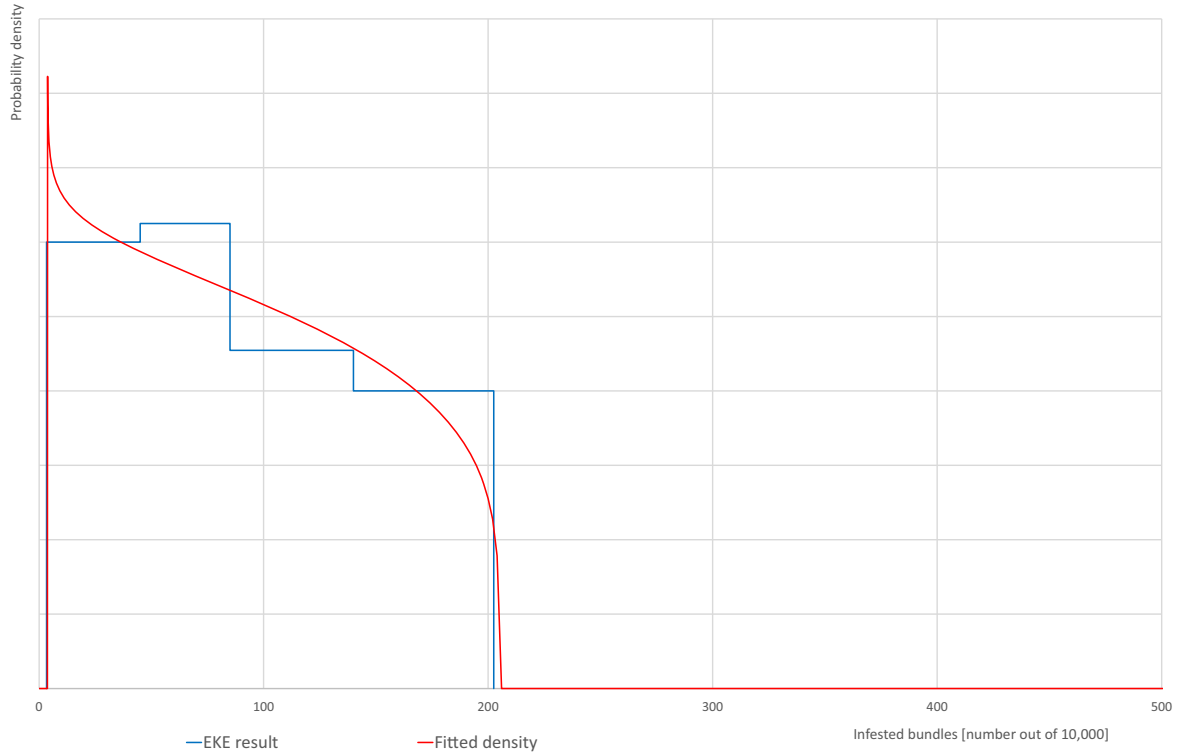
Based on the numbers of estimated infested bundles the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.12.

Table A.12: The uncertainty distribution of bundles free of *Neoscytalidium novaehollandiae* per 10,000 plants calculated by Table A.1

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9800 | | | | | 9860 | | 9915 | | 9955 | | | | | 9995 |
| EKE results | 9800 | 9805 | 9813 | 9827 | 9843 | 9862 | 9879 | 9912 | 9942 | 9957 | 9971 | 9981 | 9989 | 9993 | 9995 |

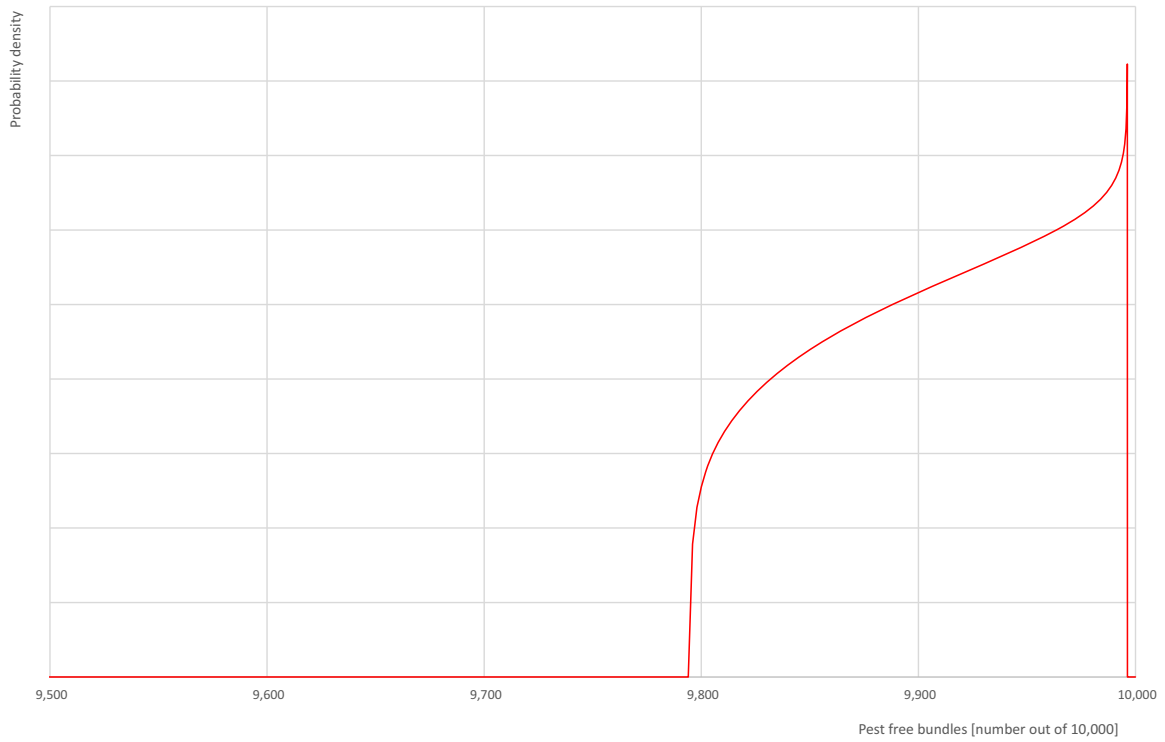
The EKE results are the fitted values.

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)

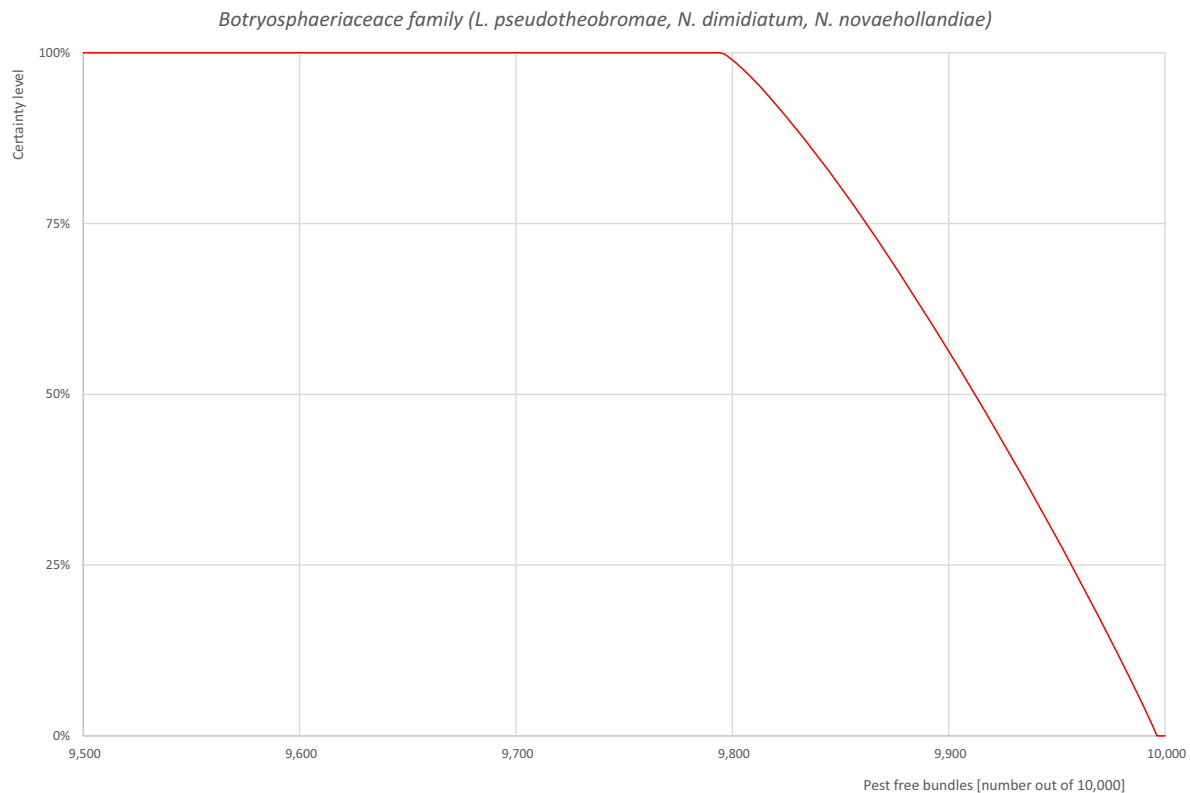


(a)

Botryosphaeriaceae family (*L. pseudotheobromae*, *N. dimidiatum*, *N. novaehollandiae*)



(b)



(c)

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

A.6.6. References list

- Akgül DS, Savaş NG, Özarslandan M, 2019. First report of wood canker caused by *Lasiodiplodia exigua* and *Neoscytalidium novaehollandiae* on grapevine in Turkey. *Plant Disease*, 103, 1036. <https://doi.org/10.1094/PDIS-11-18-1938-PDN>
- Alizadeh M, Safaie N and Shams-Bakhsh M, 2022. *Neoscytalidium novaehollandiae* causes dieback on *Pinus eldarica* and its potential for infection of urban forest trees. *Scientific Reports*, 12, 9337. <https://doi.org/10.1038/s41598-022-13414-8>
- Derviş S, Özer G and Türkölmez Ş, 2020. First report of *Neoscytalidium novaehollandiae* causing stem blight of tomato Turkey. *Journal of Plant Pathology*, 102, 1339–1340. <https://doi.org/10.1007/s42161-020-00627-x>
- Derviş D, Güney İG, Koşar İ, Bozoğlu T and Özer G, 2021. First report of *Neoscytalidium novaehollandiae* on common sage (*Salvia officinalis*). *Australasian Plant Disease Notes*, 16, 4. <https://doi.org/10.1007/s13314-021-00433-z>
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Kurt S, Uysal A, Soylu EM, Kara M and Soylu S, 2019. First record of *Neoscytalidium novaehollandiae* associated with pistachio dieback in the Southeastern Anatolia region of Turkey. *Mycologia Iranica*, 6, 55–57.
- Ören E, Koca G, Gencer R and Bayraktar H, 2020. First report of *Neoscytalidium novaehollandiae* associated with stem canker and branch dieback of almond trees. *Australasian Plant Disease Notes*, 15, 17. <https://doi.org/10.1007/s13314-020-00386-9>
- Ören E, Palacioğlu G, Ozan GN and Bayraktar H, 2022a. First report of *Neoscytalidium novaehollandiae* associated with branch dieback and stem cankers on plum in Turkey. *Journal of Plant Pathology*, 104, 1167. <https://doi.org/10.1007/s42161-022-01143-w>

- Ören E, Palacioğlu G, Ozan GN, Çelik K and Bayraktar H, 2022b. First report of *Neoscytalidium novaehollandiae* associated with canker and branch dieback on cherry trees in Turkey. *Journal Plant Pathology*, 104, 391. <https://doi.org/10.1007/s42161-021-00955-6>
- Pavlic D, Wingfield MJ, Barber P, Slippers B, Hardy GE and Burgess TI, 2008. Seven new species of the Botryosphaeriaceae from baobab and other native trees in Western Australia. *Mycologia*, 100, 851–866. <https://doi.org/10.3852/08-020>
- Ray JD, Burgess T and Lanoiselet VM, 2010. First record of *Neoscytalidium dimidiatum* and *N. novaehollandiae* on *Mangifera indica* and *N. dimidiatum* on *Ficus carica* in Australia. *Australasian Plant Disease Notes*, 5, 48–50. <https://doi.org/10.1071/dn10018>
- Sabernasab M, Jamali S, Marefat A and Abbasi S, 2019. Morphological and molecular characterization of *Neoscytalidium novaehollandiae*, the cause of *Quercus brantii* dieback in Iran. *Phytopathologia Mediterranea*, 58, 347–357.
- Shokoohi GR, Ansari S, Abolghazi A, Gramishoar M, Nouripour-Sisakht S, Mirhendi H and Makimura K, 2020. The first case of fingernail onychomycosis due to *Neoscytalidium novaehollandiae*, molecular identification and antifungal susceptibility. *Journal de mycologie medicale*, 30, 100920. <https://doi.org/10.1016/j.mycmed.2019.100920>
- de Silva NI, Phillips AJ, Liu JK, Lumyong S and Hyde KD, 2019. Phylogeny and morphology of *Lasiodiplodia* species associated with *Magnolia* forest plants. *Scientific reports*, 9, 1–11. <https://doi.org/10.1038/s41598-019-50804-x>
- Slippers B and Wingfield MJ, 2007. Botryosphaeriaceae as endophytes and latent pathogens of woody plants: diversity, ecology and impact. *Fungal Biology Reviews*, 21, 90–106. <https://doi.org/10.1016/j.fbr.2007.06.002>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.7. *Anoplophora chinensis*

A.7.1. Organism information

| | |
|-------------------------------|--|
| Taxonomic information | <p>Current valid scientific name: <i>Anoplophora chinensis</i></p> <p>Synonyms: <i>Anoplophora macularia</i>, <i>Anoplophora malasiaca</i>, <i>Callophophora macularia</i>, <i>Cerambyx chinensis</i>, <i>Cerambyx farinosus</i>, <i>Cerambyx punctator</i>, <i>Melanauster chinensis</i>, <i>Melanauster chinensis</i> var. <i>macularius</i>, <i>Melanauster macularius</i></p> <p>Name used in the EU legislation: <i>Anoplophora chinensis</i> (Thomson) [ANOLCN]</p> <p>Order: Coleoptera</p> <p>Family: Cerambycidae</p> <p>Common name: black and white longhorn, citrus long-horned beetle, citrus longhorn, citrus root cerambycid, white-spotted longicorn beetle</p> <p>Name used in the Dossier: –</p> |
| Group | Insects |
| EPPO code | ANOLCN |
| Regulated status | <p>The pest is listed in Annex II/B of Commission Implementing Regulation (EU) 2019/2072 as <i>Anoplophora chinensis</i> (Thomson) [ANOLCN]. <i>Anoplophora chinensis</i> is listed as a priority pest under Commission Delegated Regulation (EU) 2019/1702. Commission Implementing Decision 2012/138/EC lays down emergency measures to prevent the introduction and spread of <i>A. chinensis</i> in the EU.</p> <p>The pest is included in the EPPO A2 list (EPPO, online_a).</p> <p>It is a quarantine pest in Morocco, Mexico and Tunisia (EPPO, online_b).</p> |
| Pest status in Türkiye | <p><i>Anoplophora chinensis</i> is reported as transient, under eradication in Türkiye (EPPO, online_c).</p> <p><i>Anoplophora chinensis</i> is on A2 list of Türkiye (EPPO, online_b).</p> |
| Pest status in the EU | <p><i>Anoplophora chinensis</i> is present in Italy with restricted distribution in Lombardy (provinces of Varese, Milan and Brescia in containment), Lazio (1 site in the city of Rome, under eradication) and Tuscany region (1 site in Pistoia, under eradication) (EPPO, online_c).</p> <p>Present under eradication in Croatia (EPPO, online_c).</p> <p>It is transient and under eradication in France (EPPO, online_c).</p> |

| | | |
|--|--|--|
| Host status on <i>Prunus</i> spp. | All plants in genus <i>Prunus</i> including <i>P. persica</i> and <i>P. dulcis</i> are reported to be major hosts of <i>A. chinensis</i> (Lim et al., 2014; Sjöman et al., 2014, EPPO, online_d). | |
| PRA information | Pest Risk Assessments available: <ul style="list-style-type: none"> – Pest Risk Analysis, <i>Anoplophora chinensis</i> (van der Gaag et al., 2008); – Pest survey card on <i>Anoplophora chinensis</i> (EFSA, 2019). | |
| Other relevant information for the assessment | | |
| Biology | <p><i>Anoplophora chinensis</i> is a longhorn beetle native to China, Japan and Korea (CABI, online). Its life cycle consists of four stages: egg, larvae of various instars, pupae and adults. Oviposition occurs at the base of the trunk or on emerging roots, whereas the eggs are laid rarely on higher parts of trunks and main branches (van der Gaag et al., 2010).</p> <p>If the temperature is suitable, larvae hatch about 10 days after oviposition. First and second instar larvae feed in the phloem and later deeply into the wood. The minimum diameter of the branches/trunks to become suitable for infestation and larval development is 1 cm (EPPO, 2013; EFSA, 2019). Larvae develop deeply downwards in the trunk of the host tree and many also reach the roots (Hérard et al., 2005), where about 90% of the population can be found (Hérard et al., 2006). Both in the native countries (Adachi, 1994) and in southern Europe (Hérard and Maspero, 2019), larvae need 1 or 2 years to complete their development. In colder regions, however, <i>A. chinensis</i> has a longer life cycle (van der Gaag et al., 2008). Pupation occurs in late spring – summer inside the wood, usually in the upper part of the feeding areas of larvae (CABI, online).</p> <p>After metamorphosis, adults' emergence occurs between April and September, in relation to latitude and local temperature, and they may survive from 30 (recorded in China) to 70 days (recorded in Japan) (CABI, online). Adults emerge through circular holes with a mean diameter of 10–15 mm, usually smaller in males than in females, and located about 25 cm below the oviposition site (Haack et al., 2010).</p> <p>After emergence and before copulation, tender adults need a maturation feeding carried out for about 10–15 days on twigs and leaf petioles (Haack et al., 2010). However, adults continue nutritional feeding for their whole life, making the egg laying homogeneously distributed over spring and summer (Haack et al., 2010).</p> <p>Reached sexual maturation, both males and females mate polygamously. Mating occurs in summer (from May to August) on trunks and main branches, usually at least 60 cm from the trunk collar (CABI, online).</p> <p><i>Anoplophora chinensis</i> spread capacity is reported to be low, and the distance covered naturally by adults falls generally within a few hundred meters from the tree from which they emerged (Adachi, 1990). Most adults are assumed to disperse by walking and remain near their natal tree unless conditions are unfavourable, although some adults were shown to be able to travel distances of 2 km (Adachi, 1990). In Lombardy, Italy, the maximum distances between infestations in urban and agricultural areas were calculated to be about 500 and 663 m, respectively (Cavagna et al., 2013). However, 97.0% and 99.2% of new cases were found within 200 and 400 m, respectively (Cavagna et al., 2013). EFSA (2019) estimated the maximum distance of natural spread in one year to be approximately 194 m (with a 95% uncertainty range of 42–904 m), for a population with a 2- year life cycle.</p> <p>Concerning the human-assisted spread, the main pathway for <i>A. chinensis</i> dispersal was identified in the international trade of woody plants for planting (including bonsai), with a stem or root diameter > 1 cm, which are infested in the nurseries during the production process (Haack et al., 2010; EPPO, 2013; CABI, online). Larvae of <i>A. chinensis</i> were intercepted also in wood packaging material (WPM) arriving from Asia, although this is a less common pathway of dispersal (Haack et al., 2010; Herard and Maspero, 2019).</p> | |
| Symptoms | Main type of symptoms | Most symptoms caused by <i>A. chinensis</i> are mainly due to the feeding activities of the larvae within the wood, although a few characteristic symptoms are produced also by adults during maturation feeding and oviposition. Detailed descriptions of <i>A. chinensis</i> symptoms specific on <i>Prunus</i> spp. |

| | |
|--|--|
| | <p>are not available in literature. Nevertheless, symptoms induced by <i>A. chinensis</i> colonisation are similar in most hosts (CABI, online).</p> <p>The main symptoms caused by newly emerged adults on plants are foliage wilting and discoloration, twig deformation and bark erosion (EFSA, 2019). Females engrave into the bark characteristic 'T shape' oviposition pitches, which is a very characteristic symptom of tree colonisation by <i>A. chinensis</i> (Hérard and Maspero, 2019). Furthermore, in the first weeks after the oviposition it is possible to observe the sap coming out from the freshly cut slits (EPPO, 2016).</p> <p>The main symptoms caused by feeding larvae are gradual and progressive canopy decline, desiccation of the main branches due to the larval tunnelling activity concentrated at the lower part of the stem (EFSA, 2019), galleries under the bark, frass at the base of the tree and exit holes (Hérard and Maspero, 2019; CABI, online). The exit holes are large, circular, with an average diameter of about 10–15 mm, smaller for males and larger for females (Haack et al., 2010). They can be seen mainly around the lower trunk, on emerging roots, or belowground level (EFSA 2019; CABI, online).</p> |
| | <p>Presence of asymptomatic plants</p> <p>Plants can be infested with eggs and feeding larvae, without (evident) external signs or symptoms.</p> |
| | <p>Confusion with other pests</p> <p><i>Anoplophora glabripennis</i></p> |
| Host plant range | <p><i>Anoplophora chinensis</i> is a polyphagous pest and can infest plants of more than 108 host species, from 73 genera in 20 families (Sjöman et al., 2014), many of them widespread in the EU (EFSA, 2019; EPPO, online_d).</p> <p><i>Prunus dulcis</i> and <i>P. persica</i> are also reported as hosts of <i>A. chinensis</i> (Ge et al., 2014).</p> <p>Specifically, <i>A. chinensis</i> has been found to complete its life cycle on species belonging to the genera (in alphabetical order): <i>Acer</i> spp., <i>Aesculus</i> spp., <i>Alnus</i> spp., <i>Betula</i> spp., <i>Carpinus</i> spp., <i>Citrus</i> spp., <i>Cornus</i> spp., <i>Corylus</i> spp., <i>Cotoneaster</i> spp., <i>Crataegus</i> spp., <i>Fagus</i> spp., <i>Juglans</i> spp., <i>Lagerstroemia</i> spp., <i>Liquidambar</i> spp., <i>Malus</i> spp., <i>Platanus</i> spp., <i>Populus</i> spp., <i>Prunus</i> spp., <i>Pyrus</i> spp., <i>Quercus</i> spp., <i>Rhododendron</i> spp., <i>Rosa</i> spp., <i>Salix</i> spp., <i>Sorbus</i> spp. and <i>Ulmus</i> spp. (Haack et al., 2010).</p> <p>In Türkiye, <i>A. chinensis</i> has been recorded on <i>Acer</i> sp., <i>Salix caprea</i>, <i>Fagus orientalis</i>, <i>Aesculus hippocastanum</i>, <i>Platanus orientalis</i>, <i>Populus nigra</i>, <i>Salix babylonica</i> and <i>Lagerstromia indica</i> (EFSA PLH Panel, 2021).</p> |
| Reported evidence of impact | <p>Main damages are caused by feeding larvae (gradual and progressive canopy decline). It has also been reported that branches desiccation occur due to the larval tunnelling activity concentrated at the lower part of the stem (EFSA, 2019).</p> |
| Pathways and evidence that the commodity is a pathway | <p>The main pathway for the <i>A. chinensis</i> dispersal was identified in the international trade of woody host plants for planting (including bonsai) with a stem or root diameter > 1 cm (Haack et al., 2010; EPPO, 2013; CABI, online).</p> <p>A larva of <i>A. chinensis</i> was intercepted in 2015 in the Netherlands on wood packaging material imported from Asia (Hérard and Maspero, 2019). Haack et al. (2010) also reported interceptions of a few <i>A. chinensis</i> larvae extracted from wood packaging materials.</p> |
| Surveillance information | <p><i>Anoplophora chinensis</i> is included in the official surveillance programme of the Ministry and it was under the national survey and monitoring programme in the last 5 years. Survey instruction was prepared, and control and eradication measures were applied in Istanbul, Antalya and Bartın provinces. In Bartın and Antalya, <i>A. chinensis</i> was reported as eradicated (Additional information submitted by Turkish NPPO regarding <i>Malus domestica</i> opinion).</p> |

A.7.2. Possibility of pest presence in the nursery

A.7.2.1. Possibility of entry from the surrounding environment

Anoplophora chinensis was found in Türkiye as an invasive alien species in Istanbul, Antalya and Bartın provinces. In Bartın and Antalya, *A. chinensis* was then reported as eradicated (EFSA PLH Panel, 2021). To date, the only *A. chinensis* infestation known for Türkiye is in Istanbul.

In Istanbul (where the infestation is still occurring), *A. chinensis* was detected firstly in 2014 in nurseries producing ornamental plants (EPPO, online_b). The species arrived through international trade of plants for planting probably from China or Italy (EFSA PLH Panel, 2021). In Istanbul, at least three infested areas were found spread over the town (EFSA PLH Panel, 2021).

It has also been reported that the points where *A. chinensis* was detected in Istanbul are mostly public parks, home gardens and recreation areas, which are all environments rich of potential host trees, such as *Acer* sp., *Salix caprea*, *Fagus orientalis*, *Aesculus hippocastanum*, *Platanus orientalis*, *Populus nigra* and *Salix babylonica* (EFSA PLH Panel, 2021). *Anoplophora chinensis* is a largely polyphagous longhorn beetle able to infest weakened and healthy woody broadleaves (Haack et al., 2010; EFSA, 2019). Both males and females can fly from up to 2 km (Adachi, 1990).

There is no information on the species composition of the woody plants in the surroundings.

Considering these two pest characteristics (polyphagy and fly ability), *A. chinensis* can be present and reproduce in various *Prunus* spp. trees growing around the infested areas of the town of Istanbul and Marmara region, and then move to nurseries through the adult dispersal capacity.

Uncertainties:

- No information about the density and distribution of the population of *A. chinensis* in the infested areas surrounding the nurseries of Istanbul is available.
- No clear information about the size and distribution, and produced plants of the nurseries in Istanbul is available.
- No clear information about the phytosanitary inspections of *Prunus* spp. trees in terms of *A. chinensis* infestation
- There are uncertainties about the possible occurrence and abundance of woody plants and the pest in the 2 km areas surrounding the export nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery. The pest can be present in the surrounding areas and the transferring rate could be enhanced by dispersal capacity of *A. chinensis* as males and females fly, the species is highly polyphagous and potential hosts grow in wild or domestic areas close to the nurseries.

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

In both provinces of Istanbul (where the infestation is still occurring) and Bartın (where the infestation has been eradicated), *A. chinensis* was detected first in nurseries producing ornamental plants (EFSA PLH Panel, 2021), suggesting that *A. chinensis* may enter in nurseries with new plants.

Neither in the submitted Dossier nor in the additional information provided information details are given on plant protection products registered for *Prunus* spp. against *A. chinensis*. Since *A. chinensis* is a largely polyphagous longhorn beetle infesting woody broadleaves (Haack et al., 2010; EFSA, 2019), the pest may enter into the nurseries with new infested plant material (even belonging to species different than *Prunus* spp. for example walnut) arriving in Türkiye through the international or national trade of plants for planting or rootstocks bought from other nurseries.

Uncertainties:

- It is not clear whether other species of wooden plants can also be grown in the nurseries; this should be considered as potential risk factor given polyphagy of the pest.

Taking into consideration the above evidence and uncertainties, the Panel considers that the pest could enter the nursery with new plants.

A.7.2.3. Possibility of spread within the nursery

Anoplophora chinensis is known to be able to infest *Prunus* spp. (EPPO online b) and many other hosts (Haack et al., 2010; EFSA, 2019). Both males and females of *A. chinensis* can fly up to 2 km (Adachi, 1990). In the dossier, there is no information on specific procedure/treatment applied against *A. chinensis* in the export nurseries. No licensed plant protection products against *A. chinensis*, nor specific protocol for pest control in the nurseries was submitted in the dossier. Therefore, *A. chinensis* can spread within the nursery if present.

Uncertainties:

- It is unknown if inspections before export are targeted on the pest and their procedures
- The pest status of *A. chinensis* within the infested nurseries is unknown.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nursery is possible, as both males and females fly, the pest is polyphagous and potentially able to shift among hosts, within *Prunus* genus.

A.7.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus dulcis* and *Prunus persica* plants for planting neither from Türkiye nor from other countries due to the presence of *A. chinensis* between the years 1995 and August 2022 (EUROPHYT, online; TRACES-NT, online).

A.7.4. Evaluation of the risk mitigation options

In the table below, all the RROs currently applied in Türkiye are summarised and an indication of their effectiveness on *A. chinensis* is provided. The description of the risk mitigation measures currently applied in Türkiye is provided in Table 7.

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | Yes | Nurseries are registered and inspected at least once a year with unknown inspection and sampling intensities. <i>A. chinensis</i> has a quarantine status in Türkiye. |
| 2 | Phytosanitary certificates and plant passport | Yes | The procedures applied could be effective in detecting <i>A. chinensis</i> infestations though some life stages might be overlooked by non-trained personnel. <u>Uncertainties:</u> • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 3 | Rouging and pruning | Yes | Rouging by eliminating infested plants. |
| 4 | Biological and mechanical control | No | No effective natural enemies are known. |
| 5 | Pesticide application | No | The pesticides listed in the additional information provided by the third country (Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine) might not be effective in controlling <i>A. chinensis</i> because of its endophytic behaviour and high polyphagy. Besides, none of them targets the beetle. |
| 6 | Surveillance and monitoring | Yes | <i>Anoplophora chinensis</i> is included in the official surveillance programme of the Ministry and it is under the national survey and monitoring programme in the last 5 years. <u>Uncertainties:</u> • No details are provided on surveillance and monitoring protocols during the production cycle for this species. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---------------------------------|--------------------|---|
| 7 | Sampling and laboratory testing | Yes | <p><u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying the pest.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | <p>The procedures applied could be effective in detecting <i>A. chinensis</i> infestation.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.7.5. Overall likelihood of pest freedom

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

- Defoliation will reduce the pest population.
- Sorting, grading will detect infestations.
- Adults are visible and visual inspection is effective to detect the pest.

The scenario assumes that most exports will come from nurseries far away from outbreak areas of *A. chinensis* and that outbreaks are efficiently controlled. Inspection before export done by Ministry staff is effective in detecting infestations. The scenario assumes that risk mitigation measures are implemented.

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

- Nurseries are located in areas where the pest is present.
- Pest can enter by other propagation material/plants/humans.
- Limited (ad-hoc) pesticide applications will not effectively control the pest.
- Low infestation level will stay undetected on the rootstocks, also after cleaning.

The scenario assumes that some export will come from nurseries close to the outbreak areas of *A. chinensis* and that the outbreaks are not sufficiently controlled. Inspection before export done by Ministry staff is not sufficiently effective in detecting infestations. The scenario assumes that risk mitigation measures are not implemented.

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

- Median is shifted to the left side (lower infestation rate) because of the quarantine status of *A. chinensis* in Türkiye and its presence and under eradication status.

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

The main uncertainty is the population pressure in the surrounding environment, due to the lack of sufficient information in the Dossier.

A.7.5.5. Elicitation outcomes of the assessment of the pest freedom for *Anoplophora chinensis*

The elicited and fitted values for *Anoplophora chinensis* agreed by the Panel are shown in Tables A.13 and A.14 and in Figure A.7.

Table A.13: Elicited and fitted values of the uncertainty distribution of pest infestation by *Anoplophora chinensis* 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 | | | | | 2.0 | | 3.5 | | 5.5 | | | | | 10 |
| EKE | 0.213 | 0.391 | 0.624 | 1.01 | 1.46 | 1.98 | 2.48 | 3.54 | 4.75 | 5.47 | 6.35 | 7.29 | 8.32 | 9.15 | 10.0 |

The EKE results are the BetaGeneral (1.5432, 3.5044, 0, 12.7) distribution fitted with @Risk version 7.6.

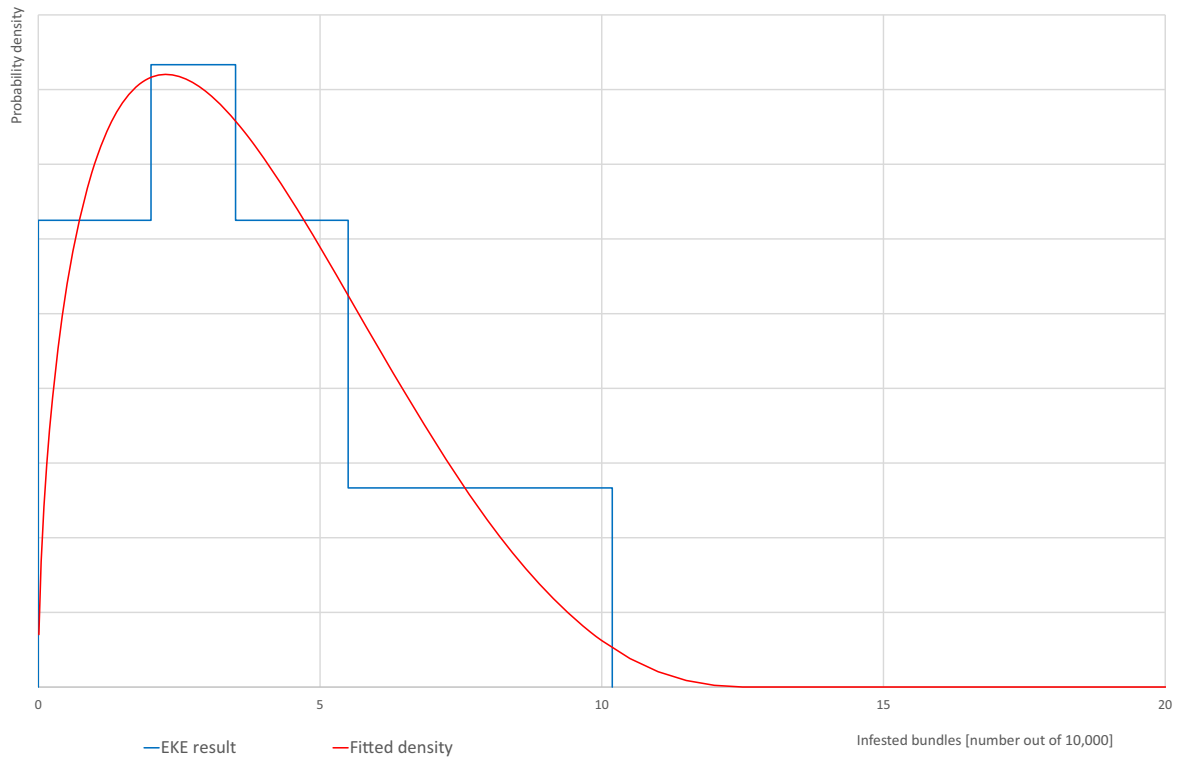
Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. =10,000 – the number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.14.

Table A.14: The uncertainty distribution of bundles free of *Anoplophora chinensis* 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 | 9990 | | | | | 9995 | | 9997 | | 9998 | | | | | 10000 |
| EKE results | 9990 | 9991 | 9992 | 9993 | 9994 | 9995 | 9995 | 9996 | 9998 | 9998 | 9998.5 | 9999.0 | 9999.4 | 9999.6 | 9999.8 |

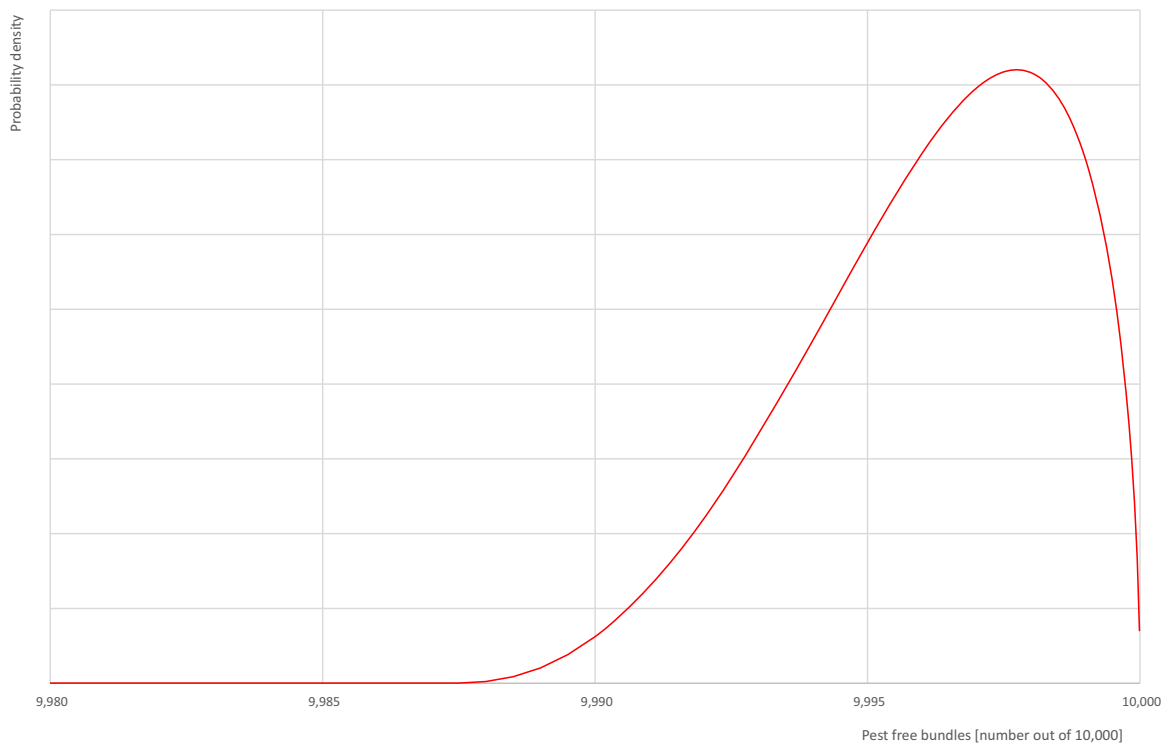
The EKE results are the fitted values.

Anoplophora chinensis

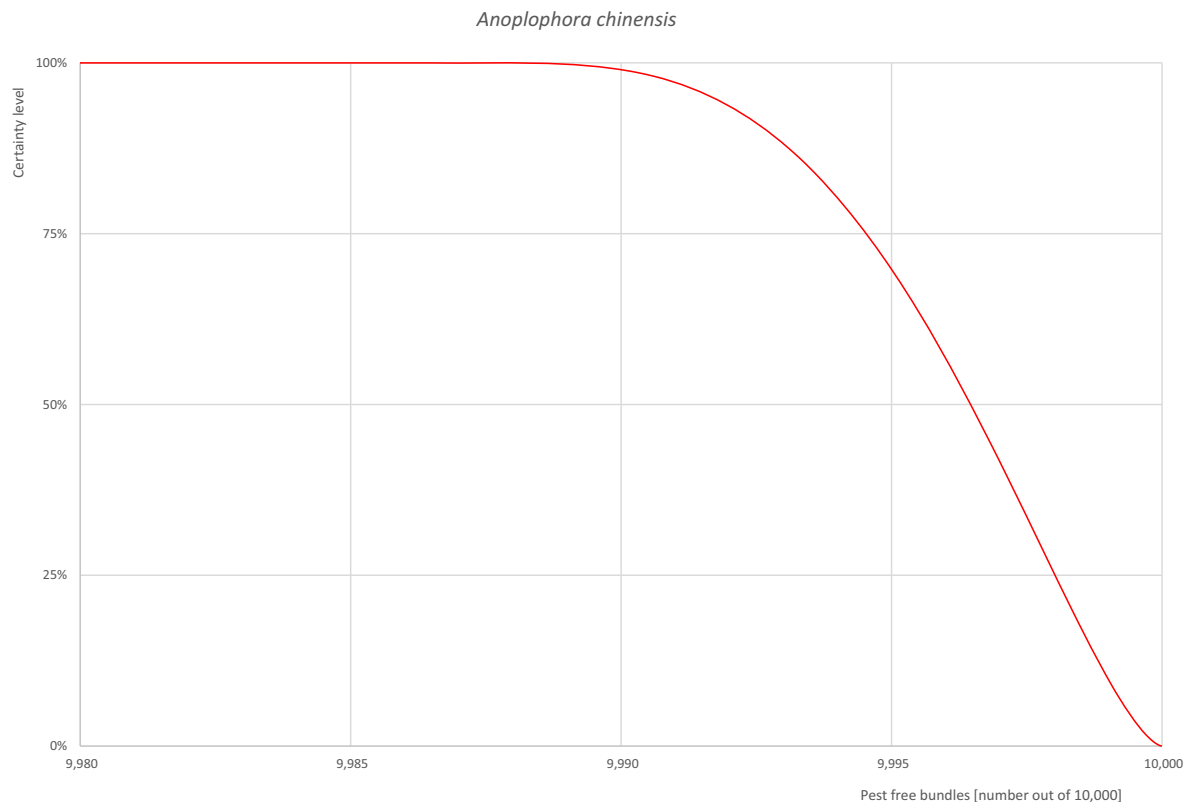


(a)

Anoplophora chinensis



(b)



(c)

Figure A.7: (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.7.6. References list

- Adachi I, 1990. Population studies of *Anoplophora malasiaca* adults (Coleoptera: Cerambycidae) in a citrus grove. *Researches on Population Ecology*, 32, 15–32. <https://doi.org/10.1007/bf02512587>
- Adachi I, 1994. Development and life cycle of *Anoplophora malasiaca* (Thomson) Coleoptera Cerambycidae on *Citrus* trees under fluctuating and constant temperature regimes. *Applied Entomology and Zoology*, 29, 485–497. <https://doi.org/10.1303/aez.29.485>
- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Anoplophora chinensis* (black and white citrus longhorn). Available online: <https://www.cabi.org/isc/datasheet/5556> [Accessed: 26 July 2022].
- Cavagna B, Ciampitti M, Materdomini R, Menguzzo S, D'Angelo G and Maspero M, 2013. Public awareness: a crucial point for a successful eradication campaign against the longhorned beetles *Anoplophora chinensis* and *A. glabripennis*. OECD conference on '*Anoplophora chinensis* & *Anoplophora glabripennis*: new tools for predicting, detecting and fighting. How to save our forests and our urban green spaces'. *Journal of Entomological and Acarological Research*, Milan, Italy, 45, 37. Available online: <http://www.pagepressjournals.org/index.php/jear/article/view/jear.2013.s1/1204>
- EFSA (European Food Safety Authority), Hoppe B, Schrader G, Kinkar M and Vos S, 2019. Pest survey card on *Anoplophora chinensis*. EFSA supporting publication 2019:EN-1749, 22 pp. <https://doi.org/10.2903/sp.efsa.2019.EN-1749>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Chatzivassiliou E, Debode J, Manceau C, Gardi C, Mosbach-Schulz O and Potting R, 2021. Scientific Opinion on the commodity risk assessment of *Robinia pseudoacacia* plants from Turkey. *EFSA Journal* 2021;19(5):6568, 54 pp. <https://doi.org/10.2903/j.efsa.2021.6568>

- EPPO (European and Mediterranean Plant Protection Organisation), 2013. PM 9/16 (1) *Anoplophora chinensis*: procedures for official control. EPPO Bulletin, 43(3), 518–526. <https://doi.org/10.1111/epp.12108>
- EPPO (European and Mediterranean Plant Protection Organisation), 2016. PM 3/79 (1) Consignment inspection for *Anoplophora chinensis* and *Anoplophora glabripennis*. EPPO Bulletin, 46, 58–67. <https://doi.org/10.1111/epp.12271>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO A2 List of pests recommended for regulation as quarantine pests, version 2019-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 26 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Anoplophora chinensis* (ANOLCN), Categorization. Available online: <https://gd.eppo.int/taxon/ANOLCN/categorization> [Accessed: 26 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Anoplophora chinensis* (ANOLCN), Distribution. Available online: <https://gd.eppo.int/taxon/ANOLCN/distribution> [Accessed: 26 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_d. *Anoplophora chinensis* (ANOLCN), Host plants. Available online: <https://gd.eppo.int/taxon/ANOLCN/hosts> [Accessed: 26 July 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Ge X, Zong S, He S, Liu Y and Kong X, 2014. Areas of China predicted to have a suitable climate for *Anoplophora chinensis* under a climate-warming scenario. Entomologia Experimentalis et Applicata, 153, 256–265. <https://doi.org/10.1111/eea.12247>
- Haack RA, Hérard F, Sun J and Turgeon JJ, 2010. Managing invasive populations of Asian longhorned beetle and citrus longhorned beetle: a worldwide perspective. Annual Review of Entomology, 55, 521–546. <https://doi.org/10.1146/annurev-ento-112408-085427>
- Hérard F and Maspero M, 2019. History of discoveries and management of the citrus longhorned beetle, *Anoplophora chinensis*, in Europe. Journal of Pest Science, 92, 117–130. <https://doi.org/10.1007/s10340-018-1014-9>
- Hérard F, Krehan H, Benker U, Boegel C, Schrage R, Chauvat E, Ciampitti M, Maspero M and Bialooki P, 2005. *Anoplophora* in Europe: infestations and management responses. In: Gottschalk KW (ed.). Proceedings, 16th US Department of Agriculture interagency research forum on gypsy moth and other invasive species 2005; 2005 January 18–21; Annapolis, MD. General Technical Report NE-337. Newtown Square, PA: US Department of Agriculture, Forest Service, Northeastern Research Station, 35–40.
- Hérard F, Ciampitti M, Maspero M, Krehan H, Benker U, Boegel C and Bialooki P, 2006. *Anoplophora* species in Europe: infestations and management processes. EPPO Bulletin, 36, 470–474. <https://doi.org/10.1111/j.1365-2338.2006.01046.x>
- Lim J, Jung S-Y, Lim J-S, Jang J, Kim K-M, Lee Y-M and Lee B-W, 2014. A review of host plants of Cerambycidae (Coleoptera: Chrysomeloidea) with new host records for fourteen Cerambycids, including the Asian longhorn beetle (*Anoplophora glabripennis* Motschulsky), in Korea. Korean Journal of Applied Entomology, 53, 111–133. <https://doi.org/10.5656/ksae.2013.11.1.061>
- Sjöman H, Östberg J and Nilsson J, 2014. Review of host trees for the wood-boring pests *Anoplophora glabripennis* and *Anoplophora chinensis*: an urban forest perspective. Arboriculture and Urban Forestry, 40, 143–164. <https://doi.org/10.48044/jauf.2014.016>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- van der Gaag DJ, Ciampitti M, Cavagna B, Maspero M and Herard F, 2008. Pest Risk Analysis, *Anoplophora chinensis*. Plant Protection Service, Wageningen, The Netherlands.
- van der Gaag DJ, Sinatra G, Roversi PF, Loomans A, Herard F and Vukadin A, 2010. Evaluation of eradication measures against *Anoplophora chinensis* in early stage infestations in Europe. EPPO Bulletin, 40, 176–187. <https://doi.org/10.1111/j.1365-2338.2010.02381.x>

A.8. *Didesmoccocus unifasciatus*

A.8.1. Organism information

| | | |
|--|--|---|
| Taxonomic information | <p>Current valid scientific name: <i>Didesmoccocus unifasciatus</i> Synonyms: <i>Physokermes unifasciatus</i>; <i>Physokermes (Eulecanium) unifasciatus</i>; <i>Sphaerolecanium unifasciatus</i>; <i>Lecanium unifasciatus</i>; <i>Sphaerolecanium unifasciatus</i>; <i>Eriochiton amygdalae</i>; <i>Eulecanium unifasciatus</i>; <i>Didesmoccocus megriensis</i>; <i>Didesmoccocus unifasciatus</i>; <i>Eriochiton amygdalae</i>; <i>Lecanium unifasciatus</i> Name used in the EU legislation: –</p> <p>Order: Hemiptera Family: Coccidae</p> <p>Common name: – Name used in the Dossier: <i>Didesmoccocus unifasciatus</i></p> | |
| Group | Insects | |
| EPPO code | – | |
| Regulated status | <i>Didesmoccocus unifasciatus</i> is not regulated in the EU. | |
| Pest status in Türkiye | The pest is present in Türkiye, in the regions of Hakkari (Kaydan and Kozár, 2010) and Diyarbakır (Bolu, 2012, Çiftçi and Bolu, 2021, García Morales et al., online). | |
| Pest status in the EU | Absent | |
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> and <i>P. dulcis</i> are listed as hosts of <i>D. unifasciatus</i> (Bolu, 2012; Çiftçi and Bolu, 2021). | |
| PRA information | No Pest Risk Assessment is currently available. | |
| Other relevant information for the assessment | | |
| Biology | <p>The biology of the lecanium scale, <i>Didesmoccocus unifasciatus</i> (Arch.) was studied in Lebanon (Talhouk, 1975).</p> <p>The scale is bisexual and univoltine. Young adults of both sexes appear and mate during the last week of April. Fertilised females double their size between the end of April when copulation occurs and the oviposition period in mid-June. A female lays between 1500 and 2400 eggs in three to five days under its scale, and egg hatching occurs some four to five days later. The scale passes through three nymphal instars. Winter is passed in the second nymphal instar. <i>D. unifasciatus</i> does not seem to have a true diapause period in Lebanon. This scale has a large number of natural enemies that keep it under control. Where contact insecticides are regularly used, a great reduction in populations of its natural enemies occurs (Talhouk, 1975).</p> | |
| Symptoms | Main type of symptoms | Infestation by this scale results in the death of almond trees within a period of three to five years after the start of an infestation. |
| | Presence of asymptomatic plants | Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves), but the presence of mealybugs on the plants could be observed for the presence of wax, honeydew and ants. |
| | Confusion with other pests | Microscopic observation is needed for specific identification. A good description and illustration of the adult female is given by Hodgson (1994) and Borchsenius (1957). This latter Author also provides a good description of first-instar nymph, female last-instar nymph and male last-instar nymph. |
| Host plant range | <p><i>Didesmoccocus unifasciatus</i> has been recorded in Palaearctic and Oriental regions on <i>Amygdalus</i> sp., <i>A. communis</i> (= <i>Prunus dulcis</i>), <i>A. nana</i>, <i>A. pedunculata</i>, <i>Armeniaca</i> sp., <i>Ficus carica</i>, <i>Malus domestica</i>, <i>Persica concolor</i>, <i>P. vulgaris</i>, <i>Prunus</i> sp., <i>P. dulcis</i>, <i>P. prostrata</i> and <i>Ulmus</i> sp. (García Morales et al., online).</p> <p><i>Prunus persica</i> and <i>P. dulcis</i> are listed as hosts of <i>D. unifasciatus</i> (Bolu, 2012; Çiftçi and Bolu, 2021).</p> | |
| Reported evidence of impact | Infestation by this scale results in the death of almond trees within a period of three to five years after the start of an infestation. | |

| | |
|--|---|
| Pathways and evidence that the commodity is a pathway | Possible pathways of entry for <i>D. unifasciatus</i> are plants for planting, cut flowers, fruits and natural spread as for other coccid species (EPPO, 2003). As a matter of fact, general pathways of entry for scale insects are plant materials of any kind (hiding in a protected site, on the bark, roots, stems, leaves, soil), human transportation, irrigation water, wind, animals and ants (Berry, 2014; Mani and Shivaraju, 2016). Aerial dispersal of crawlers (1st instar nymphs) is possible. |
| Surveillance information | No surveillance information for this pest is reported in the dossier. There is no information on whether the pest has ever been found in the nurseries or their surrounding environment. |

A.8.2. Possibility of pest presence in the nursery

A.8.2.1. Possibility of entry from the surrounding environment

Didesmococcus unifasciatus is present in Türkiye, in the provinces of Hakkari (Kaydan and Kozár, 2010) and Diyarbakır on *Prunus persica* and *P. dulcis* (Bolu, 2012; Çiftçi and Bolu, 2021). So, its distribution appears limited in the country. Possible pathways of entry into the nursery can be represented by movement of infested plants, wind, human and animal dispersal, irrigation water and possibly soil. The males can fly, but only to limited distances.

