

ADOPTED: 25 March 2021

doi: 10.2903/j.efsa.2021.6570

Commodity risk assessment of *Juglans regia* plants from Moldova

EFSA Panel on Plant Health (PLH),
Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Marie-Agnès Jacques,
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, Hans-Hermann Thulke, Wopke Van der Werf,
Antonio Vicent Civera, Jonathan Yuen, Lucia Zappalà, Andrea Battisti, Hugo Mas,
Daniel Rigling, Olaf Mosbach-Schulz and Paolo Gonthier

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'. Taking into account the available scientific information, including the technical information provided by the applicant country, this Scientific Opinion covers the plant health risks posed by the following commodities: dormant, free of leaves, bare-rooted grafted plants and rootstocks of *Juglans regia* imported from Moldova. A list of pests potentially associated with the commodities was compiled. The relevance of any pest was assessed based on evidence following defined criteria. The EU-quarantine pest *Xiphinema rivesi* non-EU populations fulfilled these criteria and hence was selected for further evaluation. For this pest, the risk mitigation measures described in the technical dossier from Moldova were evaluated taking into account the possible limiting factors. An expert judgement is given on the likelihood of pest freedom for this pest taking into consideration the risk mitigation measures, including uncertainties associated with the assessment. The Expert Knowledge Elicitation indicated, with 95% certainty, that 9,959 or more bare-rooted plants per 10,000 will be free from *X. rivesi*.

© 2021 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords: *Juglans regia*, walnut, plants for planting, grafted plants, rootstocks, European Union

Requestor: European Commission

Question number: EFSA-Q-2020-00532

Correspondence: plants@efsa.europa.eu

Panel members: Claude Bragard, Katharina Dehnen-Schmutz, Francesco Di Serio, Paolo Gonthier, Marie-Agnès Jacques, 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, Hans-Hermann Thulke, Wopke Van der Werf, Antonio Vicent Civera, Jonathan Yuen and Lucia Zappalà.

Declarations of interest: The declarations of interest of all scientific experts active in EFSA's work are available at <https://ess.efsa.europa.eu/doi/doiweb/doisearch>.

Acknowledgments: EFSA Panel on Plant Health wishes to thank Světlá Kozelská for the support during the whole process of the opinion development and to acknowledge the important contribution of the trainee Alžběta Mikulová, who provided an essential contribution to the literature search, the compilation of the pest list and the pest datasheets and drafting and reviewing the opinion.

Amendment: This opinion was previously adopted by the PLH Panel on 25 March 2021 and published on 6 May 2021. However, following the highlighting in the recent opinion on Commodity risk assessment for *Malus domestica*-Moldova of the uncertainty on the occurrence in Moldova of non-EU populations of *Xiphinema rivesi*, the Panel has reviewed the *Juglans regia*-Moldova opinion and deemed necessary on 29 April 2022 to add *Xiphinema rivesii* non-EU populations as an actionable pest and to conduct an Expert Knowledge Elicitation to assess the likelihood of pest freedom for this pest also for the *Juglans regia*-Moldova commodity. The composition of the Panel changed, however, the author list and suggested citation is kept the same as in the original version. To avoid confusion, the original version of this output has been removed from the EFSA Journal, and is available as Appendix D.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Bragard C, Dehnen-Schmutz K, Di Serio F, 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, Battisti A, Mas H, Rigling D, Mosbach-Schulz O and Gonthier P, 2021. Scientific Opinion on the commodity risk assessment of *Juglans regia* plants from Moldova. EFSA Journal 2021;19(5):6570, 50 pp. <https://doi.org/10.2903/j.efsa.2021.6570>

ISSN: 1831-4732

© 2021 European Food Safety Authority. EFSA Journal published by John Wiley and Sons Ltd on behalf of 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.