Uncertainties:

- *D. unifasciatus* population density in the nursery areas is not known.
- No information is provided about distance and botanical composition of surrounding environment.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery from the surrounding area. The pest can be present in the surrounding areas and the transferring rate could be enhanced by wind, animals and human transportation.

A.8.2.2. Possibility of entry with new plants/seeds

The pest can be transported on host plants, particularly plants for planting and cut branches. The presence of the pest can be easily detected by visual inspection, mainly for the presence of honeydew, wax and ants; however, initial infestations (crawlers) can be overlooked by non-trained personnel.

A.8.2.3. Possibility of spread within the nursery

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal, irrigation water and possibly soil. The males can fly, but only to limited distances.

The Panel considers that the transfer of the pest within the nursery is possible. Spread within the nursery could be enhanced by movement of infested plants, by wind, soil, human and animal dispersal.

A.8.3. Information from interceptions

In the EUROPHYT/TRACES-NT database there are no records of notification of *P. persica* or *P. armeniaca* plants for planting from Türkiye due to presence of *D. unifasciatus* between the years 1995 and 2022 (EUROPHYT, online; TRACES-NT, online).

A.8.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | Yes | No specific protocols are in place for this species; however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms and the colonies are easily detectable on the plant. |
| 2 | Phytosanitary certificates and plant passport | Yes | <i>Didesmococcus unifasciatus</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on inspection and monitoring protocols for this species. Limited information is available on the distribution and abundance of <i>Didesmococcus unifasciatus</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 3 | Rouging and pruning | Yes | Information provided is poorly detailed. <u>Uncertainties:</u> <ul style="list-style-type: none"> Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>Didesmococcus unifasciatus</i> if carried out during the crawler migration. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | <i>Didesmococcus unifasciatus</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>Didesmococcus unifasciatus</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | <u>Evaluation:</u> The procedures applied could be effective in detecting <i>Didesmococcus unifasciatus</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.8.5. Overall likelihood of pest freedom

A.8.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Peach and almond are considered secondary hosts.
- *D. unifasciatus* is present in two regions Hakkari Diyarbakir, where is little production of almond and peach.
- Pesticide applications targeting other pests are effective in controlling *D. unifasciatus*.
- Regular inspections by phytosanitary authorities are effective and further help to reduce infestation by this scale.
- Natural enemies are present.
- High mortality rate.

A.8.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Peach and almond are reported as hosts.
- Certified nurseries are located mainly in the part of the country, where the pest is widely distributed.
- Pesticide applications targeting other pests are not effective in controlling *D. unifasciatus*.
- Visual inspections of *Prunus persica* and *P. dulcis* plants are not effective in detecting eggs, nymphs and early infestations of the scale.

A.8.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

- Median value is shifted to lower values, as according to data presented *D. unifasciatus* is present in two regions Hakkari and Diyarbakir, where is little production of almond and peach.

A.8.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

Uncertainties:

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.8.5.5. Elicitation outcomes of the assessment of the pest freedom for *Didesmococcus unifasciatus* on crop

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

Table A.15: Elicited and fitted values of the uncertainty distribution of pest infestation by *Didesmococcus unifasciatus* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Elicited values | 0 | | | | | 7 | | 13 | | 20 | | | | | 30 |
| EKE | 0.463 | 0.989 | 1.76 | 3.15 | 4.88 | 6.94 | 8.97 | 13.1 | 17.5 | 19.9 | 22.6 | 25.1 | 27.4 | 28.9 | 30.0 |

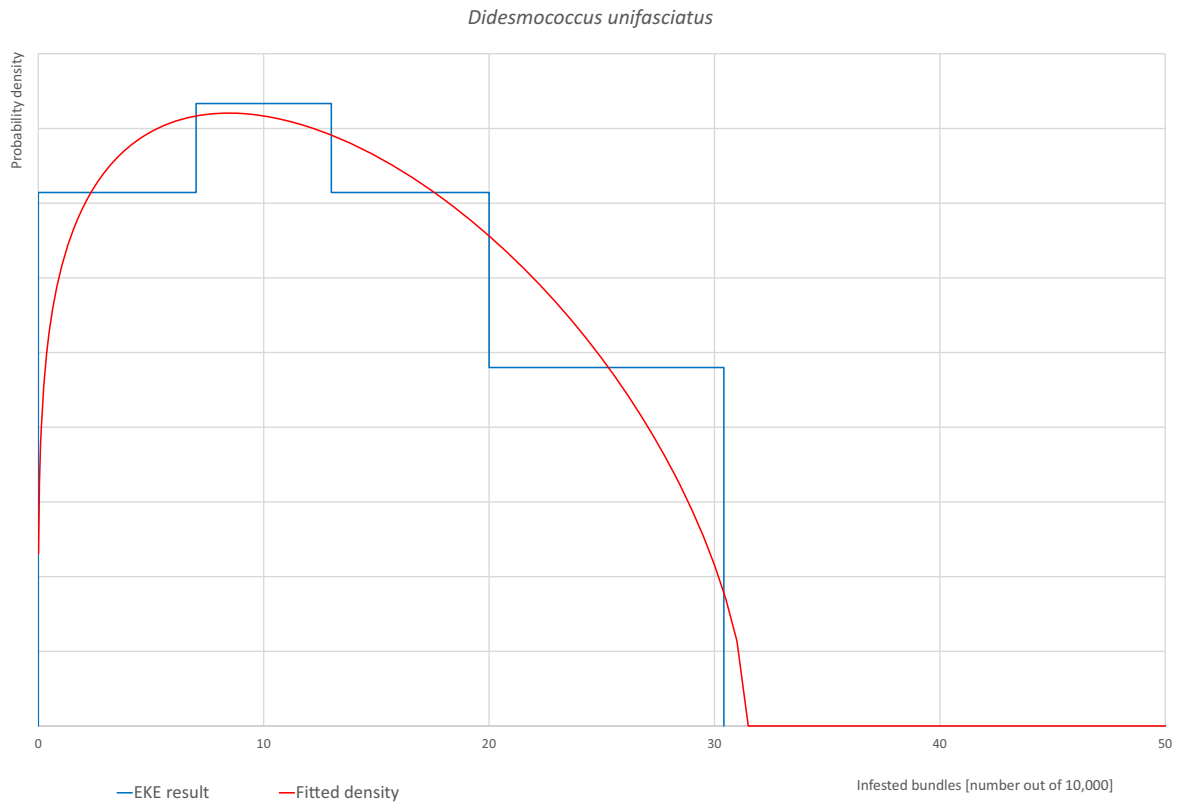
The EKE results are the BetaGeneral (1.2156, 1.5888, 0, 31.5) distribution fitted with @Risk version 7.6.

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

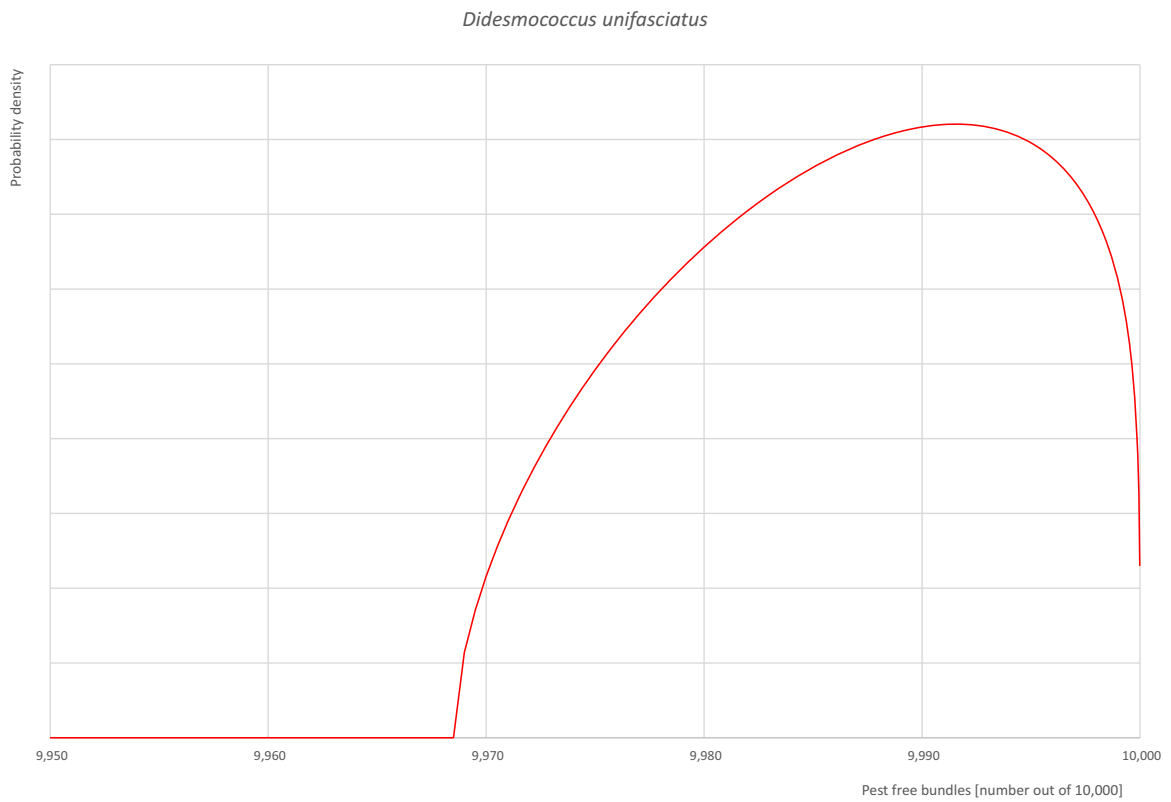
Table A.16: The uncertainty distribution of bundles free of *Didesmococcus unifasciatus* per 10,000 bundles calculated by Table A.15

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|
| Values | 9970 | | | | | 9980 | | 9987 | | 9993 | | | | | 10000 |
| EKE results | 9970 | 9971 | 9973 | 9975 | 9977 | 9980 | 9982 | 9987 | 9991 | 9993 | 9995 | 9997 | 9998 | 9999.0 | 9999.5 |

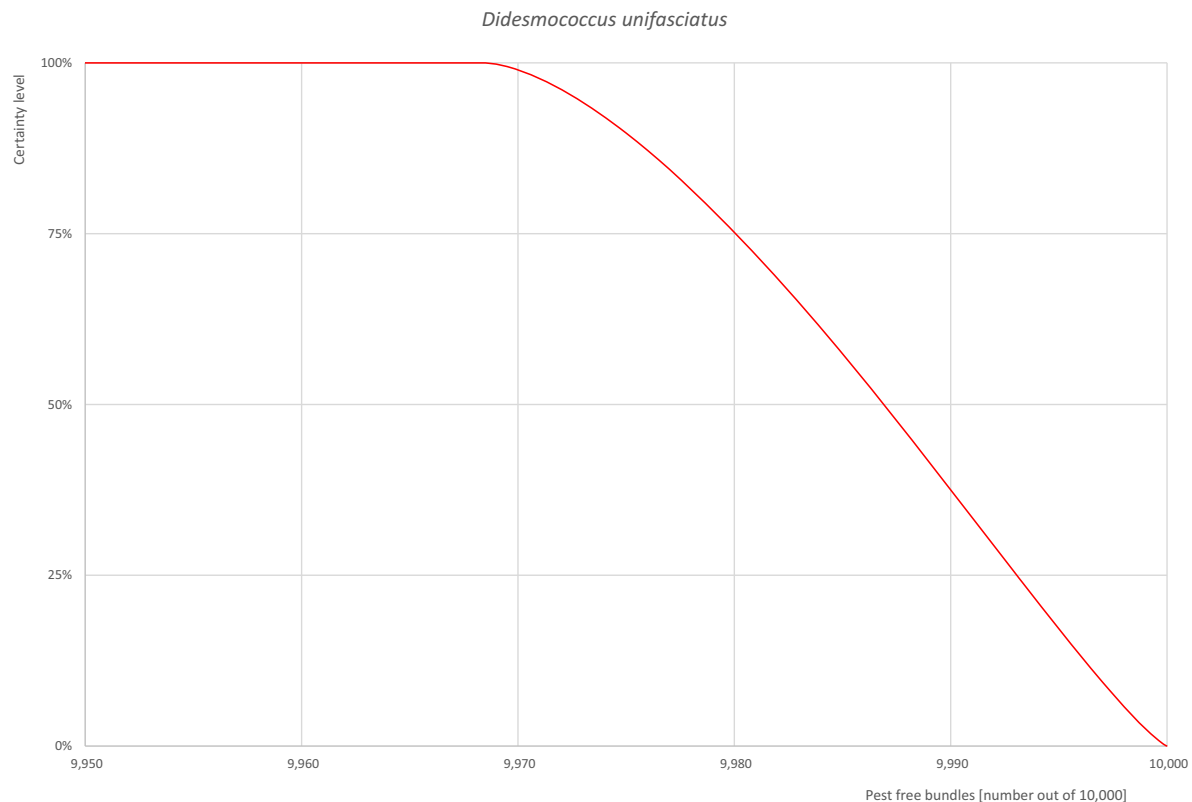
The EKE results are the fitted values.



(a)



(b)



(c)

Figure A.8: (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.8.6. References list

- Berry JA, 2014. Generic pest risk assessment: armoured scale insects (Hemiptera: Coccoidea: Diaspididae) on the fresh produce pathway. Ministry for Primary Industries, Wellington, 76 pp.
- Bolu H, 2012. A new pest on almond tree, the soft scale *Didesmococcus unifasciatus* (Archangelskaya) (Hemiptera: Coccidae) and its new records parasitoids, Turkey. Journal of the Entomological Research Society, 14, 107–114. Available online: <http://www.entomol.org>
- Borchsenius NS, 1957. Subtribe mealybugs and scales (Coccoidea). Soft scale insects Coccidae. Vol. IX. Fauna SSSR, Zoologicheskii Institut Akademii Nauk SSSR, NS, 66, 1-493.
- Çiftçi Ü and Bolu H, 2021. First records of Cocomorpha (Hemiptera) species in Diyarbakır, Turkey. Journal of Entomological Science, 56, 235–245. <https://doi.org/10.18474/0749-8004-56.2.235>
- EPPO (European and Mediterranean Plant Protection Organization), 2003. Report of a pest risk management: *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin. Available online: <https://pra.eppo.int/pr/56a01431-a11b-43a6-abb3-76e4f6a6f33d>
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y and Hardy NB, online. ScaleNet: A literature-based model of scale insect biology and systematics, *Didesmococcus unifasciatus*. Available online: <http://scalenet.info/catalogue/Didesmococcus%20unifasciatus/> [Accessed: 26 September 2022].
- Hodgson CJ, 1994 The scale insect family Coccidae: an identification manual to genera. CAB International Wallingford, Oxon, UK, 639 pp.

- Kaydan MB and Kozár F, 2010. Soft scale insect (Hemiptera: Coccoidea) species of Eastern Anatolia of Turkey. *Acta Phytopathologica et Entomologica Hungarica*, 45, 195–221. Available online: <http://www.akademai.com/content/u11316685k31v8h7/?p=9ea915d914a04deb8f29b9fa80372c26&pi=15> DOI: <https://doi.org/10.1556/APhyt.45.2010.1.16>
- Mani M and Shivaraju C, 2016. Mealybugs and their management in agricultural and horticultural crops. Berlin, Germany, Springer. 655 pp.
- Talhok AS, 1975. Contributions to the knowledge of almond pests in East Mediterranean countries: I. Notes on *Eriogaster amygdali* Wilts. (Lepid., Lasiocampidae) with a description of a new subspecies by EP Wiltshire 1. *Zeitschrift für Angewandte Entomologie*, 78, 306–312.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.9. *Euzophera semifuneralis*

A.9.1. Organism information

| | |
|--|--|
| Taxonomic information | Current valid scientific name: <i>Euzophera semifuneralis</i> Synonyms: <i>Euzophera aeglaeela</i> , <i>Euzophera aglaeella</i> , <i>Euzophera agloeella</i> , <i>Stenoptycha lulella</i> Name used in the EU legislation: – Order: Lepidoptera Family: Pyralidae Common name: American plum borer, walnut girdler Name used in the Dossier: – |
| Group | Insects |
| EPPO code | EUZOSE |
| Regulated status | <i>Euzophera semifuneralis</i> is not regulated in the EU neither is listed by EPPO. It is included in A1 list in both Argentina and Chile (EPPO, online). |
| Pest status in Türkiye | Present in the provinces of Adana and Osmaniye (Atay and Öztürk, 2010), as a pest on pomegranate. |
| Pest status in the EU | Absent in the EU (CABI, online). |
| Host status on <i>Prunus</i> spp. | <i>Prunus dulcis</i> , <i>P. persica</i> and other <i>Prunus</i> species are reported as hosts of <i>Euzophera semifuneralis</i> (Biddinger and Howitt, 1992). |
| PRA information | No Pest Risk Assessment is currently available. |
| Other relevant information for the assessment | |
| Biology | <i>Euzophera semifuneralis</i> is a pyralid moth native to North America, reported from the United States, Canada and Mexico (CABI, online). It was initially described from specimens collected in South America (Colombia), but currently there is no confirmation about the presence of the species further south of Mexico (Biddinger and Howitt, 1992; CABI, online). Out of its native range, it is only present in Türkiye (Atay and Öztürk, 2010). As in all <i>Lepidoptera</i> , <i>E. semifuneralis</i> has four stages of development as well: egg, larva (no data were found about the number of larval instars), pupa and adult (Blakeslee, 1915). <i>E. semifuneralis</i> has two or more generations per year overwintering as mature larva in a typical white silken cocoon under the bark (Solomon and Payne, 1986; Connell et al., 2005). The adults emerge in April-May. After mating the females lay 12–74 eggs singly on the twigs/young stems, or in small groups in the cracks/crevices of the bark, and in bark with small mechanical or pruning wounds, recent grafts, frost damage or disease cankers. The eggs hatch after 8–14 days. The young larvae bore into the bark and mine irregular and shallow galleries in the cambium, expelling considerable amount of frass. Larval feeding lasts 4–6 weeks, then larvae pupate under the bark. The pupal stage in summer lasts 10–18 days. Due to the frequent overlapping of generations, the larvae can be observed at any time of the year. The pupal stage in spring lasts about 20–30 days (Blakeslee, 1915; Solomon and Payne, 1986). |

| | | |
|------------------------------------|--|--|
| | <p>There are no specific data on the flight distance of <i>E. semifuneralis</i> adults, but species belonging to genus <i>Euzophera</i> are commonly considered unable to fly long distances (Korycinska, 2018). Recent interceptions (2020) on <i>Tilia</i> and <i>Liriodendron tulipifera</i> from the USA are likely referable to wood products (TRACES-NT, online). Wood with bark is also considered a suitable pathway for <i>E. semifuneralis</i>, as it was associated with the import of <i>Prunus</i> wood with bark from the USA in 2017 (Korycinska, 2018; EUROPHYT, online). In pomegranate, it has been determined that <i>E. semifuneralis</i> generally feeds by opening galleries, sometimes locally and sometimes all around, especially in the part of the stem close to the root collar of young trees (Atay and Öztürk, 2010).</p> | |
| Symptoms | Main type of symptoms | <p>Symptoms may be observed on stems and branches of various sizes but are usually seen in the lower part of the stem (Solomon and Payne, 1986). The main symptom is a remarkable accumulation of frass on the bark. Frass is mostly formed by masses of larval excrement mixed with sap exudates and silky threads. By removing the bark, larval galleries full of frass, larvae and/or white silken cocoons can be easily observed (Solomon and Payne, 1986). In pomegranate, it has been determined that <i>E. semifuneralis</i> generally feeds by opening galleries, sometimes locally and sometimes all around, especially in the part of the stem close to the root collar of young trees and plants, and under the bark of the trunks and branches of old trees (Atay and Öztürk, 2010). In general, it can be assumed that the symptoms are quite easy to detect.</p> |
| | Presence of asymptomatic plants | No report was found on the presence of asymptomatic plants. |
| | Confusion with other pests | Symptoms caused by <i>E. semifuneralis</i> are not specific. For a reliable identification of symptoms due to this moth, visual inspection may not be satisfactory, and careful observation by specialists of larvae, cocoon or another insect stage may be needed |
| Host plant range | <p><i>Euzophera semifuneralis</i> is a polyphagous pest feeding on 16 plant families and 22 genera (Biddinger and Howitt, 1992; Robinson et al., online) except conifers. It is reported as a host on Juglandaceae: pecan (<i>Carya illinoensis</i>), hickory (<i>Caryasp.</i>), black walnut (<i>Juglans nigra</i>), river walnut (<i>J. microcarpa</i>), English walnut (<i>J. regia</i>); Ebenaceae: persimmon (<i>Diospyros virginiana</i>); Fagaceae: pin oak (<i>Quercus palustris</i>), southern live oak (<i>Q. virginiana</i>); Gingkoaceae: Gingko (<i>Gingko biloba</i>); Hamamelidaceae: sweetgum (<i>Liquidambar styraciflua</i>); Moraceae: mulberry (<i>Morus alba</i>, <i>M. nigra</i>); Oleaceae: olive (<i>Olea europaea</i>); Platanaceae: sycamore (<i>Platanus occidentalis</i>), plane tree (<i>P. acerifolia</i>); Rosaceae: almond (<i>Prunus dulcis</i>), apricot (<i>P. armeniaca</i>) peach (<i>P. persica</i>), plum (<i>P. domestica</i>), sweet cherry (<i>P. avium</i>), tart cherry (<i>P. cerasus</i>), apple (<i>Malus domestica</i>), pear (<i>Pyrus communis</i>), American mountain ash (<i>Sorbus americana</i>), rowan (<i>S. aucuparia</i>); Punicaceae: pomegranate (<i>Punica granatum</i>); Salicaceae: willows (<i>Salix spp.</i>), poplars (<i>Populus spp.</i>); Tiliaceae: basswoods (<i>Tilia spp.</i>); Ulmaceae: elms (<i>Ulmus spp.</i>) (Biddinger and Howitt, 1992). <i>E. semifuneralis</i> is also found on Convolvulaceae (<i>Convolvulus arvensis</i> and <i>Ipomoea batatas</i>—stored tubers only), Malvaceae (<i>Gossypium spp.</i>) and Graminaeae (<i>Zea mays</i>) (Biddinger and Howitt, 1992). <i>E. semifuneralis</i> has been recorded in southern Türkiye, provinces of Adana and Osmaniye, infesting pomegranate orchards, showing an infestation rate between 36% and 50% (Atay and Öztürk, 2010).</p> | |
| Reported evidence of impact | <p><i>Euzophera semifuneralis</i> is generally known as pest of trees affected by mechanical injuries or infected by canker diseases (Connell et al., 2005). The larvae are usually unable to attack trees with undamaged bark. Larval feeding in the cambium often causes girdling of stems and death in young trees (Blakeslee, 1915; Solomon and Payne, 1986; Biddinger and Howitt, 1992). The pest is also known as <i>Ceratocystis</i> fungus vector. Larval feeding is reported as a possible mean to the introduction of <i>Ceratocystis</i> spores into the host (Connell et al., 2005). <i>E. semifuneralis</i> is known as a serious pest mainly to plum and cherry orchards in the USA.</p> | |

| | |
|--|---|
| | It was also noted as a pest in the pruning wounds of pecan and walnut ('walnut gridler') but the insect is usually considered not able to infest healthy, uninjured trees (Biddinger and Howitt, 1992). <i>E. semifuneralis</i> is quoted as sporadic pest on almond young orchards. Vigorous trees rarely suffer serious damage, but heavily infested branches can break under the action of the wind (Pollack, 1998). |
| Pathways and evidence that the commodity is a pathway | In pomegranate, it has been determined that <i>E. semifuneralis</i> generally feeds by opening galleries, sometimes locally and sometimes all around, especially in the part of the stem close to the root collar of young trees (Atay and Öztürk, 2010). Therefore, the Panel cannot exclude the commodity to be a pathway. |
| Surveillance information | No surveillance information is currently available from the Turkish NPPO. |

A.9.2. Possibility of pest presence in the nursery

A.9.2.1. Possibility of entry from the surrounding environment

In Türkiye, *E. semifuneralis* has only been found on pomegranate so far, causing damage on trunks and main branches. The pest is currently present on pomegranate only in two southern provinces (Adana and Osmaniye) (Atay and Öztürk, 2010). However, *E. semifuneralis* is a polyphagous species, feeding on 22 genera of woody and herbaceous plants, including *P. dulcis* and *P. persica*. The pest can spread naturally only by flight of adult moths; although no precise data on flight distance of adults is available, it is known that *Euzophera* species can fly only short distances (Korycinska, 2018). The possibility that the pest can reach almond or peach orchards or nurseries through the transport of pomegranate plants for planting (or trunks/cut branches) among the provinces cannot be excluded.

Uncertainties:

- Data available on the biology, life cycle, number of generations of *E. semifuneralis* only refer to North America. The lack of biological data referable to the ecological and climatic context of Türkiye is a factor of uncertainty about the real risk posed by the pest.
- During the surveys on damage caused by *E. semifuneralis* carried out in the provinces of Adana and Osmaniye, the pest has been found in about 20 localities and over 30 pomegranate orchards (Atay and Öztürk, 2010). This indicates a relevant presence of the pest, but there is no information on the possibility that pomegranate plants for planting (or cut branches, etc.) from Adana and Osmaniye could be transported within the Turkish territory to reach surrounding areas of almond and peach nurseries in the provinces of main production of plant for planting for export.
- There is no information on abundance of pomegranates and other host plants in the surroundings of the nurseries.

Taking into consideration the above evidence and uncertainties, the Panel considers that there is the possibility for the pest to enter the nursery, by:

- natural spread within the province of Adana and Osmaniye;
- accidental introduction of infested pomegranate (or other host) plants for planting in almond and peach production areas.

A.9.2.2. Possibility of entry with new plants/seeds

There is no data on almond or peach as host plants for *E. semifuneralis* in Türkiye so far.

Uncertainties:

- It is not clear whether other species of fruit or ornamental plants can also be grown in the nurseries; this should be considered as potential risk factor given the remarkable polyphagy of the pest.

Taking into consideration the above evidence and uncertainties, the Panel considers that the pest could enter the nursery with new plant material.

A.9.2.3. Possibility of spread within the nursery

It is known that *E. semifuneralis* is able to attack only plants showing mechanical wounds, or bark damage caused by canker disease. It is also known that the pest is able to infest stems and branches of various sizes (Solomon and Payne, 1986). Once entered, there is therefore the possibility that the pest can spread naturally (by adult flight) within the nursery by attacking young plants accidentally damaged by machinery (for example during weed management operations, grafting, or other). However, it should be considered that the likelihood that damaged plants will be found in nurseries is rather low. Anyway, the spread of the pest could be also enhanced by the lack of specific control protocols. Pruning of mother plants is expected to increase the likelihood of infestation of these plants, therefore increasing the population density in the nurseries, if present.

Uncertainties:

- Lack of data on the behaviour of the insect in Turkish ecological and climatic contexts, which are different from those species studied so far. Taking into consideration the above evidence and uncertainties, the Panel considers that the spread of the pest within the nursery is possible once entered.

A.9.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *P. dulcis* or *P. persica* plants from Türkiye or from other countries due to the presence of *E. semifuneralis* between the years 1994 and August 2022 (EUROPHYT, online; TRACES-NT, online).

A.9.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | Yes | Potential <i>E. semifuneralis</i> infestations could be readily detected, though eggs and early stage larvae are not easy to spot and might be overlooked. <u>Uncertainties:</u> • The details of the certification process are not given (e.g. number of plants, intensity of surveys and inspections, etc.). Specific figures on the intensity of survey (sampling effort) are not provided. |
| 2 | Phytosanitary certificates and plant passport | Yes | The procedures applied could be effective in detecting <i>E. semifuneralis</i> infestations though eggs and early stage larvae are not easy to spot and might be overlooked. <u>Uncertainties:</u> • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 3 | Rouging and pruning | Yes | Pruning can remove shoots and small branches infested by <i>E. semifuneralis</i> . |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> • No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>E. semifuneralis</i> . |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---------------------------------|--------------------|--|
| | | | <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | <p>It can be effective, though <i>E. semifuneralis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>E. semifuneralis</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> <p>Sampling and subsequent laboratory observation might be useful in identifying the pest.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | <p>The procedures applied could be effective in detecting <i>E. semifuneralis</i> infestation.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.9.5. Overall likelihood of pest freedom

A.9.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Prunus dulcis* and *Prunus persica* are minor hosts;
- The surroundings of the nurseries are free from alternative hosts, e.g. pomegranate.
- Mother plants are well inspected and protected.
- Plants are too young and too small to be suitable host.

A.9.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Plants of *Prunus dulcis* and *P. persica* are suitable hosts for infestation.
- Presence of injuries on the plants.
- Nurseries or surroundings with alternative hosts, e.g. pomegranate.
- Infestation not detected by staff during handling for export.
- Early infestations with less symptoms.
- Plants are stressed due to other factors and are more prone to get infested by *E. semifuneralis*

A.9.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

The Panel assumes the lower scenario due to the fact that *E. semifuneralis* infests already damaged trees mainly and that the likelihood that damaged plants will be found in nurseries is rather low.

A.9.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.9.5.5. Elicitation outcomes of the assessment of the pest freedom for *Euzophera semifuneralis*

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

Table A.17: Elicited and fitted values of the uncertainty distribution of pest infestation by *Euzophera semifuneralis* 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 | | | | | 4 | | 8 | | 12 | | | | | 20 |
| EKE | 0.293 | 0.611 | 1.07 | 1.89 | 2.90 | 4.11 | 5.31 | 7.80 | 10.6 | 12.2 | 14.0 | 15.8 | 17.6 | 18.9 | 20.0 |

The EKE results are the BetaGeneral (1.2604, 2.0485, 0, 22) distribution fitted with @Risk version 7.6.

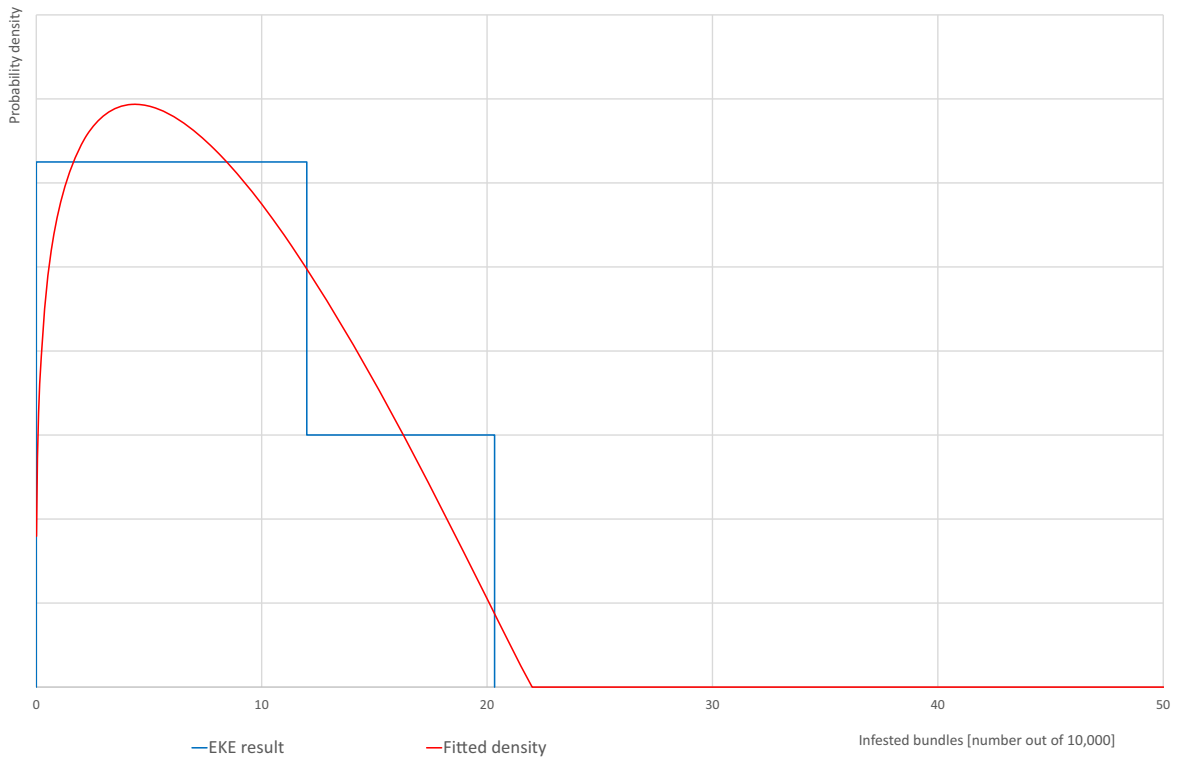
Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. =10,000 – the number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.18.

Table A.18: The uncertainty distribution of bundles free of *Euzophera semifuneralis* per 10,000 bundles calculated by Table A.17

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|--------|
| Values | 9980 | | | | | 9988 | | 9992 | | 9996 | | | | | 10000 |
| EKE results | 9980 | 9981 | 9982 | 9984 | 9986 | 9988 | 9989 | 9992 | 9995 | 9996 | 9997 | 9998 | 9998.9 | 9999.4 | 9999.7 |

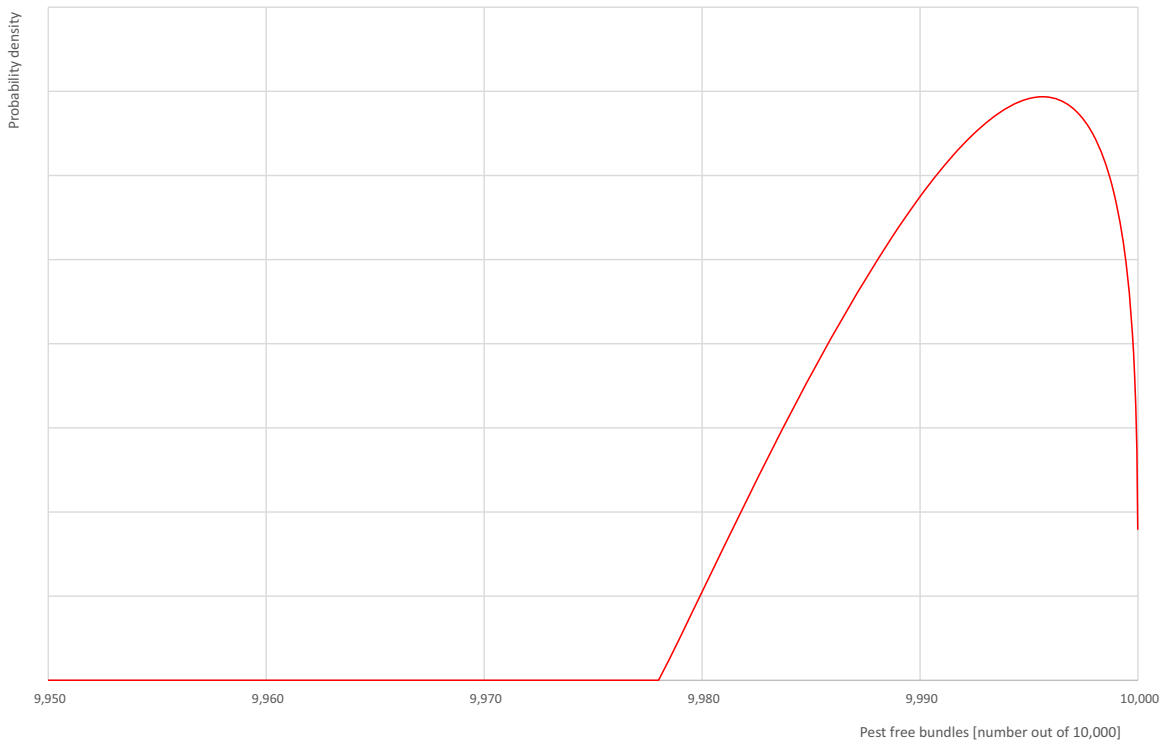
The EKE results are the fitted values.

Euzophera semifuneralis

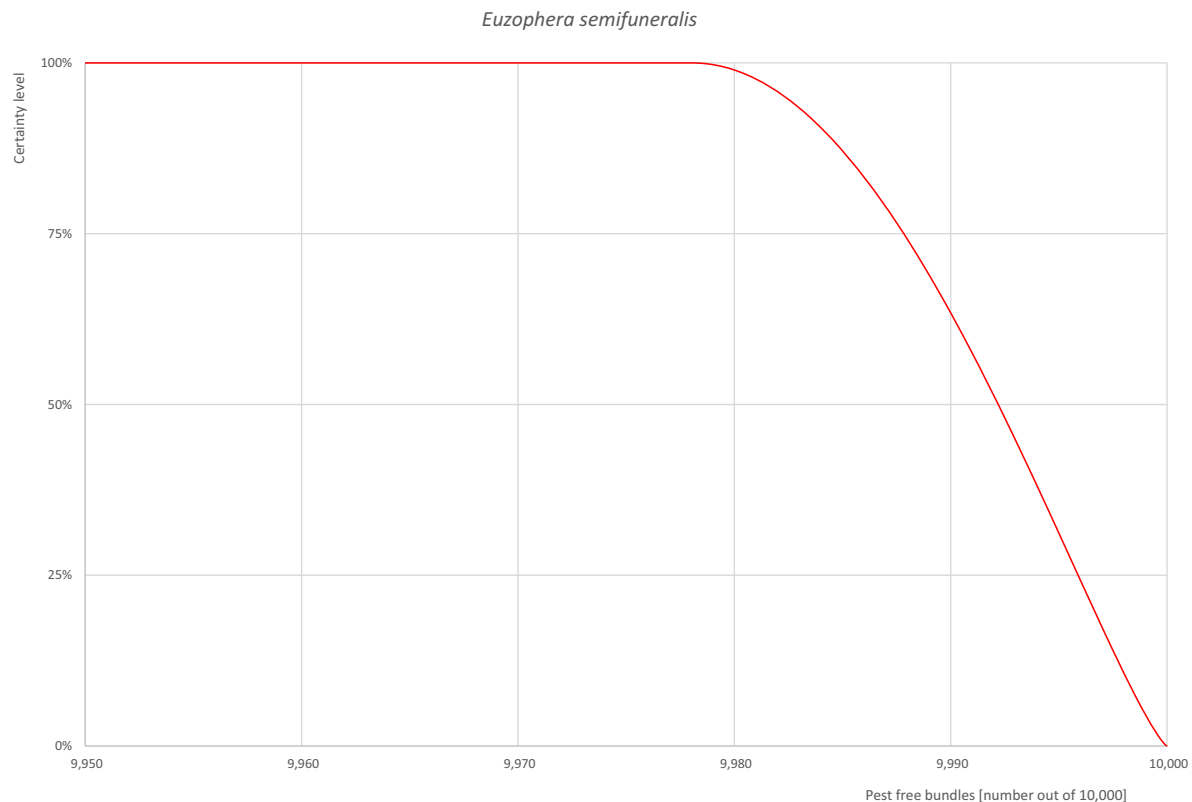


(a)

Euzophera semifuneralis



(b)



(c)

Figure A.9: (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.9.6. References list

- Atay E and Öztürk N, 2010. *Euzophera semifuneralis* (Walker, 1863) (Lepidoptera, Pyralidae) detected in pomegranate orchards in Adana and Osmaniye and its type of damage. (Adana ve Osmaniye nar bahçelerinde tespit edilen *Euzophera semifuneralis* (Walker, 1863) (Lepidoptera, Pyralidae) in tanımı ve zarar şekli.) Ziraat Fakültesi Dergisi, Mustafa Kemal Üniversitesi, 15, 51–58.
- Biddinger DJ and Howitt AJ, 1992. The food plants and distribution of the American plum borer (Lepidoptera: Pyralidae). The Great Lakes Entomologist, 25, 149–158.
- Blakeslee EB, 1915. American plum borer. Bulletin of the U.S. Department of Agriculture 261. Washington, DC: U.S. Department of Agriculture. 13 pp. Available online: <https://www.biodiversitylibrary.org/page/48699700#page/3/mode/1up> [Accessed: 18 July 2022].
- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Euzophera semifuneralis* (American plum borer). Available online: <https://www.cabi.org/isc/datasheet/23630> [Accessed: 19 July 2022].
- Connell JH, Gubler WD and van Steenwyk RA, 2005. Almond trunk injury treatment following bark damage during shaker harvest. In: Oliveira MM and Cordeiro V (eds.). XIII GREMPA Meeting on almonds and pistachios. Zaragoza: CIHEAM, 2005. pp. 199–202 (Options Méditerranéennes: Serie A. Séminaires Méditerranéennes; n. 63). Available online: https://www.researchgate.net/publication/237526570_Almond_trunk_injury_treatment_following_bark_damage_during_shaker_harvest [Accessed: 19 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online. *Euzophera semifuneralis* (EUZOSE), Categorization. Available online: <https://gd.eppo.int/taxon/EUZOSE/categorization> [Accessed: 19 July 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].

- Korycinska A, 2018. Rapid Pest Risk Analysis (PRA) for *Euzophera bigella*. UK Department for Environment, Food and Rural Affairs, 29 pp. Available online: <https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4234> [Accessed: 20 July 2022].
- Pollack S, 1998. An analysis of the feasibility of providing federal multi-peril crop insurance to nut tree growers: almonds, hazelnuts, pecans, pistachios, walnuts. A report to the Risk Management Agency from the Economic Research Service. USDA's Risk Management Agency, 78 pp. Available online: <https://legacy.rma.usda.gov> [Accessed: 20 July 2022].
- Robinson GS, Ackery PR, Kitching IJ, Beccaloni GW and Hernandez LM, online. HOSTS—a database of the world's Lepidopteran hostplants. Natural History Museum, London. Available online: <http://www.nhm.ac.uk/hosts> [Accessed: 20 July 2022].
- Solomon JD and Payne JA, 1986. A guide to the insect borers, pruners, and girdlers of pecan and hickory. Gen. Tech. Rep. SO-64. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. 31 pp.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.10. *Lepidosaphes pistaciae* and *L. malicola*

A.10.1. Organism information

| | |
|--|--|
| Taxonomic information | <p>1. <i>Lepidosaphes pistaciae</i></p> <p>Current valid scientific name: <i>Lepidosaphes pistaciae</i> Synonyms: <i>Mytilococcus pistaciae</i> Name used in the EU legislation: –</p> <p>Order: Hemiptera Family: Diaspididae</p> <p>Common name: pistachio oystershell scale, yellow pistachio scale Name used in the Dossier: –</p> <p>2. <i>Lepidosaphes malicola</i></p> <p>Current valid scientific name: <i>Lepidosaphes malicola</i> Synonyms: <i>Mytilococcus malicola</i> Name used in the EU legislation: –</p> <p>Order: Hemiptera Family: Diaspididae</p> <p>Common name: – Name used in the Dossier: –</p> |
| Group | Insects |
| EPPO code | LEPSPI <i>Lepidosaphes pistaciae</i> LEPSML <i>Lepidosaphes malicola</i> |
| Regulated status | <p><i>Lepidosaphes pistaciae</i> is not regulated in the EU and not listed by EPPO. It is on A1 list in Egypt.</p> <p><i>Lepidosaphes malicola</i> is not regulated anywhere in the world and not listed by EPPO.</p> |
| Pest status in Türkiye | <p><i>L. pistaciae</i> can be found in Türkiye in the provinces of Bolu, Adana, Antalya, Aydın, Balıkesir, Çanakkale, İzmir (Buca), Manisa, Muğla, Uşak, Gaziantep, Şanlıurfa and Siirt (İleri and Ayfer, 1954; Bolu, 1999; Özgen and Karsavuran, 2011; Kaydan et al., 2013; Ülgentürk et al., 2022).</p> <p><i>L. malicola</i> was reported in Central Anatolian Region and Eastern Anatolian Region (Kaydan et al., 2013), in Kaysari province on ornamental plants (Develioğlu et al., 2018) and in Malatya apricot area (Yiğit and Tunaz, 2019; Ülgentürk et al., 2022).</p> |
| Pest status in the EU | <p><i>L. pistaciae</i> is present in Greece (Mourikis et al., 1997). <i>L. malicola</i> is present in Bulgaria (Trencheva and Tomov, 2014).</p> |
| Host status on <i>Prunus</i> spp. | <i>Prunus armeniaca</i> is reported as host of <i>Lepidosaphes malicola</i> (Kaydan et al., 2013) and <i>L. pistaciae</i> (Watson, 2002). |

| | | |
|--|--|--|
| PRA information | No Pest Risk Assessment is currently available. | |
| Other relevant information for the assessment | | |
| Biology | <p>According to Danzig (1993) and Masjedian and Seyedoleslam (2003), <i>L. pistaciae</i> completes two generations per year in Iran. It can overwinter as an adult female on 2- to 3-year-old shoots in Türkiye (Özgen and Karsavuran, 2011). Overwintered females lay eggs in spring on young shoots. Most of the hatching occurs in May followed by movement of crawlers (first-instar nymphs) to different parts of plants mainly leaves, where the second-instar nymph starts forming a shell. Crawlers are the visible main dispersal life stage, and can move to new areas of the plant or be dispersed by wind or animal contact. Due to abiotic factors, mortality of crawlers is high. Dispersal of sessile adults and eggs occurs through human transport of infested plant material. Mature females generally occur at the end of June and reach highest population density towards the end of July. Second generation of <i>L. pistaciae</i> starts at the end of August and beginning of September. Crawlers move toward young shoots where they settle and, once reaching the mature female stage, overwinter (Özgen and Karsavuran, 2011).</p> <p>Similar to <i>L. pistaciae</i>, <i>L. malicola</i> completes two generations per year in Iran. <i>L. malicola</i> overwinters as diapausing eggs underneath the protective, waxy cover of females. The overwintered eggs start hatching in late May and finish beginning of June. Crawlers, the first-instar nymphs, move to the bark of the host plant for a brief time and then settle down to feed. Nymphs reach maturity in late summer or early autumn, and adults emerge (Nazari et al., 2020). According to Esmalli (1983), males have three nymphal stages and females five distinct stages.</p> <p>Development of <i>L. malicola</i> takes 51–57 days in Armenia (Babayan and Oganessian, 1979). Sevumyan and Aslanyan (1988) remarked that damage to walnuts decreased with altitude in Armenia, perhaps suggesting that <i>L. malicola</i> may not thrive at higher altitudes.</p> | |
| Symptoms | Main type of symptoms | <p>If heavy infestation of <i>L. pistaciae</i> occurs, it can cause death of branches, premature leaf fall and drying of the fruits of Pistacia (Danzig, 1993).</p> <p>In Iran, <i>L. pistaciae</i> is injurious to commercial pistacio trees (Mehrnejad, 2020).</p> <p><i>L. malicola</i> injures fruits, shade trees and shrubs, and is the most common pest of apple fruits in Iran (Nazari et al., 2020). Heavy infestations cause death of branches or even entire trees; infestation of fruits causes red spotting (Danzig, 1993).</p> |
| | Presence of asymptomatic plants | Low infestation can be overlooked. Crawlers can hide in wounds or underneath the leaves. |
| | Confusion with other pests | <p>Both species are visible on the trunk and branches, as elongate and mussel-shaped scales.</p> <p>They can be confused with other species of <i>Lepidosaphes</i>, such as <i>Lepidosaphes ulmi</i>, <i>L. pini</i>, <i>L. pineti</i>, <i>L. piniphila</i>.</p> |
| Host plant range | <p><i>Lepidosaphes pistaciae</i> has been recorded mainly from hosts belonging to the plant family Pistaceae, genus <i>Pistacia</i> (Borchsenius, 1966). Hosts include species of <i>Ailanthus</i>, <i>Ceanothus</i>, <i>Malus pumila</i>, <i>Pistacia vera</i>, <i>Pistacia</i> spp., <i>Populus</i>, <i>Prunus armeniaca</i>, <i>Prunus</i>, <i>Pyrus</i>, <i>Rhododendron</i>, <i>Rosa</i>, <i>Salix</i>, <i>Sassafras</i>, <i>Sorbus</i> and <i>Stillingia</i>.</p> <p><i>Lepidosaphes malicola</i> is a polyphagous species that has been recorded from hosts belonging to 12 plant families (Borchsenius, 1966); members of the Rosaceae are preferred hosts. Hosts include species belonging to the following genera: <i>Acer</i>, <i>Berberis</i>, <i>Betula</i>, <i>Catalpa</i>, <i>Cercis</i>, <i>Cornus</i>, <i>Elaeagnus</i>, <i>Euonymus</i>, <i>Fraxinus</i>, <i>Hippophae</i>, <i>Jasminum</i>, <i>Juglans</i>, <i>Ligustrum</i>, <i>Lonicera</i>, <i>Lycium</i>, <i>Malus</i>, <i>Mespilus</i>, <i>Populus</i>, <i>Prunus persica</i>, <i>Pyrus</i>, <i>Rhamnus</i>, <i>Ribes</i>, <i>Robinia</i>, <i>Rosa</i>, <i>Salix</i> and <i>Syringa</i>.</p> | |
| Reported evidence on impact | <p>Heavy infestation of <i>L. pistaciae</i> can cause death of branches, premature leaf fall and drying of the fruits of Pistacia (Danzig, 1993).</p> <p><i>L. malicola</i> injures fruits, shade trees and shrubs, and is the most common pest of apple fruits in Iran (Nazari et al., 2020). Heavy infestations cause death of branches or even entire trees; infestation of fruits causes red spotting (Danzig, 1993).</p> | |

| | |
|---------------------------------|---|
| Pathways | For both species, crawlers are the primary dispersal stage and move to new areas of the same plant or are dispersed by wind or animal contact (Özgen and Karsavuran, 2011; Nazari et al., 2020). Possible pathways of entry are plants for planting, fruits, plant materials of any kind (crawlers hiding in a protected site, on the bark wounds, roots, stems, leaves), human transportation, animals. |
| Surveillance information | No surveillance information for these pests is currently available. There is little information on whether the pests have ever been found in the nurseries or their surrounding environment (Kaydan et al., 2013). |

A.10.2. Possibility of pest presence in the nursery

A.10.2.1. Possibility of entry from the surrounding environment

Lepidosaphes pistaciae and *L. malicola* are present in Türkiye (Özgen and Karsavuran, 2011; Yiğit and Tunaz, 2019), although with limited distribution. Possible pathways of entry into the nursery can be by movement of infested plants, human and animal dispersal.

Uncertainties:

- no information is provided about distance and botanical composition of surrounding environment.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery from the surrounding area. The pest can be present in the surrounding areas and the transferring rate could be enhanced by wind, animals and human movement.

A.10.2.2. Possibility of entry with new plants/seeds

The pest can be transported on host plants, particularly plants for planting and cut branches. The presence of the pest can be easily detected by visual inspection however, initial infestations (crawlers) can be overlooked by non-trained personnel.

Uncertainties:

- Uncertain if certified material is screened for these pests.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery, especially at initial infestation stages.

A.10.2.3. Possibility of spread within the nursery

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal.

Uncertainties:

- There is uncertainty on whether plants are transplanted within the nurseries

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nursery is possible. Spread within the nursery could be enhanced by the movement of infested plants, by wind, human and animal dispersal.

A.10.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus persica* or *P. armeniaca* plants for planting from Türkiye due to the presence of *Lepidosaphes malicola* and *L. pisaciae* between the years 1995 and 2022 (EUROPHYT, online; TRACES-NT, online).

A.10.4. Evaluation of the risk mitigation options

In the table below, all risk mitigation measures currently applied in Türkiye are listed and an indication of their effectiveness on *Lepidosaphes malicola* and *L. pisaciae* is provided. The description of the risk mitigation measures currently applied in Türkiye is provided in Table 7.

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | Yes | No specific protocols are in place for these species; however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms are easily detectable on young plants. Early infestation can be overlooked. |
| 2 | Phytosanitary certificates and plant passport | Yes | <i>Lepidosaphes</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on inspection and monitoring protocols for these species. Information is available on the distribution and abundance of both species of <i>Lepidosaphes</i> in the <i>Prunus persica</i> and <i>armeniaca</i> growing area. |
| 3 | Rouging and pruning | Yes | Information provided is poorly detailed. <u>Uncertainties:</u> <ul style="list-style-type: none"> Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>Lepidosaphes</i> . <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | <i>Lepidosaphes</i> are not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for these species. There is information available on the distribution and abundance of <i>Lepidosaphes</i> in the <i>Prunus persica</i> and <i>armeniaca</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|--------------------------------|--------------------|--|
| 10 | Pre-consignment inspection | Yes | <p><u>Evaluation:</u> The procedures applied could be effective in detecting <i>Lepidosaphes</i> infestation.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.10.5. Overall likelihood of pest freedom

A.10.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Prunus armeniaca* is a rootstock and is considered a secondary host.
- Certified nurseries are located mainly in the part of the country where *Lepidosaphes pistaciae* and *L. malicola* were not reported.
- Pesticide applications targeting other pests are effective in controlling *Lepidosaphes pistaciae* and *L. malicola*.
- Regular inspections by phytosanitary authorities are effective and further help to reduce infestation by these pests.
- Natural enemies occurring in the area are effective against both *Lepidosaphes* species.

A.10.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Prunus persica* is an important host.
- Certified nurseries are located mainly in the part of the country, where *Lepidosaphes pistaciae* and *L. malicola* are widely distributed.
- Pesticide applications targeting other pests are not effective in controlling *Lepidosaphes pistaciae* and *L. malicola*.
- Visual inspections of *Prunus persica* plants are not effective in detecting eggs, nymphs and early infestations.
- Natural enemies occurring in the area are not effective against both *Lepidosaphes* species.

A.10.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Median is shifted to lower values due to limited distribution of *L. malicola* and records mainly on ornamental plants.

A.10.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

Main uncertainties:

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.10.5.5. Elicitation outcomes of the assessment of the pest freedom for *Lepidosaphes malicola* and *Lepidosaphes pistaciae*

The elicited and fitted values for *Lepidosaphes malicola* and *L. pistaciae* agreed by the Panel are shown in Tables A.19 and A.20 and in Figure A.10.

Table A.19: Elicited and fitted values of the uncertainty distribution of pest infestation by *Lepidosaphes malicola* and *L. pistaciae* 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 | | | | | 4 | | 8 | | 12 | | | | | 20 |
| EKE | 0.293 | 0.611 | 1.07 | 1.89 | 2.90 | 4.11 | 5.31 | 7.80 | 10.6 | 12.2 | 14.0 | 15.8 | 17.6 | 18.9 | 20.0 |

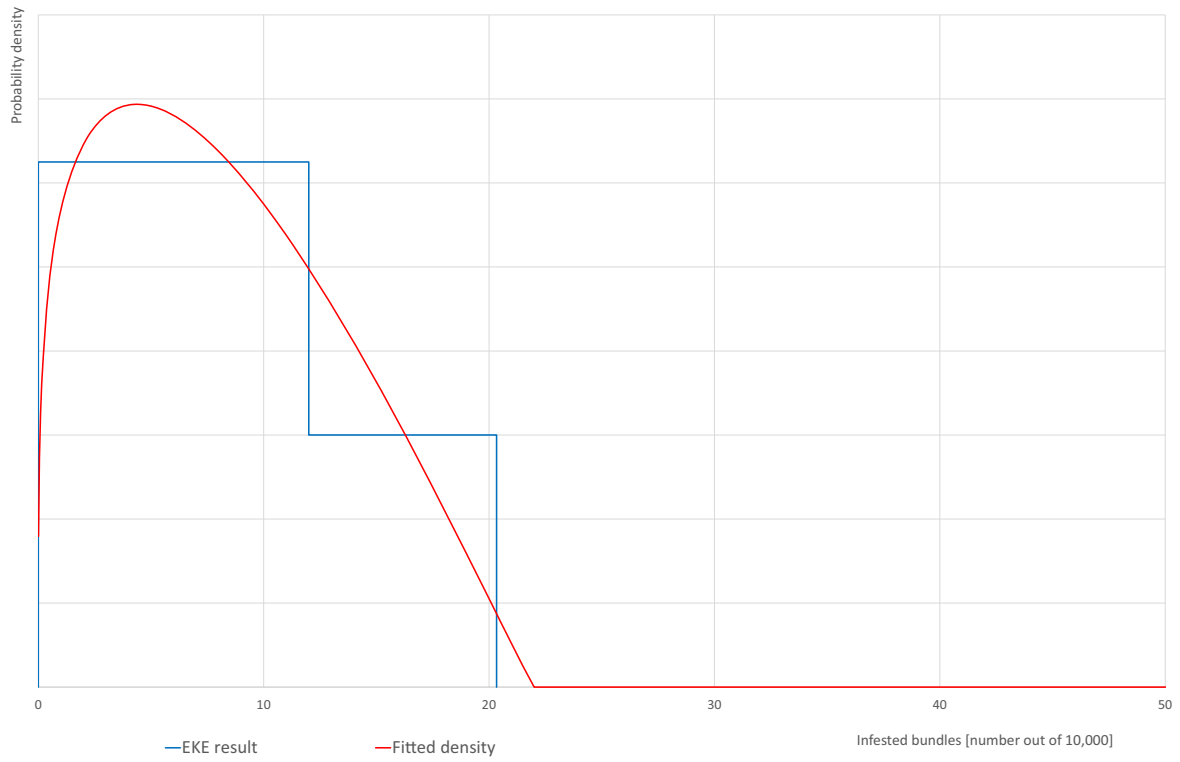
The EKE results are the BetaGeneral (1.2604, 2.0485, 0, 22) distribution fitted with @Risk version 7.6.

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

Table A.20: The uncertainty distribution of bundles free of *Lepidosaphes malicola* and *L. pistaciae* per 10,000 bundles calculated by Table A.19

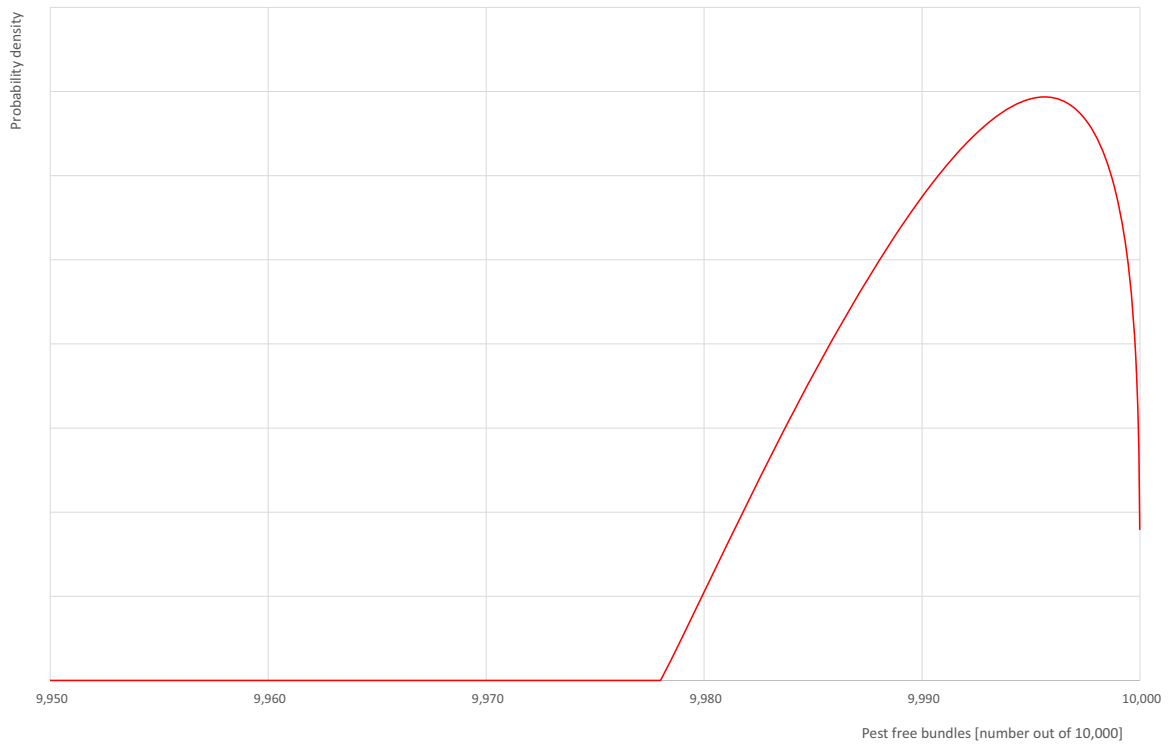
| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|--------|
| Values | 9980 | | | | | 9988 | | 9992 | | 9996 | | | | | 10000 |
| EKE results | 9980 | 9981 | 9982 | 9984 | 9986 | 9988 | 9989 | 9992 | 9995 | 9996 | 9997 | 9998 | 9998.9 | 9999.4 | 9999.7 |

Lepidosaphes malicola and *L. pistaciae*

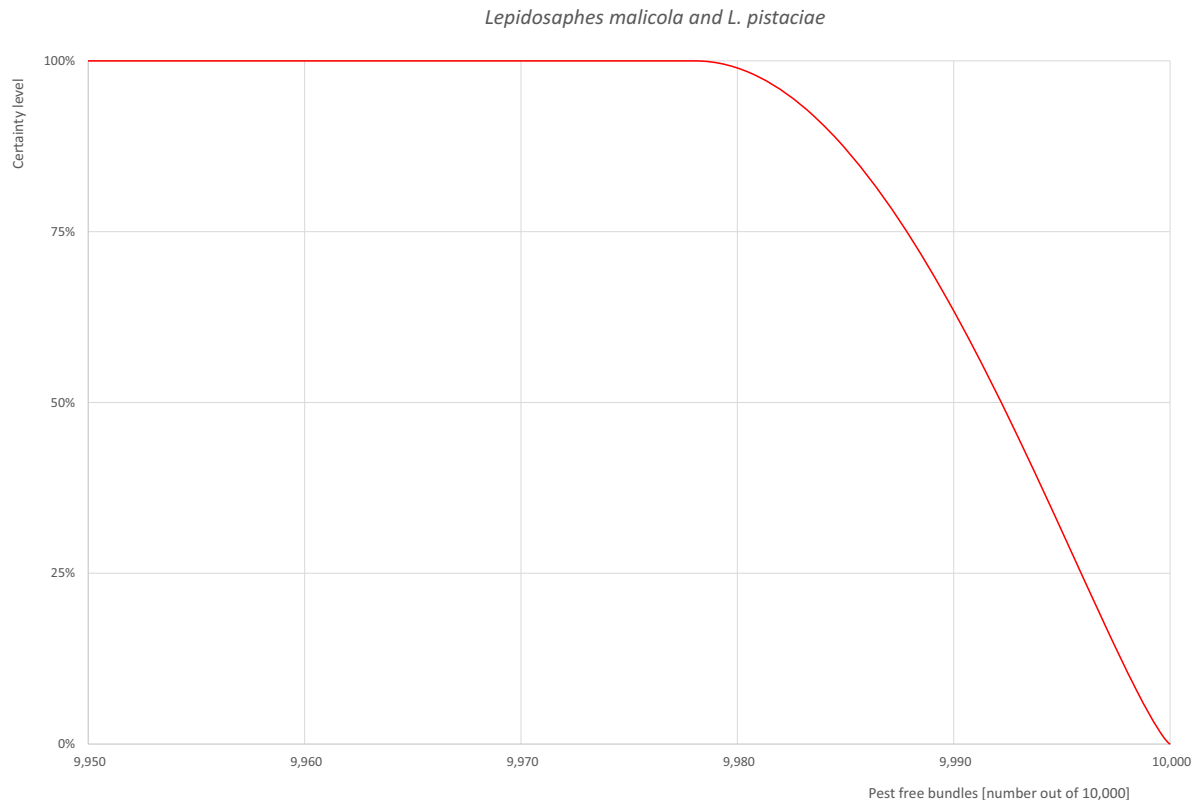


(a)

Lepidosaphes malicola and *L. pistaciae*



(b)



(c)

Figure A.10: (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.10.6. References list

- Babayan GA and Oganessian SB, 1979. Fresh data on the bioecology of the Armenian mussel scale (*Lepidosaphes malicola* Borchs) (Diaspididae) in Armenia. *Biologicheskii Zhurnal Armenii*, 32, 187–193.
- Bolu H, 1999. The Determination of population development and natural enemies, distribution areas of *Suturaspis pistaciae* (Homoptera: Coccoidea) and Coccoidea species on pistachio trees in Southeastern Anatolia Region of Turkey. Institute of Science of Cukurova. University. Doctoral Thesis, 94 pp.
- Borchsenius NS, 1965. Bases of classification of armored scales. *Entomologicheskoe Obozrenie*, 44, 326–376.
- Danzig EM, 1993. Fauna of Russia and neighbouring countries. Rhynchota, Volume X: suborder scale insects (Coccinea): families Phoenicococcidae and Diaspididae. 'Nauka' Publishing House St. Petersburg, 452.
- Develioğlu U, Muştu M and Kaydan MB, 2018. Investigation on scale insects (Hemiptera: Coccoomorpha) on ornamental plants in Kayseri province. *Türkiye entomoloji bülteni*, 8, 3–13.
- Esmaili M, 1983. Important pests of fruit trees. Sepehr Publication, Tehran, Iran.
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_bioresecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- İleri M and Ayfer M, 1954. Pistachio (*Pistacia vera*) pest and diseases. Plant Protection Institute of Adana Publications, 11, 25.
- Kaydan M, Ülgentürk S and Erkiliç L, 2013. Checklist of Turkish Coccoidea (Hemiptera: Sternorrhyncha) species. *Türkiye Entomoloji Bülteni*, 3, 157–182. Available online: <https://dergipark.org.tr/en/download/article-file/64148>
- Masjedjan H and Seyedoleslami H, 2003. Bioecology of pistachio oyster shell scale, *Lepidosaphes pistaciae* Archangelskaya (Homoptera: Diaspididae) in Isfahan. *Journal of Science and Technology of Agriculture and Natural Resources*, 6, 194.

- Mehrnejad MR, 2020. Arthropod pests of pistachios, their natural enemies and management. *Plant Protection Science*, 56, 231–260.
- Mourikis PA, Tsourgianni A and Chitzanidis A, 1997. Pistachio nut insect pests and means of control in Greece. In II International Symposium on Pistachios and Almonds, 470, 604–611.
- Nazari P, Poorjavand N and Izadi H, 2020. Simultaneous occurrence of diapause and cold hardiness in overwintering Eggs of the apple oystershell scale, *Lepidosaphes malicola* Borchsenius (Hem.: Diaspididae). *Zoological Studies*, 59.
- Özgen İ and Karsavuran Y, 2011. The population fluctuations of *Lepidosaphes pistaciae* (Archangeskaya) (Homotrera: Diaspididae) pest of pistachio trees in Siirt province of Turkey. *Munis Entomology and Zoology*, 6, 977–982.
- Trencheva KG and Tomov R, 2014 Checklist of scale insects in Bulgaria (Hemiptera, Coccoidea). *Acta Zoologica Bulgarica Suppl.* 6, 65–72.
- Ülgentürk S and Toros S, 2000. Preliminary studies on parasitoids and predators of Diaspididae (Homoptera: Coccoidea) species on park plants. *Journal of Agricultural Sciences of Ankara University Faculty of Agriculture*, 6, 106–110.
- Ülgentürk S, Ercan C, Yaşar B and Kaydan MB, 2022. Checklist of Turkish Coccoidea (Hemiptera: Sternorrhyncha) species. *Trakya University Journal of Natural Sciences*, 23, 113–129. <https://doi.org/10.23902/trkjnat.1123152>
- Watson GW, 2002. *Arthropods of Economic Importance: Diaspididae of the World*. (Series Title: World Biodiversity Database). ETI Information Services (Expert Center for Taxonomic Identification) Amsterdam, Netherlands.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 23 September 2022].
- Yiğit T and Tunaz H, 2019. Coccidae and Diaspididae (Hemiptera: Coccoomorpha) species and their prevalence status and density in Malatya apricot area. In XVII International Symposium on Apricot Breeding and Culture, 1290, 95–98.

A.11. *Maconellicoccus hirsutus*

A.11.1. Organism information

| | |
|--|--|
| Taxonomic information | Current valid scientific name: <i>Maconellicoccus hirsutus</i> Synonyms: <i>Maconellicoccus pasaniae</i> , <i>Maconellicoccus perforatus</i> , <i>Paracoccus pasaniae</i> , <i>Phenacoccus glomeratus</i> , <i>Phenacoccus hirsutus</i> , <i>Phenacoccus quaternus</i> , <i>Pseudococcus hibisci</i> , <i>Spilococcus perforatus</i> , <i>Pseudococcus crotolariae</i> Name used in the EU legislation: – Order: Hemiptera Family: Pseudococcidae Common name: pink hibiscus mealybug, hibiscus mealybug, hirsutus mealybug, pink mealybug Name used in the Dossier: <i>Maconellicoccus hirsutus</i> |
| Group | Insects |
| EPPO code | PHENHI |
| Regulated status | <i>Maconellicoccus hirsutus</i> is not regulated in the EU. It is listed in EPPO A2 list (EPPO, online_a). The pest is quarantine in Morocco, Mexico and Israel and is included in the A1 list in South Africa, Argentina, Chile, Russia, Türkiye and Ukraine. (EPPO, online_b). |
| Pest status in Türkiye | <i>Maconellicoccus hirsutus</i> was collected on citrus plants from Türkiye between 2013 and 2015 (Karacaoğlu et al., 2016). It is listed as 'present' in Türkiye with no details in CABI (online) and EPPO (online_c). |
| Pest status in the EU | Restricted, present in Cyprus (CABI, online; EPPO, online_d; García Morales et al., online) and Greece (Milonas and Partsinevelos, 2017). According to Fauna Europaea, it is present in the Netherlands, however after consulting the NPPO of the Netherlands, the record was based on an interception. Reported in the Canary Islands (Jaques and Urbaneja, 2006). |
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> is reported as host of <i>Maconellicoccus hirsutus</i> (Chang and Miller, 1996; Chong et al., 2015; EFSA PLH Panel, 2022). |
| PRA information | Pest risk assessment currently available: – Analyse du Risque Phytosanitaire <i>Maconellicoccus hirsutus</i> (Green) (EPPO, 2000); |

| | |
|--|---|
| | <ul style="list-style-type: none"> – Report of a Pest Risk Management: <i>Maconellicoccus hirsutus</i> (EPPO, 2003); – Generic Pest Risk Assessment: Armoured scale insects (Hemiptera: Coccoidea: Diaspididae) on the fresh produce pathway (Berry, 2014); – Pest categorisation of <i>Maconellicoccus hirsutus</i> (EFSA PLH Panel, 2022). |
|--|---|

Other relevant information for the assessment

| | |
|-----------------|---|
| Biology | <p><i>Maconellicoccus hirsutus</i> originates either from southern Asia or Australia (Culik et al., 2013). <i>M. hirsutus</i> reproduces amphigonically, though some earlier works reported parthenogenetic or a mix of amphigonical and parthenogenetic reproduction in <i>M. hirsutus</i> populations (Chong et al., 2008). It has a high reproductive rate and can produce up to 15 generations per year (EPPO, 2005).</p> <p>Each adult female lays 150–600 eggs in an ovisac over a period of about 1 week, and these hatch in 6–9 days (Bartlett, 1978; Mani, 1989; Chong et al., 2015). The ovisacs are attached to the plant surface, on twigs, branches, bark, bark crevices, leaves and terminal ends (Berry, 2014). Eggs are orange but turn pink before hatching. Females develop through five life stages: an egg, three nymphal instars and an adult. Males have an additional fourth ‘pupal-like’ instar. First instars are pink crawlers without waxy coating. Later instars turn grey–pink and start to secrete white wax that covers their bodies (Chong et al., 2015).</p> <p>Depending on temperature, female development from an egg to adulthood takes from 33 (at 30°C) to 66 days (at 20°C) (Chong et al., 2008). Adult females are wingless, oval and flattened in profile. Body is greyish pink and covered with a thin white cotton like wax (Chong et al., 2015). They live for approximately 20 days (Chong et al., 2008).</p> <p>Depending on temperature, male development from an egg to adulthood takes from 27.5 (at 30°C) to 66.7 days (at 20°C) (Chong et al., 2008). The development of a male from an egg to adulthood is 364 DDC (Celsius degree-days). Adult males are gnat-like with a pink or orange body and have a single pair of wings. Males are weak flyers. They live for 1–2 days and are rarely observed in nature (Chong et al., 2015).</p> <p>Eggs and adults overwinter in the soil or on the host plants. In warm climates, the mealybugs stay active and reproduce all year long (Berry, 2014).</p> <p>Small ‘crawlers’ (0.3 mm long) are readily transported by water, wind or animal agents. Crawlers settle in cracks and crevices, usually on new growth which becomes severely stunted and distorted, in which densely packed colonies develop.</p> |
| Symptoms | <p>Main type of symptoms</p> <p>In its native range as well as in newly invaded areas (Francois, 1996), <i>M. hirsutus</i> has been recorded causing economic damage to many crops. Besides, it has been estimated that if the mealybug were to spread across the southern USA, it could cause losses of 750 million USD per year (Moffit, 1999).</p> <p>The main symptoms caused by <i>M. hirsutus</i> infestation (Ghose, 1970; Mani, 1989; Dufour and Leon, 1997; Sagarra and Peterkin, 1999; Kairo et al., 2000; Alleyne, 2004; Chong et al., 2015; EFSA PLH Panel, 2022) are:</p> <ul style="list-style-type: none"> – large quantities of honeydew on the infested plants – black sooty mould development on the leaves and fruits covered by honeydew – leaf curling – shoots and leaves malformation – fruit malformation – bunchy top appearance – premature senescence of flowers and foliage – complete defoliation and death of the plant in case of heavy infestations – infestations of <i>M. hirsutus</i> are often associated with attendant ants <p>As the plant dies back, the mealybugs migrate to healthy tissues, so the colonies migrate from shoot tips to twigs, branches and finally down to the trunk. The mealybugs are in general readily visible, though sometimes hidden in the bark crevices.</p> |

| | | |
|--|---|---|
| | Presence of asymptomatic plants | Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves), but the presence of mealybugs on the plants could be observed for the presence of wax, honeydew and ants. |
| | Confusion with other pests | <i>Maconellicoccus hirsutus</i> can be distinguished from other mealybugs by specific morphological features (see e.g. EPPO, 2006). |
| Host plant range | <p><i>Maconellicoccus hirsutus</i> is a highly polyphagous pest of ornamental and agricultural crops worldwide (García Morales et al., online), causing economic damage to many of them.</p> <p><i>Prunus persica</i> is reported as a host (EPPO, online_e).</p> <p>Over 330 plant species belonging to 73 families and more than 200 genera are reported as hosts for <i>M. hirsutus</i> (Chong et al., 2015). According to EPPO (online_e), the major hosts are ladies' fingers (<i>Abelmoschus esculentus</i>), Mexican cotton (<i>Gossypium hirsutum</i>), tropical hibiscus (<i>Hibiscus rosa-sinensis</i>) and roselle (<i>Hibiscus sabdariffa</i>).</p> <p>Among other reported hosts, there are pineapple (<i>Ananas comosus</i>), flamingo-lily (<i>Anthurium andraeanum</i>), peanut (<i>Arachis hypogaea</i>), carambola (<i>Averrhoa carambola</i>), beet (<i>Beta vulgaris</i>), ramie (<i>Boehmeria nivea</i>), pigeon pea (<i>Cajanus cajan</i>), chilli (<i>Capsicum annuum</i>), chilli (<i>Capsicum frutescens</i>), citrus (<i>Citrus</i> spp.), hawthorn (<i>Crataegus</i> spp.), cosmos (<i>Cosmos</i> spp.), cucumber (<i>Cucumis sativus</i>), squash (<i>Cucurbita maxima</i>), pumpkin (<i>Cucurbita pepo</i>), fig (<i>Ficus</i> spp.), soybean (<i>Glycine max</i>), heliconia (<i>Heliconia</i> spp.), kenaf (<i>Hibiscus cannabinus</i>), ice-cream-bean (<i>Inga edulis</i>), ixora (<i>Ixora</i> spp.), Barbados nut (<i>Jatropha curcas</i>), lettuce (<i>Lactuca sativa</i>), European crab apple (<i>Malus sylvestris</i>), mango (<i>Mangifera indica</i>), mulberry (<i>Morus</i> spp.), white mulberry (<i>Morus alba</i>), banana (<i>Musa</i> spp.), avocado (<i>Persea americana</i>), common bean (<i>Phaseolus vulgaris</i>), apricot (<i>Prunus armeniaca</i>), European plum (<i>Prunus domestica</i>), peach (<i>Prunus persica</i>), pear (<i>Pyrus communis</i>), guava (<i>Psidium guajava</i>), oak (<i>Quercus</i> spp.), rose (<i>Rosa</i> spp.), willow (<i>Salix</i> spp.), American black nightshade (<i>Solanum americanum</i>), tomato (<i>Solanum lycopersicum</i>), yellow mombin (<i>Spondias mombin</i>), Brazil plum (<i>Spondias tuberosa</i>), cacao tree (<i>Theobroma cacao</i>) and grape vine (<i>Vitis vinifera</i>) (Chong et al., 2015; EPPO, online_e).</p> <p>Presumably, many ornamental woody plants are also affected, but populations and damage may be limited by natural enemies.</p> <p>The main economic impact is reported on avocado (<i>Persea americana</i>), citrus (<i>Citrus</i> spp.), cotton (<i>Gossypium hirsutum</i>), peanut (<i>Arachis hypogaea</i>), soybean (<i>Glycine max</i>), vegetable crops and ornamental plants (Chong et al., 2015).</p> | |
| Reported evidence of impact | It has been estimated that if the mealybug were to spread across the southern USA, it could cause losses of 750 million USD per year (Moffit, 1999). | |
| Pathways and evidence that the commodity is a pathway | Possible pathways of entry for <i>Maconellicoccus hirsutus</i> are plants for planting, cut flowers, fruits, plant materials of any kind (hiding in a protected site – on the bark, roots, stems, leaves, soil), human transportation, irrigation water, animals and ants (EPPO, 2003, Berry, 2014; Mani and Shivaraju, 2016). Aerial dispersal of crawlers by wind has been observed (Chong et al., 2015). | |
| Surveillance information | No surveillance information for this pest is currently available. There is no information on whether the pest has ever been found in the nurseries or their surrounding environment. | |

A.11.2. Possibility of pest presence in the nursery

A.11.2.1. Possibility of entry from the surrounding environment

Maconellicoccus hirsutus is present in Türkiye (CABI, online; EPPO, online_c), although with limited distribution. Possible pathways of entry into the nursery can be by movement of infested plants, wind, human and animal dispersal, irrigation water and possibly soil. The males can fly, but only to limited distances (Chong et al., 2015).

Uncertainties:

- *M. hirsutus* distribution in Türkiye as well as population density in the nursery areas is not known.
- No information is provided about distance and botanical composition of surrounding environment.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible for the pest to enter the nursery from the surrounding area. The pest can be present in the surrounding areas and the transferring rate could be enhanced by wind, animals and human movement.

A.11.2.2. Possibility of entry with new plants/seeds

The pest can be transported on host plants, particularly plants for planting and cut branches. The presence of the pest can be easily detected by visual inspection, mainly for the presence of honeydew, wax and ants; however, initial infestations (crawlers) can be overlooked by non-trained personnel.

Uncertainties:

- Uncertain if certified material is screened for this pest.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery, especially at initial infestation stages.

A.11.2.3. Possibility of spread within the nursery

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal, irrigation water and possibly soil. The males can fly, but only to limited distances (Chong et al., 2015).

Uncertainties:

- There is uncertainty on whether plants are transplanted within the nurseries thereby moving soil.

Taking into consideration the above evidence and uncertainties, the panel considers that the transfer of the pest within the nursery is possible. Spread within the nursery could be enhanced by the movement of infested plants, by wind, soil, human and animal dispersal.

A.11.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *P. persica* or *P. dulcis* plants for planting from Türkiye due to the presence of *Maconellicoccus hirsutus* between the years 1995 and 2022 (EUROPHYT, online; TRACES-NT, online).

A.11.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|---|
| 1 | Certified material | Yes | No specific protocols are in place for this species; however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms are easily detectable. |
| 2 | Phytosanitary certificates and plant passport | Yes | <p><i>M. hirsutus</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • No details are provided on inspection and monitoring protocols for this species. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|-----------------------------------|--------------------|---|
| | | | <ul style="list-style-type: none"> Limited information is available on the distribution and abundance of <i>M. hirsutus</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 3 | Rouging and pruning | Yes | <p>Information provided is poorly detailed.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | <p>Natural enemies can be present in the environment.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | <p>The pesticides listed in the additional information provided by the third country (Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>M. hirsutus</i>.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | <p><i>M. hirsutus</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>M. hirsutus</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <p><u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | Yes | <p>It could be useful in removing the mealybug if present on the roots.</p> |
| 9 | Refrigeration | Yes | <p>Low temperatures can slow down its development but not kill the insect.</p> |
| 10 | Pre-consignment inspection | Yes | <p><u>Evaluation:</u> The procedures applied could be effective in detecting <i>M. hirsutus</i> infestation.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.11.5. Overall likelihood of pest freedom

A.11.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Peach is considered a secondary host.
- Certified nurseries are located mainly in the part of the country where *M. hirsutus* is not reported.
- Pesticide applications targeting other pests are effective in controlling *M. hirsutus*.
- Regular inspections by phytosanitary authorities are effective and further help to reduce infestation by this pest.

A.11.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Peach is an important host.
- Certified nurseries are located mainly in the part of the country, where *M. hirsutus* is widely distributed.
- Pesticide applications targeting other pests are not effective in controlling *M. hirsutus*.
- Visual inspections of *Prunus persica* plants are not effective in detecting crawlers and early infestations of the mealybug.

A.11.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Median is shifted to lower values due to limited distribution and records only on citrus plants.

A.11.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

Main uncertainties:

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.11.5.5. Elicitation outcomes of the assessment of the pest freedom for *M. hirsutus*

The elicited and fitted values for *M. hirsutus* agreed by the Panel are shown in Tables A.21 and A.22 and in Figure A.11.

Table A.21: Elicited and fitted values of the uncertainty distribution of pest infestation by *Maconellicoccus hirsutus* 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 | | | | | 20 | | 40 | | 70 | | | | | 100 |
| EKE | 1.00 | 1.83 | 3.37 | 6.83 | 11.9 | 18.8 | 26.1 | 42.0 | 59.4 | 68.7 | 78.6 | 87.0 | 93.9 | 97.6 | 100.0 |

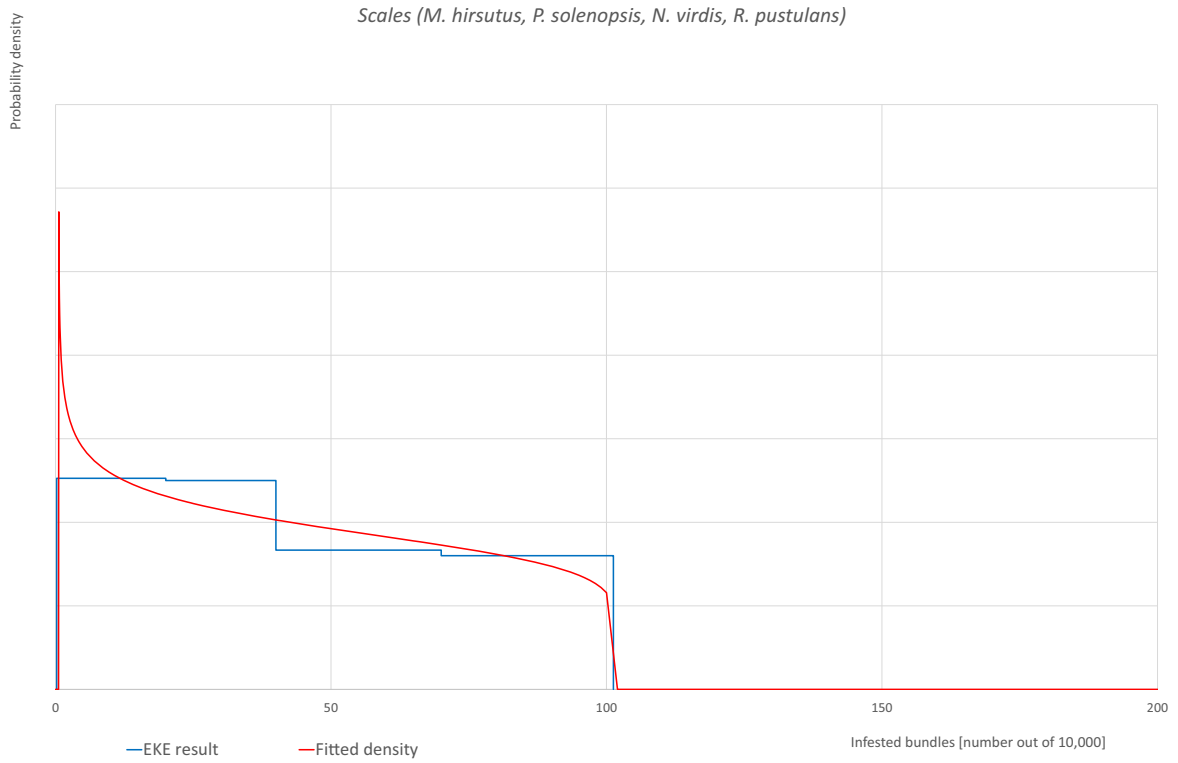
The EKE results are the BetaGeneral (0.86444, 1.127, 0.57, 102) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.22.

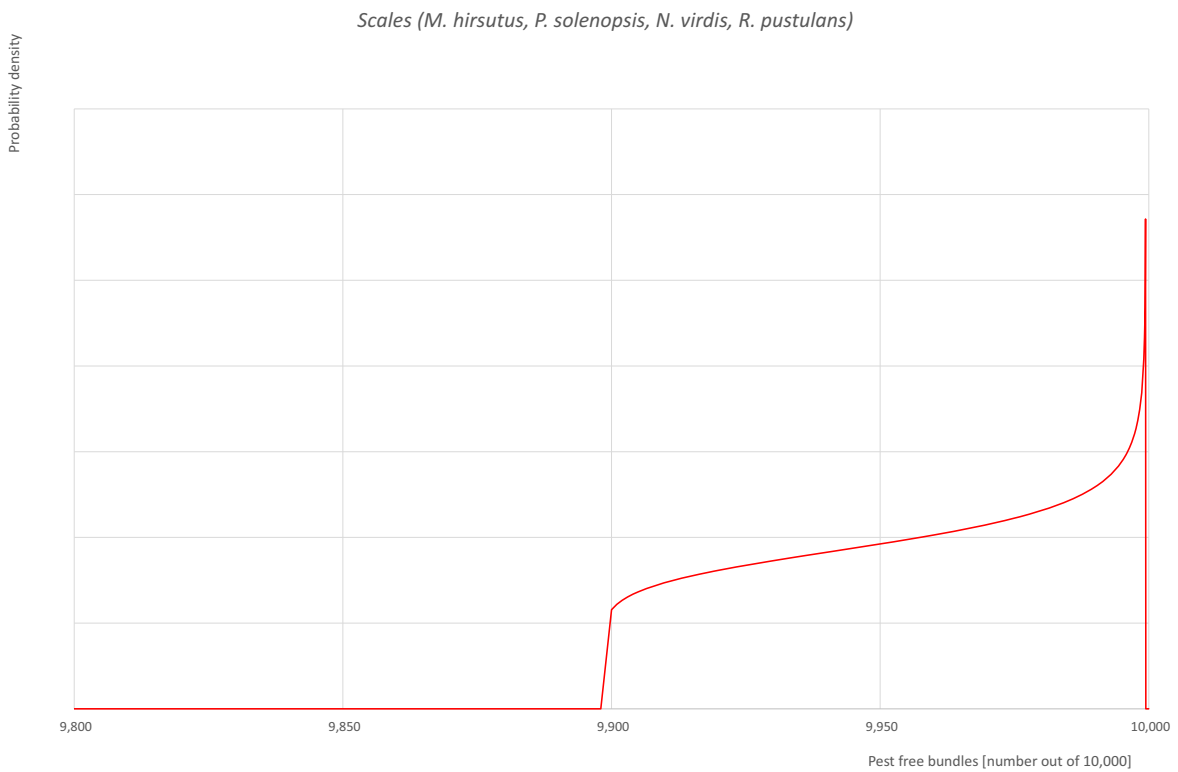
Table A.22: The uncertainty distribution of bundles free of *Maconellicoccus hirsutus* per 10,000 bundles calculated by Table A.21

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9900 | | | | | 9930 | | 9960 | | 9980 | | | | | 9999 |
| EKE results | 9900 | 9902 | 9906 | 9913 | 9921 | 9931 | 9941 | 9958 | 9974 | 9981 | 9988 | 9993 | 9997 | 9998 | 9999 |

The EKE results are the fitted values.

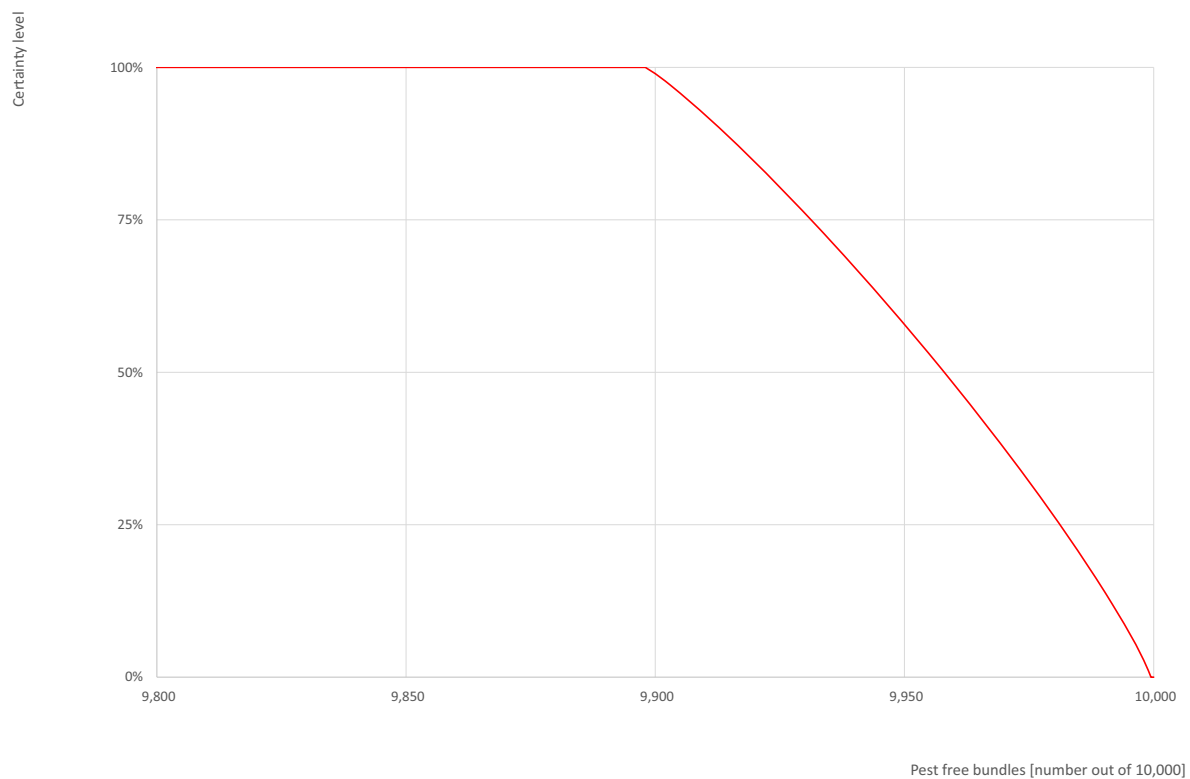


(a)



(b)

Scales (*M. hirsutus*, *P. solenopsis*, *N. virdis*, *R. pustulans*)



(c)

Figure A.11: (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.11.6. References list

- Alleyne JC, 2004. Controlling a dangerous pest—pink hibiscus mealybug. Newsletter of the University of Florida - IFAS Extension - Pinellas County Extension, 38, 2–3.
- Bartlett BR, 1978. Pseudococcidae. In Clausen CP1 (ed.). Introduced parasites and predators of arthropod Epests and weeds: A world review. Agricultural Handbook, USDA, Washington, DC. pp. 137–170. 480 pp.
- Berry JA, 2014. Generic pest risk assessment: armoured scale insects (Hemiptera: Coccoidea: Diaspididae) on the fresh produce pathway. Ministry for Primary Industries, Wellington, 76 pp.
- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Maconellicoccus hirsutus* (pink hibiscus mealybug). Available online: <https://www.cabi.org/cpc/datasheet/40171> [Accessed: 18 July 2022].
- Chang LWH and Miller CE, 1996. Pathway risk assessment: pink mealybug from the Caribbean. Animal and Plant Health Inspection Service, U.S. Department of Agriculture, 61 pp.
- Chong JH, Roda AL and Mannion CM, 2008. Life history of the mealybug, *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae), at constant temperatures. Environmental entomology, 37, 323–332. <https://doi.org/10.1093/ee/37.2.323>
- Chong JH, Aristizábal LF and Arthurs SP, 2015. Biology and management of *Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae) on ornamental plants. Journal of Integrated Pest Management, 6, 5. <https://doi.org/10.1093/jipm/pmv004>
- Culik MP, Fornazier MJ, dos Santos Martins D, Zanuncio JS, Ventura JA, Peronti ALB and Zanuncio JC, 2013. The invasive mealybug *Maconellicoccus hirsutus*: lessons for its current range expansion in South America and invasive pest management in general. Journal of Pest Science.,86, 387–398. <https://doi.org/10.1007/s10340-013-0512-z>

- Dufour BP and Leon J, 1997. Informe de mision de informacion sobre el control de la cochinilla rosada del hibisco (*Maconellicoccus hirsutus* Green) en la region del Caribe. IICA - El Salvador. 22 pp.
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Baptista P, Chatzivassiliou E, Di Serio F, Gonthier P, Jaques Miret JA, Justesen AF, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Stefani E, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Gregoire J-C, Malumphy C, Antonatos S, Kertesz V, Maiorano A, Papachristos D and MacLeod A, 2022. Scientific Opinion on the pest categorisation of *Maconellicoccus hirsutus*. EFSA Journal 2022;20(1):7024, 45 pp. <https://doi.org/10.2903/j.efsa.2022.7024>
- EPPO (European and Mediterranean Plant Protection Organization), 2000. Analyse du Risque Phytosanitaire *Maconellicoccus hirsutus* (Green). European and Mediterranean Plant Protection Organization, Bulletin. Available online: <https://pra.eppo.int/pr/56a01431-a11b-43a6-abb3-76e4f6a6f33d>
- EPPO (European and Mediterranean Plant Protection Organization), 2003. Report of a Pest Risk Management: *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin. Available online: <https://pra.eppo.int/pr/56a01431-a11b-43a6-abb3-76e4f6a6f33d>
- EPPO (European and Mediterranean Plant Protection Organization), 2005. Data sheets on quarantine pests *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin, 35, 413–415.
- EPPO (European and Mediterranean Plant Protection Organization), 2006. Diagnostics *Maconellicoccus hirsutus*. European and Mediterranean Plant Protection Organization, Bulletin, 36, 167–169.
- EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO A2 List of pests recommended for regulation as quarantine pests, version 2021-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 18 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Maconellicoccus hirsutus* (PHENHI), Categorization. Available online: <https://gd.eppo.int/taxon/PHENHI/categorization> [Accessed: 18 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Maconellicoccus hirsutus* (PHENHI), Distribution details in Türkiye. Available online: <https://gd.eppo.int/taxon/PHENHI/distribution/TR> [Accessed: 18 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_d. *Maconellicoccus hirsutus* (PHENHI), Distribution. Available online: <https://gd.eppo.int/taxon/PHENHI/distribution> [Accessed: 18 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_e. *Maconellicoccus hirsutus* (PHENHI), Hosts. Available online: <https://gd.eppo.int/taxon/PHENHI/hosts> [Accessed: 18 July 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_bioresecurity/europhyt/index_en.htm [Accessed: 08 September 2022].
- Francois B, 1996. Measuring the impact of mealybug infestation. In Proceedings of the First Symposium on the hibiscus mealybug in the Caribbean, 24–27.
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y and Hardy NB, online. ScaleNet: A literature-based model of scale insect biology and systematics, *Maconellicoccus hirsutus*. Available online: <https://scalenet.info/catalogue/Maconellicoccus%20hirsutus/> [Accessed: 18 July 2022].
- Ghose SK, 1970. Predators, parasites and attending ants of the mealybug, *Maconellicoccus hirsutus* (Green) (Pseudococcidae, Hemiptera). Plant Protection Bulletin, India, 22, 22–30.
- Jaques J and Urbaneja A, 2006. *Pulvinaria psidii* Maskell (= *P. cupaniae* Cockerell, *P. cussoniae* May, *P. darwiniensis* Froggatt, *P. gymnosporiae* May, *P. psidii philippina* Cockerell, *Chloropulvinaria psidii* Borchsenius, *Lecanium vacuolatum* Dash) Homoptera: Coccidae. Levante Agrícola (379). <http://redivia.gva.es/handle/20.500.11939/6413>
- Kairo MTK, Pollard GV, Peterkin DD and Lopez VF, 2000. Biological control of the hibiscus mealybug, *Maconellicoccus hirsutus* Green (Hemiptera: Pseudococcidae) in the Caribbean. Integrated Pest Management Reviews, 5, 241–254.
- Karacaoğlu M, Kaydan MB and Satar S, 2016. Detected mealybug species from *Citrus* plantations in Aegean and Mediterranean Regions. In: Abstract. Turkey 6th Plant Protection Congress with International Participation, at Konya, Turkey. Available online: https://www.researchgate.net/publication/308722044_Detected_Mealybug_Species_From_Citrus_Plantations_in_Aegean_and_Mediterranean_Regions
- Mani M, 1989. A review of the pink mealybug – *Maconellicoccus hirsutus*. Insect Science and Its Application, 10, 157–167.
- Mani M and Shivaraju C, 2016. Mealybugs and their management in agricultural and horticultural crops. Berlin, Germany, Springer. 655 pp.
- Milonas PG and Partsinevelos GK, 2017. The pink hibiscus mealybug *Maconellicoccus hirsutus* (green) (Hemiptera: Pseudococcidae) in Greece. Hellenic Plant Protection Journal, 10, 80–83. <https://doi.org/10.1515/hppj-2017-0009>
- Sagarra LA and Peterkin DD, 1999. Invasion of the Caribbean by the hibiscus mealybug, *Maconellicoccus hirsutus* Green (Homoptera: Pseudococcidae). Phytoprotection, 80, 103–113.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.12. *Malacosoma parallela*

A.12.1. Organism information

| | |
|--|---|
| Taxonomic information | Current valid scientific name: <i>Malacosoma parallela</i> Staudinger Synonyms: <i>Bombyx neustria</i> var. <i>parallela</i> Name used in the EU legislation: – Order: Lepidoptera Family: Lasiocampidae Common name: mountain ring silk moth Name used in the Dossier: <i>Malacosoma parallela</i> |
| Group | Insects |
| EPPO code | MALAPA |
| Regulated status | The pest is included in the EPPO A2 list (EPPO, online_a). |
| Pest status in Türkiye | <i>Malacosoma parallela</i> is present in Türkiye, with no further details on its distribution (CABI, online; EPPO, online_b). |
| Pest status in the EU | <i>Malacosoma parallela</i> is absent in the EU. |
| Host status on <i>Prunus</i> spp. | <i>Prunus</i> spp. and <i>Prunus dulcis</i> are listed as host and major host respectively (EPPO, online_c). |
| PRA information | Pest Risk Assessments available: <ul style="list-style-type: none"> – Data sheets on quarantine pests, <i>Malacosoma parallela</i> (EPPO, 2005); – Pest Risk Management report (EPPO, online_d); – Report of a Pest Risk Assessment–Pest Risk Assessment Scheme (EPPO, online_d). |

Other relevant information for the assessment

| | | |
|-----------------|--|--|
| Biology | The main outbreaks of <i>M. parallela</i> occur in mountain forests at an altitude of 1,000–1,800 m where the pest finds optimal conditions for its development. It can occur up to 2,400 m. The moth completes one generation per year overwintering in the egg stage. Flight peaks of <i>M. parallela</i> usually occur between June and July, depending on altitude. Adults have a crepuscular behaviour. Copulation occurs 2–3 h after emergence of the adults. Eggs are laid in groups; egg masses usually contain from 100 to 400 eggs covered by a thick layer of special female secretion (spumaline), which is shining whitish grey and silvery when fresh and then turns dark. The layer of secretion protects eggs against unfavourable conditions during overwintering. Egg masses are laid around thin branches of host plants. One female usually makes one egg mass, but sometimes two or three. Neonate larvae appear from the end of March at the same time as young leaves of host plants. They usually all hatch during 1–2 days and begin to make a web nest on branches. They feed on young leaves around the nest. The nest is usually constructed by the group of individuals hatched from one egg mass. It can be up to 25 cm long and 17 cm wide. When larvae reach third or fourth instar, the group usually leaves the first nest and constructs new ones (2 or 3) in places where there is more food. Larvae moult inside nests and feed on leaves around the nest. They leave the nests at the fifth or sixth instar and then continue to live individually. The length of their development time depends much on the altitude and host plant. Larvae moult five times before making cocoons on leaves and in other different places at the end of May and in June (Grechkin, 1956; Degtyareva, 1964; Sarkissyan, 1972; Romanenko, 1981; Maslov, 1988). | |
| Symptoms | Main type of symptoms | Defoliation of host plants is usually very spectacular. The presence of egg masses, nests and individual larvae is easily detected. Moths are attracted by sources of light. |
| | Presence of asymptomatic plants | No specific data are available. |
| | Confusion with other pests | Egg masses encircle thin branches of host plants similar to the egg masses of the closely related European species <i>Malacosoma neustria</i> . |

| | |
|--|--|
| Host plant range | <i>M. parallela</i> is extremely polyphagous and causes most damage in its native range to <i>Quercus</i> spp., <i>Prunus</i> spp., and <i>Malus</i> spp. Significant damage also occurs on various other woody species, including many native species of Central Asia: <i>Berberis integerrima</i> , <i>Chaenomeles japonica</i> , <i>Cotoneaster insignis</i> , <i>Cotoneaster suavis</i> , <i>Crataegus hissarica</i> , <i>Crataegus pontica</i> , <i>Crataegus turkestanica</i> , <i>Cydonia oblonga</i> , <i>Prunus armeniaca</i> , <i>Prunus avium</i> , <i>Prunus cerasus</i> , <i>Prunus divaricata</i> , <i>Prunus mahaleb</i> , <i>Prunus padus</i> , <i>Prunus persica</i> , <i>Prunus dulcis</i> , <i>Pyrus communis</i> , <i>Rosa canina</i> , <i>Rosa corymbifera</i> , <i>Rosa kokanica</i> , <i>Rosa maracandica</i> , <i>Salix excelsa</i> , <i>Salix tenuijulis</i> , <i>Sorbus persica</i> , <i>Sorbus turkestanica</i> . Other native and planted deciduous trees and shrubs are damaged occasionally: <i>Atraphaxis pyrifolia</i> , <i>Elaeagnus angustifolia</i> , <i>Fraxinus sogdiana</i> , <i>Hippophae rhamnoides</i> , <i>Juglans regia</i> , <i>Lonicera korolkowii</i> , <i>Lonicera nummulariifolia</i> , <i>Myricaria bracteata</i> , <i>Populus alba</i> , <i>Populus tremula</i> , <i>Ribes nigrum</i> , <i>Ribes rubrum</i> , <i>Rubus idaeus</i> , <i>Rubus turkestanicus</i> and <i>Ulmus minor</i> (Pavlovskii and Shtakelberg, 1955; Grechkin, 1956; Degtyareva, 1964; Sarkissyan, 1972; Romanenko, 1981; Maslov, 1988). |
| Reported evidence of impact | <i>M. parallela</i> is an important defoliator of many deciduous trees in different countries of the former USSR. Outbreaks often last for two consecutive years. It was especially noted as a very dangerous pest of oak in the mountains of Armenia (Sarkissyan, 1972) and of forests, fruit trees and shrubs of Rosaceae, Fagaceae and Elaeagnaceae in the mountains of Tajikistan (Grechkin, 1956; Degtyareva, 1964). It attacks both stressed and healthy trees of different ages. Outbreaks occur throughout large mountain areas, often resulting in 100% defoliation and sometimes leading to the death of trees and forests. Damage may be caused by this species alone, or in association with <i>Yponomeuta padellus</i> , <i>Euproctis kargalica</i> , <i>Erschoviella musculana</i> , <i>Lymantria dispar</i> or other defoliators. Attacks may result in serious changes in the environment over large areas, including problems of erosion. |
| Pathways and evidence that the commodity is a pathway | <i>M. parallela</i> can spread by flights of adult moths. All stages of the life cycle can be transported on host plants moving in trade, particularly plants for planting and cut branches. Eggs, larvae and pupae (cocoons) may be associated with wood carrying bark and may be present as contaminants on other commodities. |
| Surveillance information | No surveillance information is currently available from the Türkiye NPPO. |

A.12.2. Possibility of pest presence in the nursery

A.12.2.1. Possibility of entry from the surrounding environment

If present in the surroundings, the pest can enter the nursery as Türkiye is producing *Prunus dulcis* and *P. persica* plants for planting outdoors. The pest could enter the nursery mainly by active dispersal (flight). Being highly polyphagous, the pest could be associated with many host plants occurring in the surroundings.