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 ANSA of Moldova..... | 5 |
| 2.2. Literature searches performed by EFSA..... | 6 |
| 2.3. Methodology..... | 7 |
| 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..... | 8 |
| 2.3.4. Expert Knowledge Elicitation..... | 9 |
| 3. Commodity data..... | 10 |
| 3.1. Description of the commodity..... | 10 |
| 3.2. Description of the production areas..... | 10 |
| 3.3. Production and handling processes..... | 10 |
| 3.3.1. Growing conditions..... | 10 |
| 3.3.2. Source of planting material..... | 11 |
| 3.3.3. Production cycle..... | 11 |
| 3.3.4. Pest monitoring during production..... | 11 |
| 3.3.5. Harvest and post-harvest processes and export procedure..... | 12 |
| 3.4. Phytosanitary surveillance and monitoring system in Moldova..... | 12 |
| 3.5. Pest prevention and control implemented for the commodity..... | 13 |
| 4. Identification of pests potentially associated with the commodity..... | 13 |
| 4.1. Selection of relevant EU quarantine pests associated with the commodity..... | 14 |
| 4.2. Selection of other relevant pests (not regulated in the EU) associated with the commodity..... | 18 |
| 4.3. Overview of interceptions..... | 18 |
| 4.4. List of potential pests not further assessed..... | 18 |
| 4.5. Summary of pests selected for further evaluation..... | 18 |
| 5. Risk mitigation measures..... | 19 |
| 5.1. Risk mitigation measures proposed..... | 19 |
| 5.2. Evaluation of the current measures for the selected relevant pests including uncertainties..... | 22 |
| 5.2.1. Overview of the evaluation of <i>Xiphinema rivesi</i> non-EU populations (Dorylaimida; Longidoridae)..... | 22 |
| 5.2.2. Outcome of Expert Knowledge Elicitation..... | 23 |
| 6. Conclusions..... | 27 |
| References..... | 27 |
| Abbreviations..... | 28 |
| Glossary..... | 28 |
| Appendix A – Data sheets of pests selected for further evaluation..... | 30 |
| Appendix B – Web of Science All Databases Search String..... | 42 |
| Appendix C – Excel file with the pest list of <i>Juglans regia</i> | 49 |
| Appendix D – Original version of the Scientific Opinion..... | 50 |

1. Introduction

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

1.1.1. Background

The new Plant Health Regulation (EU) 2016/2031¹, 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 Acts 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 a scientific opinion in the field of plant health for *Juglans regia* from Moldova taking into account the available scientific information, including the technical dossier provided by Moldova.

1.2. Interpretation of the Terms of Reference

The EFSA Panel on Plant Health (hereafter referred to as 'the Panel') was requested to conduct a commodity risk assessment of *Juglans regia* from Moldova following the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019).

The EU quarantine pests that are regulated as a group in the Commission Implementing Regulation (EU) 2019/2072⁴ 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.

¹ Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants, amending Regulations (EU) 228/2013, (EU) 652/2014 and (EU) 1143/2014 of the European Parliament and of the Council and repealing Council Directives 69/464/EEC, 74/647/EEC, 93/85/EEC, 98/57/EC, 2000/29/EC, 2006/91/EC and 2007/33/EC. OJ L 317, 23.11.2016, pp. 4–104.

² Commission Implementing Regulation (EU) 2018/2019 of 18 December 2018 establishing a provisional list of high risk plants, plant products or other objects, within the meaning of Article 42 of Regulation (EU) 2016/2031 and a list of plants for which phytosanitary certificates are not required for introduction into the Union, within the meaning of Article 73 of that Regulation C/2018/8877. OJ L 323, 19.12.2018, pp. 10–15.

³ Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, pp. 1–24.

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

Annex VII of the same Regulation, in certain cases (e.g. point 32), makes reference to the following countries that are excluded from the obligation to comply with specific import requirements for those non-European populations, or isolates, or species: Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (SeveroZapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug), San Marino, Serbia, Switzerland, Turkey, Ukraine and the United Kingdom (except Northern Ireland⁵). Those countries are historically linked to the reference to 'non-European countries' existing in the previous legal framework, Directive 2000/29/EC⁶.

Consequently, for those countries

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

Pests listed as 'Regulated Non-Quarantine Pest' (RNQP) in Annex IV of the Commission Implementing Regulation (EU) 2019/2072, and deregulated pests (i.e. pest that were listed as quarantine pests in the Council Directive 2000/29/EC and were deregulated by Commission Implementing Regulation (EU) 2019/2072) were not considered for further evaluation.

In its evaluation, the Panel:

- Checked whether the provided information in the technical dossier (hereafter referred to as 'the Dossier') provided by the applicant [Agentia Nationala Pentru Siguranta Alimentor (ANSA), National Food Safety Agency of the Republic of Moldova] was sufficient to conduct a commodity risk assessment. When necessary, additional information was requested to the applicant.
- Selected the relevant Union quarantine pests and protected zone quarantine pests (as specified in Commission Implementing Regulation (EU) 2019/2072, hereafter referred to as 'EU quarantine pests') and other relevant pests present in Moldova and associated with the commodity.
- Did not assess the effectiveness of measures for Union quarantine pests for which specific measures are in place for the import of the commodity from Moldova in Commission Implementing Regulation (EU) 2019/2072 and/or in the relevant legislative texts for emergency measures and if the specific country is in the scope of those emergency measures. The assessment was restricted to whether or not the applicant country implements those measures.
- Assessed the effectiveness of the measures described in the Dossier for those Union quarantine pests for which no specific measures are in place for the importation of the commodity from Moldova and other relevant pests present in Moldova and associated with the commodity.