Uncertainties:

- No data available on the distribution of the pest or population densities in the areas of production in Türkiye.
- No information is provided about the presence of suitable host plants in the areas surrounding the nurseries.

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

A.12.2.2. Possibility of entry with new plants/seeds

The pest (larvae, pupae and mainly eggs) can be transported on host plants, particularly plants for planting and cut branches. The presence of the pest can be easily detected by visual inspection; however, eggs masses can be overlooked by non-trained personnel.

Uncertainties:

- Uncertain if certified material is screened for this pest.

Taking into consideration the above evidence and uncertainties, the panel considers it possible that the pest could enter the nursery, though unlikely because all stages can be detected by visual inspection.

A.12.2.3. Possibility of spread within the nursery

If the pest enters the nursery from the surroundings, it could spread either by adult flight, larval movement or infested plant material. Active dispersal of larvae is possible especially if plants are touching with each other (as in stoolbeds).

No specific procedure/treatment is applied against *M. parallela* nor specific protocol for pest control in the nurseries are currently available. For this reason, the pest can easily spread within the nurseries when present.

Uncertainties:

- It is unknown if inspections before export are performed targeting the pest and details on their procedures are missing.
- Given that the pest is polyphagous, the pest could be associated with other host plants produced in the nursery; however, no data is available.

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

A.12.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus persica* or *P. dulcis* plants for planting from Türkiye due to the presence of *M. parallela* between the years 1995 and 2022 (EUROPHYT, online; TRACES-NT, online).

A.12.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|--|--------------------|--|
| 1 | Certified material | Yes | Potential <i>M. parallela</i> infestations could be easily detected, though egg masses might be overlooked by non-trained personnel. <u>Uncertainties:</u> • The details of the certification process are not given (e.g. number of plants, intensity of surveys and inspections, etc.). Specific figures on the intensity of survey (sampling effort) are not provided. |
| 2 | Phyosanitary certificates and plant passport | Yes | The procedures applied could be effective in detecting <i>M. parallela</i> infestations though egg masses might be overlooked by non-trained personnel. <u>Uncertainties:</u> • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 3 | Rouging and pruning | Yes | Pruning can remove <i>M. parallela</i> egg masses and nests. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> • No details are provided on abundance and efficacy of the natural enemies. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---------------------------------|--------------------|---|
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>M. parallela</i> . <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | It can be effective, though <i>M. parallela</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>M. parallela</i> in the <i>Prunus persica</i> and <i>P. dulcis</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying the pest. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | The procedures applied could be effective in detecting <i>M. parallela</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.12.5. Overall likelihood of pest freedom

A.12.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Peach and almond are considered secondary hosts.
- Certified nurseries are located mainly in the part of the country, where *M. parallela* is not reported.
- M. parallela* has limited distribution in Türkiye due to climatic restrictions.
- Pesticide applications targeting other pests are effective in controlling *M. parallela*.
- Pruning reduces infestation levels.
- Natural enemies are present in the environment.
- Defoliation and nests presence facilitate the detection of the pest.
- Visual inspection is performed by trained personnel.

A.12.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- Peach and almond are important hosts.
- Certified nurseries are located mainly in the part of the country where *M. parallela* is widely distributed.
- M. parallela* is widely present in Türkiye with no climatic restrictions.
- Pesticide applications targeting other pests are not effective in controlling *M. parallela*.

- Visual inspections of *Prunus persica* and *P. dulcis* plants are not effective in detecting eggs, young larvae and early infestations of the moth.
- Natural enemies are not present or affected by pesticide treatments.

A.12.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Due to the absence of information about pest presence and pressure in the nursery area, the panel considers lower values for being as likely as higher values.

A.12.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

Main uncertainties:

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.12.5.5. Elicitation outcomes of the assessment of the pest freedom for *Malacosoma. parallela*

The elicited and fitted values for *M. parallela* agreed by the Panel are shown in Tables A.23 and A.24 and in Figure A.12.

Table A.23: Elicited and fitted values of the uncertainty distribution of pest infestation by *M. parallela* 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 |

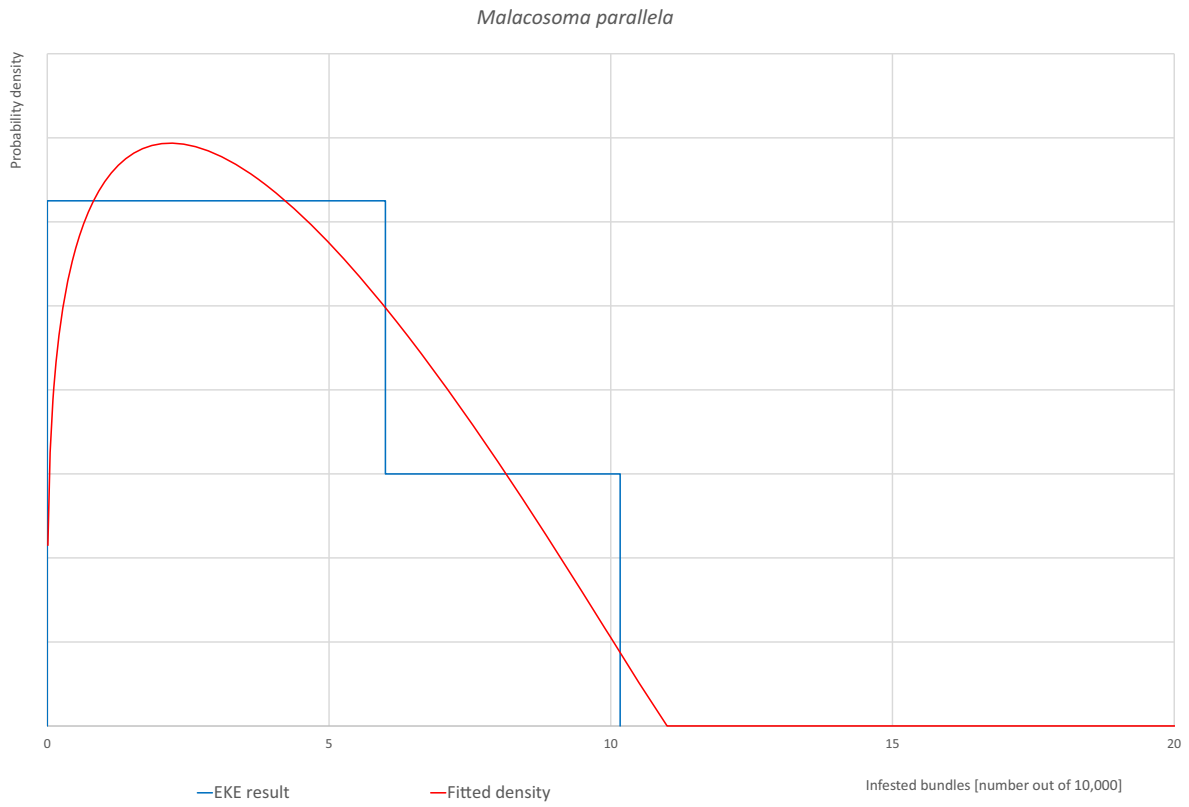
The EKE results are BetaGeneral (1.2604, 2.0485, 0, 11) distribution fitted with @Risk version 7.6.

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

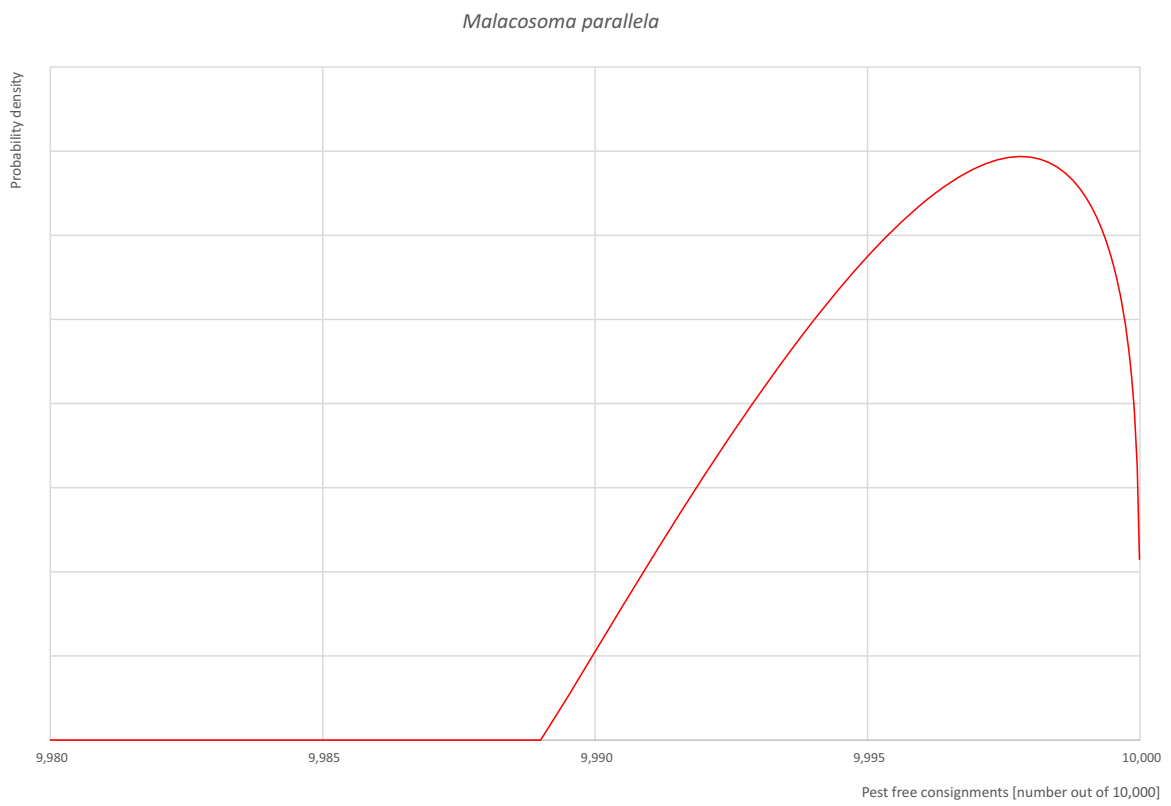
Table A.24: The uncertainty distribution of bundles free of *M. parallela* per 10,000 bundles calculated by Table A.23

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|--------|--------|--------|--------|
| Values | 9990 | | | | 9994 | | 9996 | | 9998 | | | | | 10000 | 9990 |
| EKE results | 9990 | 9991 | 9991 | 9992 | 9993 | 9994 | 9995 | 9996 | 9997 | 9998 | 9999 | 9999.1 | 9999.5 | 9999.7 | 9999.9 |

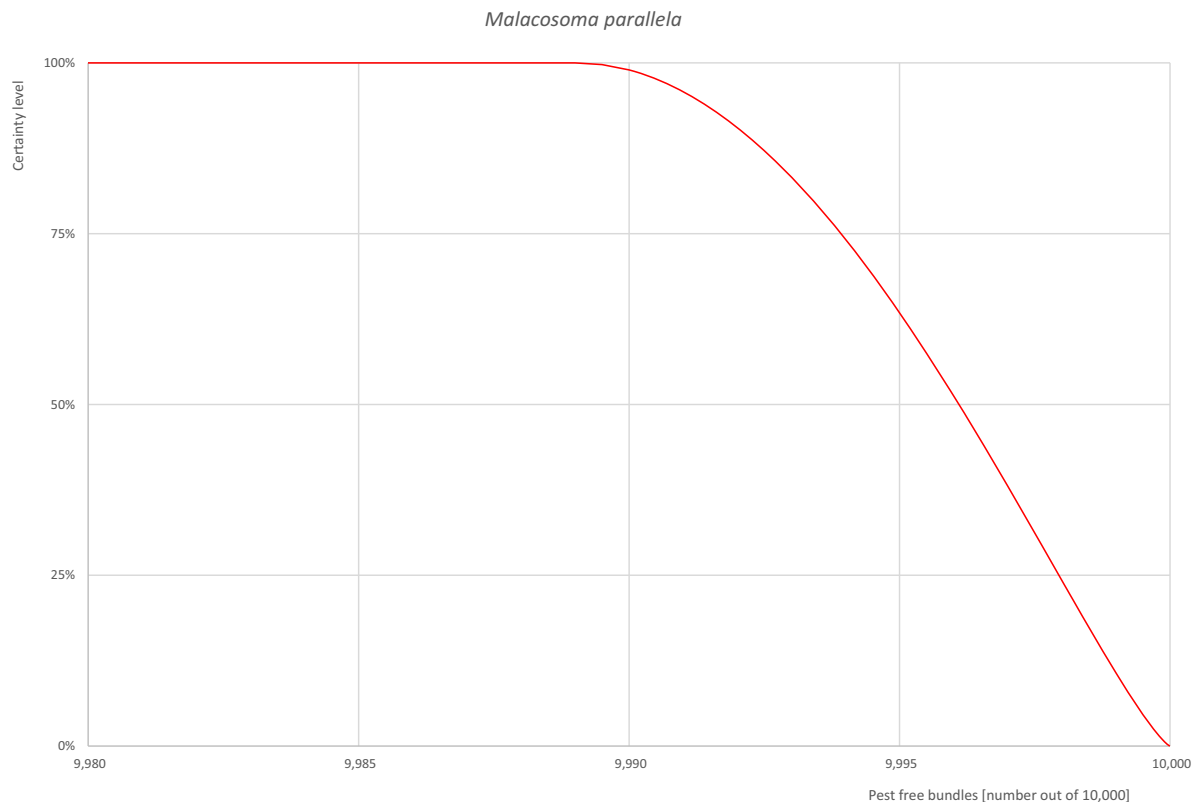
The EKE results are the fitted values.



(a)



(b)



(c)

Figure A.12: (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.12.6. References list

- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Malacosoma parallela* (mountain ring silk moth). Available online: <https://www.cabi.org/isc/datasheet/32330> [Accessed: 27 April 2022].
- Degtyareva VI, 1964. The main Lepidopteran pests of trees and shrubs of the central part of Gissar mountain ridge and Gissar valley. Izdatel'stvo Akademii Nauk Tadjikskoi SSR, Dushanbe (TJ). (in Russian).
- EPPO (European and Mediterranean Plant Protection Organization), 2005. Data sheets on quarantine pests, *Malacosoma parallela*. OEPP/EPPO, Bulletin OEPP/EPPO Bulletin, 35, 431–433.
- EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO A2 List of pests recommended for regulation as quarantine pests, version 2021-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 27 April 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Malacosoma parallela* (MALAPA), Distribution. Available online: <https://gd.eppo.int/taxon/MALAPA/distribution> [Accessed: 27 April 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Malacosoma parallela* (MALAPA), Host plants. Available online: <https://gd.eppo.int/taxon/MALAPA/hosts> [Accessed: 27 April 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_d. *Malacosoma parallela* (MALAPA), Documents. Available online: <https://gd.eppo.int/taxon/MALAPA/documents> [Accessed: 27 April 2022].
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions – EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 08 September 2022].
- Grechkin VP, 1956. Important species of pests of mountain forests of Tajikistan. Zoologicheskii Zhurnal, 35, 1476–1492. (in Russian).
- Maslov AD, 1988. Guide to forest protection against pests and diseases. Agropromizdat, Moscow (RU). (in Russian).

Pavlovskii EN and Shtakelberg AA, 1955. Guide to forest pests. Izdatel'stvo Akademii Nauk SSSR, Moscow–Leningrad (RU). (in Russian).

Romanenko KE, 1981. Pests of field shelter belts in Kirgizia. Ilim, Frunze (KG). (in Russian).

Sarkissyan RA, 1972. Population dynamics of *Euproctis chryorrhoea* and *Malacosoma parallela* in the Zangezur mountains of the Armenian SSR.

TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.13. *Nipaecoccus viridis*

A.13.1. Organism information

| | |
|--|---|
| Taxonomic information | <p>Current valid scientific name: <i>Nipaecoccus viridis</i> Synonyms: <i>Dactylopius perniciosus</i>, <i>Dactylopius vastator</i>, <i>Dactylopius viridis</i>, <i>Nipaecoccus vastator</i>, <i>Pseudococcus filamentosus</i> var. <i>corymbatus</i>, <i>Pseudococcus perniciosus</i>, <i>Pseudococcus solitarius</i>, <i>Pseudococcus vastator</i>, <i>Pseudococcus viridis</i>, <i>Ripersia theae</i>, <i>Trionymus sericeus</i> Name used in the EU legislation: –</p> <p>Order: Hemiptera Family: Pseudococcidae</p> <p>Common name: spherical mealybug, coffee mealybug, cotton mealybug, globular mealybug, hibiscus mealybug, karoo thorn mealybug, lebeck mealybug Name used in the Dossier: <i>Nipaecoccus viridis</i></p> |
| Group | Insects |
| EPPO code | NIPAVI |
| Regulated status | <p><i>Nipaecoccus viridis</i> is not regulated in the EU, neither is listed by EPPO.</p> <p>It is categorised in Türkiye (A1 list since 2016) and in countries of Asia and America (EPPO, online_a).</p> |
| Pest status in Türkiye | Present, restricted distribution (EPPO, online_b) found in Marmara region on <i>Robinia pseudacacia</i> (Ülgentürk, 2022). |
| Pest status in the EU | <i>Nipaecoccus viridis</i> is absent in the EU (CABI, online; EPPO, online_b; García Morales et al., online). |
| Host status on <i>Prunus</i> spp. | <p><i>Nipaecoccus viridis</i> is a polyphagous pest with a known host range that includes at least 140 plant genera in 53 families (García Morales et al., online).</p> <p><i>Prunus armeniaca</i> is a host (Abdul-Rassoul, 2015; García Morales et al., online).</p> |
| PRA information | <p>Available Pest Risk Assessment:</p> <ul style="list-style-type: none"> – DROPSA report of Table grapes - fruit pathway and alert list (Wistermann et al., 2016); – DROPSA report on Oranges and mandarins- fruit pathway and alert list (Grousset et al., 2016); – Import Risk Analysis: Pears (<i>Pyrus bretschneideri</i>, <i>Pyrus pyrifolia</i> and <i>Pyrus</i> sp. nr. <i>communis</i>) fresh fruit from China to New Zealand (Tyson et al., 2009). |

Other relevant information for the assessment

| | |
|----------------|--|
| Biology | <p><i>Nipaecoccus viridis</i> reproduce both sexually and parthenogenically. Eggs are laid in a large hemispherical ovisac, which usually hide the female (Sharaf and Meyerdirk, 1987). Females lay about 300–500 eggs in their lifetime (Mani and Shivaraju, 2016) and sometimes more than 1,100 eggs (Bartlett, 1978). The mealybug prefers to feed and reproduce on fast growing tissues like new branches and fruits (Diepenbrock and Burrow, 2020). <i>Nipaecoccus viridis</i> is probably indigenous to the warm tropical areas of the Indian subcontinent (Franco et al., 2004) and is spread in many parts of the world, mainly in tropics and subtropics (Thomas and Leppla, 2008).</p> |
|----------------|--|

| | |
|-----------------|---|
| | <p>The development stages of <i>N. viridis</i> are egg, three nymphal instars (for females) and four nymphal instars (for males), and adult (Mani and Shivaraju, 2016). According to Sharaf and Meyerdirk (1987), the number of instars is four for females and five for males. The first-instar nymph (crawler) can be carried away by wind. The development time lasts between 19 and 20 days at 25°C and 15–19 days at 32°C (Gerson and Aplebaum, online). Males have forewings and live up to 3 days. Females are wingless and live up to 50 days (Gerson and Aplebaum, online). The mealybug can have several overlapping generations per year (Sharaf and Meyerdirk, 1987). Six to seven generations occur annually in the Jordan Valley (Gerson and Aplebaum, online). In the Middle East mealybug overwinters as adult in cracks and crevices of the stems and branches (Gerson and Aplebaum, online). In Iraq, <i>N. viridis</i> overwinters as egg, nymph and adult (Jarjes et al., 1989).</p> |
| Symptoms | <p>Main type of symptoms <i>Nipaecoccus viridis</i> adults and larvae can damage all plant parts, such as leaves, fruits, twigs, flowers and even roots (Abdul-Rassoul, 1970; Sharaf and Meyerdirk, 1987). Main symptoms are (CABI, online; Gerson and Aplebaum, online; Sharaf and Meyerdirk, 1987):</p> <ul style="list-style-type: none"> • curling and dwarfing of the terminal growth, • abortion of flowers, • yellowing of leaves, • yellowing of fruits, • corky scars on fruits, • watery green spots on ripen fruits, • fruit size deformation, • dropping of fruits, • white or pale-yellow waxy secretion, • honeydew, • sooty mould, • distortion and rosetting of plants, • wilting, • dieback, • defoliation. <p>On citrus, feeding on twigs causes deformation. The pest may stunt trees, produces honeydew, and on fruit may cause deformation, discoloration and drop. In India, 5% damage was observed in two vineyards in Bangalore. In Hawaii, it was long considered the most destructive mealybug. On <i>Citrus</i>, losses are mostly due to fruit drop (which may reach 50% for Navel oranges in South Africa) and quality issues due to fruit deformation (CABI CPC citing references from the 1970s). In Southern China on <i>Citrus</i>, it is considered as very widespread and important (Li et al., 1997). It is an agricultural pest in Asia, attacking food, forage, ornamental and fibre crops, and a pest of stored potatoes. It often causes considerable damage (Stocks and Hodges, 2010).</p> <p>Presence of asymptomatic plants Plant damage might not be obvious in early infestation or during dormancy (due to the absence of leaves), but the presence of mealybugs on the plants could be observed. During the crawler stage, infestation is difficult to be noted.</p> <p>Confusion with other pests <i>Nipaecoccus viridis</i> can be confused with several other mealybugs. Many mealybugs are very similar to each other in overall appearance and are thus difficult to identify. (a) This mealybug can be distinguished from other mealybugs on citrus by means of the key provided by Hattingh et al. (1998). Diagnostic features are the purple body contents of all stages and the eggs as well as the globular, finely woven, smooth-surfaced ovisac, the threads of which can be drawn out extensively. The gross appearance of this species can give an initial impression of a margarodid (e.g. <i>Icerya</i> sp.) rather than a mealybug.</p> |

| | |
|--|--|
| Host plant range | <i>Nipaecoccus viridis</i> attacks 53 plant families and 140 genera (García Morales et al., online). Main hosts are avocado (<i>Persea americana</i>), citrus (<i>Citrus</i> spp.), coffee (<i>Coffea</i> spp.), cotton (<i>Gossypium</i> spp.), grapevine (<i>Vitis vinifera</i>), mango (<i>Mangifera indica</i>), pomegranate (<i>Punica granatum</i>) and tamarind (<i>Tamarindus</i> spp.) (CABI, online; Gerson and Aplebaum, online). Other host plants are fig (<i>Ficus carica</i>), Indian siris (<i>Albizia lebbek</i>), jack fruit (<i>Artocarpus heterophyllus</i>), crape myrtle (<i>Lagerstroemia indica</i>), white mulberry (<i>Morus alba</i>), oleander (<i>Nerium oleander</i>), potato (<i>Solanum tuberosum</i>), rosemallows (<i>Hibiscus</i> spp.) and soybean (<i>Glycine max</i>) (CABI, online; García Morales et al., online). |
| Reported evidence of impact | <i>Nipaecoccus viridis</i> is an agricultural pest in Asia that attacks food, forage, ornamental and fibre crops (Sharaf and Meyerdirk, 1987). It has economic impact on ber, citrus, custard apple, grapes, guava, jackfruit, mango, pomegranate and pummelo (Mani and Shivaraju, 2016). |
| Pathways and evidence that the commodity is a pathway | Plants for planting (presence on roots is controversial) and fruits are the main pathways for introduction and spread of <i>N. viridis</i> (Grousset et al., 2016; Wistermann et al., 2016). |
| Surveillance information | No surveillance information for this pest is currently available from the Turkish NPPO. There is no information on whether the pest has ever been found in nurseries or their surrounding environment. |

A.13.2. Possibility of pest presence in the nursery

A.13.2.1. Possibility of entry from the surrounding environment

In Türkiye, *N. viridis* was detected in Marmara region on *Robinia pseudoacacia* (Ülgentürk et al., 2022). Thereafter, its status is present, restricted distribution.

Due to its polyphagy, the pest is likely to be present in the environment surrounding the nurseries producing *P. armeniaca* plants. It is possible that nurseries are located in areas where the pest is present. If host are present in the surroundings and pest pressure is high (e.g. citrus or cotton production), introduction into the nursery is likely. Possible pathways of entry into the nursery can be by movement of infested plants, wind, human and animal dispersal and irrigation water (Mani and Shivaraju, 2016). Males can fly but live only 3 days (Gerson and Aplebaum, online). The first-nymph instars (crawlers) can disperse by walking and by wind (Mani and Shivaraju, 2016).

Possible pathways of entry into the nurseries can be by movement of infested plants, wind, human and animal dispersal and irrigation water (Mani and Shivaraju, 2016). The first-nymph instars (crawlers) can disperse by walking and by wind (Mani and Shivaraju, 2016).

Uncertainties:

- No information about the density of the population of *N. viridis* in the area surrounding the nurseries is available.

Taking into consideration the above evidence and uncertainties, the panel considers that it is possible for the pest to enter the nursery from the surrounding area. The pest can be present in the surrounding areas and the transfer rate could be enhanced by wind and accidental transportation by humans.

A.13.2.2. Possibility of entry with new plants/seeds

The pest can be transported on host plants, particularly plants for planting and cut branches. The presence of the pest can be easily detected by visual inspection, mainly for the presence of honeydew, wax and ants; however, initial infestations (crawlers) can be overlooked by non-trained personnel.

Uncertainties:

- Uncertain if certified material is screened for this pest.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery, especially at initial infestation stages.

A.13.2.3. Possibility of spread within the nursery

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal, irrigation water and possibly soil. The males can fly, but only to limited distances (Chong et al., 2015).

Uncertainties:

- There is uncertainty on whether plants are transplanted within the nurseries thereby moving soil.

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nursery is possible. Spread within the nursery could be enhanced by movement of infested plants, by wind, soil, human and animal dispersal.

A.13.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus* plants for planting neither from Türkiye nor from other countries due to the presence of *N. viridis* between the years 1995 and September 2022 (EUROPHYT, online; TRACES-NT, online).

Intercepted in the USA and Republic of Korea on *Citrus* (Grousset et al., 2016; Wistermann et al., 2016).

A.13.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|---|
| 1 | Certified material | Yes | Nurseries are registered and inspected at least once a year with unknown inspection and sampling intensities. <i>N. viridis</i> has no quarantine status in Türkiye. No specific protocols are in place for this species; however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms are easily detectable. |
| 2 | Phytosanitary certificates and plant passport | Yes | <i>N. viridis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are provided on inspection and monitoring protocols for this species. • Limited information is available on the distribution and abundance of <i>N. viridis</i> in the <i>Prunus armeniaca</i> growing area. |
| 3 | Rouging and pruning | Yes | Pruning can remove <i>N. viridis</i> infested plant parts. Information provided is poorly detailed. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | yes | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>N. viridis</i> . |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---------------------------------|--------------------|---|
| | | | <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | <p>It can be effective, though <i>N. viridis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>N. viridis</i> in the <i>Prunus armeniaca</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <p><u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | Yes | It could be effective in removing the insect when present on the roots. |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | <p>The procedures applied could be effective in detecting <i>N. viridis</i> infestation.</p> <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.13.5. Overall likelihood of pest freedom

A.13.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Low abundance of the pest in the surrounding environment of the nursery.
- There are no alternative host plant species present in the nursery.
- The pest is not present in the areas where the nurseries are located.
- Infestations of the mealybug are easily spotted and plants with symptoms are not exported.

A.13.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- N. viridis* is polyphagous and can be present on many host plants in the surrounding environment of the nurseries.
- N. viridis* has no quarantine status in Türkiye and nursery managers are unaware of the presence of the pest in the production area.
- Pesticide applications targeting other pests are not effective in controlling *N. viridis*.

A.13.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Based on the fact that the pest is relatively easy to detect, lower values are considered for being more likely.

A.13.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The main uncertainty is the population pressure in the surrounding environment, due to the lack of sufficient information in the dossier.

A.13.5.5. Elicitation outcomes of the assessment of the pest freedom for *Nipaecoccus viridis*

The elicited and fitted values for *Nipaecoccus viridis* agreed by the panel are shown in Tables A.25 and A.26 and in Figure A.13.

Table A.25: Elicited and fitted values of the uncertainty distribution of pest infestation by *Nipaecoccus viridis* 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 | | | | | 20 | | 40 | | 70 | | | | | 100 |
| EKE | 1.00 | 1.83 | 3.37 | 6.83 | 11.9 | 18.8 | 26.1 | 42.0 | 59.4 | 68.7 | 78.6 | 87.0 | 93.9 | 97.6 | 100.0 |

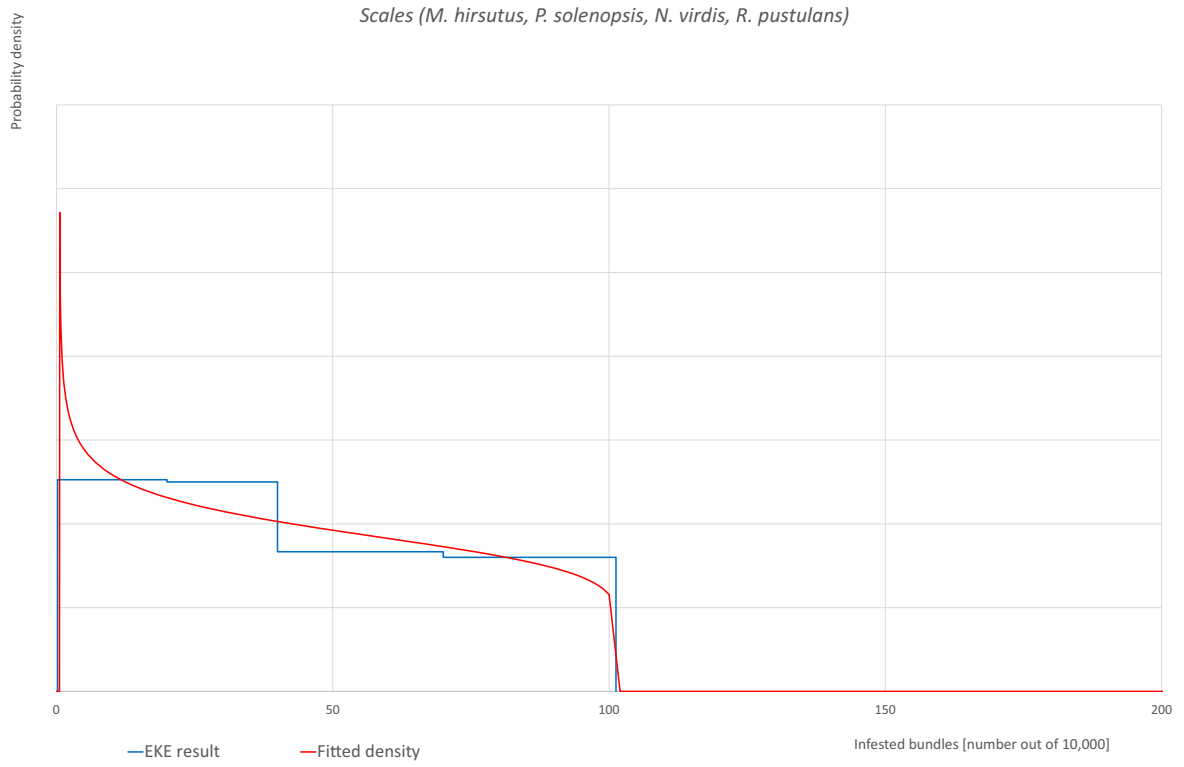
The EKE results are the BetaGeneral (0.86444, 1.127, 0.57, 102) distribution fitted with @Risk version 7.6.

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

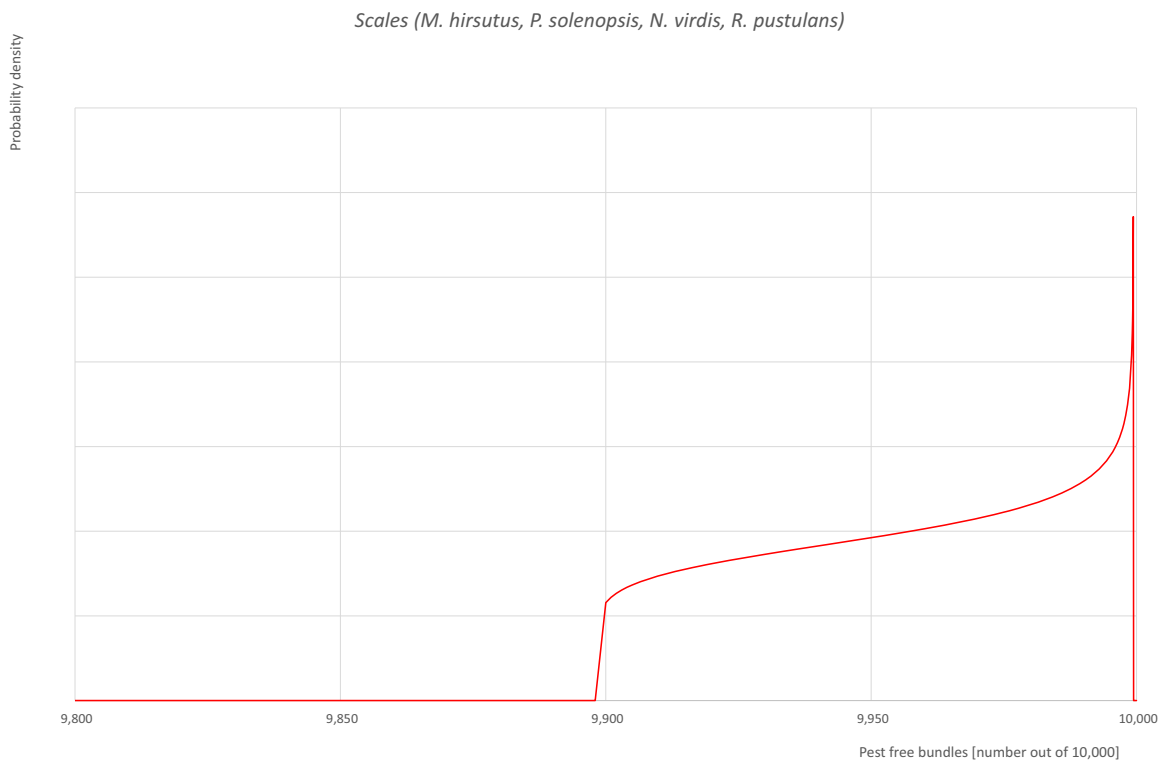
Table A.26: The uncertainty distribution of bundles free of *Nipaecoccus viridis* per 10,000 bundles calculated by Table A.25

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9900 | | | | | 9930 | | 9960 | | 9980 | | | | | 9999 |
| EKE results | 9900 | 9902 | 9906 | 9913 | 9921 | 9931 | 9941 | 9958 | 9974 | 9981 | 9988 | 9993 | 9997 | 9998 | 9999 |

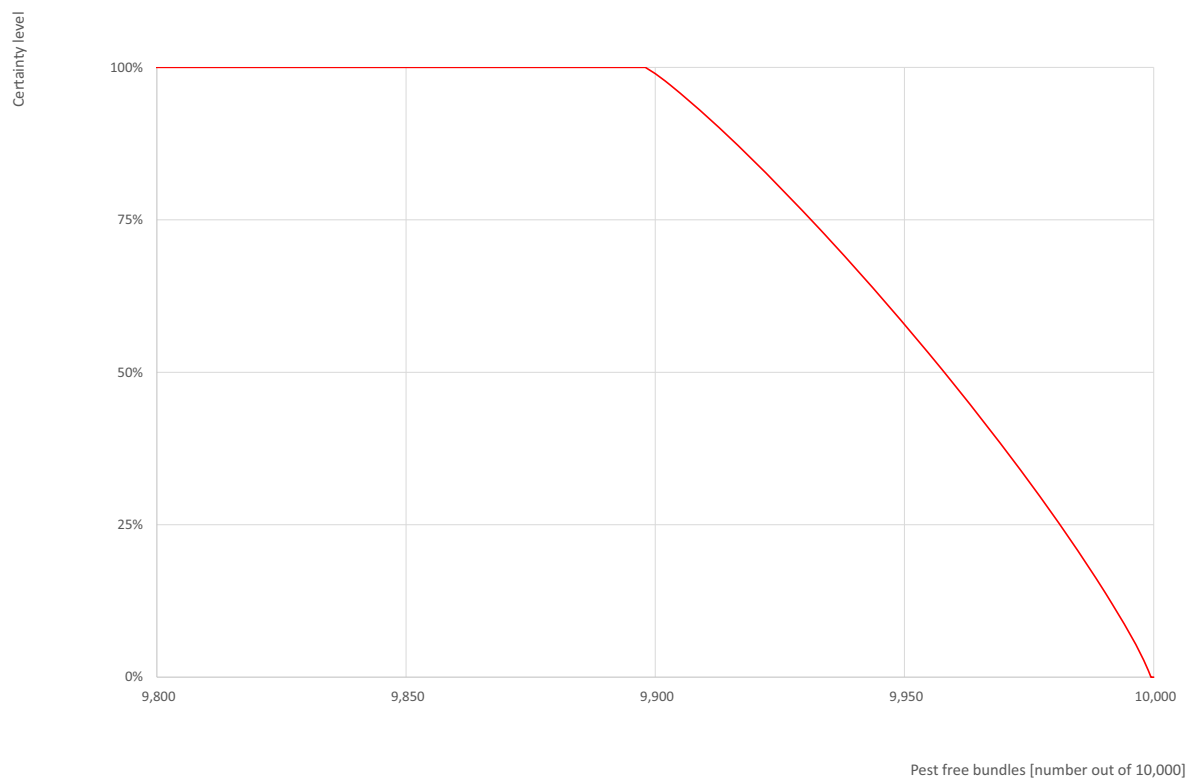
The EKE results are the fitted values.



(a)



(b)

Scales (*M. hirsutus*, *P. solenopsis*, *N. viridis*, *R. pustulans*)

(c)

Figure A.13: (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.13.6. References list

- Abdul-Rassoul MS, 1970. Notes on *Nipaecoccus vastator* (Maskell) (Coccidae: Homoptera). A serious pest of citrus trees and various plants – first record from Iraq. Bulletin Iraq Natural History Museum, 4, 105–108.
- Abdul-Rassoul MS, 2015. Host plants of the mealybug *Nipaecoccus viridis* (Newstead, 1894) (Homoptera, Pseudococcidae) in Iraq with detection of new hosts. Advances in BioResearch, 6, 23–26.
- Bartlett BR, 1978. Pseudococcidae. In Clausen CP1 (ed.). Introduced parasites and predators of arthropod Epests and weeds: A world review. Agricultural Handbook, USDA, Washington, DC. pp. 137–170. 480 pp.
- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Nipaecoccus viridis* (spherical mealybug). Available online: <https://www.cabi.org/cpc/datasheet/36335> [Accessed: 27 April 2022].
- Diepenbrock LM and Burrow JD, 2020. Citrus Pest Quick Guide: Lebeck mealybug *Nipaecoccus viridis* (Newstead). Entomology and Nematology Department, UF/IFAS Extension. 1 pp. <https://doi.org/10.32473/edis-in1280-2020>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. *Nipaecoccus viridis* (NIPAVI), Categorization. Available online: <https://gd.eppo.int/taxon/NIPAVI/categorization> [Accessed: 27 April 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Nipaecoccus viridis* (NIPAVI), Distribution. Available online: <https://gd.eppo.int/taxon/NIPAVI/distribution> [Accessed: 27 April 2022]
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Franco JC, Suma P, Da Silva EB, Blumberg D and Mendel Z, 2004. Management strategies of mealybug pests of citrus in Mediterranean countries. Phytoparasitica, 30, 507. <https://doi.org/10.1007/bf02980445>
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y and Hardy NB, online. ScaleNet: A literature-based model of scale insect biology and systematics, *Nipaecoccus viridis*. Available online: <http://scalenet.info/catalogue/Nipaecoccus%20viridis/> [Accessed: 27 April 2022].

- Gerson U and Aplebaum S, online. Plant Pests of the Middle East, *Nipaecoccus viridis* (Newstead). Available online: http://www.agri.huji.ac.il/mepests/pest/Nipaecoccus_viridis/ [Accessed: 27 April 2022].
- Grousset F, Wistermann A, Steffen K, Petter F, Schrader G and Suffert M, 2016. DROPSA Deliverable 1.3 Part 7 - Report for Oranges and Mandarins – Fruit pathway and Alert List. 84 pp. Available online: <https://pra.eppo.int/pra/ca21b6c7-b3e0-46f9-b3c2-b1cc0da478ec>
- Hattingh V, Cilliers CJ and Bedford ECG, 1998. Citrus mealybugs. In: Bedford ECG, Berg MA van den, Villiers EA de (eds.). Citrus pests in the Republic of South Africa. 2nd edition (revised). Agricultural Research Council, Republic of South Africa, No. 391, 112–120.
- Jarjes SJ, Al-Mallah NM and Abdulla SI, 1989. Insects and mites pests survey on rose-bay shrubs in Mosul region with some ecological and biological aspects of *Nipaecoccus viridis* New. and *Parlatoria crypta* M on rose-bay shrubs. Mesopotamia Journal of Agriculture, 21, 29.
- Mani M and Shivaraju C, 2016. Mealybugs and their management in agricultural and horticultural crops. Berlin, Germany, Springer. 655 pp.
- Sharaf NW and Meyerdirk DE, 1987. A review on the biology, ecology and control of *Nipaecoccus viridis* (Homoptera: Pseudococcidae). Miscellaneous Publications of the Entomological Society of America, 66, 1–18.
- Thomas DD and Leppla NC, 2008. The likelihood and consequences of introduction of the spherical mealybug, *Nipaecoccus viridis* (Newstead), into Florida, and its potential effect on citrus production. Proceedings of the Florida State Horticultural Society, Florida, Department of Agriculture, 121, 152–154.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Tyson J, Rainey S, Breach J and Toy S, 2009. Import Risk Analysis: Pears (*Pyrus bretschneideri*, *Pyrus pyrifolia*, and *Pyrus* sp. nr. *communis*) fresh fruit from China. MAF Biosecurity New Zealand, Wellington. 462 pp. Available online: <https://www.mpi.govt.nz/dmsdocument/2884-Pears-Pyrus-bretschneideri-Pyrus-pyrifolia-and-Pyrus-sp.-nr.-communis-fresh-fruit-from-China-Final-Risk-Analysis-October-2009>
- Ülgentürk S, Ercan C, Yaşar B and Kaydan MB, 2022. Checklist of Turkish Coccoidea (Hemiptera: Starnorrhyncha) species. Trakya University Journal of Natural Sciences, 23, 113–129. <https://doi.org/10.23902/trkjnat.1123152>
- Wistermann A, Grousset F, Petter F, Schrader G and Suffert M, 2016. DROPSA Deliverable 1.3 Part 6 - Report on Table grapes – Fruit pathway and Alert List. 59 pp. Available online: https://www.researchgate.net/publication/322314744_Work_package_1_Pathways_of_introduction_of_fruit_pests_and_pathogens_Deliverable_13_PART_6-REPORT_on_TABLE_GRAPES-Fruit_pathway_and_Alert_List_Dropsa_EU_project_number_613678

A.14. *Phenacoccus solenopsis*

A.14.1. Organism information

| | |
|--|--|
| Taxonomic information | Current valid scientific name: <i>Phenacoccus solenopsis</i> Synonyms: <i>Phenacoccus cevalliae</i> , <i>Phenacoccus gossypiphilous</i> Name used in the EU legislation: – Order: Hemiptera Family: Pseudococcidae Common name: cotton mealybug, solenopsis mealybug Name used in the Dossier: <i>Phenacoccus solenopsis</i> |
| Group | Insects |
| EPPO code | PHENSO |
| Regulated status | <i>Phenacoccus solenopsis</i> is not regulated in the EU, neither listed by EPPO. It is a quarantine pest in Bangladesh (Islam et al., 2017). |
| Pest status in Türkiye | Present, few occurrences (EPPO, online). First found in Türkiye in 2012 on ornamental plants in the city centre of Adana (EPPO, online). |
| Pest status in the EU | Restricted, present in Cyprus, France, Italy (EPPO, online) and recently in Greece (EFSA PLH Panel, 2021a). |
| Host status on <i>Prunus</i> spp. | <i>Prunus dulcis</i> is reported as a host plant by Spodek et al. (2018). |
| PRA information | Available pest risk assessment: – Rapid pest risk analysis for <i>Phenacoccus solenopsis</i> (Cotton mealybug) and the closely related <i>P. defectus</i> and <i>P. solani</i> (Malumphy et al., 2013); |

| | |
|--|---|
| | <ul style="list-style-type: none"> – Pest risk analysis (PRA) of mealybugs spp. in Bangladesh (Islam et al., 2017); – Pest categorisation of <i>Phenacoccus solenopsis</i> (EFSA PLH Panel, 2021a). |
|--|---|

Other relevant information for the assessment

| | | |
|-------------------------|---|---|
| Biology | <p><i>P. solenopsis</i> originates from Southern California and Nevada (Spodek et al., 2018). The life cycle of <i>P. solenopsis</i> takes between 28 and 35 days. The pest can complete about 8–12 generations in a year (Fand and Suroshe, 2015). The female of <i>P. solenopsis</i> develops through an egg, three nymphal instars to an adult. The male has an additional nymphal stage, the last two are called prepupa and pupa. Males have wings and females are wingless. Reproduction is amphigonic and ovoviviparous. Adult females are pale yellow to orange and covered by a powdery wax secretion (Hodgson et al., 2008). They mate only once and lay approximately 150–600 eggs in a white, waxy ovisac (Fand and Suroshe, 2015). Facultative parthenogenesis was observed under laboratory conditions of mealybugs collected from Nagpur, India (Vennila et al., 2010). The crawlers (first-instar nymphs) disperse to other parts of the same plant or get carried by the wind or other means (machinery, workers, animals) to other areas (Hodgson et al., 2008). The adult males live from few hours up to 3 days, depending on the temperature (Hodgson et al., 2008). Adult females can live for up to 3 months (Gerson and Aplebaum, online). In winter, <i>P. solenopsis</i> populations were found on the stems, branches and root collar of hibiscus plants (Spodek et al., 2018). It overwinters as an adult female, on the bark, the stem and branches of woody plants. It has been reported developing in the soil on roots of non-woody plants (Spodek et al., 2018). This mealybug has been reported to be capable of surviving temperatures ranging from 0 to 45°C, throughout the year (CABI, online).</p> | |
| Symptoms | Main type of symptoms | <p><i>P. solenopsis</i> prefers the upper parts of the plants, young shoots or branches carrying fruitlets (Spodek et al., 2018). Large populations of mealybugs cause general weakening, distortion, defoliation, dieback and death of susceptible plants (Malumphy et al., 2013). Plants become covered in a sooty mould that develops on the honeydew produced by mealybugs. On cotton, the infested plants become stunted, growth appears to stop and most plants look dehydrated. In severe outbreaks, the bolls fail to open, and defoliation occurs (including the loss of flower buds, flowers and immature bolls) (Hodgson et al., 2008). On tomatoes, the pest causes foliar yellowing, leaf wrinkling, puckering and severe damage, resulting in death (Ibrahim et al., 2015).</p> |
| | Presence of asymptomatic plants | <p>Plant damage might not be obvious in early infestation or during dormancy (due to absence of leaves), but the mealybugs on the plants could be observed due to the presence of wax, honeydew and ants. During the crawler stage, infestation is difficult to be noted (Ben-Dov, 1994).</p> |
| | Confusion with other pests | <p><i>P. solenopsis</i> is very similar to other species of <i>Phenacoccus</i>. A microscope observation with the morphological key is needed for identification of the pest (Hodgson et al., 2008).</p> |
| Host plant range | <p><i>P. solenopsis</i> is highly polyphagous, feeding on approximately 300 plant species in 65 botanical families (EFSA PLH Panel, 2021a). The plant families containing most hosts are Amaranthaceae, Asteraceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Malvaceae and Solanaceae. Hosts include many crops grown in the EU. However, Spodek et al. (2018) reported that some of the woody plants affected by the pest, including citrus (<i>Citrus</i> spp.), almond (<i>Prunus dulcis</i>) and grapevine (<i>Vitis vinifera</i>), are not suitable for the reproduction of <i>P. solenopsis</i> in Israel. <i>P. solenopsis</i> breeds on herbaceous plants in citrus groves and vineyards. These preferred hosts desiccate during the hot summer, and the mealybugs tend to migrate on to nearby stems of the crop plant, forming conspicuous aggregates on branches and in the canopy, but also on wooden or metal posts. Mealybug development was not observed on citrus and grapevines (Arif et al., 2009; Spodek et al., 2018, EFSA PLH Panel, 2021a).</p> | |

| | |
|--|--|
| Reported evidence of impact | The main economic impact was reported on cotton, causing 30–60% yield losses in India and Pakistan (Fand and Suroshe, 2015). In Israel, it is a serious pest in greenhouses (on bell pepper, tomato, eggplant) and on cotton fields (Spodek et al., 2018). |
| Pathways and evidence that the commodity is a pathway | The pest can be present on all parts of the commodity (leaves and stem of potted plants). Other possible pathways of entry for mealybugs are plant materials of any kind (hiding in a protected site – on the bark, roots, stems, leaves), human transportation, irrigation water, wind, animals and ants (Mani and Shivaraju, 2016). |
| Surveillance information | No surveillance information for this pest is currently available from the Turkish NPPO. There is no information on whether the pest has ever been found in nurseries or their surrounding environment. |

A.14.2. Possibility of pest presence in the nursery

A.14.2.1. Possibility of entry from the surrounding environment

In Türkiye, *P. solenopsis* was detected for the first time in Adana in 2013 (Kaydan et al., 2013). Thereafter, it was recorded in Hatay and Mersin. Then, it spread to the west being recorded in Alanya, Antalya, Mugla, Aydin, Izmir and it is now present along the Mediterranean coast. The pest is very frequent on cotton, but in Izmir, it is a very serious pest also in greenhouses (EFSA PLH 2021b, citing others).