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

2. Data and methodologies

2.1. Data provided by ANSA of Moldova

The Panel considered all the data and information provided by ANSA of Moldova in July 2020, including the additional information provided on 18 January 2021 and clarification provided on 3 February 2021, after EFSA's request. The Dossier is managed by EFSA.

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

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

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

Table 1: Structure and overview of the Dossier

| Dossier section | Overview of contents | Filename |
|-----------------|--|---|
| 1.0 | Technical dossier | Annex 2.pdf_Juglans L._EN |
| 2.0 | Appendix A – Checklist of the data provided Appendix B – Sources of information | Annex 4.pdf_MD-20-06-24-ARES 3479472_Add info Juglans_Malus |
| 3.0 | Additional information received on 18 January 2021 | ADDITIONAL INFORMATION Juglans regia for R. Moldova – 15.1.2021 |
| 4.0 | Clarification on pests status for selected pests received on 3 February 2021 | EFSA depistarea organismelor 3.2.2021.docx |

The data and supporting information provided by ANSA of Moldova formed the basis of the commodity risk assessment. The below overview shows the sources of information used by ANSA of Moldova to compile the Dossier as specified in the Dossier Section 2.0.

- 1) Ministry of Agriculture, Regional Development and Environment, State Commission for Testing Plant Varieties 'Catalog of Plant Varieties of the Republic of Moldova', a. 2019, Official Edition (<https://cstsp.md/uploads/files/RegistruText2018.pdf>)
- 2) Vasile BABUC, Ananie PESTEANU, Eugeniu GUDUMAC, 'PRODUCEREA MATERIALULUI SADITOR DE MAR', Chisinau, 2013
- 3) Mihai Busuioc, 'Entomologia agricola', Chisinau, 2006
- 4) Marcel Parvu, 'Ghid practic de fitopatologie', Editura Presa Universitara Clujeana, 2000
- 5) Gheorghe Popescu, 'Tratat de patologia plantelor', Editura Eurobit Timisoara, 2005
- 6) M. Hatman, I. Bobes, Al. Lazar, C Gheorghies, C. Glodeanu, V. Severin, C. Tusa, I. Popescu, I. Vonica, 'Fitopatologie', Editura Didactica si Pedagogica, Bucuresti, 1989
- 7) <https://pomicol.wordpress.com>
- 8) <https://www.weatheronline.co.uk/reports/climate/Moldova.htm>
- 9) <https://en.wikipedia.org/wiki/Codlingmoth>
- 10) <https://www.agroatlas.ru/ru/content/pests/Quadraspidotusperniciosus/index.html>
- 11) <https://ru.wikipedia.org/wiki/AmepwkaHckas6enas6a6oa>
- 12) <https://wikivisually.com/wiki/Lepidosaphesulmi>
- 13) <https://animaldiversity.org/accounts/Lymantriadispar>
- 14) <https://ru.wikipedia.org/wiki/Henapimiiwenkonpsta>
- 15) <https://kccc.ru/en/handbookipests/archips-rosana>
- 16) <https://en.wikipedia.org/wiki/Archipsrosana>
- 17) <https://agrobasesapp.com/australlaklisease/vvalnut-blight>
- 18) <https://www.rno.skiskyrnitosti-orechovych-listovi>
- 19) <https://www.botanistii.roiblogiantracnoza-nucului-gnornonia-juglandis/>
- 20) <https://www.legis.md>
- 21) <https://ansa.gov.md/uploads/files/Protectia%20plantelor/Certifitosan/fitoCertMoldova.pdf>
- 22) <https://www.pesticide.mdiregistru-cautarei>
- 23) <https://www.ippc.int/en/core-activities/standards-sefting/ispms/>
- 24) <https://gd.eppo.int/>
- 25) <https://www.eppo.int/RESOURCES/eppostandards>
- 26) <https://eur-lex.europa.eu/leaa I-content/RO/TXT/?uri=CELEX:32019R2072>

2.2. Literature searches performed by EFSA

The following searches were combined: (i) a general search to identify pests of *Juglans regia* in different databases and (ii) a general search to identify pests associated with *Juglans* as a genus. The general searches were run between 6 August and 1 September 2020 using the databases indicated in Table 2. No language, date or document type restrictions were applied in the search strategy.

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

As for Web of Science, the literature search was performed using a specific, ad hoc established search string (see Appendix B). The string was run in 'All Databases' with no range limits for time or language filters.

Finally, the pest list that was assessed included all the pests associated with *J. regia* and all EU quarantine pests associated with *Juglans* as genus.

Table 2: Databases used by EFSA for the compilation of the pest list associated with *Juglans* and *Juglans regia*

| Database | Platform/Link |
|--|---|
| Aphids on World Plants | https://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm |
| CABI Crop Protection Compendium | https://www.cabi.org/cpc/ |
| Database of Insects and Their Food Plants | https://www.brc.ac.uk/dbif/hosts.aspx |
| Database of plant pests in Israel | https://www.moag.gov.il/en/Pages/SearchNegaim.aspx |
| Database of the World's Lepidopteran Hostplants | https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm/ |
| EPPO Global Database | https://gd.eppo.int/ |
| EUROPHYT | https://webgate.ec.europa.eu/europhyt/ |
| Leaf-miners | https://www.leafmines.co.uk/html/plants.htm |
| Nemaplex | https://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx |
| New Zealand Fungi | https://nzfungi2.landcareresearch.co.nz/default.aspxNavControl=search&selected=NameSearch |
| NZFUNGI - New Zealand Fungi (and Bacteria) | https://nzfungi.landcareresearch.co.nz/html/mycology.asp?ID= |
| Plant Pest Information Network New Zealand | https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/ |
| Plant Viruses Online | https://bio-mirror.im.ac.cn/mirrors/pvo/vid/famindex.htm |
| Scalenet | https://scalenet.info/associates/ |
| Spider Mites Web | https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php |
| TRACES-NT | https://webgate.ec.europa.eu/tracesnt/login |
| USDA ARS Fungi Database | https://nt.ars-grin.gov/fungalDATABASES/fungushost/fungushost.cfm |
| Web of Science: All Databases (Web of Science Core Collection, CABI: CAB Abstracts, BIOSIS Citation Index, Chinese Science Citation Database, Current Contents Connect, Data Citation Index, FSTA, KCI-Korean Journal Database, Russian Science Citation Index, MEDLINE, SciELO Citation Index, Zoological Record) | Web of Science https://www.webofknowledge.com |
| World Agroforestry | https://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749 |

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 sheet in Appendix A) and the relevant literature and legislation [e.g. Regulation (EU) 2016/2031; Commission Implementing Regulations (EU) 2018/2019; (EU) 2018/2018⁷, (EU) 2019/2072] were taken into account.

2.3. Methodology

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

In the first step, pests potentially associated with the commodity in the country of origin (EU regulated pests and other pests) that may require risk mitigation measures were identified. Pests not

⁷ Commission Implementing Regulation (EU) (EU) 2018/2018 of 18 December 2018 laying down specific rules concerning the procedure to be followed in order to carry out the risk assessment of high-risk plants, plant products and other objects within the meaning of Article 42(1) of Regulation (EU) 2016/2031 of the European Parliament and of the Council. OJ L 323, 19.12.2018, p. 7–9.

regulated in the EU and 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 overall efficacy of the proposed risk mitigation measures for each pest was evaluated.

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

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

2.3.1. Commodity data

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

2.3.2. Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of *J. regia* from Moldova, a pest list was compiled. The pest list is a compilation of all identified plant pests reported as associated with *J. regia* based on information provided in the Dossier Sections 1.0 and 4.0 and on searches performed by the Panel. In addition, all EU quarantine pests associated with any species of *Juglans* were added to the list.

The scientific names of the host plants (i.e. *Juglans regia* and *Juglans*) were used when searching in the EPPO Global Database and CABI Crop Protection Compendium. The same strategy was applied to the other databases excluding EUROPHYT, TRACES-NT and Web of Science.

EUROPHYT was investigated by searching for the interceptions associated with *J. regia* commodities imported from Moldova from 1995 to May 2020 and TRACES-NT from May 2020 to January 2021, respectively. In addition, for the pests selected for further evaluation, a search in the EUROPHYT and/or TRACES was performed for the years between 1995 and March 2022 for the interceptions from the whole world, at species level.

The search strategy used for Web of Science Databases was designed combining English common names for pests and diseases, terms describing symptoms caused by the pests on the host plants, and the scientific and English common names of the commodity and excluding pests that were identified using searches in other databases. The established search string is detailed in Appendix B and was run on 6 August 2020.