Other host plants reported in Türkiye (Kaydan et al., 2013) are *Amaranthus retroflexus*, *Chrysanthemum morifolium*, *Vinca rosea*, *Calendula officinalis*, *Hibiscus rosa-sinensis*, *Hibiscus syriacus*, *Capsicum annuum*, *Lycopersicon esculentum*, *Solanum melongena*. According to Kaydan et al. (2013), the pest was easy to detect and present with high density on all host plant surveyed in the area.

Due to its polyphagy, the pest is likely to be present in the environment surrounding the nurseries producing *P. dulcis* plants. It is possible that nurseries are located in areas where the pest is present. If host are present in the surroundings and pest pressure is high (e.g. cotton production), introduction into the nursery is likely.

Possible pathways of entry into the nurseries can be by movement of infested plants, wind, human and animal dispersal and irrigation water (Mani and Shivaraju, 2016). The first-nymph instars (crawlers) can disperse by walking and by wind (Mani and Shivaraju, 2016).

Uncertainties:

- No information about the density of the population of *P. solenopsis* in the area surrounding the nurseries is available.

Taking into consideration the above evidence and uncertainties, the panel considers that it is possible for the pest to enter the nursery from the surrounding area. The pest can be present in the surrounding areas and the transfer rate could be enhanced by wind and accidental transportation by humans.

A.14.2.2. Possibility of entry with new plants/seeds

According to the dossier, the propagation material used by export nurseries is mainly produced where *P. solenopsis* is reported to be present in Türkiye, Adana, Hatay, Mersin, Alanya, Antalya, Mugla, Aydin and Izmir and it is now present along the Mediterranean coast. Therefore, there is a possibility for the pest to be introduced with propagation material of *P. dulcis* plants.

Uncertainties:

- Location of nurseries delivering propagation material to export nurseries.
- Presence of the pest in the area where nurseries are located.
- Other host plant species introduced in export nurseries.

A.14.2.3. Possibility of spread within the nursery

If the pest is present in the nursery, it is likely to spread within the nursery during the production cycle of the plants.

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal and irrigation water (Mani and Shivaraju, 2016). The first-nymph instars (crawlers) can disperse by walking and by wind (Mani and Shivaraju, 2016).

Uncertainties:

- Other host plant species grown in the nurseries allowing *P. solenopsis* to successfully reproduce.

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

A.14.3. Information from interceptions

There are no records of notification of *P. solenopsis* on *Prunus* plants for planting neither from Türkiye nor from other countries (EUROPHYT, online; TRACES-NT, online).

There have been multiple interceptions of *P. solenopsis* in England and Netherlands (EPPO, online).

A.14.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Certified material | Yes | Nurseries are registered and inspected at least once a year with unknown inspection and sampling intensities. <i>P. solenopsis</i> has no quarantine status in Türkiye. No specific protocols are in place for this species, however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms are easily detectable. |
| 2 | Phytosanitary certificates and plant passport | Yes | <i>P. solenopsis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are provided on inspection and monitoring protocols for this species. • Limited information is available on the distribution and abundance of <i>P. solenopsis</i> in the <i>Prunus dulcis</i> growing area. |
| 3 | Rouging and pruning | Yes | Pruning can remove <i>P. solenopsis</i> infested plant parts. Information provided is poorly detailed. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4-Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>P. solenopsis</i> . <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are available on the timing and number of treatments. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---------------------------------|--------------------|--|
| 6 | Surveillance and monitoring | Yes | It can be effective, though <i>P. solenopsis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>P. solenopsis</i> in the <i>Prunus dulcis</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | Yes | It could be effective in removing the insect when present on the roots. |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | The procedures applied could be effective in detecting <i>P. solenopsis</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.14.5. Overall likelihood of pest freedom

A.14.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- Low abundance of the pest in the surrounding environment of the nursery.
- Transfer from sources in the surrounding environment to the nursery plants is very difficult for a crawling insect.
- There are no alternative host plant species present in the nursery.
- The pest is not present in the areas where the nurseries are located.
- Infestations of the mealybug are easily spotted and plants with symptoms are not exported.
- P. solenopsis* does not reproduce on *P. dulcis*.

A.14.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

High abundance of the pest in the surrounding environment of the nursery.

- P. solenopsis* is polyphagous and can be present on many host plants in the surrounding environment of the nurseries.
- P. solenopsis* has no quarantine status in Türkiye and nursery managers are unaware of the presence of the pest in the production area.
- Pesticide applications targeting other pests are not effective in controlling *P. solenopsis*.

A.14.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Based on the fact that the pest is relatively easy to detect, lower values are considered for being more likely.

A.14.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile interquartile range)

The main uncertainty is the population pressure in the surrounding environment, due to the lack of sufficient information in the dossier.

A.14.5.5. Elicitation outcomes of the assessment of the pest freedom for *Phenacoccus solenopsis*

The elicited and fitted values for *P. solenopsis* agreed by the panel are shown in Tables A.27 and A.28 and in Figure A14.

Table A.27: Elicited and fitted values of the uncertainty distribution of pest infestation by *Nipaecoccus viridis* 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 | | | | | 20 | | 40 | | 70 | | | | | 100 |
| EKE | 1.00 | 1.83 | 3.37 | 6.83 | 11.9 | 18.8 | 26.1 | 42.0 | 59.4 | 68.7 | 78.6 | 87.0 | 93.9 | 97.6 | 100.0 |

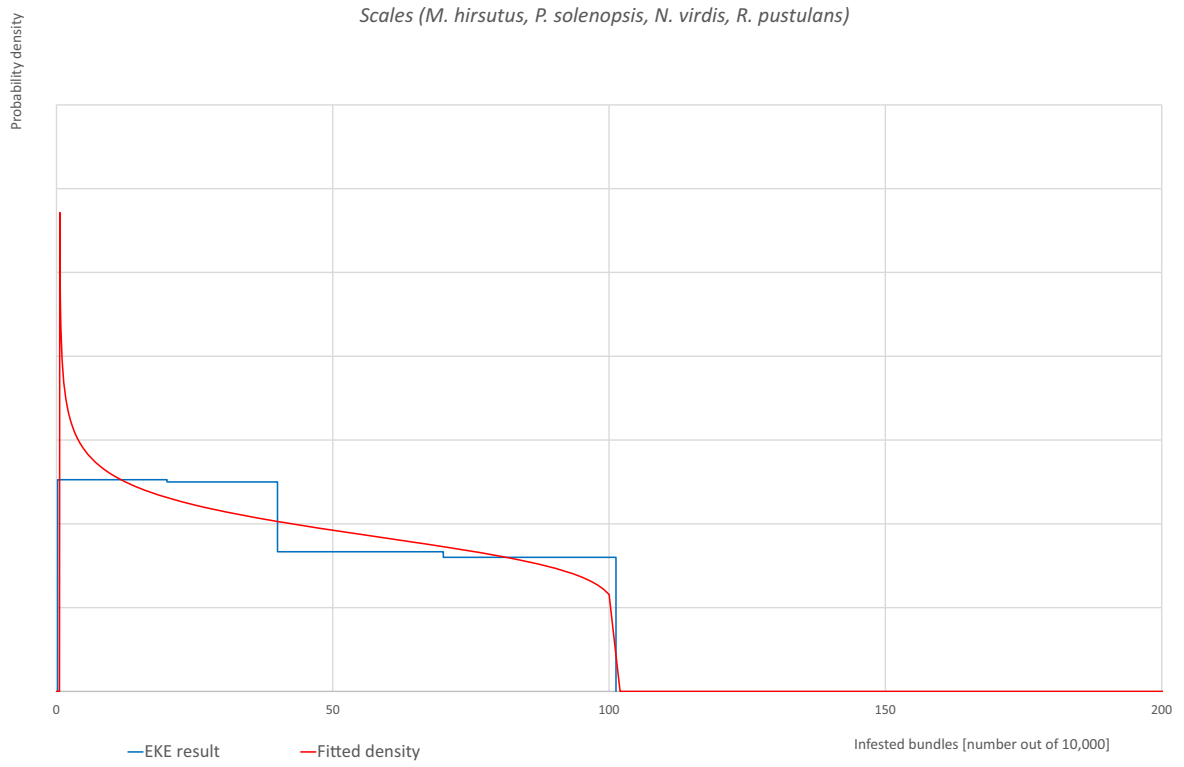
The EKE results are the BetaGeneral (0.86444, 1.127, 0.57, 102) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.28.

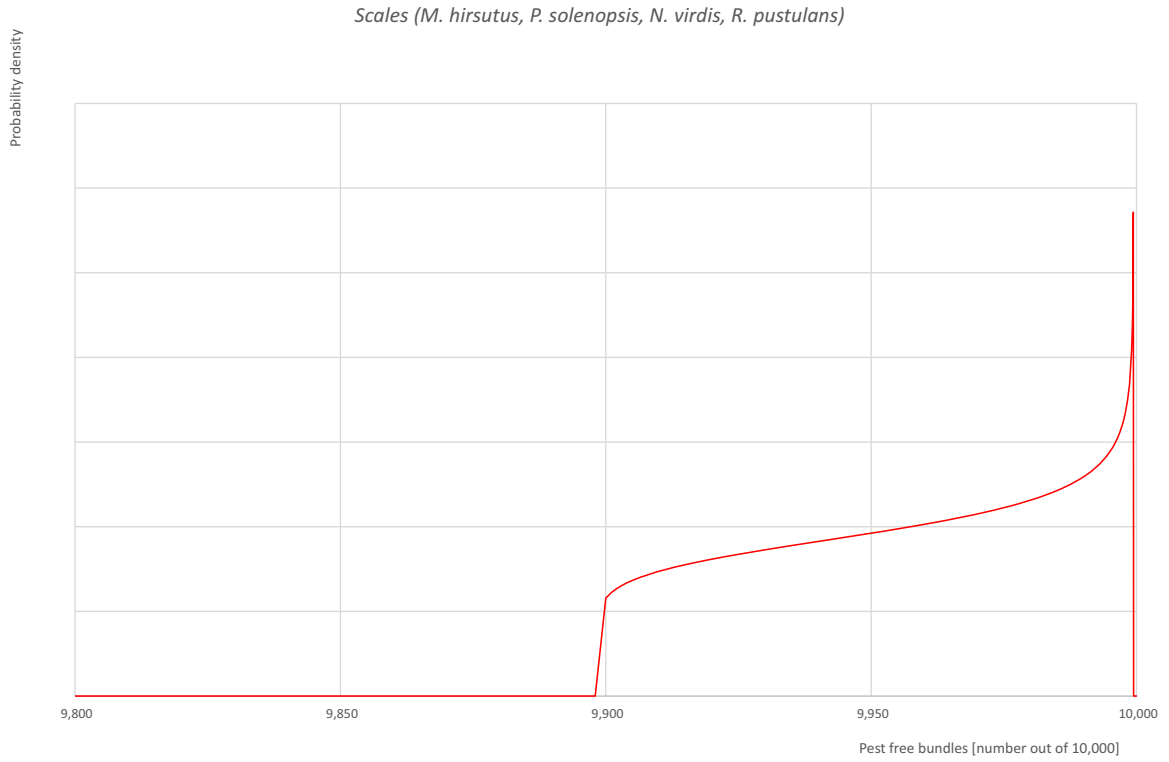
Table A.28: The uncertainty distribution of bundles free of *P. solenopsis* per 10,000 bundles calculated by Table A.27

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9900 | | | | | 9930 | | 9960 | | 9980 | | | | | 9999 |
| EKE results | 9900 | 9902 | 9906 | 9913 | 9921 | 9931 | 9941 | 9958 | 9974 | 9981 | 9988 | 9993 | 9997 | 9998 | 9999 |

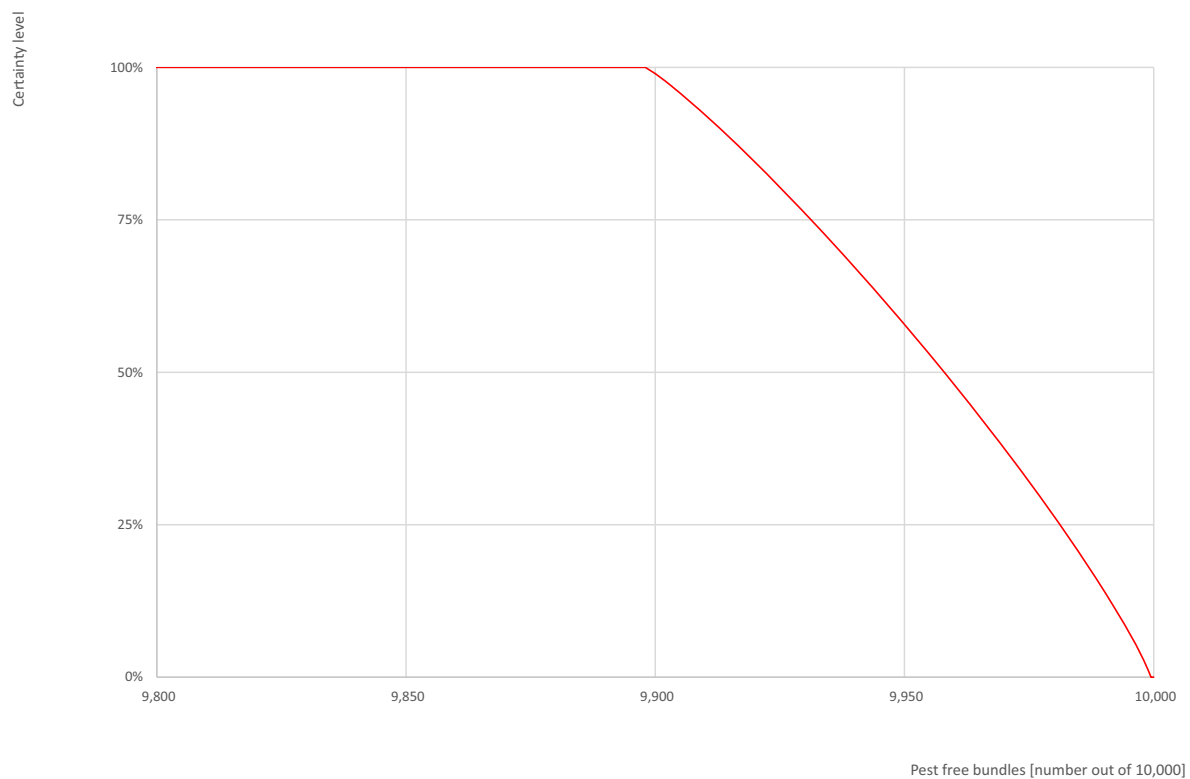
The EKE results are the fitted values.



(a)



(b)

Scales (*M. hirsutus*, *P. solenopsis*, *N. virdis*, *R. pustulans*)

(c)

Figure A.14: (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.14.6. References list

- Arif MI, Rafiq M and Ghaffar A, 2009. Host plants of cotton mealybug (*Phenacoccus solenopsis*): a new menace to cotton agroecosystem of Punjab, Pakistan. *International Journal of Agriculture and Biology*, 11, 163–167.
- Ben-Dov Y, 1994. A systematic catalogue of the mealybugs of the world (Insecta: Homoptera: Coccoidea: Pseudococcidae and Putoidae) with data on geographical distribution, host plants, biology and economic importance. 100th Intercept Limited Andover, UK. 686 pp.
- CABI (Centre for Agriculture and Bioscience International), online. Datasheet *Phenacoccus solenopsis* (cotton mealybug). Available online: <https://www.cabi.org/isc/datasheet/109097> [Accessed: 25 July 2022]
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Di Serio F, Gonthier P, Jaques Miret JA, Justesen AF, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Potting R, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Gregoire J-C, Malumphy C, Campese C, Czwieneczek E, Kertesz V, Maiorano A and MacLeod A, 2021a. Scientific Opinion on the pest categorisation of *Phenacoccus solenopsis*. *EFSA Journal* 2021;19(8):6801, 36 pp. <https://doi.org/10.2903/j.efsa.2021.6801>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Chatzivassiliou E, Debode J, Manceau C, Gardi C, Mosbach-Schulz O and Potting R, 2021b. Scientific Opinion on the commodity risk assessment of *Nerium oleander* plants from Turkey. *EFSA Journal* 2021;19(5):6569, 34 pp. <https://doi.org/10.2903/j.efsa.2021.6569>
- EPPO (European and Mediterranean Plant Protection Organization), online. *Phenacoccus solenopsis* (PHENSO), Distribution. Available online: <https://gd.eppo.int/taxon/PHENSO/distribution> [Accessed: 25 July 2022]
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions – EUROPHYT. Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].

- Fand B and Suroshe S, 2015. The invasive mealybug *Phenacoccus solenopsis* Tinsley, a threat to tropical and subtropical agricultural and horticultural production systems - a review. *Crop Protection*, 69, 34–43. <https://doi.org/10.1016/j.cropro.2014.12.001>
- Gerson U and Aplebaum S, online. Plant Pests of the Middle East, *Phenacoccus solenopsis* Tinsley. Available online: http://www.agri.huji.ac.il/mepests/pest/Phenacoccus_solenopsis/ [Accessed: 25 July 2022].
- Hodgson C, Abbas G, Arif MJ, Saeed S and Karar H, 2008. *Phenacoccus solenopsis* Tinsley (Sternorrhyncha: Coccoidea: Pseudococcidae), an invasive mealybug damaging cotton in Pakistan and India, with a discussion on seasonal morphological variation. *Zootaxa*, 1913, 1–35. <https://doi.org/10.11646/zootaxa.1913.1.1>
- Ibrahim SS, Moharum FA and El-Ghany NMA, 2015. The cotton mealybug *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) as a new insect pest on tomato plants in Egypt. *Journal of plant protection research*, 55, 48–51. <https://doi.org/10.1515/jppr-2015-0007>
- Islam KS, Ali R, Hossain A, Aminuzzaman FM, Ullah J, Alam F, Saha S and Abdullah-Al-Mahamud KM, 2017. Pest risk analysis (PRA) of mealybug spp. in Bangladesh. Strengthening Phytosanitary Capacity in Bangladesh Project. Plant Quarantine Wing Department of Agricultural Extension Khamarbari, Farmgate, Dhaka, 1205. 128 pp. Available online: http://dae.portal.gov.bd/sites/default/files/files/dae.portal.gov.bd/page/902599be_5f17_4c92_9a29_676fd187c1cc/PRA%20Mealybug%20spp.%20SPCBP%2C%20PPW%2CDAE.pdf
- Kaydan MB, Çalışkan AF and Ulusoy MR, 2013. New record of invasive mealybug *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) in Turkey. *EPPO Bulletin*, 43, 169–171. <https://doi.org/10.1111/epp.12015>
- Malumphy C, Baker R and Anderson H, 2013. Rapid pest risk analysis for *Phenacoccus solenopsis* (cotton mealybug) and the closely related *P. defectus* and *P. solani*. FERA (The Food and Environment Research Agency), UK, 8 pp.
- Mani M and Shivaraju C, 2016. Mealybugs and their management in agricultural and horticultural crops. Berlin, Germany, Springer. 655 pp.
- Spodek M, Ben-Dov Y, Mondaca L, Protasov A, Erel E and Mendel Z, 2018. The cotton mealybug, *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) in Israel: pest status, host plants and natural enemies. *Phytoparasitica*, 46, 45–55. <https://doi.org/10.1007/s12600-018-0642-1>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Vennila S, Deshmukh AJ, Pinjarkar D, Agarwal M, Ramamurthy VV, Joshi S, Kranthi KR and Bambawale OM, 2010. Biology of the mealybug, *Phenacoccus solenopsis* on cotton in the laboratory. *Journal of Insect Science*, 10, 115.

A.15. *Pochazia shantungensis*

A.15.1. Organism information

| | |
|--|---|
| Taxonomic information | Current valid scientific name: <i>Pochazia shantungensis</i> Synonyms: <i>Ricania shantungensis</i> Name used in the EU legislation: – Order: Hemiptera Family: Ricaniidae Common name: brown winged cicada Name used in the Dossier: – |
| Group | Insects |
| EPPO code | POCZSH |
| Regulated status | The pest is not regulated in the EU. <i>Pochazia shantungensis</i> is included in the EPPO Alert list since 2021 (EPPO, online_a). |
| Pest status in Türkiye | <i>Pochazia shantungensis</i> is present in Türkiye according to Hizal et al. (2019) as <i>Ricania shantungensis</i> . According to the information provided in the dossier (integration of information), the pest is present in the Marmara region. |
| Pest status in the EU | <i>Pochazia shantungensis</i> was reported in France in 2018 (Bourgoin, 2020) and is reported as 'Transient' in Germany where a few specimens were found on <i>Catalpa bungei</i> in a private garden in Baden–Württemberg, though establishment is not yet confirmed (EPPO, online_b). Very recently, it has been found in Italy (Stroinski et al., 2022). |
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> is reported as a host of <i>Pochazia shantungensis</i> (EPPO, online_c). |

| | | |
|--|---|--|
| PRA information | Available pest risk assessment: – PRA for <i>Pochazia shantungensis</i> (Schrader, 2021). | |
| Other relevant information for the assessment | | |
| Biology | <i>Pochazia shantungensis</i> lays eggs in zigzag rows and covers them with white wax filaments. The eggs hatch around mid-May to early June with the spawning season occurring in mid-August. This pest directly causes damage by sucking plant saps and laying eggs. Indirect damage could be related to sooty mould occurrence on the honeydew produced by the pest. Lower developmental threshold, thermal constant, optimal developmental temperature and upper developmental threshold were estimated to be 12.1°C, 202 DD, 31°C and 36.9°C, respectively (Baek et al., 2019). The pest is overwintering in the egg stage. Adults start to lay eggs 3–4 weeks after their emergence. From early September to October, they produce damage. As the temperature decreases, the number of adults decrease as well. Two generations per year are reported for China and one generation/year in South Korea. For other similar species (e.g. <i>Ricania speculum</i>), the number of generations in the newly invaded European areas is reduced to one per year (Rossi and Lucchi, 2015). | |
| Symptoms | Main type of symptoms | The insect causes damage by its sap feeding activity. Besides, 1-year-old twigs in which eggs are laid may die as phloem and xylem are destroyed by the ovipositing female. In addition, sooty mould develops on honeydew excreted by <i>P. shantungensis</i> and the tree vigour can decline (Choi et al., 2011). |
| | Presence of asymptomatic plants | No data available. |
| | Confusion with other pests | A morphologic description of the species, including photos and an identification key, is available at Rahman et al. (2012), a differentiation from <i>Pochazia albomaculata</i> can also be found there. Nymphal stages might be easily confused with those of <i>Ricania speculum</i> , recently introduced in Europe (Mazza et al., 2014). |
| Host plant range | The species is highly polyphagous. Kim et al. (2015) report about 138 species of host plants from 62 families, while according to Bourgoin et al. (2020), more than 200 host plants (81 families, 157 genera, 208 species) are known. <i>P. persica</i> is listed as host plant for <i>Pochazia shantungensis</i> together with maple species, apple, eggplant, ginkgo, ailanthus, cornel, blueberry, Japanese cherry, kaki, privet, paprika, rhododendron, Rubus-species, willow species, sunflower (EPPO online_c; Schrader, 2021). | |
| Reported evidence of impact | <i>P. shantungensis</i> is reported as an invasive pest in South Korea on several crops as apple, blueberries, chestnut (Jo et al., 2016). | |
| Pathways and evidence that the commodity is a pathway | In Türkiye, <i>P. shantungensis</i> was reported on <i>Ligustrum lucidum</i> and <i>Liquidambar styraciflua</i> (Hizal et al., 2019). | |
| Surveillance information | <i>P. shantungensis</i> is reported as an invasive pest in South Korea on several crops as apple, blueberries, chestnut (Jo et al., 2016). | |

A.15.2. Possibility of pest presence in the nursery

A.15.2.1. Possibility of entry from the surrounding environment

P. shantungensis is present in the Marmara Region (EFSA PLH Panel, 2021), where nurseries producing *P. persica* (Bursa) are located. Adults can spread by flying. Plants are grown in the open field. The pest is present in Türkiye, and due to its polyphagous nature, host plants are widely available in the surrounding environment. *P. shantungensis* in South Korea has spread very fast after its introduction (Jo et al., 2016) and *P. persica* is reported to be a host.

Uncertainties:

- The distribution range of the species in Türkiye is not known.
- The pest pressure in the surrounding environment is not known.

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

A.15.2.2. Possibility of entry with new plants/seeds

The pest can be introduced in the production/exporting nurseries via infested young plants coming from forest nurseries or via infested plants of other host species entering the nursery grown in the vicinity of *P. persica* plants.

Uncertainties:

- The distribution of the pest in Türkiye is not known.
- The pest pressure in the surrounding environment is not known.

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

A.15.2.3. Possibility of spread within the nursery

The pest can spread by flying. The plants are grown in an open nursery and dispersal of adults is possible. Other suitable host plant species could be present in the nursery producing *P. persica*.

Uncertainties:

- The presence of other host plant species in the nursery is not known.

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

A.15.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *P. persica* plants for planting from Türkiye due to the presence of *P. shantungensis* between the years 1995 and 2022 (EUROPHYT, online; TRACES-NT, online).

A.15.4. Evaluation of the risk mitigation options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|---|
| 1 | Certified material | Yes | <p>Potential <i>P. shantungensis</i> infestations could be easily detected, though eggs might be overlooked by non-trained personnel.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • The details of the certification process are not given (e.g. number of plants, intensity of surveys and inspections, etc.). • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 2 | Phytosanitary certificates and plant passport | Yes | <p>The procedures applied could be effective in detecting <i>P. shantungensis</i> infestations though eggs might be overlooked by non-trained personnel.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 3 | Rouging and pruning | Yes | Pruning can remove <i>P. shantungensis</i> eggs. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|-----------------------------------|--------------------|---|
| 4 | Biological and mechanical control | Yes | Natural enemies might be present in the environment. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>P. shantungensis</i> . <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | It can be effective, though <i>P. shantungensis</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>P. shantungensis</i> in the <i>Prunus persica</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying the pest. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | No | Root washing has no effect on <i>P. shantungensis</i> |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | The procedures applied could be effective in detecting <i>P. shantungensis</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.15.5. Overall likelihood of pest freedom

A.15.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- The pest has a restricted distribution in Türkiye.
- Insecticide treatments against other insects are effective.
- Visual inspection is performed by trained personnel.
- Pruning reduces infestation levels.

A.15.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- There are nurseries producing *P. persica* located near the area where *P. shantungensis* was originally recorded.
- There are no targeted insecticides treatments against *P. shantungensis*.
- There are suitable hosts in the production area and the pest is a good flyer.
- The growers could be unaware of the presence of *P. shantungensis* in the area.

- *P. shantungensis* is regarded as invasive pest and it could be more widespread in Türkiye than currently known.
- There are no targeted surveys for *P. shantungensis*.

A.15.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (median)

Based on the fact that an early infestation could be easily detected and removed, the panel judges lower values for being more likely. Therefore, the median was placed closer to the lowest scenario.

A.15.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The main uncertainty is the population pressure in the surrounding environment.

Main uncertainties:

- Data on efficacy of inspections are not available.
- Details on insecticide applications are not known.
- Data on pest pressure in the nursery areas are not available.

A.15.5.5. Elicitation outcomes of the assessment of the pest freedom for *Pochazia shantungensis* on *Prunus persica* and *Prunus dulcis*

The following tables show the elicited and fitted values for pest infestation (Table A.29) and pest freedom (Table A.30).

Table A.29: Elicited and fitted values of the uncertainty distribution of pest infestation by *P. shantungensis* 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 | | | | | 18 | | 35 | | 55 | | | | | 80 |
| EKE | 1.00 | 2.14 | 3.96 | 7.48 | 12.1 | 17.8 | 23.5 | 35.4 | 48.0 | 54.7 | 62.1 | 68.6 | 74.3 | 77.6 | 80.0 |

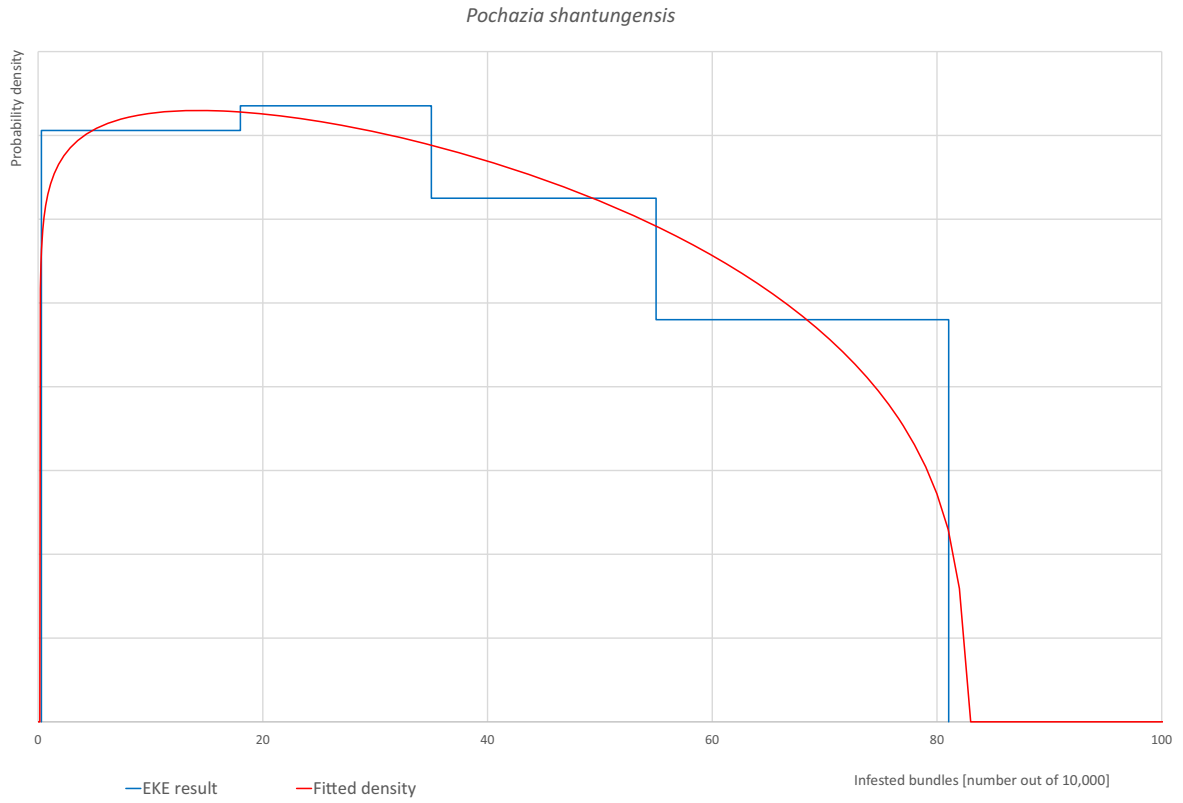
The EKE results are the BetaGeneral(1.0694,1.3347,0.16,82.5) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.30.

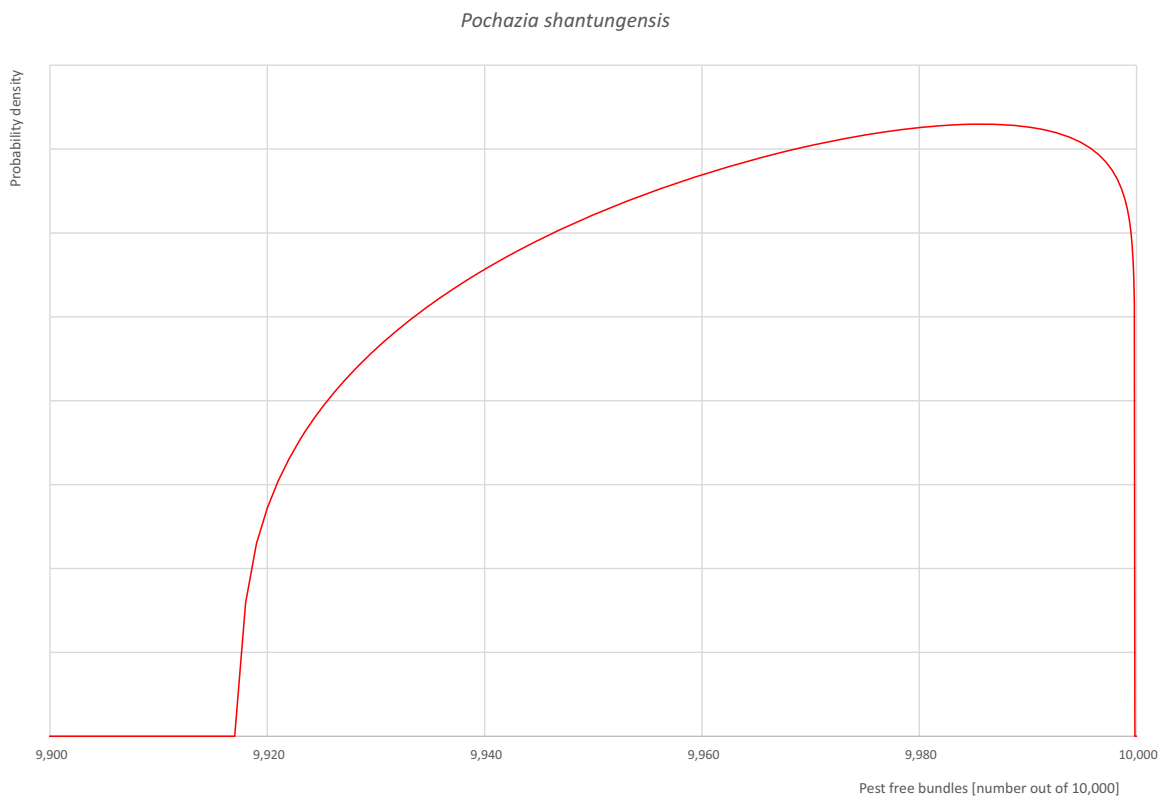
Table A.30: The uncertainty distribution of bundles free of *P. shantungensis* per 10,000 bundles calculated by Table A.29

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9920 | | | | | 9945 | | 9965 | | 9982 | | | | | 9999 |
| EKE results | 9920 | 9922 | 9926 | 9931 | 9938 | 9945 | 9952 | 9965 | 9976 | 9982 | 9988 | 9993 | 9996 | 9998 | 9999 |

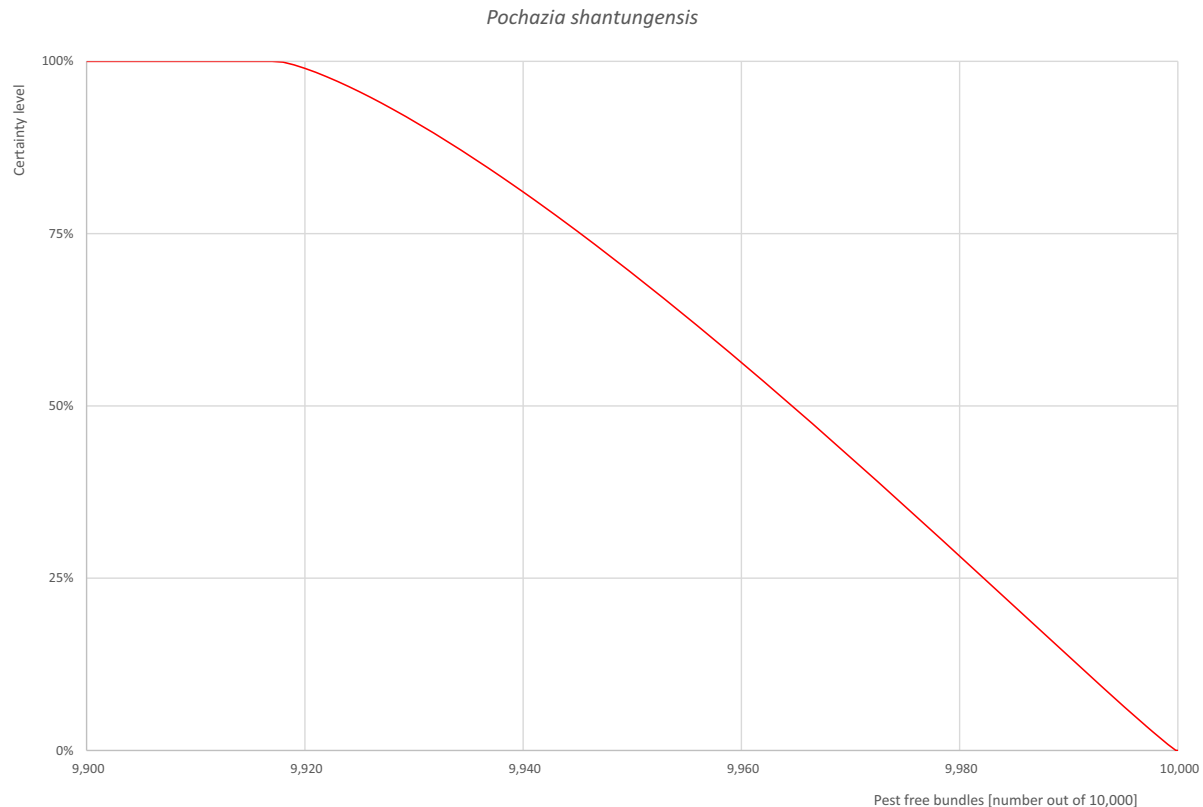
The EKE results are the fitted values.



(a)



(b)



(c)

Figure A.15: (a) Elicited uncertainty of pest infestation per 10,000 plants (histogram in blue—vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion of pest-free plants per 10,000 (i.e. = 1 – pest infestation proportion expressed as percentage); (c) descending uncertainty distribution function of pest infestation per 10,000 plants

A.15.6. References list

- Baek S, Koh SH and Lee JH, 2019. Occurrence model of first instars of *Ricania shantungensis* (Hemiptera: Ricaniidae). *Journal of Asia-Pacific Entomology*, 22, 1040–1045. <https://doi.org/10.1016/j.aspen.2019.08.010>
- Bourgoin T, Gros P and Stroiński A, 2020. *Pochazia shantungensis* (Chou & Lu, 1977), an important Asiatic invasive pest on fruit trees, first time reported from France (Hemiptera, Fulgoromorpha, Ricaniidae). *Bulletin de la Société Entomologique de France*, 125, 271–272. https://doi.org/10.32475/bsef_2150
- Choi YS, Hwang IS, Kang TJ, Lim JR and Choe KR, 2011. Oviposition characteristics of *Ricania* sp. (Homoptera: Ricaniidae), a new fruit pest. *Korean Journal of Applied Entomology*, 50, 367–372. <https://doi.org/10.5656/ksae.2011.09.0.49>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, Gonthier P, Jacques M-A, Jaques Miret JA, Justesen AF, MacLeod A, Magnusson CS, Milonas P, Navas-Cortes JA, Parnell S, Reignault PL, Thulke H-H, Van der Werf W, Vicent Civera A, Yuen J, Zappalà L, Chatzivassiliou E, Debode J, Manceau C, Gardi C, Mosbach-Schulz O and Potting R, 2021. Scientific Opinion on the commodity risk assessment of *Robinia pseudoacacia* plants from Turkey. *EFSA Journal* 2021;19(5):6568, 54 pp. <https://doi.org/10.2903/j.efsa.2021.6568>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO A2 List of pests recommended for regulation as quarantine pests, version 2021-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 21 July 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Pochazia shantungensis* (POCZSH), Distribution. Available online: <https://gd.eppo.int/taxon/POCZSH/distribution> [Accessed: 21 July 2022]
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Pochazia shantungensis* (POCZSH), Host plants. Available online: <https://gd.eppo.int/taxon/POCZSH/hosts> [Accessed: 21 July 2022]

- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Jo SH, Ryu TH, Kwon H, Seo MJ, Yu YM, Yasunaga-Aoki C and Youn YN, 2016. Ecological characteristics and environmentally friendly control strategies of *Pochazia shantungensis* (Hemiptera: Ricaniidae) in Korea. Journal of the Faculty of Agriculture, Kyushu University, 61, 299–311.
- Kim DE, Lee H, Kim MJ and Lee DH, 2015. Predicting the potential habitat, host plants, and geographical distribution of *Pochazia shantungensis* (Hemiptera: Ricaniidae) in Korea. Korean Journal of Applied Entomology, 54, 179–189. <https://doi.org/10.5656/ksae.2015.06.0.011>
- Hizal E, Oztemiz S and Gjonov I, 2019. *Ricania shantungensis* Chou & Lu 1977 (Hemiptera: Fulgoromorpha: Ricanidae) A new invasive insect species in European Turkey. Fresenius Environmental Bulletin, 28, 9816–9820.
- Rahman MA, Kwon YJ, Suh SJ, Youn YN and Jo SH, 2012. The genus *Pochazia* Amyot and Serville (Hemiptera: Ricanidae) from Korea, with a newly recorded species. Journal of Entomology, 9, 239–247. <https://doi.org/10.3923/je.2012.239.247>
- Schrader G, 2021. PRA for *Pochazia shantungensis*. Julius Kühn-Institute, Institute for national and international Plant Health, 8 pp. Available online: https://pflanzengesundheits.julius-kuehn.de/dokumente/upload/Pochazia-shantungensis_exprPRA_en.pdf
- Jo SH, Ryu TH, Kwon H, Seo MJ, Yu YM, Yasunaga-Aoki C and Youn YN, 2016. Ecological characteristics and environmentally friendly control strategies of *Pochazia shantungensis* (Hemiptera: Ricanidae) in Korea. Journal of the Faculty of Agriculture, Kyushu University, 61, 299–311. <https://doi.org/10.5109/1685886>
- Mazza G, Pennacchio F, Gargani E, Franceschini I, Roversi PF and Cianferoni F, 2014. First report of *Ricania speculum* (Walker, 1851) in Europe (Hemiptera: Fulgoromorpha: Ricanidae). Zootaxa, 3861, 297–300. <https://doi.org/10.11646/zootaxa.3861.3.7>
- Rossi E and Lucchi A, 2015. The Asian planthopper *Ricania speculum* (Walker) (Homoptera: Ricanidae) on several crops in Italy: a potential threat to the EPPO region? Bulletin OEPP/EPPO Bulletin 45, 119–122. <https://doi.org/10.1111/epp.12175>
- Stroinski A, Balderi M, Marraccini D and Mazza G 2022. First records of *Pochazia shantungensis* (Chou & Lu, 1977) (Hemiptera: Fulgoromorpha: Ricanidae) in Italy. Zootaxa, 5188, 275–282. <https://doi.org/10.11646/zootaxa.5188.3.4>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].

A.16. *Russelaspis pustulans*

A.16.1. Organism information

| | |
|-------------------------------|--|
| Taxonomic information | Current valid scientific name: <i>Russelaspis pustulans</i> Synonyms: <i>Asterodiaspis pustulans</i> , <i>Asterolecanium pustulans</i> , <i>Planchonia pustulans</i> , <i>Asterolecanium pustulans sambuci</i> , <i>Asterolecanium pustulans seychellarum</i> , <i>Asterolecanium sambuci</i> , <i>Asterolecanium morini</i> , <i>Russelaspis pustulans</i> Subspecies of <i>Russelaspis pustulans</i> : <i>Russelaspis pustulans pustulans</i> and <i>Russelaspis pustulans princeps</i> Name used in the EU legislation: – Order: Hemiptera Family: Asterolecaniidae Common name: oleander pit scale, fig pustule scale, akee fringed scale Name used in the Dossier: – |
| Group | Insects |
| EPPO code | ASTLPU |
| Regulated status | <i>Russelaspis pustulans pustulans</i> is prohibited organism in Australia (Government of Western Australia, Department of Primary Industries and Regional Development, online). |
| Pest status in Türkiye | <i>Russelaspis pustulans</i> was recorded on <i>Nerium oleander</i> in Mediterranean Region in 2022 (Çalışkan et al., 2015, Ülgentürk et al., 2022) |

| | | |
|--|--|---|
| Pest status in the EU | <i>R. pustulans</i> reported in Cyprus (Şişman and Ülgentürk, 2010) but has not been confirmed by the NPPO. It has been present in the Canary Islands (Spain) for at least 30 years (EFSA PLH Panel, 2022, citing others). For plant health purposes, the Canary Islands are outside the risk assessment area of the EU. Stumpf and Lambdin (2006) reported <i>R. pustulans</i> present in Italy and Malta but without providing details on the source of this information. Mazzeo et al. (2014) reviewed the exotic scale insects in Italy and did not mention <i>R. pustulans</i> . Mifsud et al. (2014) produced a comprehensive checklist of the scale insects of Malta but explicitly stated that no Maltese specimens of <i>R. pustulans</i> had been seen. The reports of <i>R. pustulans</i> occurring in Italy and Malta are therefore questionable. The Maltese Plant Protection Directorate communicated that the current status of the pest in Malta is unknown. Similarly, the Italian NPPO stated that the presence of the pest in the country is not known by regional services (EFSA PLH Panel, 2022). | |
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> and <i>P. armeniaca</i> are reported as a potential host (Abd El-Salam and Mangoud, 2001; EFSA PLH Panel, 2022; García Morales et al., online). | |
| PRA information | Available pest risk assessment: <ul style="list-style-type: none"> – Pest categorisation of <i>Russellaspis pustulans</i> (EFSA PLH Panel, 2022). | |
| Other relevant information for the assessment | | |
| Biology | <i>Russellaspis pustulans</i> is present in tropical and subtropical areas all over the world (Malumphy, 2014). According to El-Minshawy et al. (1971) and EFSA PLH Panel (2022), the pest is parthenogenetic, and males' stages are unknown. The pest can have two to three generations within a year and only non-gravid females are able to overwinter. The duration of the life cycle in summer can be from 93 to 120 days, in winter from 240 to 275 days. It was observed that <i>R. pustulans</i> females laid on <i>N. oleander</i> an average of 128 eggs each (range 66–192). However, Habib (1943) reported that only 50–60 eggs actually hatched. In Egypt on fig trees, females laid on average between 90 and 195 eggs/female (Abd El-Salam and Mangoud, 2001). First-instar nymphs (known as 'crawlers') are mobile and disperse by walking to other parts of the same plant or are carried by the wind, phoresy (attached to other animals, including birds) or incidentally by machinery and agricultural workers, to other areas. Once a suitable feeding site is located, they insert their stylets to feed and remain anchored to the host (EFSA PLH Panel, 2022). | |
| Symptoms | Main type of symptoms | Main symptoms of infection are formation of pits (Russell, 1941; Moursi et al., 2007; Çalışkan et al., 2015), wilting of leaves and twigs, defoliation and dieback of branches, death of trees and yield loss (Abd El-Salam and Mangoud, 2001). Infested plants by <i>R. pustulans</i> have usually symptoms of deep or shallow pits. On some plants, no pits can be observed; it all depends on the host susceptibility (Russell, 1941; Moursi et al., 2007; Çalışkan et al., 2015). Pits usually occur on stems and branches. On leaves and fruits generally, no pits can be seen (Çalışkan et al., 2015). The pest infests mainly branches and stems, but also new |
| | Presence of asymptomatic plants | Presence scales are generally obvious. However, crawlers can hide in wounds or underneath the bark. |
| | Confusion with other pests | Possibly confused with other scale insects. It requires taxonomic identification. |
| Host plant range | <i>Russellaspis pustulans</i> is a polyphagous pest and feeds on plants belonging to 69 families. Families that contain large numbers of host plants include Apocynaceae, Fabaceae, Malvaceae, Moraceae and Rosaceae. The main hosts of economic importance of <i>R. pustulans</i> are fig (<i>Ficus carica</i>), apple (<i>Malus domestica</i>), guava (<i>Psidium guajava</i>), mango (<i>Mangifera indica</i>), olive (<i>Olea europaea</i>), peach (<i>Prunus persica</i>) and other fruit and ornamental trees (EFSA PLH Panel, 2022). | |
| Reported evidence of impact | <i>Russellaspis pustulans</i> is a major pest of fig trees in Burg El-Arab although specific symptoms are not described (Hassan et al., 2012). | |

| | |
|--|---|
| Pathways and evidence that the commodity is a pathway | Plants for planting, cut branches, cut foliage and fruits. |
| Surveillance information | There is no surveillance information on whether the pest has ever been found in the nursery or their surrounding environment. |

A.16.2. Possibility of pest presence in the nursery

A.16.2.1. Possibility of entry from the surrounding environment

Russellaspis pustulans is present in Türkiye (Ülgentürk et al., 2022). Possible pathways of entry into the nursery can be movement of crawlers by wind or by animals and humans. Given the wide host range of this pest, it is possible that local populations of *R. pustulans* are present in the neighbouring environment with *Prunus* plants destined for export. There is no evidence that the nurseries are located in a pest-free area for *R. pustulans*, so the panel assumes that it can be present in the production areas of *Prunus* destined for export to the EU.

Uncertainties:

- There is no surveillance information on the presence and population pressure of *R. pustulans* in the area where the nurseries are located.
- The proximity of the nurseries to possible sources of populations of *R. pustulans* is unknown.

Taking into consideration the above evidence and uncertainties, the panel considers that it is possible that *R. pustulans* can enter nurseries from the surrounding area.

A.16.2.2. Possibility of entry with new plants/seeds

According to additional information provided by NPPO Türkiye, the source of the planting material to produce *Prunus* grafting material and some rootstocks for export is from approved mother plants in an approved nursery. Some rootstocks are plants of *P. armeniaca* grown from seed from an approved source and therefore entry via this pathway is not likely; however, initial infestations (crawlers) can be overlooked by non-trained personnel.

Uncertainties:

- No details if certified material is screened for this pest.

Taking into consideration the above evidence and uncertainties, the Panel considers it possible that the pest could enter the nursery, especially at initial infestation stages.

A.16.2.3. Possibility of spread within the nursery

Possible pathways of spreading within the nursery can be by movement of infested plants, wind, human and animal dispersal.

Uncertainties:

- There is uncertainty on whether plants are transplanted within the nurseries.

Taking into consideration the above evidence and uncertainties, the panel considers that the transfer of the pest within the nursery is possible. Spread within the nursery could be enhanced by movement of infested plants, by wind, human and animal dispersal.

A.16.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus dulcis* and *Prunus persica* plants for planting neither from Türkiye nor from other countries due to the presence of *Russellaspis pustulans* between the years 1995 and August 2022 (EUROPHYT, online; TRACES-NT, online). In 2008, *R. pustulans* was intercepted on plants of *Psidium* sp. and *Solanum melongena* and coming from India to UK in 2008.

A.16.4. Evaluation of the risk reduction options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|---|
| 1 | Certified material | Yes | Nurseries are registered and inspected at least once a year with unknown inspection and sampling intensities. No specific protocols are in place for this species; however, the observation of the vegetal material may be useful to prevent its presence also given that the symptoms are easily detectable. |
| 2 | Phytosanitary certificates and plant passport | Yes | <i>R. pustulans</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on inspection and monitoring protocols for this species. Limited information is available on the distribution and abundance of <i>R. pustulans</i> in the <i>Prunus persica</i> growing area. |
| 3 | Rouging and pruning | Yes | Pruning can remove <i>R. pustulans</i> infested plant parts. Information provided is poorly detailed. <u>Uncertainties:</u> <ul style="list-style-type: none"> Early infestations can be overlooked. |
| 4 | Biological and mechanical control | Yes | Natural enemies can be present in the environment. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on abundance and efficacy of the natural enemies. |
| 5 | Pesticide application | Yes | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) though targeting other pests may be effective in controlling <i>R. pustulans</i> <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are available on the timing and number of treatments. |
| 6 | Surveillance and monitoring | Yes | It can be effective, though <i>R. pustulans</i> is not listed among harmful organisms monitored or tested for the presence on plants for planting in Türkiye. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on surveillance and monitoring protocols during the production cycle for this species. Limited information is available on the distribution and abundance of <i>R. pustulans</i> in the <i>Prunus persica</i> growing area. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying eggs, nymphs and adults. <u>Uncertainties:</u> <ul style="list-style-type: none"> No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | Yes | It could be effective in removing the insect when present on the roots. |

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|--------------------------------|--------------------|---|
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | The procedures applied could be effective in detecting <i>R. pustulans</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> Specific figures on the intensity of survey (sampling effort) are not provided. |

A.16.5. Overall likelihood of pest freedom

A.16.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- *R. pustulans* is present in Türkiye, however not in nursery surrounding areas, therefore low pest pressure is present from environment
- Inspections are expected to be effective because sessile stages of the insect are visible.
- Insecticide treatments are expected to be conducted at the right timing to target unprotected life stages of the insect.
- Mother plants are kept healthy as well by using treatments
- *Prunus persica* is considered a minor host.

A.16.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- *Russellaspis pustulans* is present in surrounding areas and due to wind and intensive human activity, there is a high pressure from environment.
- Inspections are expected to be ineffective because of the presence of hidden stages (crawlers).
- *Prunus persica* and *P. armeniaca* (rootstock) are considered as a major host.
- Insecticide treatments are expected to be conducted at timing when the insect is protected by wax.
- Mother plants are infested despite treatments and may contribute spreading the pest within the nursery.

A.16.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Taking into consideration the following: the pest pressure outside the nursery and the likelihood of introduction into the nursery by wind and human activity, the internal spread and the absence of reported problems within the nursery and at EU borders, the Panel assumes a lower central scenario.

A.16.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

- The main uncertainty is the population pressure in the surrounding environment, due to the lack of sufficient information in the dossier.

A.16.5.5. Elicitation outcomes of the assessment of the pest freedom for *Russelaspis pustulans*

The elicited and fitted values for *Russelaspis pustulans* agreed by the Panel are shown in Tables A.31 and A.32 and in Figure A.16.

Table A.31: Elicited and fitted values of the uncertainty distribution of pest infestation by *Russelaspis pustulans* 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 | | | | | 20 | | 40 | | 70 | | | | | 100 |
| EKE | 1.00 | 1.83 | 3.37 | 6.83 | 11.9 | 18.8 | 26.1 | 42.0 | 59.4 | 68.7 | 78.6 | 87.0 | 93.9 | 97.6 | 100.0 |

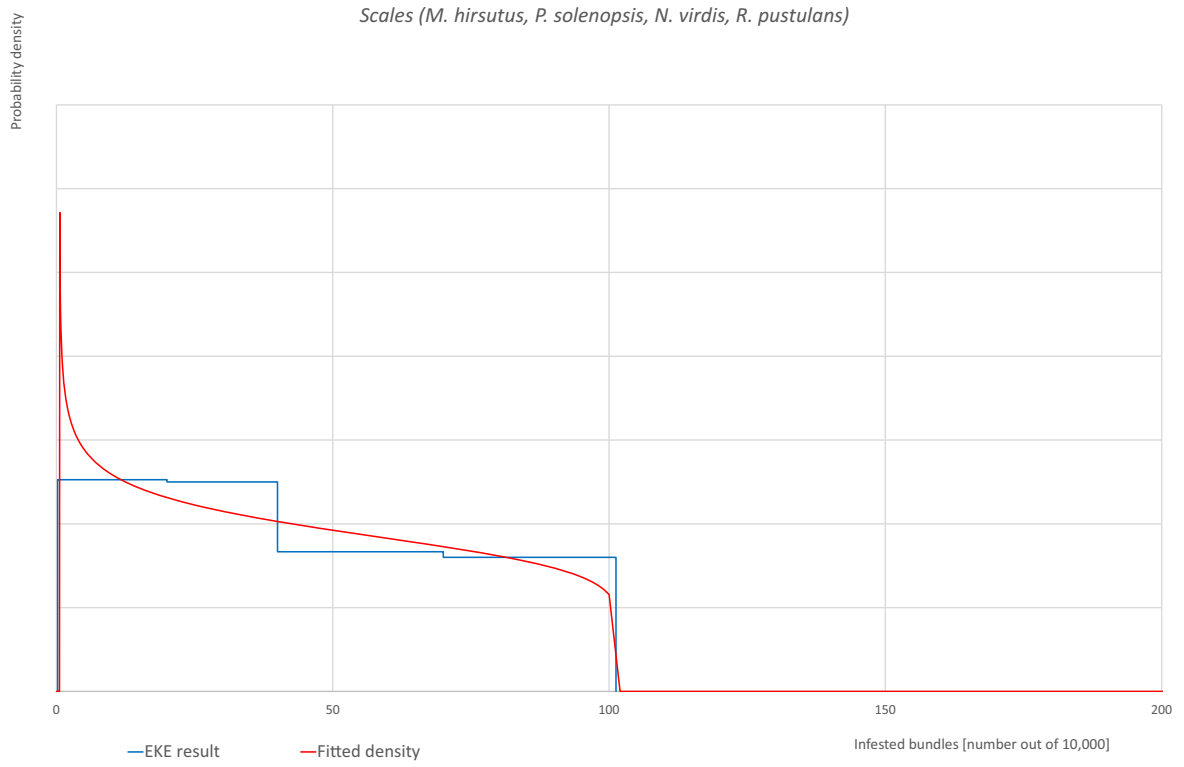
The EKE results are the BetaGeneral(0.86444,1.127,0.57,102) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.32.

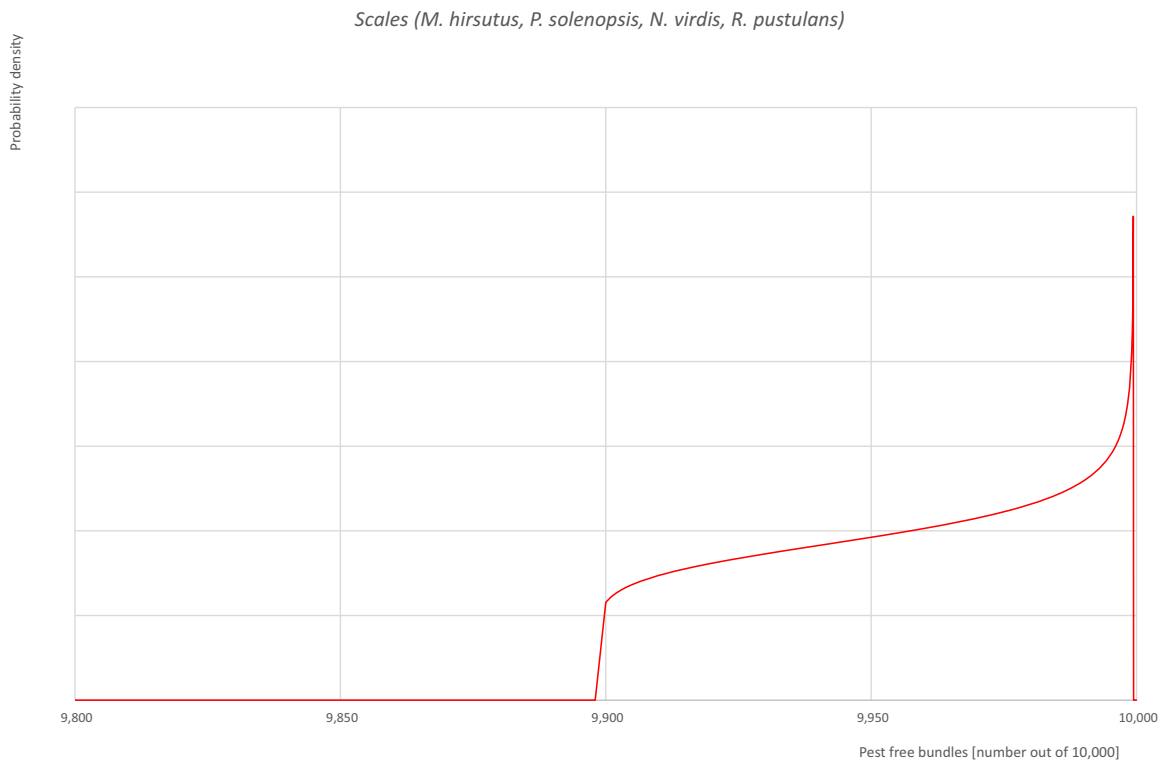
Table A.32: The uncertainty distribution of bundles free of *Russelaspis pustulans* per 10,000 bundles calculated by Table A.31

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9900 | | | | | 9930 | | 9960 | | 9980 | | | | | 9999 |
| EKE results | 9900 | 9902 | 9906 | 9913 | 9921 | 9931 | 9941 | 9958 | 9974 | 9981 | 9988 | 9993 | 9997 | 9998 | 9999 |

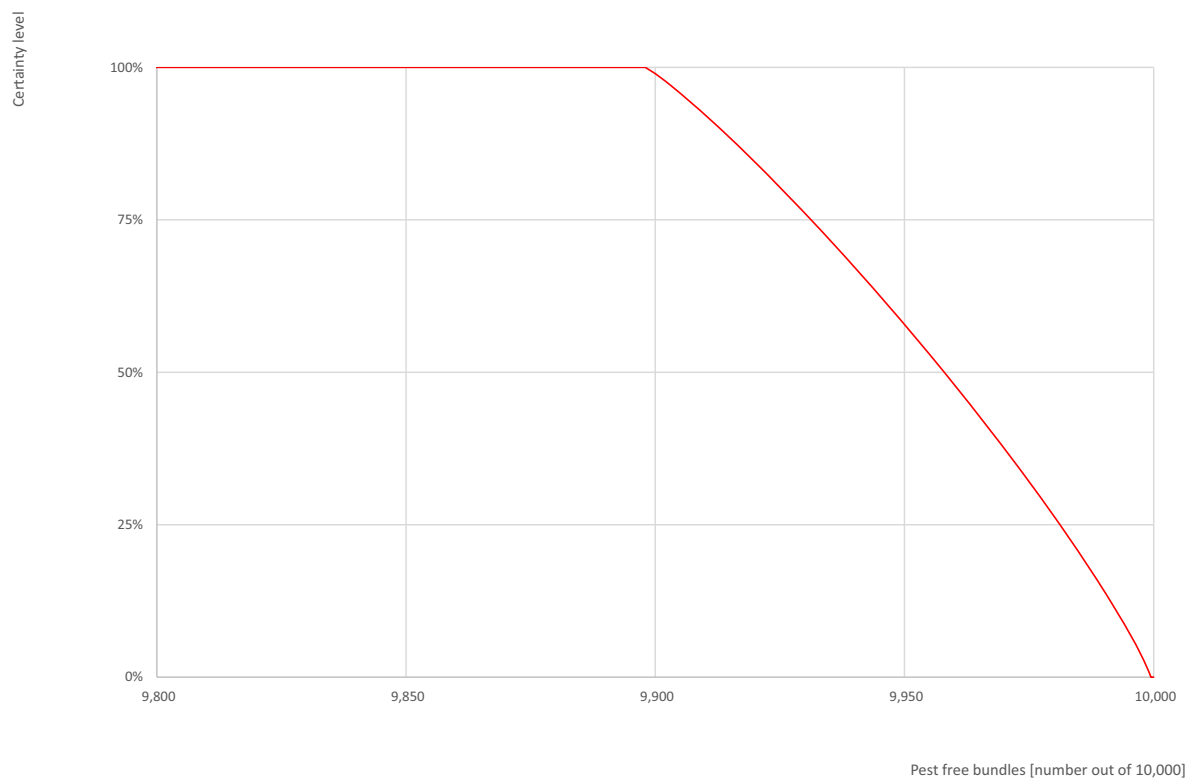
The EKE results are the fitted values.



(a)



(b)

Scales (*M. hirsutus*, *P. solenopsis*, *N. virdis*, *R. pustulans*)

(c)

Figure A.16: (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.16.6. References list

- Abd El-Salam A and Mangoud H, 2001. Development and implementation of integrated pest management to programs of apple trees in reclaimed lands in Egypt: I-The Fig Scale Insect (FSI), *Russellaspis (Asterolecanium) pustulans* (Cockerell). *Journal of Agriculture in the Tropics and Subtropics*, 102, 33–44.
- Çalışkan AF, Kaydan MB, Satar S and Ulusoy MR, 2015. First record of *Russellaspis pustulans* (Cockerell) (Hemiptera: Asterolecaniidae) in Turkey. *Turkish Journal of Zoology*, 39, 715–716. <https://doi.org/10.3906/zoo-1406-2>
- EFSA PLH Panel (EFSA Panel on Plant Health), Bragard, C, Baptista, P, Chatzivassiliou, E, Di Serio, F, Gonthier, P, Jaques Miret, JA, Justesen, AF, MacLeod, A, Magnusson, CS, Milonas, P, Navas-Cortes, JA, Parnell, S, Potting, R, Reignault, PL, Stefani, E, Thulke, H-H, Van der Werf, W, Vicent Civera, A, Yuen, J, Zappalà, L, Grégoire, J-C, Malumphy, C, Kertesz, V, Maiorano, A and MacLeod, A, 2022. Scientific Opinion on the pest categorisation of *Russellaspis pustulans*. *EFSA Journal* 2022;20(6):7335, 29 pp. <https://doi.org/10.2903/j.efsa.2022.7335>
- El-Minshawy AM, El-Sawaf SK, Hammad SM and Donia A, 1971. The biology of *Asterolecanium pustulans* Cockerell in Alexandria district [Hemiptera-Homoptera: Asterolecaniidae]. *Faculty of Agriculture, Alexandria University, Bulletin de la Société entomologique d'Égypte*, LV, 441–446.
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y and Hardy NB, online. ScaleNet: A literature-based model of scale insect biology and systematics, *Russellaspis pustulans*. Available online: <http://scalenet.info/catalogue/Russellaspis%20pustulans/> [Accessed: 24 August 2022].
- Government of Western Australia, Department of Primary Industries and Regional Development, online. *Russellaspis pustulans pustulans* (Cockerell, 1892). Available online: <https://www.agric.wa.gov.au/organisms/109862> [Accessed: 15 July 2022].

- Habib A, 1943. The biology and bionomics of *Asterolecanium pustulans* Ckll. Bulletin de la Société entomologique d'Égypte, 27, 87–111.
- Hassan NA, Radwan SG and El-Sahn OMN, 2012. Common scale insects (Hemiptera: Coccoidea) in Egypt. Egyptian Academic Journal of Biological Sciences, 5, 153–160.
- Malumphy C, 2014. An annotated checklist of scale insects (Hemiptera: Coccoidea) of Saint Lucia, Lesser Antilles. Zootaxa, 3846, 69–86. <https://doi.org/10.11646/zootaxa.3846.1.3>
- Mazzeo G, Longo S, Pellizzari G, Porcelli F, Suma P and Russo A, 2014. Exotic scale insects (Coccoidea) on ornamental plants in Italy: a never-ending story. Acta Zoologica Bulgarica, 6, 55–61.
- Mifsud D, Mazzeo G, Russo A and Watson GW, 2014. The scale insects (Hemiptera: Coccoidea) of the Maltese archipelago. Zootaxa, 3866, 499–525. <https://doi.org/10.11646/zootaxa.3866.4.3>
- Moursi GA, Moussa SFM, Fatma AA and Basma A, 2007. Seasonal abundance of the fig pustule scale Insect, *Rusalaspis pustulans* Cockerell (Homoptera: Asterolecaniidae) and its parasitoids in Middle Egypt. Plant protection Research, Institute, Agriculture Research centre, Giza, Egypt. 19 pp.
- Russell LM, 1941. A classification of the scale insect genus *Asterolecanium* (Vol. 424). US Department of Agriculture. 322 pp. <https://doi.org/10.5962/bhl.title.65621>
- Şişman S and Ülgentürk S, 2010. Scale insects species (Hemiptera: Coccoidea) in the Turkish republic of northern Cyprus. Turkish Journal of Zoology, 34, 219–224. <https://doi.org/10.3906/zoo-0901-23>
- Stumpf CF and Lambdin PL, 2006. Pit scales (Sternorrhyncha-Coccoidea) of North and South America. Tennessee Agricultural Experiment Station.
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Ülgentürk S, Ercan C, Yaşar B and Kaydan MB, 2022. Checklist of Turkish Coccoidea (Hemiptera: Sternorrhyncha) species. Trakya University Journal of Natural Sciences, 23, 113–129. <https://doi.org/10.23902/trkjnat.1123152>

A.17. *Scirtothrips dorsalis*

A.17.1. Organism information

| | |
|-------------------------------|---|
| Taxonomic information | <p>Current valid scientific name: <i>Scirtothrips dorsalis</i></p> <p>Synonyms: <i>Anaphothrips andreae</i>, <i>Anaphothrips dorsalis</i>, <i>Anaphothrips fragariae</i>, <i>Heliothrips minutissimus</i>, <i>Neophysopus fragariae</i>, <i>Scirtothrips andreae</i>, <i>Scirtothrips dorsalis padmae</i>, <i>Scirtothrips fragariae</i>, <i>Scirtothrips minutissimus</i>, <i>Scirtothrips padmae</i></p> <p>Name used in the EU legislation: <i>Scirtothrips dorsalis</i> Hood [SCITDO]</p> <p>Order: Thysanoptera</p> <p>Family: Thripidae</p> <p>Common name: Assam thrips, chilli thrips, flower thrips, strawberry thrips, yellow tea thrips, castor thrips</p> <p>Name used in the Dossier: <i>Scirtothrips dorsalis</i></p> |
| Group | Insects |
| EPPO code | SCITDO |
| Regulated status | <p>The pest is listed in Annex II of Commission Implementing Regulation (EU) 2019/2072 as <i>Scirtothrips dorsalis</i> Hood [SCITDO].</p> <p><i>Scirtothrips dorsalis</i> is included in the EPPO A2 list (EPPO, online_a).</p> <p>The species is a quarantine pest in Israel, Mexico, Morocco and Tunisia. It is on A1 list of Brazil, Chile, Egypt, Kazakhstan, Russia, Türkiye, Ukraine, United Kingdom and EAEU (Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia). It is on A2 list of Bahrain (EPPO, online_b).</p> |
| Pest status in Türkiye | <p>According to EPPO (online_c), pest is present in Türkiye with few occurrences reported. Firstly, was reported on blueberries (<i>Vaccinium myrtillus</i>) in October 2020 in Adana province, and after applying insecticides, the pest was considered eradicated (EPPO Reporting Service (2021/153), Atakan and Pehlivan 2021a,b).</p> <p>In the following year, the insect was detected on orange trees (<i>Citrus sinensis</i>) in an orchard in Antalya province, on strawberry (<i>Fragaria x ananassa</i>) in Adana province (Atakan and Pehlivan, 2021a,b).</p> |
| Pest status in the EU | <i>Scirtothrips dorsalis</i> is present with restricted distribution in Spain and transient in Denmark and the Netherlands (EPPO, online_c). |

| | | |
|--|--|--|
| Host status on <i>Prunus</i> spp. | <i>Prunus persica</i> and <i>Prunus armeniaca</i> are considered hosts (Ohkubo, 1995; Zhang et al., 2004; Meissner et al., 2005). | |
| PRA information | <p>Available pest risk assessments:</p> <ul style="list-style-type: none"> – CSL pest risk analysis for <i>Scirtothrips dorsalis</i> (MacLeod and Collins, 2006); – Pest risk assessment <i>Scirtothrips dorsalis</i> (Vierbergen and van der Gaag, 2009); – Scientific opinion on the pest categorisation of <i>Scirtothrips dorsalis</i> (EFSA PLH Panel, 2014); – UK Risk Register Details for <i>Scirtothrips dorsalis</i> (DEFRA, online). | |
| Other relevant information for the assessment | | |
| Biology | <p>The pest can have between 8 in temperate regions and up to 18 generations annually in warm subtropical and tropical areas (Kumar et al., 2013).</p> <p>The stages of the life cycle include egg, first and second instar larva, prepupa, pupa and adult (Kumar et al., 2013). They can be found on all the aboveground plant parts (Kumar et al., 2014). Temperature threshold for development is 9.7°C and 32°C, with 265 degree-days required for development from egg to adult (Tatara, 1994). The adult can live up to 13–15 days (Kumar et al., 2013).</p> <p>Females can lay between 60 and 200 eggs in their lifetime (Seal and Klassen, 2012). Females develop from fertilised and males from unfertilised eggs (Kumar et al., 2013). The eggs are inserted into soft plant tissues and hatching nymphs appear between 2 and 7 days (Kumar et al., 2014).</p> <p>Larvae and adults tend to gather near the mid-vein or near the damaged part of leaf tissue. Pupae are found in the leaf litter, on the axils of the leaves, in curled leaves or under the calyx of flowers and fruits (Kumar et al., 2013; MacLeod and Collins, 2006).</p> <p>The pest cannot overwinter, if the temperature remains below -4°C for 5 or more days the pest dies (Nietschke et al., 2008).</p> <p>Reached sexual maturation, both males and females mate polygamously. Mating occurs in summer (from May to August) on trunks and main branches, usually at least 60 cm from the trunk collar (CABI, online).</p> <p>Adults fly actively for short distances and are transported passively by wind currents, which enables long-distance spread (EFSA PLH Panel, 2014).</p> <p><i>S. dorsalis</i> is a vector of plant viruses including peanut necrosis virus (PBNV), groundnut bud necrosis virus (GBNV), watermelon silver mottle virus (WsmoV), capsicum chlorosis virus (CaCV) and melon yellow spot virus (MYSV) (Kumar et al., 2013).</p> | |
| Symptoms | Main type of symptoms | <p>The pest damages young leaves, buds, tender stems and fruits by puncturing tender tissues with their stylets and extracting the contents of individual epidermal cells leading to necrosis of tissue (Kumar et al., 2013).</p> <p>According to Kumar et al (2013) and Kumar et al (2014), main symptoms are:</p> <ul style="list-style-type: none"> – sandy paper lines' on the epidermis of the leaves, – leaf crinkling and upwards leaf curling, – leaf size reduction, – discoloration of buds, flowers and young fruits, – silvering of the leaf surface, – linear thickenings of the leaf lamina, – brown frass markings on the leaves and fruits, – fruits develop corky tissues, – grey to black markings on fruits, – fruit distortion and early senescence of leaves, – defoliation. |

| | | |
|--|--|--|
| | Presence of asymptomatic plants | Eggs and early stages of infestation may be difficult to detect. |
| | Confusion with other pests | Sometimes, infested plants appear like plant damaged by broad mites (Kumar et al., 2013). Due to small size and morphological similarities within the genus, the identification is difficult. The proper identification of the pest requires use of molecular and morphological methods (Kumar et al., 2013). |
| Host plant range | <i>S. dorsalis</i> is a polyphagous pest with over 225 host plant species (see Section 3.4.1) of EFSA PLH Panel (2014). | |
| Reported evidence of impact | <i>Scirtothrips dorsalis</i> is an EU quarantine pest. | |
| Pathways and evidence that the commodity is a pathway | Plants for planting and fruits. The pest is mainly found on leaves, but also branches, trunks, shoots and fruit of the host plants (CABI, online). | |
| Surveillance information | There is no information available to assess whether the pest has ever been found in the nurseries or surrounding environment of the nurseries. | |

A.17.2. Possibility of pest presence in the nursery

A.17.2.1. Possibility of entry from the surrounding environment

In Türkiye, *S. dorsalis* is reported to be present with few occurrences. *S. dorsalis* is not reported on *Prunus persica* or *P. armeniaca* in Türkiye. Given the wide host range of this pest, it is possible that local populations of *S. dorsalis* are present in the neighbouring environment with *Prunus* plants destined for export. There is no evidence that the nurseries are located in a pest-free area for *S. dorsalis*, so the Panel assumes that *S. dorsalis* can be present in the production areas of *Prunus* destined for export to the EU.

Uncertainties:

- There is no surveillance information on the presence and population pressure of *S. dorsalis* in the area where the nurseries are located.
- The proximity of the nurseries to possible sources of populations of *S. dorsalis* is unknown.

Taking into consideration the above evidence and uncertainties, the Panel considers that it is possible that *S. dorsalis* can enter nurseries from the surrounding area.

A.17.2.2. Possibility of entry with new plants/seeds

The source of the planting material to produce *Prunus* originates from officially approved nurseries. Most of the rootstock material comes from tissue culture; therefore, entry off the pest with new plants is highly unlikely, but it cannot be excluded that *S. dorsalis* is present on plants of peach or nectarine.

Uncertainties:

- Eggs and early stages of infestation may be overlooked in young shoots.

Taking into consideration the above evidence and uncertainties, the Panel considers that the pest could enter the nursery with new plants/seeds.

A.17.2.3. Possibility of spread within the nursery

The insect within the nursery can spread or hitchhike on clothing of nursery staff. Local populations may first establish on mother plants or to other plant species that may be grown close to the plants destined for export and subsequently spread to new plants. It can spread with wind passively (carried by wind).

Taking into consideration the above evidence and uncertainties, the Panel considers that the transfer of the pest within the nursery is possible, as both males and females fly, the pest is polyphagous and potentially able to shift among hosts, within *Prunus* genus.

Uncertainties:

- It is unknown if inspections before export are targeted on the pest and their procedures.
- The pest status of *S. dorsalis* within the infested nurseries is unknown.

A.17.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notification of *Prunus persica* or *P. armeniaca* plants for planting neither from Türkiye nor from other countries due to the presence between the years 1995 and August 2022 (EUROPHYT, online; TRACES-NT, online).

A.17.4. Evaluation of the risk reduction options

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

| No. | Risk mitigation measure (name) | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|---|
| 1 | Certified material | Yes | Nurseries are registered and inspected at least once a year with unknown inspection and sampling intensities. <i>S. dorsalis</i> is on A1 list in Türkiye. |
| 2 | Phytosanitary certificates and plant passport | Yes | The procedures applied could be effective in detecting <i>S. dorsalis</i> infestations though some life stages might be overlooked by non-trained personnel. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Specific figures on the intensity of survey (sampling effort) are not provided. |
| 3 | Rouging and pruning | Yes | Rouging and pruning can eliminate infested plants and leaves on the infested plants. |
| 4 | Biological and mechanical control | No | Predators and parasitoids exist; however, no information is provided by applicant. |
| 5 | Pesticide application | No | The pesticides listed in the additional information provided by the third country (Annex 4 – Technical Guidelines for Integrated Control for Peach and Nectarine) could be effective in controlling <i>S. dorsalis</i> ; however, no details are provided. |
| 6 | Surveillance and monitoring | Yes | <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are provided on surveillance and monitoring protocols during the production cycle for this species. • Even though <i>S. dorsalis</i> is on A1 list in Türkiye, details of surveillance were not provided. |
| 7 | Sampling and laboratory testing | Yes | <u>Evaluation:</u> Sampling and subsequent laboratory observation might be useful in identifying the pest. <u>Uncertainties:</u> <ul style="list-style-type: none"> • No details are provided on sampling procedures targeting arthropods. |
| 8 | Root washing | Yes | Removal of soil and plant debris could be effective. |
| 9 | Refrigeration | Yes | Low temperatures can slow down its development but not kill the insect. |
| 10 | Pre-consignment inspection | Yes | The procedures applied could be effective in detecting <i>S. dorsalis</i> infestation. <u>Uncertainties:</u> <ul style="list-style-type: none"> • Specific figures on the intensity of survey (sampling effort) are not provided. |

A.17.5. Overall likelihood of pest freedom

A.17.5.1. Reasoning for a scenario which would lead to a reasonably low number of infested consignments

- *Prunus* spp. is considered a secondary host.
- Certified nurseries are located mainly in the part of the country where *S. dorsalis* is not reported.
- Pesticide applications targeting other pests are effective in controlling *S. dorsalis*.
- Regular inspections by phytosanitary authorities are effective and further help to reduce infestation by this pest.

A.17.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested consignments

- *Prunus* spp. is an important host.
- Certified nurseries are located mainly in the part of the country, where *S. dorsalis* is widely distributed.
- Pesticide applications targeting other pests are not effective in controlling *S. dorsalis*.
- Visual inspections of *Prunus* spp. plants are not effective in detecting early infestations of *S. dorsalis*.

A.17.5.3. Reasoning for a central scenario equally likely to over- or underestimate the number of infested consignments (Median)

Based on the fact that commodity is transported without leaves as well as that infestation starts from bottom in the basal part which is rootstock coming from seed and tissue culture, the panel judges lower values for being more likely.

A.17.5.4. Reasoning for the precision of the judgement describing the remaining uncertainties (1st and 3rd quartile/interquartile range)

The main uncertainty is the population pressure in the surrounding environment, due to the lack of sufficient information in the dossier.

A.17.5.5. Elicitation outcomes of the assessment of the pest freedom for *Scirtothrips dorsalis*

The elicited and fitted values for *Scirtothrips dorsalis* agreed by the Panel are shown in Tables A.33 and A.34 and in Figure A.17.

Table A.33: Elicited and fitted values of the uncertainty distribution of pest infestation by *Scirtothrips dorsalis* per 10,000 bundles

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Elicited values | 3 | | | | | 30 | | 50 | | 80 | | | | | 120 |
| EKE | 3.00 | 5.19 | 8.32 | 13.8 | 20.6 | 28.5 | 36.3 | 52.2 | 69.2 | 78.6 | 89.1 | 99.1 | 108.5 | 114.7 | 119.8 |

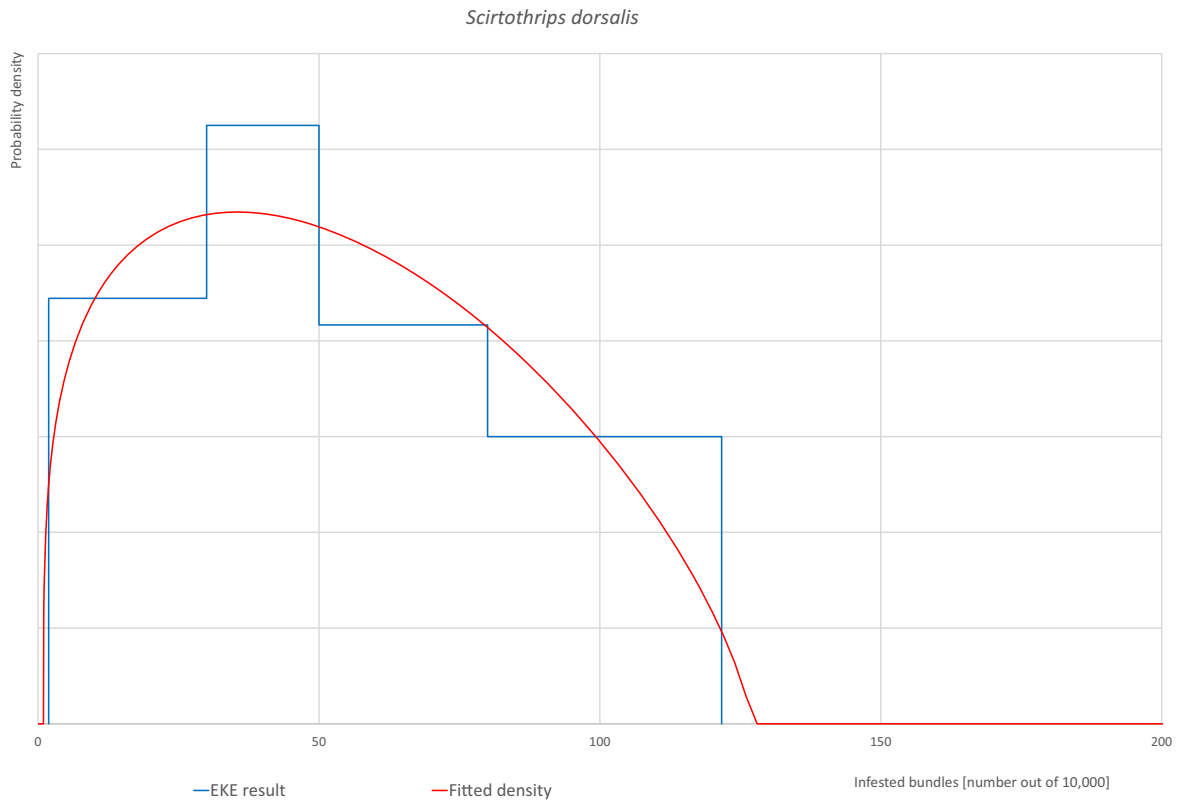
The EKE results are BetaGeneral (1.2722, 1.7222, 0.95, 127) distribution fitted with @Risk version 7.6.

Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – the number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.34.

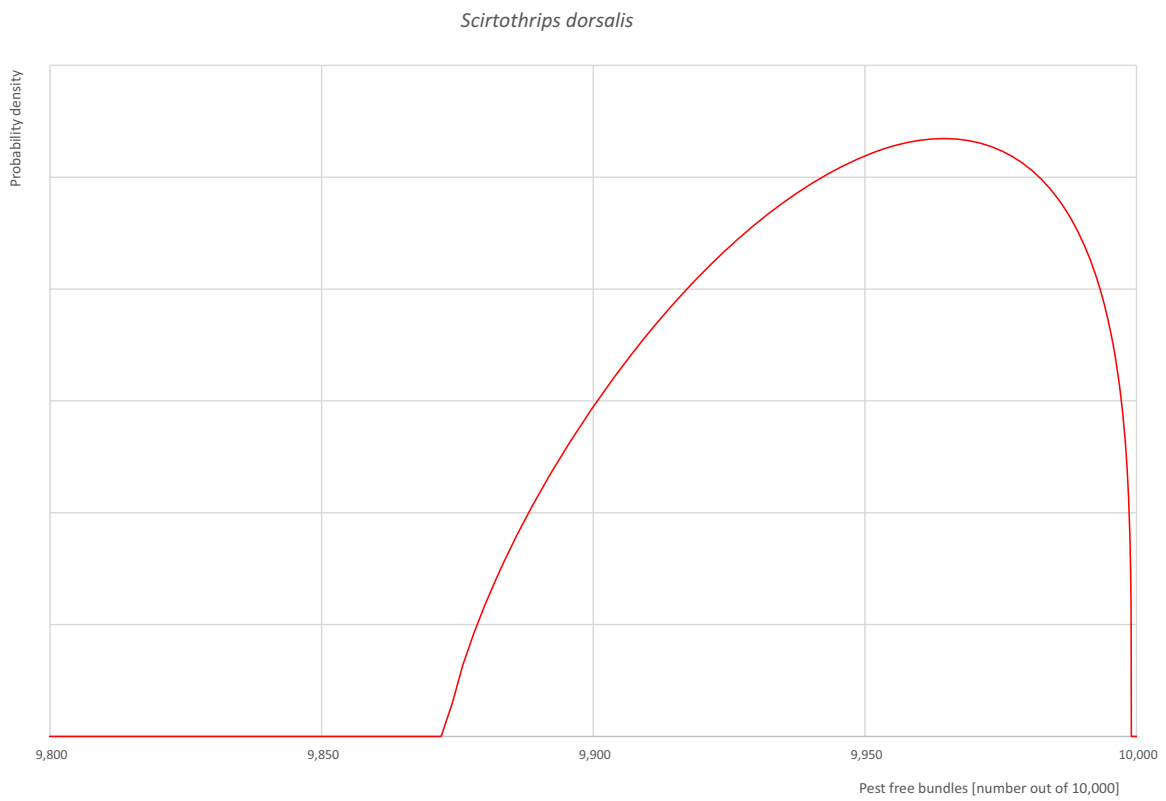
Table A.34: The uncertainty distribution of bundles free of *Scirtothrips dorsalis* per 10,000 bundles calculated by Table A.31

| Percentile | 1% | 2.5% | 5% | 10% | 17% | 25% | 33% | 50% | 67% | 75% | 83% | 90% | 95% | 97.5% | 99% |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| Values | 9880 | | | | | 9920 | | 9950 | | 9970 | | | | | 9997 |
| EKE results | 9880 | 9885 | 9891 | 9901 | 9911 | 9921 | 9931 | 9948 | 9964 | 9971 | 9979 | 9986 | 9992 | 9995 | 9997 |

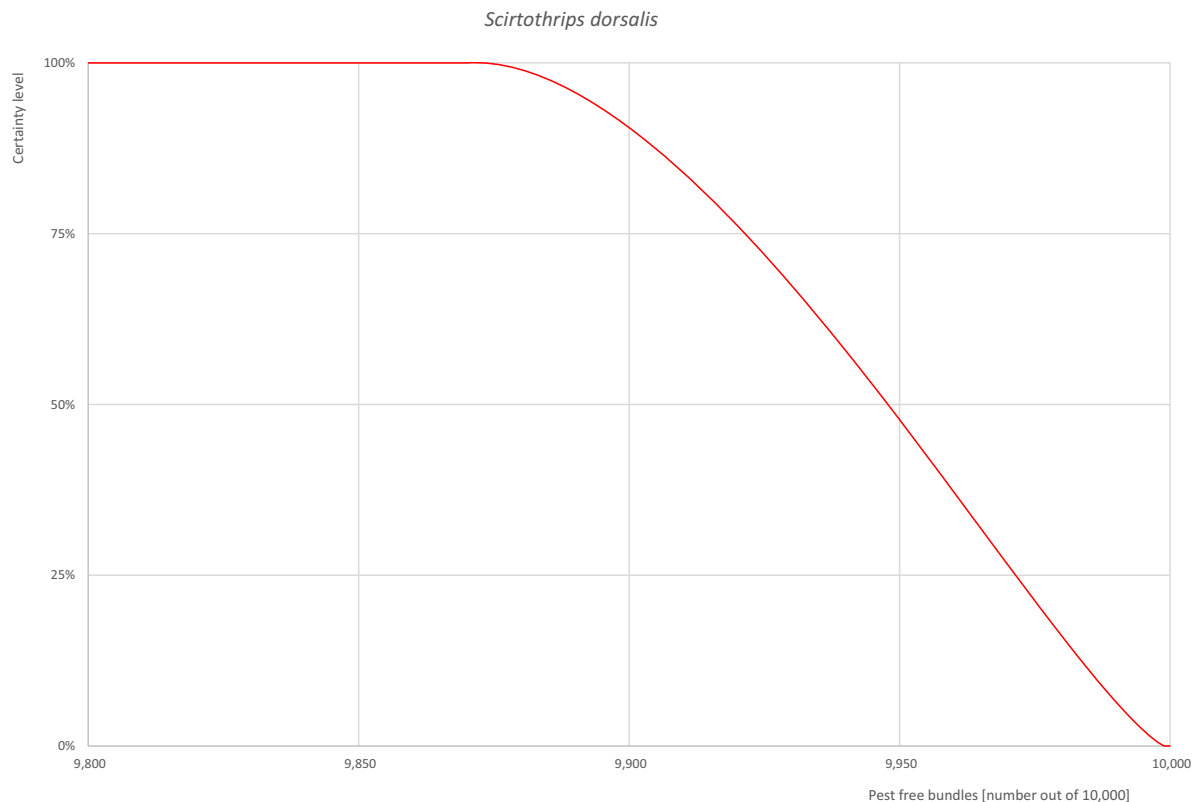
The EKE results are the fitted values.



(a)



(b)



(c)

Figure A.17: (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.17.6. References list

- Atakan E and Pehlivan S, 2021a. First report of the chilli thrips, *Scirtothrips dorsalis* Hood, 1919 (Thysanoptera: Thripidae) in Turkey. Turkish Journal of Zoology 45, 156–160. <https://doi.org/10.3906/zoo-2012-14>
- Atakan E and Pehlivan S, 2021b. A new harmful thrips species in orange in Antalya province: *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). Mediterranean Agricultural Sciences 34, 273–277. <https://doi.org/10.29136/mediterranean.1013009>
- CABI (Centre for Agriculture and Bioscience International), online. *Scirtothrips dorsalis* (chilli thrips). Available online: <https://www.cabi.org/cpc/datasheet/49065#REF-DDB-202162> [Accessed: 22 September 2022].
- DEFRA (Department for Environment, Food and Rural Affairs), online. UK risk register details for *Scirtothrips dorsalis*. Available online: <https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/viewPestRisks.cfm?csref=21873> [Accessed: 22 September 2022].
- EFSA PLH Panel (EFSA Panel on Plant Health), 2014. Scientific Opinion on the pest categorisation of *Scirtothrips dorsalis*. EFSA Journal 2014;12(12):3915, 29 pp. <https://doi.org/10.2903/j.efsa.2014.3915>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. EPPO A2 List of pests recommended for regulation as quarantine pests, version 2021-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 22 September 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Scirtothrips dorsalis* (SCITDO), Categorization. Available online: <https://gd.eppo.int/taxon/SCITDO/categorization> [Accessed: 22 September 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. *Scirtothrips dorsalis* (SCITDO), Distribution. Available online: <https://gd.eppo.int/taxon/SCITDO/distribution> [Accessed: 22 September 2022].

- EUROPHYT, online. European Union Notification System for Plant Health Interceptions - EUROPHYT Available online: http://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 8 September 2022].
- Kumar V, Kakkar G, McKenzie CL, Seal DR and Osborne LS, 2013. An overview of chilli thrips, *Scirtothrips dorsalis* (Thysanoptera: Thripidae) biology, distribution and management. Weed and pest control-Conventional and new challenges, 53–77. <https://doi.org/10.5772/55045>
- Kumar V, Seal DR and Kakkar G, 2014. Chilli thrips *Scirtothrips dorsalis* Hood (Insecta: Thysanoptera: Thripidae). Journal of Entomology and Zoology Studies 2014, 2, 104–106. https://doi.org/10.1007/springerreference_85820
- MacLeod A and Collins D, 2006. CSL pest risk analysis for *Scirtothrips dorsalis*. CSL (Central Science Laboratory), 8 pp.
- Meissner H, Lemay A, Borchert D, Nietschke B, Neeley A, Magarey R, Ciomperlik M, Brodel C and Dobbs T, 2005. Evaluation of possible pathways of introduction for *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) from the Caribbean into the continental United States. Plant Protection and Quarantine Center for Plant Health Science and Technology.
- Nietschke BS, Borchert DM, Magarey RD and Ciomperlik MA, 2008. Climatological potential for *Scirtothrips dorsalis* (Thysanoptera: Thripidae) establishment in the United States. Florida Entomologist, 91, 79–86. [https://doi.org/10.1653/0015-4040\(2008\)091\[0079:cpfsdt\]2.0.co;2](https://doi.org/10.1653/0015-4040(2008)091[0079:cpfsdt]2.0.co;2)
- Ohkubo N, 1995. Host plants of yellow tea thrips, *Scirtothrips dorsalis* Hood and annual occurrence on them. Bulletin of the Nagasaki Fruit Tree Experimental Station, 2, 1–16. <https://agris.fao.org/agris-search/search.do?recordID=JP1999001517>
- Seal DR and Klassen W, 2012. Chilli thrips (castor thrips, Assam thrips, yellow tea thrips, strawberry thrips), *Scirtothrips dorsalis* Hood, provisional management guidelines. University of Florida, Gainesville, FL, 4 pp.
- Tatara A, 1994. Effect of temperature and host plant on the development, fertility and longevity of *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae). Applied Entomology and Zoology, 29, 31–37. <https://doi.org/10.1303/aez.29.31>
- TRACES-NT, online. TRADE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 08 September 2022].
- Vierbergen B and van der Gaag DJ, 2009. Pest Risk Assessment *Scirtothrips dorsalis*. Plant Protection Service, the Netherlands, 9 pp. Available online: <https://pra.eppo.int/getfile/ddcf51cf-df6d-40f9-9d28-46f447652ed7>
- Zhang WQ, Lu YF, Tong XL, 2004. A new insect pest of Lotus Flower - *Scirtothrips dorsalis* Hood and its control strategies. Journal of Chinese Landscape Architecture, 4, 33–35. http://en.cnki.com.cn/Article_en/CJFDTOTAL-ZGYL200404011.htm

Appendix B – Web of Science All Databases Search String

B.1. Web of Science All Databases Search String '*Prunus dulcis*'

In the table below, the search string used in Web of Science is reported. In total, 442 papers were retrieved. Titles and abstracts were screened, and 13 pests were added to the list of pests (see Appendix D).

| | |
|------------------------------|---|
| Web of Science All databases | <p>TOPIC: ("Prunus dulcis" OR "P. dulcis" OR "almond tree\$")</p> <p>AND</p> <p>TOPIC: ("pathogen* OR pathogenic bacteria OR fung* OR oomycet* OR myce* OR bacteri* OR virus* OR viroid* OR insect\$ OR mite\$ OR phytoplasm* OR arthropod* OR nematod* OR disease\$ OR infecti* OR damag* OR symptom* OR pest\$ OR vector OR hostplant\$ OR "host plant\$" OR host OR "root lesion\$" OR decline\$ OR infestation\$ OR damage\$ OR symptom\$ OR dieback* OR "die back*" OR malaise OR aphid\$ OR curculio OR thrip\$ OR cicad\$ OR miner\$ OR borer\$ OR weevil\$ OR "plant bug\$" OR spittlebug\$ OR moth\$ OR mealybug\$ OR cutworm\$ OR pillbug\$ OR "root feeder\$" OR caterpillar\$ OR "foliar feeder\$" OR virosis OR viruses OR blight\$ OR wilt\$ OR wilted OR canker OR scab\$ OR rot OR rots OR "rotten" OR "damping off" OR "damping-off" OR blister\$ OR smut OR "mould" OR "mold" OR "damping syndrome\$" OR mildew OR scald\$ OR "root knot" OR "root-knot" OR rootkit OR cyst\$ OR "dagger" OR "plant parasitic" OR "parasitic plant" OR "plant\$parasitic" OR "root feeding" OR "root\$feeding")</p> <p>NOT</p> <p>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\$")</p> <p>NOT</p> <p>TOPIC: ("Acalitus phloeocoptes" OR "Acronicta psi" OR "Actias selene" OR "Aculus fockeui" OR "Aglaope infausta" OR "Aglaope labasi" OR "Agrobacterium tumefaciens" OR "Aleurodicus dispersus" OR "Alternaria alternata" OR "American plum line pattern virus" OR "Amphitetranychus viennensis" OR "Amyeloidis transitella" OR "Anarsia lineatella" OR "Anastrepha fraterculus" OR "Anastrepha obliqua" OR "Anoplophora chinensis" OR "Anthonomus quadrigibbus" OR "Aonidiella aurantii" OR "Aphis aurantii" OR "Aphis citricidus" OR "Aphis craccivora" OR "Aphis fabae" OR "Aphis gossypii" OR "Aphis spiraecola" OR "Aposporina morbosa" OR "Apomyeloidis ceratoniae" OR "Aporia crataegi" OR "Apple chlorotic leaf spot virus" OR "Apple mosaic virus" OR "Apterona crenulella" OR "Arabis mosaic virus" OR "Argyrotaenia citrana" OR "Armillaria luteobubalina" OR "Armillaria mellea" OR "Armillaria tabescens" OR "Aspergillus ficuum" OR "Aspergillus flavus" OR "Aspergillus glaucus" OR "Aspergillus niger" OR "Aspergillus ochraceus" OR "Aspergillus wentii" OR "Automeris melanops" OR "Bartalinia pruni" OR "Bondia comonana" OR "Botryosphaeria dothidea" OR "Botryosphaeria parva" OR "Botryosphaeria ribis" OR "Botryotinia fuckeliana" OR "Botrytis cinerea" OR "Brachycaudus amygdalinus" OR "Brachycaudus cardui" OR "Brachycaudus helichrysi" OR "Brachycaudus persicae" OR "Brachycaudus prunicola" OR "Brachycaudus schwartzi" OR "Brithys pantratii" OR "Bryobia rubrioculus" OR "Cacoecimorpha pronubana" OR "Cadophora luteo-olivacea" OR "Cadra calidella" OR "Cadra cautella" OR "Caliroa cerasi" OR "Candidatus Phytoplasma phoenicium" OR "Candidatus Phytoplasma phoenicium" OR "Candidatus Phytoplasma pruni" OR "Candidatus Phytoplasma prunorum" OR "Candidatus Phytoplasma solani" OR "Capitophorus prunifoliae" OR "Capnodis tenebrionis" OR "Carposina sasakii" OR "Ceratitis capitata" OR "Ceratitis quinaria" OR "Ceratocystis destructans" OR "Ceratocystis fimbriata" OR "Cercospora cerasella" OR "Cercospora circumscissa" OR "Ceresa alta" OR "Ceroplastes floridensis" OR "Ceroplastes rusci" OR "Cerrena unicolor" OR "Cherry leaf roll virus" OR "Chlidaspis asiatica" OR "Chondrostereum purpureum" OR "Chrysobothris affinis" OR "Cladosporium carpophilum" OR "Cladosporium</p> |
|------------------------------|---|

cladosporioides" OR "Clavaspis covilleae" OR "Coccus hesperidum hesperidum" OR "Colletotrichum acutatum" OR "Colletotrichum gloeosporioides" OR "Colletotrichum godetiae" OR "Collophora africana" OR "Collophora hispanica" OR "Collophora paarla" OR "Collophora rubra" OR "Collophorina hispanica" OR "Comstockaspis perniciosa" OR "Coniothyrium amygdali" OR "Coniothyrium pyrinum" OR "Corticium solani" OR "Criconema mutabile" OR "Criconemella" OR "Cryptococcus adeliensis" OR "Cydia latiferreana" OR "Cydia molesta" OR "Cydia pomonella" OR "Cylindrocarpon obtusiusculum" OR "Cynodon dactylon" OR "Cytospora amygdali" OR "Cytospora californica" OR "Cytospora cincta subsp. amygdalina" OR "Cytospora eucalypti" OR "Cytospora leucostoma" OR "Cytospora mali" OR "Cytospora parakantschavelii" OR "Cytospora plurivora" OR "Cytospora sorbicola" OR "Dactylonectria macrodidyma" OR "Deborrea malgassa" OR "Dendrophora albobadia" OR "Deudorix isocrates" OR "Diabrotica speciosa" OR "Diabrotica undecimpunctata undecimpunctata" OR "Diaporthe amygdali" OR "Diaporthe australafricana" OR "Diaporthe eres" OR "Diaporthe neotheicola" OR "Diaporthe novem" OR "Diaporthe rhusicola" OR "Diaspidiotus africanus" OR "Diaspidiotus anaticus" OR "Diaspidiotus ancylus" OR "Diaspidiotus ostreaeformis" OR "Diaspidiotus prunorum" OR "Diatrype whitmanensis" OR "Didesmococcus unifasciatus" OR "Diloba caeruleocephala" OR "Diplodia amygdali" OR "Diplodia mutila" OR "Diplodia olivarum" OR "Diplodia seriata" OR "Discostroma corticola" OR "Dothiorella iberica" OR "Dothiorella prunicola" OR "Dothiorella sarmentorum" OR "Drechslera spicifera" OR "Drosicha dalbergiae" OR "Eacles imperialis" OR "Ectomyeloides ceratoniae" OR "Enarmonia formosana" OR "Ephestia kuehniella" OR "Epichoristodes acerbella" OR "Epicrocis anthracanthes" OR "Epidiaspis leperii" OR "Epiphyas postvittana" OR "Eriogaster" OR "Eriogaster amygdali" OR "Eulecanium kunoense" OR "Eulecanium tiliae" OR "Euproctis chryorrhoea" OR "Eurytoma amygdali" OR "Eutetranychus orientalis" OR "Eutypa lata" OR "Eutypella prunastri" OR "Euwallacea fornicatus sensu stricto" OR "Euzophera osseatella" OR "Euzophera pinguis" OR "Euzophera semifuneralis" OR "Ferrisia gilli" OR "Filippia follicularis" OR "Fomes pomaceus" OR "Fomitopsis pinicola" OR "Fusarium acuminatum" OR "Fusarium avenaceum" OR "Fusarium brachygibbosum" OR "Fusarium californicum" OR "Fusarium euwallaceae" OR "Fusarium oxysporum" OR "Fusarium roseum" OR "Fusarium solani" OR "Fusicladium amygdali" OR "Fusicladium carpophilum" OR "Fusicoccum amygdali" OR "Ganoderma annulare" OR "Ganoderma brownii" OR "Ganoderma lucidum" OR "Gloeoporus dichrous" OR "Gloeosporium amygdalinum" OR "Glomerella cingulata" OR "Grapholita funebrana" OR "Grapholita molesta" OR "Grapholita packardii" OR "Grapholita prunivora" OR "Hedya dimidioalba" OR "Helicotylenchus dihystra" OR "Hemiberlesia lataniae" OR "Hemiberlesia quercicola" OR "Hendersonia amygdali" OR "Hendersonula toruloidea" OR "Heterodera mediterranea" OR "Homalodisca vitripennis" OR "Hop stunt viroid" OR "Hyalophora cecropia" OR "Hyalopterus amygdali" OR "Hyalopterus pruni" OR "Hyphantria cunea" OR "Hyphoderma puberum" OR "Hyphodontia aspera" OR "Iphiclides podalirius" OR "Laetiporus sulphureus" OR "Lasiodiplodia theobromae" OR "Lenzites betulina" OR "Lepidosaphes ulmi" OR "Leucostoma persoonii" OR "Little cherry virus" OR "Little cherry virus 1" OR "Lymantria destituta" OR "Lymantria dispar" OR "Lymantria lapidicola" OR "Lymantria obfusca" OR "Macrophomina phaseoli" OR "Macrophomina phaseolina" OR "Malacosoma americanum" OR "Malacosoma californica" OR "Malacosoma disstria" OR "Malacosoma neustria" OR "Malacosoma parallela" OR "Margarodes vitis" OR "Megabiston plumosaria" OR "Melanaspis inopinata" OR "Meloidogyne arenaria" OR "Meloidogyne floridensis" OR "Meloidogyne hapla" OR "Meloidogyne incognita" OR "Meloidogyne javanica" OR "Mercetaspis baluchistanensis" OR "Mercetaspis halli" OR "Merlinius brevidens" OR "Mesocriconema xenoplax" OR "Metaseiulus occidentalis" OR "Monilinia fructicola" OR "Monilinia fructigena" OR "Monilinia laxa" OR "Monilinia polystroma" OR "Monosteira unicostata" OR "Mycosphaerella cerasella" OR "Myrothecium verrucaria" OR "Myzus amygdalinus" OR "Myzus ascalonicus" OR "Myzus cerasi" OR "Myzus persicae" OR "Naupactus xanthographus" OR "Nectria cinnabarina" OR "Neocosmospora euwallaceae" OR "Neofusicoccum australe" OR "Neofusicoccum mediterraneum" OR "Neofusicoccum nonquaesitum" OR "Neofusicoccum parvum" OR "Neolobocriconema laterale" OR "Neopestalotiopsis asiatica" OR "Neopinnaspis harperi" OR "Neoscytalidium dimidiatum" OR "Neoscytalidium novaehollandiae" OR "Nippolachnus piri" OR "Nothophoma quercina" OR "Oeomona hirta" OR "Oiketicus kirbyi" OR "Olone dalbergiae" OR "Oligonychus perseae" OR "Omophlus lepturoides" OR "Orgyia leucostigma" OR "Orgyia postica" OR "Orgyia vetusta" OR "Otiorynchus cribricollis" OR "Oxyporus latemarginatus" OR "Oxyporus similis" OR "Palaeolecanium bituberculatum" OR "Panonychus ulmi" OR "Panthiades hebraeus" OR "Parabemisia myricae" OR "Paralipsa gularis" OR "Paratrachodorus minor" OR "Paratylenchus hamatus" OR "Parlatoria oleae" OR

"Parthenolecanium corni" OR "Parthenolecanium corni corni" OR "Parthenolecanium persicae" OR "Passalora rubrotincta" OR "Peach latent mosaic viroid" OR "Peach mosaic virus" OR "Peach rosette phytoplasma" OR "Peach wart disease" OR "Peach yellows phytoplasma" OR "Penicillium funiculosum" OR "Peniophora lycii" OR "Phaeoacremonium amygdalinum" OR "Phaeoacremonium angustius" OR "Phaeoacremonium iranianaum" OR "Phaeoacremonium italicum" OR "Phaeoacremonium minimum" OR "Phaeoacremonium parasiticum" OR "Phaeoacremonium scolyti" OR "Phaeoacremonium viticola" OR "Phaeosclera dematioides" OR "Phellinus gilvus" OR "Phellinus pomaceus" OR "Phellinus robustus" OR "Phellinus torulosus" OR "Phenacoccus aceris" OR "Phenacoccus solenopsis" OR "Philaenus spumarius" OR "Phlebia rufa" OR "Phoma amygdali-communis" OR "Phoma pomorum" OR "Phomopsis amygdali" OR "Phomopsis mali" OR "Phomopsis padina" OR "Phomopsis parabolica" OR "Phomopsis perniciosa" OR "Phomopsis pruni" OR "Phomopsis prunorum" OR "Phomopsis ribatejana" OR "Phomopsis stipata" OR "Phomopsis theicola" OR "Phyllophaga" OR "Phyllosticta persicae" OR "Phymatotrichopsis omnivora" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora chlamydospora" OR "Phytophthora cinnamomi" OR "Phytophthora citricola" OR "Phytophthora citrophthora" OR "Phytophthora cryptogea" OR "Phytophthora drechsleri" OR "Phytophthora megasperma" OR "Phytophthora nicotianae var. parasitica" OR "Phytophthora niederhauseri" OR "Phytophthora parasitica" OR "Phytophthora parsiana" OR "Phytophthora plurivora" OR "Phytophthora syringae" OR "Phytoplasma pruni" OR "Phytoplasma prunorum" OR "Planococcus citri" OR "Pleospora herbarum" OR "Pleurostoma richardsiae" OR "Pleurostomophora richardsiae" OR "Plodia interpunctella" OR "Plum pox virus" OR "Podosphaera tridactyla" OR "Podosphaera tridactyla var. tridactyla" OR "Polystigma amygdalinum" OR "Polystigma fulvum" OR "Polystigma ochraceum" OR "Polystigma rubrum" OR "Pratylenchus brachyurus" OR "Pratylenchus crenatus" OR "Pratylenchus neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus pratensis" OR "Pratylenchus scribneri" OR "Pratylenchus thornei" OR "Pratylenchus vulnus" OR "Prionoxystus robiniae" OR "Protortonia ecuadorensis" OR "Prune dwarf virus" OR "Prunus necrotic ringspot virus" OR "Pseudaulacaspis pentagona" OR "Pseudaulacaspis pentagona" OR "Pseudococcus calceolariae" OR "Pseudococcus comstocki" OR "Pseudococcus viburni" OR "Pseudomonas amygdali" OR "Pseudomonas syringae" OR "Pseudomonas syringae pv. morsprunorum" OR "Pterochloroides persicae" OR "Pterochloroides persicae" OR "Pyroderces rileyi" OR "Raspberry ringspot virus" OR "Recurvaria nanella" OR "Recurvaria nanella" OR "Reptalus panzeri" OR "Rhagoletis cingulata" OR "Rhagoletis fausta" OR "Rhagoletis indifferens" OR "Rhizobium radiobacter" OR "Rhizobium rhizogenes" OR "Rhizoctonia solani" OR "Rhizopus arrhizus" OR "Rhizopus circinans" OR "Rhizopus stolonifer" OR "Rhodococcus turanicus" OR "Rhopalosiphum nymphaeae" OR "Rosellinia necatrix" OR "Rotylenchus eximius" OR "Saperda candida" OR "Saturnia" OR "Saturnia pyri" OR "Saturnia pyri" OR "Saturnia pyri" OR "Schizophyllum commune" OR "Schizopora flavipora" OR "Sclerotinia fructicola" OR "Sclerotinia laxa" OR "Sclerotinia sclerotiorum" OR "Scolytus amygdali" OR "Scolytus rugulosus" OR "Scolytus scheyrewi" OR "Seimatosporium lichenicola" OR "Sphaerolecanium prunastri" OR "Sphaerotheca pannosa" OR "Sphaerulina amygdali" OR "Sporocadus carpophilus" OR "Sporocadus incanus" OR "Stereum hirsutum" OR "Stigmella prunetorum" OR "Stigmella carpophila" OR "Strawberry latent ringspot virus" OR "Synanthedon exitiosa" OR "Synanthedon exitiosa" OR "Taphrina deformans" OR "Tetranychus pacificus" OR "Tetranychus turkestanii" OR "Tetranychus urticae" OR "Thagona roseidorsum" OR "Theba pisana" OR "Thrips imaginis" OR "Thyridopteryx ephemeraeformis" OR "Thyrostroma carpophilum" OR "Timocratica albella" OR "Tomato black ring virus" OR "Tomato ringspot virus" OR "Trametes versicolor" OR "Tranzschelia discolor" OR "Tranzschelia discolor f. sp. dulcis" OR "Tranzschelia pruni-spinosae" OR "Tranzschelia pruni-spinosae var. discolor" OR "Tribolium castaneum" OR "Trichodorus" OR "Trichodorus porosus" OR "Trichosea champa" OR "Trichothecium roseum" OR "Trirachys holosericeus" OR "Trirachys sartus" OR "Trogoderma granarium" OR "Tylenchorhynchus clarus" OR "Tylenchorhynchus cylindricus" OR "Tylenchorhynchus sp." OR "Ulocladium atrum" OR "Ulocladium chartarum" OR "Valsa leucostoma" OR "Venturia carpophila" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Wilsonomyces carpophilus" OR "Xanthomonas arboricola pv. pruni" OR "Xiphinema americanum" OR "Xiphinema melitense" OR "Xiphinema meridianum" OR "Xiphinema pachtaicum" OR "Xylella fastidiosa" OR "Xylella fastidiosa subsp. fastidiosa" OR "Xylella fastidiosa subsp. multiplex" OR "Xylella fastidiosa subsp. pauca" OR "Xyleutes punctifera" OR "Xylotrechus namanganensis" OR "Yponomeuta padella" OR "Yponomeuta padellus" OR "Ypsolopha persicella" OR "Zygotylenchus guevarai")

B.2. Web of Science All Databases Search String '*Prunus persica*'

In the table below, the search string used in Web of Science is reported. In total, 3326 papers were retrieved. Titles and abstracts were screened, and 18 pests were added to the list of pests (see Appendix D).

| | |
|------------------------------|---|
| Web of Science All databases | <p>TOPIC: ("Prunus persica" OR "P. persica" OR "peach")</p> <p>AND</p> <p>TOPIC: ("pathogen* OR pathogenic bacteria OR fung* OR oomycet* OR myce* OR bacteri* OR virus* OR viroid* OR insect\$ OR mite\$ OR phytoplasm* OR arthropod* OR nematod* OR disease\$ OR infecti* OR damag* OR symptom* OR pest\$ OR vector OR hostplant\$ OR "host plant\$" OR host OR "root lesion\$" OR decline\$ OR infestation\$ OR damage\$ OR symptom\$ OR dieback* OR "die back*" OR malaise OR aphid\$ OR curculio OR thrip\$ OR cicad\$ OR miner\$ OR borer\$ OR weevil\$ OR "plant bug\$" OR spittlebug\$ OR moth\$ OR mealybug\$ OR cutworm\$ OR pillbug\$ OR "root feeder\$" OR caterpillar\$ OR "foliar feeder\$" OR virosis OR viruses OR blight\$ OR wilt\$ OR wilted OR canker OR scab\$ OR rot OR rots OR "rotten" OR "damping off" OR "damping-off" OR blister\$ OR smut OR "mould" OR "mold" OR "damping syndrome\$" OR mildew OR scald\$ OR "root knot" OR "root-knot" OR rootkit OR cyst\$ OR "dagger" OR "plant parasitic" OR "parasitic plant" OR "plant\$parasitic" OR "root feeding" OR "root\$feeding")</p> <p>NOT</p> <p>TOPIC: ("heavy metal\$" OR "pollut*" OR "weather" OR "propert*" OR probes OR "spectr*" OR "antioxidant\$" OR "peach palm" 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\$")</p> <p>NOT</p> <p>TOPIC: ("Abortiporus biennis" OR "Abura momocola" OR "Acanthospermum hispidum" OR "Acleris crocepepla" OR "Acleris fimbriana" OR "Acleris minuta" OR "Acremonium rutilum" OR "Acremonium tubakii" OR "Acrobasis indigenella" OR "Aculus fockeui" OR "Adelphocoris lineolatus" OR "Adoxophyes orana" OR "Aenetus virescens" OR "Agrilus mali" OR "Agriotes lineatus" OR "Agrobacterium tumefaciens" OR "Agrotis ipsilon" OR "Aleimma loeflingiana" OR "Aleurocanthus spiniferus" OR "Aleurocanthus woglumi" OR "Aleurodicus dispersus" OR "Alsophila aescularia" OR "Alsophila pometaria" OR "Alternaria alternata" OR "Alternaria cerasi" OR "Alternaria scrophulariae" OR "Alternaria tenuissima" OR "Amblypelta cocophaga" OR "Amblypelta lutescens" OR "American plum line pattern virus" OR "Ampelomyces quisqualis" OR "Amphitetranynchus viennensis" OR "Amyeloidis transitella" OR "Amylostereum sacratum" OR "Anarsia lineatella" OR "Anastrepha chicalayae" OR "Anastrepha fraterculus" OR "Anastrepha ludens" OR "Anastrepha serpentina" OR "Anastrepha striata" OR "Anastrepha suspensa" OR "Andaspis hawaiiensis" OR "Anomis mesogona" OR "Anoplophora chinensis" OR "Antheraea polyphemus" OR "Anthonomus quadrigibbus" OR "Antrodia albida" OR "Aonidiella aurantii" OR "Aonidiella citrina" OR "Aonidiella orientalis" OR "Apate monachus" OR "Aphelenchoides fragariae" OR "Aphis aurantii" OR "Aphis fabae" OR "Aphis gossypii" OR "Aphis spiraeicola" OR "Aposporina morbosa" OR "Aplonobia citri" OR "Aplosporella amygdalina" OR "Aplosporella prunicola" OR "Apomyeloides ceratoniae" OR "Aporia crataegi" OR "Aposphaeria fuscomaculans" OR "Apple chlorotic leaf spot virus" OR "Apple mosaic virus" OR "Apple scar skin viroid" OR "Apple stem grooving virus" OR "Apricot pseudo-chlorotic leaf spot virus" OR "Apriona cinerea" OR "Arabis mosaic virus" OR "Archips argyrospila" OR "Archips breviplicanus" OR "Archips fuscocupreanus" OR "Archips podana" OR "Archips pomivora" OR "Archips rosana" OR "Archips termias" OR "Archips xylosteanus" OR "Argentinean Peach Yellows" OR "Argyresthia albistria" OR "Argyresthia pruniella" OR "Argyrotaenia citrana" OR "Argyrotaenia ljungiana" OR "Armillaria fuscipes" OR "Armillaria gallica" OR "Armillaria heimii" OR "Armillaria limonea" OR "Armillaria luteobubalina" OR "Armillaria mellea" OR "Armillaria mexicana" OR "Armillaria novae-zelandiae" OR "Armillaria ostoyae" OR</p> |
|------------------------------|---|

"*Armillaria tabescens*" OR "*Armillariella mellea*" OR "*Armillariella tabescens*" OR "*Aromia bungii*" OR "*Artace cribraria*" OR "*Arthrinium arundinis*" OR "*Ascochyta pruni*" OR "*Ascocoryne sarcoides*" OR "*Ascotis selenaria*" OR "*Aspergillus awamori*" OR "*Aspergillus flavus*" OR "*Aspergillus fumigatus*" OR "*Aspergillus niger*" OR "*Aspergillus terreus*" OR "*Aspergillus versicolor*" OR "*Aspidiotus destructor*" OR "*Aspidiotus nerii*" OR "*Asymmetrasca decedens*" OR "*Athelia rolfsii*" OR "*Atherigona orientalis*" OR "*Aureobasidium pullulans*" OR "*Automeris aurantiaca*" OR "*Bactrocera aquilonis*" OR "*Bactrocera correcta*" OR "*Bactrocera cucurbitae*" OR "*Bactrocera dorsalis*" OR "*Bactrocera facialis*" OR "*Bactrocera jarvisi*" OR "*Bactrocera kirki*" OR "*Bactrocera neohumeralis*" OR "*Bactrocera psidii*" OR "*Bactrocera pyrifoliae*" OR "*Bactrocera trivialis*" OR "*Bactrocera tryoni*" OR "*Bactrocera tuberculata*" OR "*Bactrocera zonata*" OR "*Beerella yemenensis*" OR "*Bemisia tabaci*" OR "*Betacallis prunicola*" OR "*Bionectria ochroleuca*" OR "*Blastodacna pyrigalla*" OR "*Bondia comonana*" OR "*Borocera madagascariensis*" OR "*Botryodiplodia persicae*" OR "*Botryodiplodia theobromae*" OR "*Botryosphaeria berengeriana*" OR "*Botryosphaeria dothidea*" OR "*Botryosphaeria dothidea f. chromogena*" OR "*Botryosphaeria obtusa*" OR "*Botryosphaeria parva*" OR "*Botryosphaeria quercuum*" OR "*Botryosphaeria rhodina*" OR "*Botryosphaeria ribis*" OR "*Botryosphaeria ribis f. chromogena*" OR "*Botryosphaeria sinensis*" OR "*Botryosphaeria stevensii*" OR "*Botryotinia fuckeliana*" OR "*Botrytis cinerea*" OR "*Brachycaudus amygdalinus*" OR "*Brachycaudus cardui*" OR "*Brachycaudus helichrysi*" OR "*Brachycaudus persicae*" OR "*Brachycaudus persicaecola*" OR "*Brachycaudus prunicola*" OR "*Brachycaudus schwartzi*" OR "*Brachycaudus semisubterraneus*" OR "*Brevipalpus phoenicis*" OR "*Bromus hordeaceus*" OR "*Bryobia praetiosa*" OR "*Bryobia pseudorubrioculus*" OR "*Bryobia rubrioculus*" OR "*Cacoecimorpha pronubana*" OR "*Caligula japonica*" OR "*Callosamia promethea*" OR "*Calocera cornea*" OR "*Calonectria kytensis*" OR "*Calosphaeria princeps*" OR "*Calosphaeria pulchella*" OR "*Camarosporium persicae*" OR "*Candida albicans*" OR "*Candidatus Phytoplasma asteris*" OR "*Candidatus Phytoplasma aurantifolia*" OR "*Candidatus Phytoplasma australiense*" OR "*Candidatus Phytoplasma phoenicium*" OR "*Candidatus Phytoplasma pruni*" OR "*Candidatus Phytoplasma prunorum*" OR "*Candidatus Phytoplasma solani*" OR "*Candidatus Phytoplasma trifolii*" OR "*Candidula intersecta*" OR "*Capnodis tenebrionis*" OR "*Capnodium elongatum*" OR "*Carpophilus freemani*" OR "*Carpophilus mutilatus*" OR "*Carposina sasakii*" OR "*Caryospora minima*" OR "*Caryospora putaminum*" OR "*Catunica adiposa*" OR "*Cephalothecium roseum*" OR "*Ceratitis capitata*" OR "*Ceratitis cosyra*" OR "*Ceratitis fasciventris*" OR "*Ceratitis quilicii*" OR "*Ceratitis quinaria*" OR "*Ceratitis rosa*" OR "*Ceratocystis fimbriata*" OR "*Cercoseptoria prunicola*" OR "*Cercoseptoria pruni-persicae*" OR "*Cercospora circumscissa*" OR "*Cercospora consobrina*" OR "*Cercospora persica*" OR "*Cercospora persicae*" OR "*Cercospora prunina*" OR "*Cercospora pruni-persicae*" OR "*Cercospora pruni-persicicola*" OR "*Cercospora rubrotincta*" OR "*Cercospora persica*" OR "*Ceresa alta*" OR "*Ceriporia spissa*" OR "*Ceriporiopsis subvermispora*" OR "*Ceroplastes ceriferus*" OR "*Ceroplastes floridensis*" OR "*Ceroplastes japonicus*" OR "*Ceroplastes pseudoceriferus*" OR "*Ceroplastes quadrilineatus*" OR "*Ceroplastes sinensis*" OR "*Chalastospora gossypii*" OR "*Cherry green ring mottle virus*" OR "*Cherry leaf roll virus*" OR "*Cherry necrotic rusty mottle virus*" OR "*Cherry rasp leaf virus*" OR "*Cherry rusty mottle disease*" OR "*Cherry virus A*" OR "*Chinavia hilaris*" OR "*Chionaspis furfura*" OR "*Chlidaspis asiatica*" OR "*Choanephora persicaria*" OR "*Chondrostereum purpureum*" OR "*Choreutis pariana*" OR "*Choristoneura diversana*" OR "*Choristoneura longicellana*" OR "*Choristoneura rosaceana*" OR "*Chrysobothris femorata*" OR "*Chrysomphalus aonidium*" OR "*Citheronia brissotii*" OR "*Cladosporium carpophilum*" OR "*Cladosporium persicum*" OR "*Cladosporium phyllophilum*" OR "*Clasterosporium carpophilum*" OR "*Clavaspis disclusa*" OR "*Clepsis persicana*" OR "*Clitocybe monadelpha*" OR "*Clitocybe parasitica*" OR "*Clitocybe tabescens*" OR "*Coccomyces hiemalis*" OR "*Coccomyces lutescens*" OR "*Coccus hesperidum hesperidum*" OR "*Colladonus montanus*" OR "*Colletotrichum acutatum*" OR "*Colletotrichum fioriniae*" OR "*Colletotrichum fructicola*" OR "*Colletotrichum gloeosporioides*" OR "*Colletotrichum nymphaeae*" OR "*Colletotrichum paranaense*" OR "*Colletotrichum siamense*" OR "*Colletotrichum truncatum*" OR "*Collophora africana*" OR "*Collophora capensis*" OR "*Collophora paarla*" OR "*Collophora pallida*" OR "*Collophora rubra*" OR "*Collophora rubra*" OR "*Commelina benghalensis*" OR "*Comstockaspis perniciosus*" OR "*Coniochaeta prunicola*" OR "*Coniothecium persicae*" OR "*Coniothyrium fuckelii*" OR "*Coniothyrium insitivum*" OR "*Coniothyrium nakatae*" OR "*Coniothyrium olivaceum*" OR "*Conogethes punctiferalis*" OR "*Conotrachelus nenuphar*" OR "*Coriolus hirsutus*" OR "*Coriolus versicolor*" OR "*Cornularia persicae*" OR "*Coryneum beijerinckii*" OR "*Coryneum beyerinckii*" OR "*Coryneum carpophilum*" OR "*Coryneum nigrellum*" OR "*Cossus cossus*" OR "*Cotinis nitida*" OR "*Cristulariella moricola*" OR

"Cryptoblabes gnidiella" OR "Cryptococcus adeliensis" OR "Cryptococcus uzbekistanensis" OR "Cryptodiaporthe castanea" OR "Cryptophasa albacosta" OR "Cryptophasa unipunctana" OR "Ctenopseustis obliquana" OR "Cuerna costalis" OR "Cuscuta reflexa" OR "Cydia molesta" OR "Cydia pomonella" OR "Cylindrocarpon pauciseptatum" OR "Cylindrocladium floridanum" OR "Cylindrosporium padi" OR "Cynodon dactylon" OR "Cyphella marginata" OR "Cystidia couaggaria" OR "Cytospora ambiens" OR "Cytospora chrysosperma" OR "Cytospora cincta" OR "Cytospora eucalypticola" OR "Cytospora leucostoma" OR "Cytospora mali" OR "Cytospora persicae" OR "Cytospora plurivora" OR "Cytospora prunorum" OR "Cytospora rubescens" OR "Cytospora sorbicola" OR "Dacryopinax spathularia" OR "Dactyloectria pauciseptata" OR "Datana ministra" OR "Dendrophora albobadia" OR "Deudorix isocrates" OR "Diabrotica speciosa" OR "Diabrotica undecimpunctata undecimpunctata" OR "Diaporthe amygdali" OR "Diaporthe eres" OR "Diaporthe momicola" OR "Diaporthe oxe" OR "Diaporthe pescicola" OR "Diaporthe taoicola" OR "Diaspidiotus africanus" OR "Diaspidiotus ancyclus" OR "Diaspidiotus forbesi" OR "Diaspidiotus juglansregiae" OR "Diaspidiotus ostreaeformis" OR "Diaspidiotus perniciosus" OR "Diaspidiotus prunorum" OR "Dichocrocis punctiferalis" OR "Dichomeris fasciella" OR "Dichomeris picocarpa" OR "Dichomeris tostella" OR "Didesmococcus unifasciatus" OR "Didymosphaeria rubicola" OR "Didymosphaeria rubi-ulmifolii" OR "Diplocarpon maculatum" OR "Diplocarpon mespili" OR "Diplodia africana" OR "Diplodia griffonii" OR "Diplodia mutila" OR "Diplodia natalensis" OR "Diplodia persicina" OR "Diplodia pinea" OR "Diplodia pseudoseriata" OR "Diplodia sapinea" OR "Diplodia seriata" OR "Diplodina persicae" OR "Diptacus gigantorhynchus" OR "Dirphia curtiba" OR "Doratifera vulnerans" OR "Dothidea collecta" OR "Dothiorella viticola" OR "Drosicha corpulenta" OR "Drosophila melanogaster" OR "Drosophila sukuzii" OR "Dysaphis plantaginea" OR "Edwardsiana rosae" OR "Egybolis vaillantina" OR "Elfvigia applanata" OR "Enarmonia albicana" OR "Enarmonia formosana" OR "Eotetranychus lewisi" OR "Eotetranychus populi" OR "Eotetranychus pruni" OR "Eotetranychus sexmaculatus" OR "Eotetranychus smithi" OR "Eotetranychus uncatus" OR "Epichoristodes acerbella" OR "Epicoccum nigrum" OR "Epicoccum purpurascens" OR "Epidiopsis leperii" OR "Epiphyas postvittana" OR "Erannis defoliaria" OR "Erannis tiliaria" OR "Erthesina fullo" OR "Eudaruca caricis" OR "Eudocima fullonia" OR "Eudocima tyrannus" OR "Eulecanium caryae" OR "Eulecanium kunmingi" OR "Eulecanium kunoense" OR "Eulecanium nocivum" OR "Eulecanium rugulosum" OR "Eulecanium tiliae" OR "Euphorbia hirta" OR "Euproctis chrysorrhoea" OR "Euproctis fraterna" OR "Euproctis pulverea" OR "Eupsilia sidus" OR "Eurhizococcus brasiliensis" OR "Eurytetranychus ulmi" OR "Euschistus servus" OR "Euschistus tristigmus" OR "Euschistus variolarius" OR "Eutetranychus africanus" OR "Eutetranychus banksi" OR "Eutetranychus enodes" OR "Eutetranychus orientalis" OR "Eutetranychus transversistriatus" OR "Eutypa lata" OR "Euwallacea fornicatus sensu lato" OR "Euwallacea fornicatus sensu stricto" OR "Euxoa auxiliaris" OR "Euxoa messoria" OR "Euxoa scandens" OR "Euxoa tessellata" OR "Euzophera bigella" OR "Euzophera semifuneralis" OR "Evippe syrichtis" OR "Exoascus deformans" OR "Fabraea maculata" OR "Filatima persicaeella" OR "Fomes annosus" OR "Fomes applanatus" OR "Fomes cajanderi" OR "Fomes connatus" OR "Fomes fasciatus" OR "Fomes leucophaeus" OR "Fomes lobatus" OR "Fomes pinicola" OR "Fomes pomaceus" OR "Fomes roseus" OR "Fomes subroseus" OR "Fomitopsis meliae" OR "Fomitopsis nivosa" OR "Fomitopsis palustris" OR "Fomitopsis pinicola" OR "Forficula auricularia" OR "Frankliniella" OR "Frankliniella cestrum" OR "Frankliniella gardeniae" OR "Frankliniella intonsa" OR "Frankliniella occidentalis" OR "Frankliniella schultzei" OR "Fumago vagans" OR "Fusarium avenaceum" OR "Fusarium cerasi" OR "Fusarium culmorum" OR "Fusarium equiseti" OR "Fusarium lateritium" OR "Fusarium orthoceras" OR "Fusarium oxysporum" OR "Fusarium proliferatum" OR "Fusarium roseum" OR "Fusarium solani" OR "Fusicladium carpophilum" OR "Fusicladium cerasi" OR "Fusicladium pruni" OR "Fusicladosporium carpophilum" OR "Fusicoccum aesculi" OR "Fusicoccum amygdali" OR "Fusicoccum persicae" OR "Galinsoga parviflora" OR "Ganoderma annulare" OR "Ganoderma applanatum" OR "Ganoderma brownii" OR "Ganoderma curtisii" OR "Ganoderma lobatum" OR "Ganoderma lucidum" OR "Gastropacha quercifolia" OR "Gelasma illiturata" OR "Geotrichum candidum" OR "Gibberella avenacea" OR "Gibberella baccata" OR "Gibberella lateritium" OR "Gibberella pulicaris" OR "Gilbertella persicaria" OR "Globisporangium debaryanum" OR "Gloeocystidiellum sacratum" OR "Gloeodes pomigena" OR "Gloeophyllum mexicanum" OR "Gloeophyllum trabeum" OR "Gloeoporus dichrous" OR "Gloeosporium laeticolor" OR "Gloeosporium serotinum" OR "Glomerella cingulata" OR "Glomerella pruni-persicae" OR "Glyptoteles leucacrinella" OR "Gnomonia circumscissa" OR "Gnorimoschema banksiella" OR "Goacampa olcesta" OR

"Gonionota melobaphes" OR "Graphocephala versuta" OR "Grapholita funebrana" OR "Grapholita molesta" OR "Grapholita packardii" OR "Grapholita prunivora" OR "Guignardia pruni-persicae" OR "Gymnandrosoma aurantianum" OR "Gynanisa maja" OR "Halyomorpha halys" OR "Hansfordia pruni" OR "Haploa clymene" OR "Haploa colona" OR "Haploa lecontei" OR "Haplothrips gowdeyi" OR "Haptoncus luteolus" OR "Helicobasidium mompa" OR "Helicotylenchus dihystra" OR "Helicotylenchus erythrinae" OR "Helicotylenchus pseudorobustus" OR "Helicoverpa armigera" OR "Helicoverpa zea" OR "Heliotropium europaeum" OR "Hemiberlesia lataniae" OR "Hemicycliophora parvana" OR "Hemileuca maia" OR "Hemitheia aestivaria" OR "Hendersonia morbosa" OR "Hendersonula toruloidea" OR "Heterobasidion annosum" OR "Homalodisca insolita" OR "Homalodisca vitripennis" OR "Homona magnanima" OR "Hop stunt viroid" OR "Hoplolaimus indicus" OR "Hyalophora cecropia" OR "Hyalopterus amygdali" OR "Hyalopterus arundiniformis" OR "Hyalopterus pruni" OR "Hypercompe indecisa" OR "Hyphantria cunea" OR "Hyphoderma praetermissum" OR "Hyphodermella rosae" OR "Hyphodontia lanata" OR "Hysteroneura setariae" OR "Icerya seychellarum" OR "Ilyonectria capensis" OR "Imbrasia wahlbergii" OR "Inocutis jamaicensis" OR "Inurois fletcheri" OR "Iphiclides podalirius" OR "Irpex lacteus" OR "Kallima inachus" OR "Labdia semicoccinea" OR "Labedera proxima" OR "Lacanobia oleracea" OR "Lacanobia subjuncta" OR "Laeticorticium roseum" OR "Langia zenzeroides" OR "Lasiodiplodia citricola" OR "Lasiodiplodia pseudotheobromae" OR "Lasiodiplodia theobromae" OR "Latoia latistriga" OR "Laxitextum bicolor" OR "Laxitextum crassum" OR "Lenzites betulina" OR "Lenzites sepiaria" OR "Lenzites trabea" OR "Lepidosaphes conchiformis" OR "Lepidosaphes malicola" OR "Lepidosaphes pinnaeformis" OR "Lepidosaphes tubulorum" OR "Lepidosaphes ulmi" OR "Leptothyrium pomi" OR "Leucoptera malifoliella" OR "Leucostoma cincta" OR "Leucostoma cinctum" OR "Leucostoma parapersoonii" OR "Leucostoma persoonii" OR "Leucotelium pruni-persicae" OR "Lithophane antennata" OR "Little cherry virus" OR "Little cherry virus 1" OR "Longidorus" OR "Longidorus jonesi" OR "Longistigma xizangensis" OR "Lycorma delicatula" OR "Lygus lineolaris" OR "Lygus pratensis" OR "Lymantria dispar" OR "Lyonetia clerkella" OR "Maconellicoccus hirsutus" OR "Macrophoma kawatsukai" OR "Macrophoma macrospora" OR "Macrophoma persicina" OR "Macrophomina phaseoli" OR "Macrophomina phaseolina" OR "Macrosiphum euphorbiae" OR "Macrosporium commune" OR "Maireina marginata" OR "Malacosoma americana" OR "Malacosoma americanum" OR "Malacosoma californica" OR "Malacosoma distria" OR "Malacosoma incurva" OR "Malacosoma indicum" OR "Malacosoma parallela" OR "Mamestra brassicae" OR "Margarodes vitis" OR "Maroga melanostigma" OR "Marumba gaschkewitschii" OR "Megaplatypus mutatus" OR "Melanaspis corticosa" OR "Melanaspis tenebricosa" OR "Meloidogyne arenaria" OR "Meloidogyne enterolobii" OR "Meloidogyne ethiopica" OR "Meloidogyne floridensis" OR "Meloidogyne hispanica" OR "Meloidogyne incognita" OR "Meloidogyne javanica" OR "Meloidogyne morocciensis" OR "Meloidogyne nataliei" OR "Meloidogyne partityla" OR "Mercetaspis halli" OR "Mercetaspis peshawarensis" OR "Meruliopsis ambigua" OR "Merulius confluens" OR "Mesocriconema xenoplax" OR "Mesolecanium nigrofasciatum" OR "Metcalfa pruinosa" OR "Microdiplodia iliceti" OR "Miuraea persica" OR "Miuraea persicae" OR "Mollisia melaleuca" OR "Monilia cinerea" OR "Monilia cinerea f. americana" OR "Monilia fragrans" OR "Monilia fructicola" OR "Monilia fructigena" OR "Monilia implicata" OR "Monilia laxa" OR "Monilia mumeicola" OR "Monilia mumeicola" OR "Monilia polystroma" OR "Monilia yunnanensis" OR "Monilinia fructicola" OR "Monilinia fructigena" OR "Monilinia laxa" OR "Monilinia mumeicola" OR "Monilinia polystroma" OR "Monilinia seaveri" OR "Monilinia yunnanensis" OR "Monolepta australis" OR "Moodna ostrinella" OR "Mucor circinelloides" OR "Mucor piriformis" OR "Mucor stolonifer" OR "Mycosphaerella cerasella" OR "Mycosphaerella pachyasca" OR "Mycosphaerella persica" OR "Mycosphaerella pruni-persicae" OR "Mycosphaerella tassiana" OR "Myrobalan latent ringspot virus" OR "Myzus cerasi" OR "Myzus cornutus" OR "Myzus persicae" OR "Myzus varians" OR "Natrassia mangiferae" OR "Naupactus leucoloma" OR "Naupactus xanthographus" OR "Nearctaphis bakeri" OR "Nectria cinnabarina" OR "Nectria haematococca" OR "Nectria ochroleuca" OR "Neaaliturus fenestratus" OR "Neofusicoccum australe" OR "Neofusicoccum parvum" OR "Neofusicoccum vitifusiforme" OR "Neonectria radicola" OR "Neopinnaspis harperi" OR "Neopulvinaria innumerabilis innumerabilis" OR "Neoris haraldi" OR "Nezara viridula" OR "Nippolachnus bengalensis" OR "Nippolachnus piri" OR "Nothopateella chinensis" OR "Odontia spathulata" OR "Odontotermes lokanandi" OR "Oeomona hirta" OR "Oidium laxum" OR "Oidium leucoconium" OR "Oidium leucoconium var. persicae" OR "Oiketicus kirbyi" OR "Oiketicus platensis" OR "Oligonychus bicolor" OR "Oligonychus coffeae" OR "Oligonychus gossypii" OR "Oligonychus litchii" OR "Oligonychus mangiferus" OR "Oligonychus perseae"

OR "Oligonychus punicae" OR "Oligonychus yothersi" OR "Omophlus lepturoides" OR "Oncometopia orbona" OR "Operophtera brumata" OR "Oraesia emarginata" OR "Oraesia excavata" OR "Orgyia leucostigma" OR "Orobanche cernua" OR "Orthodes cynica" OR "Orthosia hibisci" OR "Orthosia rubescens" OR "Osmoporus proteus" OR "Ostrinia nubilalis" OR "Oxyporus corticola" OR "Oxyporus latemarginatus" OR "Oxyporus similis" OR "Ozamia fuscomaculella" OR "Pachypasa capensis" OR "Pachypasa subfascia" OR "Palaeolecanium bituberculatum" OR "Paleacrita vernata" OR "Pandemis cerasana" OR "Pandemis heparana" OR "Pangaeus bilineatus" OR "Panonychus citri" OR "Panonychus elongatus" OR "Panonychus mori" OR "Panonychus ulmi" OR "Pantoea ananatis" OR "Pantomorus cervinus" OR "Panus rudis" OR "Panus stipticus" OR "Papaipema nebris" OR "Papilio eurymedon" OR "Papilio glaucus" OR "Papilio rutulus" OR "Papilio troilus" OR "Parabemisia myricae" OR "Parachronistis albiceps" OR "Paraconiothyrium africanum" OR "Paraconiothyrium brasiliense" OR "Paraconiothyrium variabile" OR "Parallelia stiposa" OR "Paraphlepsius irroratus" OR "Parasa latistriga" OR "Paratrichodorus porosus" OR "Parlatoria desolator" OR "Parlatoria oleae" OR "Parlatoria proteus" OR "Parlatoria theae" OR "Parlatoria yunnanensis" OR "Parthenolecanium cerasifex" OR "Parthenolecanium corni" OR "Parthenolecanium corni corni" OR "Parthenolecanium persicae" OR "Parthenolecanium pruinosum" OR "Passalora circumscissa" OR "Passalora rubrotincta" OR "Peach latent mosaic viroid" OR "Peach mosaic virus" OR "Peach rosette mosaic virus" OR "Peach rosette phytoplasma" OR "Peach wart disease" OR "Peach yellows phytoplasma" OR "Pectobacterium rhapontici" OR "Pellicularia koleroga" OR "Penicillium expansum" OR "Penicillium italicum" OR "Peniophora affinis" OR "Peridroma saucia" OR "Pestalotia disseminata" OR "Pestalotiopsis adusta" OR "Pestalotiopsis foedans" OR "Phaeoacremonium aleophilum" OR "Phaeoacremonium alvesii" OR "Phaeoacremonium griseorubrum" OR "Phaeoacremonium inflatipes" OR "Phaeoacremonium italicum" OR "Phaeoacremonium minimum" OR "Phaeoacremonium parasiticum" OR "Phaeoacremonium scolyti" OR "Phaeoacremonium tuscanicum" OR "Phaeomoniella effusa" OR "Phanerochaete arizonica" OR "Phanerochaete velutina" OR "Phellinus gilvus" OR "Phellinus noxius" OR "Phellinus pomaceus" OR "Phenacoccus aceris" OR "Phenacoccus graminicola" OR "Phialophora parasitica" OR "Philaenus spumarius" OR "Phloeospora padi" OR "Phlyctinus callosus" OR "Phoma glomerata" OR "Phoma laundoniae" OR "Phoma persicae" OR "Phoma persicaria" OR "Phoma pomorum" OR "Phomopsis amygdali" OR "Phomopsis amygdalina" OR "Phomopsis cotoneastri" OR "Phomopsis mali" OR "Phomopsis oblonga" OR "Phomopsis padina" OR "Phomopsis parabolica" OR "Phomopsis perniciosa" OR "Phorodon humuli" OR "Phorodon japonensis" OR "Phorodon persifoliae" OR "Phycita nr. roborella" OR "Phyllactinia suffulta" OR "Phyllocoptes abaeus" OR "Phyllonorycter cerasicolella" OR "Phyllonorycter crataegella" OR "Phyllonorycter pomonella" OR "Phyllosticta circumscissa" OR "Phyllosticta laurocerasi" OR "Phyllosticta maculiformis" OR "Phyllosticta persicae" OR "Phyllosticta persicophila" OR "Phyllosticta pirina" OR "Phyllosticta prunicola" OR "Phymatotrichopsis omnivora" OR "Phymatotrichum omnivorum" OR "Physalospora fusca" OR "Physalospora obtusa" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora capsici" OR "Phytophthora cinnamomi" OR "Phytophthora citricola" OR "Phytophthora citrophthora" OR "Phytophthora cryptogea" OR "Phytophthora drechsleri" OR "Phytophthora meadii" OR "Phytophthora megasperma" OR "Phytophthora nicotianae" OR "Phytophthora nicotianae var. parasitica" OR "Phytophthora parasitica" OR "Phytophthora rosacearum" OR "Phytophthora syringae" OR "Phytoplasma brasiliense" OR "Phytoplasma fraxini" OR "Phytoplasma mali" OR "Phytoplasma pruni" OR "Phytoplasma prunorum" OR "Phytoplasma pyri" OR "Phytoplasma ziziphi" OR "Phytopythium helicoides" OR "Pinnaspis strachani" OR "Planotortrix excessana" OR "Platynota flavedana" OR "Platynota idaeusalis" OR "Platynota stultana" OR "Plodia interpunctella" OR "Plum pox virus" OR "Pochazia shantungensis" OR "Podosphaera clandestina" OR "Podosphaera leucotricha" OR "Podosphaera oxycanthae" OR "Podosphaera pannosa" OR "Podosphaera tridactyla" OR "Podosphaera tridactyla var. tridactyla" OR "Polygonum aviculare" OR "Polyporus adustus" OR "Polyporus albellus" OR "Polyporus arcularius" OR "Polyporus cinnabarinus" OR "Polyporus curtisii" OR "Polyporus dichrous" OR "Polyporus gilvus" OR "Polyporus hirsutus" OR "Polyporus lacteus" OR "Polyporus licnoides var. sublilacinus" OR "Polyporus meliae" OR "Polyporus ostreiformis" OR "Polyporus palustris" OR "Polyporus pargamenus" OR "Polyporus sanguineus" OR "Polyporus submurinus" OR "Polyporus sulphureus" OR "Polyporus tulipiferae" OR "Polyporus versicolor" OR "Polystictus sanguineus" OR "Polystictus versicolor" OR "Polystigma deformans" OR "Popillia japonica" OR "Poria ambigua" OR "Poria corticola" OR "Pratylenchus brachyurus" OR "Pratylenchus neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus thornei" OR "Pratylenchus

vulnus" OR "Pratylenchus zeae" OR "Proeulia auraria" OR "Proeulia chrysopteris" OR "Promalactis semantris" OR "Promalactis suzukiella" OR "Propolis versicolor" OR "Prosoeuzophera impletella" OR "Protorthodes rufula" OR "Prune dwarf virus" OR "Prunus necrotic ringspot virus" OR "Pseudaulacaspis pentagona" OR "Pseudaulacaspis prunicola prunicola" OR "Pseudocamarosporium africanum" OR "Pseudocercospora angularis" OR "Pseudocercospora circumscissa" OR "Pseudocercospora prunicola" OR "Pseudocercospora pruni-persicicola" OR "Pseudocercospora pruni-yedoensis" OR "Pseudococcus calceolariae" OR "Pseudococcus comstocki" OR "Pseudococcus dolichomelos" OR "Pseudococcus longispinus" OR "Pseudococcus maritimus" OR "Pseudococcus viburni" OR "Pseudomonas amygdali" OR "Pseudomonas cichorii" OR "Pseudomonas fluorescens" OR "Pseudomonas marginalis pv. marginalis" OR "Pseudomonas pruni" OR "Pseudomonas syringae" OR "Pseudomonas syringae pv. actinidiae" OR "Pseudomonas syringae pv. morsprunorum" OR "Pseudomonas syringae pv. persicae" OR "Pseudomonas syringae pv. syringae" OR "Pseudomonas tumefaciens" OR "Pseudoparlatoria parlatorioides" OR "Psorosticha zizyphi" OR "Pterochloroides persicae" OR "Ptychogaster rubescens" OR "Puccinia cerasi" OR "Puccinia pruni" OR "Puccinia pruni-persicae" OR "Puccinia pruni-spinosae" OR "Pulcherricium caeruleum" OR "Pullularia pullulans" OR "Pulvinaria amygdali" OR "Pulvinaria persicae" OR "Pulvinaria rhois" OR "Pulvinaria vitis" OR "Punctularia strigosozonata" OR "Pycnoporus cinnabarinus" OR "Pycnoporus coccineus" OR "Pycnoporus sanguineus" OR "Pyroderces badia" OR "Pyroderces rileyi" OR "Pyrosis undulosa" OR "Pyrrharcia isabella" OR "Pythium irregulare" OR "Pythium sylvaticum" OR "Pythium ultimum" OR "Pythium vexans" OR "Raspberry ringspot virus" OR "Rectifusarium ventricosum" OR "Recurvaria leucateella" OR "Recurvaria nanella" OR "Reptalus panzeri" OR "Rhabdospora persiciphila" OR "Rhagoletis cingulata" OR "Rhagoletis completa" OR "Rhagoletis fausta" OR "Rhagoletis indifferens" OR "Rhagoletis pomonella" OR "Rhagoletis suavis" OR "Rhizobium radiobacter" OR "Rhizobium rhizogenes" OR "Rhizoctonia solani" OR "Rhizoecus americanus" OR "Rhizoecus colombiensis" OR "Rhizoecus falcifer" OR "Rhizopus arrhizus" OR "Rhizopus nigricans" OR "Rhizopus oryzae" OR "Rhizopus stolonifer" OR "Rhodococcus turanicus" OR "Rhopalosiphum maidis" OR "Rhopalosiphum momo" OR "Rhopalosiphum nymphaeae" OR "Rhopalosiphum padi" OR "Rhopalosiphum rufiabdominale" OR "Richardia brasiliensis" OR "Rosellinia necatrix" OR "Rosellinia novae" OR "Rothschildia aurota" OR "Rothschildia hesperus" OR "Rothschildia lebeau" OR "Rotylenchulus reniformis" OR "Russellaspis pustulans pustulans" OR "Saissetia coffeae" OR "Saissetia oleae oleae" OR "Saissetia persimilis" OR "Saperda candida" OR "Sarcinella prunicola" OR "Saturnia pyri" OR "Scaphytopius acutus" OR "Schizaphis piricola" OR "Schizophyllum alneum" OR "Schizophyllum commune" OR "Schizopora flavipora" OR "Schizopora paradoxa" OR "Scirtothrips dorsalis" OR "Sclerotinia cinerea" OR "Sclerotinia fructicola" OR "Sclerotinia fructigena" OR "Sclerotinia fruticola" OR "Sclerotinia laxa" OR "Sclerotinia sclerotiorum" OR "Sclerotium rolfsii" OR "Scoliopteryx libatrix" OR "Scolytus rugulosus" OR "Scolytus schevyrewi" OR "Scutellonema brachyurus" OR "Scythropia crataegella" OR "Seimatosporium luteosporum" OR "Septobasidium bogoriense" OR "Septobasidium natalense" OR "Septobasidium tanakae" OR "Serrodes partita" OR "Setaria faberi" OR "Sibine nesea" OR "Sistotrema brinkmannii" OR "Smerinthus ocellata" OR "Solanum elaeagnifolium" OR "Spaelotis clandestina" OR "Spencermartinsia viticola" OR "Sphaerolecanium prunastri" OR "Sphaeropsis malorum" OR "Sphaerotheca pannosa" OR "Sphaerotheca pannosa f. persicae" OR "Sphaerotheca pannosa var. persicae" OR "Sphinx drupiferarum" OR "Spilonota ocellana" OR "Spilosoma virginica" OR "Spiroplasma citri" OR "Spodoptera frugiperda" OR "Spodoptera litura" OR "Spodoptera ornithogalli" OR "Spodoptera praefica" OR "Sporocadus carpophilus" OR "Steccherinum ochraceum" OR "Stellaria media" OR "Stemphylium lycopersici" OR "Stemphylium pruni" OR "Stenella persicae" OR "Stereum albobadium" OR "Stereum complicatum" OR "Stereum hirsutum" OR "Stereum ochraceoflavum" OR "Stereum purpureum" OR "Stigmia carpophila" OR "Strawberry latent ringspot virus" OR "Streblote capensis" OR "Sunira bicolorago" OR "Suturaspis archangelskyae" OR "Synanthedon exitiosa" OR "Synanthedon hector" OR "Synanthedon pictipes" OR "Synanthedon scitula" OR "Synanthedon vespiformis" OR "Taeniothrips meridionalis" OR "Talaromyces funiculosus" OR "Taphrina armeniaca" OR "Taphrina deformans" OR "Teloschistes exilis var. pulvinatus" OR "Telphusa chloroderces" OR "Telphusa euryzeucta" OR "Tessarotoma papillosa" OR "Tetranychus browningi" OR "Tetranychus canadensis" OR "Tetranychus cinnabarinus" OR "Tetranychus desertorum" OR "Tetranychus fijiensis" OR "Tetranychus gladioli" OR "Tetranychus kanzawai" OR "Tetranychus lambi" OR "Tetranychus ludeni" OR "Tetranychus mcdanieli" OR "Tetranychus mexicanus" OR "Tetranychus neocaledonicus" OR "Tetranychus pacificus" OR "Tetranychus

piercei" OR "Tetranychus shanghaiensis" OR "Tetranychus turkestanii" OR "Tetranychus urticae" OR "Thanatephorus cucumeris" OR "Thaumatotibia leucotreta" OR "Thecla betulae" OR "Thelonectria aurea" OR "Thrips angusticeps" OR "Thrips australis" OR "Thrips imaginis" OR "Thrips major" OR "Thrips obscuratus" OR "Thyanta custator" OR "Thyas junco" OR "Thyridopteryx ephemeraeformis" OR "Thyronectria pseudotrachia" OR "Thyrostroma carpophilum" OR "Timocratica albella" OR "Tinocalloides montanus" OR "Tobacco mosaic virus" OR "Togninia minima" OR "Tomato black ring virus" OR "Tomato ringspot virus" OR "Trametes gallica var. trogii" OR "Trametes hirsuta" OR "Trametes ijobarskii" OR "Trametes pubescens" OR "Trametes roseola" OR "Trametes versicolor" OR "Trametes zonata" OR "Tranzschelia discolor" OR "Tranzschelia discolor f. sp. persicae" OR "Tranzschelia persicae" OR "Tranzschelia pruni-spinosae" OR "Tranzschelia pruni-spinosae var. discolor" OR "Tranzschelia punctata" OR "Trichaptum biforme" OR "Trichoderma harzianum" OR "Trichodorus giennensis" OR "Trichoferus campestris" OR "Trichosea champia" OR "Trichothecium roseum" OR "Trirachys holosericeus" OR "Trirachys sartus" OR "Truncatella laurocerasi" OR "Tryblidiella rufula" OR "Tuberocephalus momonis" OR "Tuberocephalus sakurae" OR "Tylenchorhynchus claytoni" OR "Tylenchulus palustris" OR "Uncinula necator var. necator" OR "Uredo persicae" OR "Urophorus humeralis" OR "Ustilina deusta" OR "Valsa ceratosperma" OR "Valsa cincta" OR "Valsa decorticans" OR "Valsa japonica" OR "Valsa leucostoma" OR "Valsa leucostoma var. cincta" OR "Venturia carpophila" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Wilsonomyces carpophilus" OR "Xanthomonas arboricola pv. pruni" OR "Xanthoria parietina" OR "Xestia c-nigrum" OR "Xiphinema americanum" OR "Xiphinema diversicaudatum" OR "Xiphinema italiae" OR "Xiphinema rivesi" OR "Xyleborinus saxesenii" OR "Xyleborus dispar" OR "Xylella fastidiosa" OR "Xylella fastidiosa subsp. multiplex" OR "Xylosandrus crassiusculus" OR "Xylotrechus namanganensis" OR "Yponomeuta padellus" OR "Ypsolopha persicella" OR "Zaprionus indianus" OR "Zasmidium persicae" OR "Zeuzera coffeae" OR "Zizyphia cleodorella" OR "Zygina flammigera")

B.3. Web of Science All Databases Search String '*Prunus armeniaca*'

In the table below, the search string used in Web of Science is reported. In total, 411 papers were retrieved (see Appendix D).

| | |
|------------------------------|--|
| Web of Science All databases | <p>TOPIC: ("Prunus armeniaca" OR "P. armeniaca" OR "apricot tree\$")</p> <p>AND</p> <p>TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease\$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest\$" OR "vector" OR "host plant\$" OR "host-plant\$" OR "host" OR "root lesion\$" OR "declines\$" OR "infestation\$" OR "damages\$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight\$" OR "canker" OR "scab\$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst\$ OR "dagger" OR "plant parasitic" OR " root feeding" OR " root\$ feeding" OR "plant\$parasitic" OR "root lesion\$" OR damage\$ OR infestation\$ OR symptom* OR pest\$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt\$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease\$ OR infecti* OR damag* OR symptom* OR pest\$ OR declines\$ OR infestation\$ OR damage\$ OR virosis OR canker OR blister\$ OR mosaic OR "leaf curl" OR "latent" OR insect \$ OR mite\$ OR malaise OR aphid\$ OR curculio OR thrip\$ OR cicad\$ OR miner\$ OR borer\$ OR weevil\$ OR "plant bug\$" OR spittlebug\$ OR moth\$ OR mealybug\$ OR cutworm\$ OR pillbug\$ OR caterpillar\$ OR "foliar feeder\$" OR "root feeder\$")</p> <p>NOT</p> <p>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</p> |
|------------------------------|--|

fraction" OR "traditional medicine" OR "medicine" OR mammal\$ OR bird\$ OR "human disease\$")

NOT

TOPIC: ("Acanthococcus armeniacus" OR "Acleris variegana" OR "Acrobasis tricolorella" OR "Acrionicta interrupta" OR "Acsala anomala" OR "Actias artemis" OR "Actias selene" OR "Adelphocoris lineolatus" OR "Adetomeris erythroptus" OR "Adoxophyes orana" OR "Aeolesthes sarta" OR "Agrilus mali" OR "Agrobacterium tumefaciens" OR "Aleimma loeflingiana" OR "Aleurocanthus spiniferus" OR "Aleurocanthus woglumi" OR "Alternaria alternata" OR "Alternaria citri" OR "Alternaria pruni" OR "Alternaria tenuissima" OR "American plum line pattern virus" OR "Amphitetranynchus viennensis" OR "Amylostereum sacratum" OR "Anarsia lineatella" OR "Anastrepha fraterculus" OR "Anoplophora chinensis" OR "Anthonomus piri" OR "Aonidiella orientalis" OR "Aphis gossypii" OR "Aphis spiraeicola" OR "Apiognomonina erythrostoma" OR "Apiosporina morbosa" OR "Aplosporella pruni" OR "Aporia crataegi" OR "Apple chlorotic leaf spot virus" OR "Apple mosaic virus" OR "Apple scar skin viroid" OR "Apple stem grooving virus" OR "Apricot latent virus" OR "Apricot pseudo-chlorotic leaf spot virus" OR "Apricot ring pox and cherry twisted leaf diseases" OR "Arabis mosaic virus" OR "Archips argyrospila" OR "Archips breviplicatus" OR "Archips fuscocupreanus" OR "Archips rosana" OR "Archips xylosteana" OR "Archips xylosteanus" OR "Argyrotaenia citrana" OR "Armillaria limonea" OR "Armillaria luteobubalina" OR "Armillaria mellea" OR "Armillaria novae-zelandiae" OR "Armillariella tabescens" OR "Aromia bungii" OR "Ascochyta pruni" OR "Ascochyta prunicola" OR "Asiacornococcus kaki" OR "Aspergillus niger" OR "Asteromella mali" OR "Aureobasidium pullulans" OR "Austroagallia sinuata" OR "Bactrocera dorsalis" OR "Bactrocera jarvisi" OR "Bactrocera neohumeralis" OR "Bactrocera tryoni" OR "Bactrocera zonata" OR "Blastospora smilacis" OR "Blumeriella jaapii" OR "Botryosphaeria dothidea" OR "Botryosphaeria obtusa" OR "Botryosphaeria ribis" OR "Botryosphaeria stevensii" OR "Botryotinia fuckeliana" OR "Botrytis cinerea" OR "Brachycaudus schwartzi" OR "Bryobia praetiosa" OR "Bryobia rubrioculus" OR "Cadra cautella" OR "Cadra figulilella" OR "Caeoma makinoi" OR "Caligula japonica" OR "Caliroa cerasi" OR "Calosphaeria africana" OR "Calosphaeria ambigua" OR "Calosphaeria princeps" OR "Calosphaeria prunicola" OR "Calosphaeria velutina" OR "Camarosporium persicae" OR "Candidatus Phytoplasma asteris" OR "Candidatus Phytoplasma mali" OR "Candidatus Phytoplasma phoenicium" OR "Candidatus Phytoplasma pruni" OR "Candidatus Phytoplasma prunorum" OR "Candidatus Phytoplasma solani" OR "Capnodis tenebrionis" OR "Carpophilus hemipterus" OR "Carpophilus mutilatus" OR "Carposina sasakii" OR "Cenopalpus pulcher" OR "Ceratitis capitata" OR "Ceratitis quinaria" OR "Ceratitis rosa" OR "Ceratocystis alba" OR "Ceratocystis fimbriata" OR "Cercospora circumscissa" OR "Cercospora persicae" OR "Ceroplastes ceriferus" OR "Ceroplastes destructor" OR "Ceroplastes floridensis" OR "Ceroplastes japonicus" OR "Ceroplastes pseudoceriferus" OR "Cherry green ring mottle virus" OR "Cherry necrotic rusty mottle virus" OR "Cherry rusty mottle disease" OR "Cherry virus A" OR "Chileulia stalactitis" OR "Chinavia hilaris" OR "Chlidaspis asiatica" OR "Chondrostereum purpureum" OR "Choreutis pariana" OR "Choristoneura rosaceana" OR "Chrysobothris femorata" OR "Cladosporium carpophilum" OR "Cladosporium prunicola" OR "Clasterosporium carpophilum" OR "Clasterosporium degenerans" OR "Clitocybe tabescens" OR "Cnephasia longana" OR "Coccomyces hiemalis" OR "Coccomyces lutescens" OR "Coccomyces prunophorae" OR "Coccus hesperidum hesperidum" OR "Colladonus montanus" OR "Colletotrichum acutatum" OR "Colletotrichum fioriniae" OR "Colletotrichum gloeosporioides" OR "Collophora africana" OR "Collophora hispanica" OR "Collybia drucei" OR "Commelina benghalensis" OR "Commelina diffusa" OR "Comstockaspis perniciosa" OR "Coniella vitis" OR "Coniochaeta prunicola" OR "Coniochaeta velutina" OR "Coniothyrium fuckelii" OR "Coniothyrium tirolense" OR "Conotrachelus nenuphar" OR "Corcyra cephalonica" OR "Coriolus hirsutus" OR "Coriolus versicolor" OR "Cornu aspersum" OR "Corticium solani" OR "Coryneum beijerinckii" OR "Coryneum carpophilum" OR "Cryptococcus adeliensis" OR "Cryptodiaporthe castanea" OR "Crytophasa unipunctana" OR "Cryptovalsa ampelina" OR "Ctenopseustis obliquana" OR "Cucumber green mottle mosaic virus" OR "Cydia latiferreana" OR "Cydia molesta" OR "Cydia pomonella" OR "Cylindrocarpon destructans" OR "Cylindrocarpon obtusisporum" OR "Cylindrosporium lutescens" OR "Cystidia couaggaria" OR "Cytospora ambiens" OR "Cytospora cincta" OR "Cytospora eutypelloides" OR "Cytospora leucostoma" OR "Cytospora mali" OR "Cytospora rubescens" OR "Cytospora sorbicola" OR "Dematium pullulans" OR "Diabrotica undecimpunctata undecimpunctata" OR "Diaporthe ambigua" OR "Diaporthe amygdali" OR "Diaporthe eres" OR "Diaspidiotus ancyclus" OR "Diaspidiotus

prunorum" OR "Diaspidiotus pyri" OR "Diaspidiotus transcaspensis" OR "Diatrype flavovirens" OR "Diatrype oregonensis" OR "Diatrype stigma" OR "Dibotryon morbosum" OR "Diplodia amygdali" OR "Diplodia mutila" OR "Diplodia natalensis" OR "Diplodia persicae" OR "Diplodia pruni" OR "Diplodia sarmentorum" OR "Diplodia seriata" OR "Doratifera vulnerans" OR "Dothiorella iberica" OR "Dothiorella plurivora" OR "Dothiorella sarmentorum" OR "Drechslera avenacea" OR "Drosicha turkestanica" OR "Drosophila suzukii" OR "Dysmicoccus brevipes" OR "Elfvvingia applanata" OR "Elfvvingia australis" OR "Emericella nidulans var. dentata" OR "Enarmonia formosana" OR "Eotetranychus boreus" OR "Eotetranychus edi" OR "Eotetranychus kankitus" OR "Ephestia elutella" OR "Epicoccum pruni" OR "Epiphyas postvittana" OR "Erthesina fullo" OR "Erwinia amylovora" OR "Erythrimum salmonicolor" OR "Eulecanium rugulosum" OR "Eulecanium tiliae" OR "Euproctis chrysorrhoea" OR "Eurytoma schreineri" OR "Eutetranychus orientalis" OR "Eutypa armeniaca" OR "Eutypa crema" OR "Eutypa lata" OR "Eutypa leptoplaca" OR "Eutypa petrakii" OR "Eutypella citricola" OR "Eutypella leprosa" OR "Eutypella microtheca" OR "Eutypella tetraploa" OR "Euzophera semifuneralis" OR "Fomes pomaceus" OR "Fomitopsis pinicola" OR "Forficula auricularia" OR "Frankliniella occidentalis" OR "Fusarium lateritium" OR "Fusarium roseum" OR "Fusarium sambucinum var. coeruleum" OR "Fusicladium carpophilum" OR "Fusicladium cerasi" OR "Fusicladium pruni" OR "Fusicoccum pruni" OR "Ganoderma applanatum" OR "Ganoderma australe" OR "Gilbertella persicaria" OR "Gloeocystidiellum sacratum" OR "Gloeoporus dichrous" OR "Gloeosporium armeniacum" OR "Gloeosporium serotinum" OR "Gnomonia circumscissa" OR "Gnomonia erythrostoma" OR "Grapholita funebrana" OR "Grapholita molesta" OR "Grapholita prunivora" OR "Grovesinia pruni" OR "Gueriniella serratulae" OR "Halyomorpha halys" OR "Hedya dimidioalba" OR "Helicobasidium mompa" OR "Helicotylenchus dihystra" OR "Helicotylenchus erythrinae" OR "Helicoverpa armigera" OR "Hemicriconemoides mangiferae" OR "Hendersonula cypria" OR "Hendersonula toruloidea" OR "Heterobasidion annosum" OR "Heterodera mediterranea" OR "Hop stunt viroid" OR "Hoplocampa flava" OR "Hoplocampa minuta" OR "Hyalopterus pruni" OR "Hypolimnas misippus" OR "Indarbela quadrinotata" OR "Inurois fletcheri" OR "Iphiclydes podalirius" OR "Irpex lacteus" OR "Ischnaspis longirostris" OR "Laetiporus sulphureus" OR "Lambertella pruni" OR "Langia zenzeroides" OR "Lasiodiplodia theobromae" OR "Latoia latistriga" OR "Lepidosaphes malicola" OR "Lepidosaphes pistaciae" OR "Lepidosaphes ulmi" OR "Leptothyrium pomi" OR "Leucoptera malifoliella" OR "Leucostoma cinctum" OR "Leucostoma personii" OR "Leucostoma persoonii" OR "Libertina stipata" OR "Lichnoptera decora" OR "Little cherry virus 1" OR "Longidorus jonesi" OR "Lycorma delicatula" OR "Lymantria dispar" OR "Lymantria monacha" OR "Lymantria obfuscata" OR "Maconellicoccus hirsutus" OR "Macrophoma kawatsukai" OR "Macrophomina phaseoli" OR "Macrophomina phaseolina" OR "Malacosoma americana" OR "Malacosoma californica" OR "Malacosoma incurva" OR "Malacosoma parallela" OR "Mamestra configurata" OR "Megaplatypus mutatus" OR "Melanaspis inopinata" OR "Meloidogyne incognita" OR "Meloidogyne javanica" OR "Mercetaspis halli" OR "Merlinius brevidens" OR "Merlinius lineatus" OR "Mesocriconema xenoplax" OR "Microstroma juglandis" OR "Microtermes unicolor" OR "Miuraea degenerans" OR "Miuraea persicae" OR "Monilia cinerea" OR "Monilia cinerea f. americana" OR "Monilia fructigena" OR "Monilia laxa" OR "Monilia linhartiana" OR "Monilia mumeicola" OR "Monilia polystroma" OR "Monilinia demissa" OR "Monilinia fructicola" OR "Monilinia fructigena" OR "Monilinia laxa" OR "Monilinia mumeicola" OR "Monilinia polystroma" OR "Monochaetia rosenwaldia" OR "Mucor piriformis" OR "Mucor plumbeus" OR "Mucor racemosus" OR "Mycosphaerella cerasella" OR "Mycosphaerella pruni-persicae" OR "Myrotheciella australiensis" OR "Myzus mumeicola" OR "Myzus persicae" OR "Natrassia mangiferae" OR "Naupactus xanthographus" OR "Nectria cinnabarina" OR "Nealiturus fenestratus" OR "Nealiturus haematoceps" OR "Neofusicoccum australe" OR "Neofusicoccum parvum" OR "Neofusicoccum stellenboschiana" OR "Neofusicoccum vitifusiforme" OR "Neonectria obtusispora" OR "Neonectria radicola" OR "Neosphaleroptera nubilana" OR "Nigrospora oryzae" OR "Nipaecoccus viridis" OR "Odontotermes lokanandi" OR "Oidium leucoconium var. persicae" OR "Oiketicus kirbyi" OR "Oiketicus toumeyii" OR "Oligonychus sayedi" OR "Oncopodium pruni" OR "Operophtera brumata" OR "Orgyia leucostigma" OR "Orobanche aegyptiaca" OR "Orobanche cernua" OR "Orobanche ramosa" OR "Pandemis heparana" OR "Panonychus ulmi" OR "Papilio rutulus" OR "Parasaissetia nigra" OR "Paratrichodorus lobatus" OR "Paratrichodorus minor" OR "Paratrichodorus porosus" OR "Paratrichodorus teres" OR "Paratylenchus hamatus" OR "Paratylenchus neoamblycephalus" OR "Paratylenchus projectus" OR "Parlatoria oleae" OR "Parlatoria theae" OR "Parthenolecanium corni corni" OR "Parthenolecanium persicae" OR "Passalora

circumscissa" OR "Peach latent mosaic viroid" OR "Peach mosaic virus" OR "Peach rosette phytoplasma" OR "Peach yellows phytoplasma" OR "Penicillium expansum" OR "Peridroma saucia" OR "Pestalotia laurocerasi" OR "Petriella sordida" OR "Phaeoacremonium africanum" OR "Phaeoacremonium aleophilum" OR "Phaeoacremonium griseo" OR "Phaeoacremonium inflatipes" OR "Phaeoacremonium iranianaum" OR "Phaeoacremonium junior" OR "Phaeoacremonium krajdienii" OR "Phaeoacremonium longicollarum" OR "Phaeoacremonium minimum" OR "Phaeoacremonium pallidum" OR "Phaeoacremonium parasiticum" OR "Phaeoacremonium scolyti" OR "Phaeoacremonium subulatum" OR "Phaeoacremonium venezuelense" OR "Phaeoacremonium viticola" OR "Phaeoisaria clematidis" OR "Phaeomoniella tardicola" OR "Phellinus igniarius" OR "Phellinus noxius" OR "Phellinus pomaceus" OR "Phellinus robustus" OR "Phellinus setulosus" OR "Phenacoccus aceris" OR "Phialophora parasitica" OR "Phloeospora padi" OR "Phoma mume" OR "Phoma persicaria" OR "Phoma pomorum" OR "Phomopsis amygdalina" OR "Phomopsis theicola" OR "Phomopsis vexans" OR "Phycita nr. roborella" OR "Phyllactinia guttata" OR "Phyllactinia suffulta" OR "Phyllosticta armenicola" OR "Phyllosticta cerasicola" OR "Phyllosticta circumscissa" OR "Phyllosticta laurocerasi" OR "Phyllosticta persicae" OR "Phyllosticta prunicola" OR "Phyllosticta vindobonensis" OR "Phymatotrichum omnivorum" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora cinnamomi" OR "Phytophthora citricola" OR "Phytophthora citrophthora" OR "Phytophthora cryptogea" OR "Phytophthora drechsleri" OR "Phytophthora lacustris" OR "Phytophthora megasperma" OR "Phytophthora nicotianae" OR "Phytophthora palmivora" OR "Phytophthora parasitica" OR "Phytophthora plurivora" OR "Phytophthora rosacearum" OR "Phytophthora syringae" OR "Phytophthora tropicalis" OR "Phytoplasma mali" OR "Phytoplasma pruni" OR "Phytoplasma prunorum" OR "Planotortrix excessana" OR "Pleospora armeniacae" OR "Pleospora herbarum" OR "Plodia interpunctella" OR "Plowrightia morbosa" OR "Plum bark necrosis stem pitting-associated virus" OR "Plum pox virus" OR "Podosphaera clandestina" OR "Podosphaera clandestina var. clandestina" OR "Podosphaera clandestina var. tridactyla" OR "Podosphaera leucotricha" OR "Podosphaera oxyacanthae" OR "Podosphaera pannosa" OR "Podosphaera prunina" OR "Podosphaera tridactyla" OR "Podosphaera tridactyla f. armeniacae" OR "Podosphaera tridactyla var. tridactyla" OR "Polygonum aviculare" OR "Polyporus curtisii" OR "Polyporus gilvus" OR "Polyporus sulphureus" OR "Polystictus versicolor" OR "Polystigma deformans" OR "Popillia japonica" OR "Pratylenchus coffeae" OR "Pratylenchus crenatus" OR "Pratylenchus neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus thornei" OR "Pratylenchus vulnus" OR "Proeulia auraria" OR "Proeulia chrysopteris" OR "Protorthodes rufula" OR "Prune dwarf virus" OR "Prunus necrotic ringspot virus" OR "Psammotettix striatus" OR "Pseudaulacaspis pentagona" OR "Pseudocercospora circumscissa" OR "Pseudococcus viburni" OR "Pseudomonas fluorescens" OR "Pseudomonas pruni" OR "Pseudomonas syringae" OR "Pseudomonas syringae pv. syringae" OR "Pseudomonas viridiflava" OR "Pterochloroides persicae" OR "Puccinia pruni" OR "Puccinia pruni-spinosae" OR "Pulvinaria vitis" OR "Pycnoporus coccineus" OR "Pyroderces rileyi" OR "Pythium aphanidermatum" OR "Pythium iranense" OR "Pythium irregulare" OR "Pythium oligandrum" OR "Pythium paroeandrum" OR "Pythium ultimum" OR "Raspberry ringspot virus" OR "Recurvaria nanella" OR "Rhagoletis indifferens" OR "Rhagoletis pomonella" OR "Rhizobium radiobacter" OR "Rhizobium rhizogenes" OR "Rhizoctonia solani" OR "Rhizopus arrhizus" OR "Rhizopus stolonifer" OR "Rhodococcus sariuoni" OR "Rhodococcus turanicus" OR "Rhodogastria similis" OR "Rhynchites bacchus" OR "Rosellinia necatrix" OR "Rothschildia hesperus" OR "Rothschildia orizaba" OR "Rotylenchulus macrodoratus" OR "Rotylenchulus reniformis" OR "Russellaspis pustulans pustulans" OR "Saissetia oleae oleae" OR "Saturnia atlantica" OR "Saturnia pyri" OR "Schizophyllum alneum" OR "Schizophyllum commune" OR "Schizotetranychus smirnovi" OR "Scirtothrips dorsalis" OR "Sclerotinia fructicola" OR "Sclerotinia fructigena" OR "Sclerotinia fruticola" OR "Sclerotinia laxa" OR "Sclerotinia sclerotiorum" OR "Sclerotium rolfsii" OR "Scolytus rugulosus" OR "Scutellonema brachyurus" OR "Septobasidium bogoriense" OR "Septobasidium pseudopedicellatum" OR "Septobasidium tanakae" OR "Septoria cerasina" OR "Septoria piricola" OR "Septoria pruni" OR "Spencermartinsia plurivora" OR "Sphaeloma pruni-domesticae" OR "Sphaerolectanium prunastris" OR "Sphaerotheca pannosa" OR "Sphaerotheca pannosa f. persicae" OR "Sphaerotheca pannosa var. persicae" OR "Sporocadus carpophilus" OR "Stereum ochraceoflavum" OR "Stereum purpureum" OR "Stigmia carpophila" OR "Strawberry latent ringspot virus" OR "Suturaspis archangelskyae" OR "Synanthedon exitiosa" OR "Synanthedon hector" OR "Synanthedon myopaeformis" OR "Taphrina armeniacae" OR "Taphrina communis" OR "Taphrina deformans" OR "Taphrina insititia" OR "Taphrina mume" OR "Taphrina pruni" OR

"Tectocephus velatus" OR "Tetranychus kanzawai" OR "Tetranychus ludeni" OR "Tetranychus pacificus" OR "Tetranychus schoenei" OR "Tetranychus urticae" OR "Thanatephorus cucumeris" OR "Thaumatotibia leucotreta" OR "Thecla betulina" OR "Thrips flavus" OR "Thrips obscuratus" OR "Thyrostroma carpophilum" OR "Timocratica albella" OR "Togninia africana" OR "Togninia griseo-olivacea" OR "Togninia minima" OR "Togninia parasitica" OR "Tomato black ring virus" OR "Tomato ringspot virus" OR "Tortrix viridana" OR "Trametes cingulata" OR "Trametes gallica var. trogii" OR "Trametes hirsuta" OR "Trametes hispida" OR "Trametes proteus" OR "Trametes versicolor" OR "Tranzschelia discolor" OR "Tranzschelia japonica" OR "Tranzschelia persicae" OR "Tranzschelia pruni-spinosae" OR "Tranzschelia pruni-spinosae var. discolor" OR "Trichoferus campestris" OR "Trimmatostroma undulatum" OR "Trirachys holosericeus" OR "Trirachys sartus" OR "Truncatella angustata" OR "Truncospora truncatospora" OR "Tubercularia vulgaris" OR "Turanoclytus namanganensis" OR "Tylenchorhynchus clarus" OR "Tylenchorhynchus claytoni" OR "Uncinula prunastri" OR "Uncinula prunastri var. armeniaca" OR "Urophorus humeralis" OR "Uzbekistanica pruni" OR "Valsa ambiens" OR "Valsa japonica" OR "Valsa leucostoma" OR "Valsa leucostoma var. rubescens" OR "Valsaria eucalypti" OR "Venturia carpophila" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Whetzelinia sclerotiorum" OR "Wilsonomyces carpophilus" OR "Xanthochrous hispidus" OR "Xanthomonas arboricola pv. pruni" OR "Xiphinema americanum" OR "Xiphinema diversicaudatum" OR "Xiphinema index" OR "Xiphinema pachtaicum" OR "Xiphinema pyrenaicum" OR "Xyleborinus saxesenii" OR "Xyleborus dispar" OR "Xylella fastidiosa" OR "Xylella fastidiosa subsp. multiplex" OR "Xylosandrus germanus" OR "Xylotrechus namanganensis" OR "Zaprionus indianus")

B.4. Web of Science All Databases Search String '*Prunus davidiana*'

In the table below, the search string used in Web of Science is reported. In total, 31 papers were retrieved (see Appendix D).

| | |
|------------------------------|---|
| Web of Science All databases | <p>TOPIC: ("Prunus davidiana" OR "P. davidiana" OR "David's peach")</p> <p>AND</p> <p>TOPIC: ("pathogen*" OR "fung*" OR "oomycet*" OR "myce*" OR "disease\$" OR "infecti*" OR "damag*" OR "symptom*" OR "pest\$" OR "vector" OR "host plant\$" OR "host-plant\$" OR "host" OR "root lesion\$" OR "declines\$" OR "infestation\$" OR "damages\$" OR "dieback*" OR "die back*" OR "die-back*" OR "blight\$" OR "canker" OR "scab\$" OR "rot" OR "rots" OR "rotten" OR "damping-off" OR "smut" OR "mould" OR "mold" OR nematod* OR "root knot" OR "root-knot" OR root tip OR cyst\$ OR "dagger" OR "plant parasitic" OR " root feeding" OR " root\$ feeding" OR "plant\$parasitic" OR "root lesion\$" OR damage\$ OR infestation\$ OR symptom* OR pest\$ OR pathogenic bacteria OR mycoplasma* OR bacteri* OR phytoplasma* OR wilt\$ OR wilted OR canker OR witch* OR yellowing OR leafroll OR bacterial gall OR crown gall OR spot OR blast OR pathogen* OR virus* OR viroid* OR disease\$ OR infecti* OR damag* OR symptom* OR pest\$ OR decline\$ OR infestation\$ OR damage\$ OR virosis OR canker OR blister\$ OR mosaic OR "leaf curl" OR "latent" OR insect \$ OR mite\$ OR malaise OR aphid\$ OR curculio OR thrip\$ OR cicad\$ OR miner\$ OR borer\$ OR weevil\$ OR "plant bug\$" OR spittlebug\$ OR moth\$ OR mealybug\$ OR cutworm\$ OR pillbug\$ OR caterpillar\$ OR "foliar feeder\$" OR "root feeder\$")</p> <p>NOT</p> <p>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 diseases\$" OR "plant extracts" OR "immunological" OR "purified fraction" OR "traditional medicine" OR "medicine" OR mammal\$ OR bird\$ OR "human disease\$")</p> |
|------------------------------|---|

NOT

TOPIC: ("Aleurodicus dispersus" OR "Anarsia lineatella" OR "Anoplophora chinensis" OR "Apriona cinerea" OR "Cacoecimorpha pronubana" OR "Carposina sasakii" OR "Ceratitis quinaria" OR "Cherry leaf roll virus" OR "Diabrotica speciosa" OR "Epichoristodes acerbella" OR "Euwallacea fornicatus sensu stricto" OR "Grapholita molesta" OR "Grapholita prunivora" OR "Helicoverpa zea" OR "Malacosoma americanum" OR "Oligonychus perseae" OR "Omophlus lepturoides" OR "Parabemisia myricae" OR "Peach mosaic virus" OR "Peach yellows phytoplasma" OR "Pseudococcus calceolariae" OR "Pseudococcus comstocki" OR "Pseudococcus viburni" OR "Reptalus panzeri" OR "Scolytus schevyrewi" OR "Tomato black ring virus" OR "Trirachys sartus" OR "Xylotrechus namanganensis" OR "Candidatus Phytoplasma prunorum" OR "Abagrotis alternata" OR "Acleris quinquefasciana" OR "Acleris tripunctana" OR "Acronicta alni" OR "Acronicta clarescens" OR "Acronicta impleta" OR "Acronicta interrupta" OR "Acronicta lanceolaria" OR "Acronicta pruni" OR "Acronicta psi" OR "Acronicta radcliffei" OR "Acronicta rumicis" OR "Acronicta superans" OR "Actebia fennica" OR "Actias selene" OR "Adoxophyes orana" OR "Agrobacterium tumefaciens" OR "Aleurocanthus spiniferus" OR "Allophyes oxyacanthae" OR "Alsophila pometaria" OR "Alternaria cerasi" OR "American plum line pattern virus" OR "Amphisphaeria vibratilis" OR "Amphitetranychus viennensis" OR "Antheraea polyphemus" OR "Anthonomus quadrigibbus" OR "Aphelenchoides ritzemabosi" OR "Aphis aurantii" OR "Aphis gossypii" OR "Aphis odinae" OR "Aphis spiraeola" OR "Apiognomonium erythrostoma" OR "Apiosporina morbosa" OR "Apple chlorotic leaf spot virus" OR "Apple mosaic virus" OR "Apple rubbery wood phytoplasma" OR "Archips fuscocupreanus" OR "Argyresthia ephippella" OR "Argyresthia pruniella" OR "Armillaria mellea" OR "Armillaria ostoyae" OR "Ascochyta ovalispora" OR "Aspergillus niger" OR "Asteromella cerasicola" OR "Aureobasidium pullulans" OR "Automeris io" OR "Bactrocera correcta" OR "Bactrocera dorsalis" OR "Balsa malana" OR "Basilarchia arthemis" OR "Betacallis prunicola" OR "Blumeriella jaapii" OR "Botryosphaeria dothidea" OR "Botryosphaeria stevensii" OR "Botrytis cinerea" OR "Brachycaudus cardui" OR "Brachycaudus cerasicola" OR "Brachycaudus helichrysi" OR "Cadophora novi-eboraci" OR "Cadophora prunicola" OR "Cadophora ramosa" OR "Caecilia makinoi" OR "Callosamia promethea" OR "Calosphaeria princeps" OR "Calosphaeria pulchella" OR "Candidatus Phytoplasma asteris" OR "Candidatus Phytoplasma mali" OR "Candidatus Phytoplasma pruni" OR "Carnation ringspot virus" OR "Carsia sororiata" OR "Ceratitis capitata" OR "Cercospora cerasella" OR "Cercospora circumscissa" OR "Ceroplastes japonicus" OR "Cerura scitiscrupta" OR "Cherry green ring mottle virus" OR "Cherry necrotic rusty mottle virus" OR "Cherry rasp leaf virus" OR "Cherry rusty mottle disease" OR "Cherry virus A" OR "Chionaspis furfura" OR "Chlidaspis asiatica" OR "Chondrostereum purpureum" OR "Chrysobothris mali" OR "Chrysomphalus aonidum" OR "Cladosporium carpophilum" OR "Cladosporium epiphyllum" OR "Cladosporium phyllophilum" OR "Coccomyces hiemalis" OR "Collophora paarla" OR "Comocladia permunda" OR "Comstockaspis perniciosus" OR "Conotrachelus nenuphar" OR "Coronophora gregaria" OR "Coryneum carpophilum" OR "Cosmia trapezina" OR "Curvularia geniculata" OR "Cylindrocarpus destructans" OR "Cylindrosporium hiemalis" OR "Cytospora cincta" OR "Cytospora leucostoma" OR "Cytospora salicacearum" OR "Cytospora sorbicola" OR "Cytosporina ludibunda" OR "Dasychira meridionalis" OR "Datana ministra" OR "Dermatea cerasi" OR "Dermea cerasi" OR "Diaporthe decorticans" OR "Diaporthe eres" OR "Diaporthe perniciosus" OR "Diaspidiotus forbesi" OR "Diaspidiotus juglansregiae" OR "Diaspidiotus ostreaeformis" OR "Diaspidiotus prunorum" OR "Diaspidiotus pyri" OR "Diatrype macrothecia" OR "Dibotryon morbosum" OR "Diloba caeruleocephala" OR "Diplodia cerasorum" OR "Diplodia mutila" OR "Diplodia seriata" OR "Drosicha maskelli" OR "Drosicha stebbingii" OR "Drosophila suzukii" OR "Enarmonia formosana" OR "Eotetranychus pruni" OR "Eotetranychus prunicola" OR "Eotetranychus rubiphilus" OR "Epidiaspis leperii" OR "Epiphyas postvittana" OR "Erannis tiliaria" OR "Eriogaster lanestrus" OR "Eulecanium cerasorum" OR "Eulecanium ciliatum" OR "Eulecanium kunoense" OR "Eulecanium rugulosum" OR "Eulecanium tiliae" OR "Euproctis chrysorrhoea" OR "Eupsilia morrisoni" OR "Eupsilia sidus" OR "Eupsilia transversa" OR "Euscelidius variegatus" OR "Eutetranychus orientalis" OR "Eutypa lata" OR "Euxoa auxiliaris" OR "Euxoa tessellata" OR "Euzophera semifuneralis" OR "Exidia glandulosa var. scutelliformis" OR "Exoascus cerasi" OR "Exoascus pruni" OR "Fomes fomentarius" OR "Fomes pomaceus" OR "Fomitopsis pinicola" OR "Fusarium lateritium" OR "Fuscoporia gilva" OR "Fusicladium carpophilum" OR "Fusicladium cerasi" OR "Ganoderma applanatum" OR "Gibberella avenacea" OR "Glomerella cingulata" OR "Gnomonia erythrostoma" OR "Gonimbrasia gueinzii" OR

"Grapholita funebrana" OR "Grapholita packardii" OR "Halyomorpha halys" OR "Harknellenus titus" OR "Hemigraphiphora plebeia" OR "Hemileuca eglanterina" OR "Hemileuca maia" OR "Heterocampa biundata" OR "Heterocampa guttivitta" OR "Higginsia hiemalis" OR "Homohadena badistriga" OR "Hyalophora cecropia" OR "Hyalophora columbia" OR "Hyalopterus pruni" OR "Hyphantria cunea" OR "Hypoxyton rubiginosum" OR "Hysterium vulgare" OR "Hysteroneura setariae" OR "Ilyonectria robusta" OR "Imbrasia gueinzii" OR "Iphiclydes podalirius" OR "Lacanobia subjuncta" OR "Laetiporus sulphureus" OR "Lambdina fervidaria" OR "Lepidosaphes malicola" OR "Lepidosaphes ulmi" OR "Leucoptera malifoliella" OR "Leucostoma cinctum" OR "Leucostoma personii" OR "Leucostoma persoonii" OR "Lithophane antennata" OR "Lithophane bethunei" OR "Lithophane grotei" OR "Lithophane hemina" OR "Lithophane laticinerea" OR "Little cherry virus" OR "Little cherry virus 1" OR "Little cherry virus 2" OR "Lomographa temerata" OR "Lophocampa argentata" OR "Lophocampa caryae" OR "Lycorma delicatula" OR "Lymantria dispar" OR "Lymantria obfuscata" OR "Lyonetia clerkella" OR "Macrophomina phaseoli" OR "Macrophomina phaseolina" OR "Malacosoma americana" OR "Malacosoma californica" OR "Malacosoma disstria" OR "Malacosoma parallela" OR "Megaplatus mutatus" OR "Meloidogyne hapla" OR "Meloidogyne javanica" OR "Mercetaspis halli" OR "Mesocriconema xenoplax" OR "Metarranthis warnerae" OR "Microdiplodia microsporella" OR "Microgloeum pruni" OR "Monilia fructigena" OR "Monilia laxa" OR "Monilinia fructicola" OR "Monilinia fructigena" OR "Monilinia kusanoi" OR "Monilinia laxa" OR "Monilinia padi" OR "Monilinia polystroma" OR "Monilinia seaveri" OR "Mycosphaerella cerasella" OR "Myzus cerasi" OR "Myzus muscaensis" OR "Myzus ornatus" OR "Myzus persicae" OR "Myzus siegesbeckiae" OR "Myzus varians" OR "Natrasia mangiferae" OR "Naupactus xanthographus" OR "Nectria cinnabarina" OR "Neofusicoccum mangiferae" OR "Neonectria radicola" OR "Neopulvinaria innumerabilis innumerabilis" OR "Nymphalis polychloros" OR "Operophtera brumata" OR "Orgyia leucostigma" OR "Orgyia vetusta" OR "Orthosia gracilis" OR "Orthosia hibisci" OR "Panonychus ulmi" OR "Panus rudis" OR "Paonias astylus" OR "Paonias excaecata" OR "Paonias myops" OR "Papilio glaucus" OR "Papilio multicaudatus" OR "Papilio rutulus" OR "Paraphoma radicina" OR "Parlatoria oleae" OR "Parlatoria theae" OR "Parornix geminatella" OR "Peach rosette phytoplasma" OR "Peach wart disease" OR "Penicillium expansum" OR "Peridroma saucia" OR "Pestalotia adusta" OR "Pestalotiopsis adusta" OR "Phaeoacremonium minimum" OR "Phaeoacremonium parasiticum" OR "Phaeosporis catacrypta" OR "Phellinus igniarius" OR "Phellinus pomaceus" OR "Phenacoccus aceris" OR "Phenacoccus transcaucasicus" OR "Phloeospora padi" OR "Phoma pomorum" OR "Phomopsis padina" OR "Phorodon humuli" OR "Phyllactinia mali" OR "Phyllactinia suffulta" OR "Phylloidesma americana" OR "Phyllonorycter cerasicolella" OR "Phyllosticta circumscissa" OR "Phyllosticta prunicola" OR "Phymatotrichopsis omnivora" OR "Phymatotrichum omnivorum" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora cryptogea" OR "Phytophthora gregata" OR "Phytophthora megasperma" OR "Phytophthora plurivora" OR "Phytophthora syringae" OR "Phytoplasma pruni" OR "Phytoplasma prunorum" OR "Plagiodis fervidaria" OR "Pleospora cerasi" OR "Plum pox virus" OR "Podosphaera clandestina" OR "Podosphaera oxycanthae" OR "Podosphaera pannosa" OR "Podosphaera tridactyla" OR "Podosphaera tridactyla var. tridactyla" OR "Polygonia c-album" OR "Polyporus ciliatus" OR "Polyporus leptoccephalus" OR "Polyporus tulipiferae" OR "Popillia japonica" OR "Pratylenchus neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus pratensis" OR "Pratylenchus thornei" OR "Pratylenchus vulnus" OR "Prune dwarf virus" OR "Pruniphilomyces circumscissus" OR "Prunus necrotic ringspot virus" OR "Prunus virus F" OR "Pseudaulacaspis pentagona" OR "Pseudaulacaspis prunicola prunicola" OR "Pseudocercospora circumscissa" OR "Pseudomonas pruni" OR "Pseudomonas syringae pv. morsprunorum" OR "Pseudomonas syringae pv. syringae" OR "Pterochloroides persicae" OR "Puccinia cerasi" OR "Pucciniastrum areolatum" OR "Radulum orbiculare" OR "Ramularia cerasorum" OR "Ramularia mali" OR "Rhagoletis cerasi" OR "Rhagoletis cingulata" OR "Rhagoletis fausta" OR "Rhagoletis indifferens" OR "Rhagoletis pomonella" OR "Rhizobium radiobacter" OR "Rhizobium rhizogenes" OR "Rhizopus stolonifer" OR "Rhodococcus turanicus" OR "Rhopalosiphum maidis" OR "Rhopalosiphum nymphaeae" OR "Rhopalosiphum oxycanthae" OR "Roepkea marchali" OR "Rosellinia necatrix" OR "Satyrium liparops" OR "Schizophyllum alneum" OR "Schizotetranychus iraniensis" OR "Schizura concinna" OR "Schizura unicornis" OR "Schoutedenia ralumensis" OR "Sclerotinia fructicola" OR "Sclerotinia laxa" OR "Sclerotium bataticola" OR "Scoleocampa liburna" OR "Septoria cerasi" OR "Sinomegoura citricola" OR "Smerinthus jamaicensis" OR "Sour cherry pink fruit agent" OR "Sphinx drupiferarum" OR "Spilosoma virginica" OR "Stereum hirsutum" OR "Stereum purpureum" OR "Stigmina

carpophila" OR "Synanthedon myopaeformis" OR "Synanthedon pictipes" OR "Taphrina cerasi" OR "Taphrina wiesneri" OR "Tetranychus urticae" OR "Thekopsora areolata" OR "Thekopsora pseudocerasi" OR "Thyridopteryx ephemeraeformis" OR "Tinocalloides montanus" OR "Tolyte velleda" OR "Tomato ringspot virus" OR "Trametes hirsuta" OR "Trametes velutina" OR "Trametes versicolor" OR "Trametes zonata" OR "Tranzschelia discolor" OR "Tranzschelia japonica" OR "Tranzschelia pruni-spinosae" OR "Tranzschelia pruni-spinosae var. discolor" OR "Tuberocephalus higansakurae" OR "Tuberocephalus momonis" OR "Tuberocephalus sakurae" OR "Venturia cerasi" OR "Verticillium albo-atrum" OR "Verticillium dahliae" OR "Wilsonomyces carpophilus" OR "Xanthomonas arboricola pv. pruni" OR "Xiphinema americanum" OR "Xylaria mali" OR "Xyleborus dispar" OR "Xylella fastidiosa" OR "Xylella fastidiosa subsp. multiplex" OR "Yponomeuta evonymella" OR "Yponomeuta mahalebella" OR "Yponomeuta padella" OR "Zaprionus indianus")

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

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

| Pest name | EPPO Code | Group | Pest present in Türkiye | Present in the EU | Pest can be associated with the commodity | Impact | Justification for inclusion in this list |
|---|-----------|----------|-------------------------|-------------------|---|-----------|--|
| <i>Diaspidiotus prunorum</i> | DIAOPR | INS | Yes | No | Yes | Uncertain | Distribution and impact on <i>Prunus</i> spp. is under concern. |
| <i>Eulecanium rugulosum</i> | LECARG | INS | Yes | No | Yes | Uncertain | Impact on <i>Prunus</i> spp. is under concern. |
| <i>Heterodera mediterranea</i> | HETDMD | NEM | Yes | Restricted | Yes | Uncertain | Impact on <i>Prunus</i> spp. is under concern. |
| <i>Osphranteria coerulescens inaurata</i> | | INS | Yes | No | Yes | Uncertain | Not enough evidence of association with the commodity. Commodity is too small for the larvae developmental stages. |
| <i>Pantoea ananatis</i> | ERWIAN | Bacteria | Yes | Restricted | Yes | Uncertain | Distribution in Türkiye under concern. |
| <i>Pseudomonas amygdali</i> | PSDMAM | Bacteria | Yes | Restricted | Yes | Uncertain | Unclear taxonomy. |
| <i>Rhodococcus turanicus</i> | | INS | Yes | No | Yes | Uncertain | Distribution in Türkiye and impact on <i>Prunus</i> spp. is under concern. |
| <i>Sphenoptera tappesi</i> | | INS | Yes | Restricted | Yes | Uncertain | Impact on <i>Prunus</i> spp. is under concern. It can be thought that the pest attacks mostly trees that are under water stress. |

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

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

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