The titles and abstracts of the scientific papers retrieved were screened and the pests associated with *J. regia* were included in the pest list.

The compiled pest list (see Microsoft Excel[®] file in Appendix C) includes all identified agents associated with *J. regia*, potentially including predators and parasitoids of insects and not harmful microorganisms, and all quarantine pests that use *Juglans* as host. The pest list was eventually further compiled with other relevant information (e.g. EPPO Codes, taxonomic information, categorisation, distribution) useful for the selection of the pests relevant for the purposes of this opinion.

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

Pests for which limited information was available on one or more criteria used to identify them as relevant for this Opinion, if any, are specified in Section 4.4.

2.3.3. Listing and evaluation of risk mitigation measures

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

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

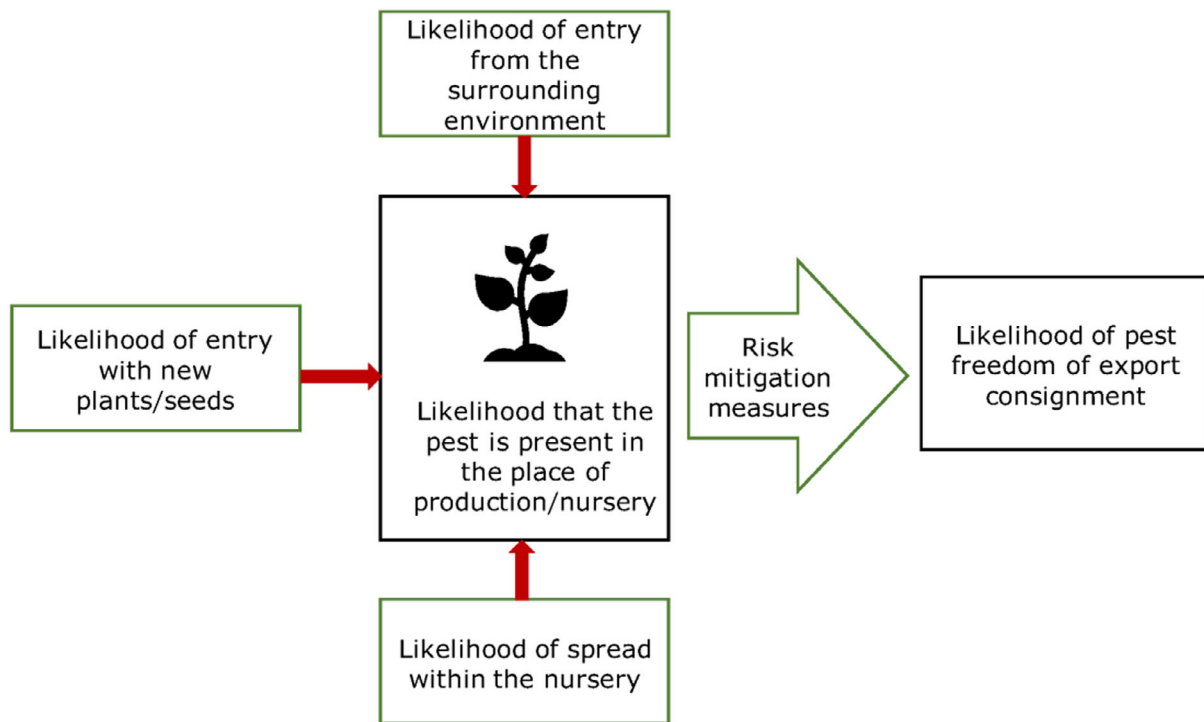


Figure 1: Conceptual framework to assess likelihood that plants are exported free from relevant pests (Source: EFSA PLH Panel, 2019)

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

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

2.3.4. Expert Knowledge Elicitation

To estimate the pest freedom of the 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 (reported in the specific pest data sheets), how many of 10,000 bundles of *Juglans regia* grafted bare-rooted plants will be infested with the relevant pest/pathogen when arriving in the EU?'

The risk assessment uses bundles of 10 bare-rooted plants as the most suitable unit. The following reasoning is given:

- i) There is no quantitative information available regarding clustering of plants during production;
- ii) Plants are grouped in bundles of 10 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 1.0, the commodity to be exported to the EU are *Juglans regia* (common name: walnut; family: Juglandaceae) plants for planting that can be classified as 'cuttings/seedlings (scion and rootstock) grown in soil, plants with roots washed with water'. Two different commodities are planned: grafted walnut plants and walnut rootstocks.

The following varieties of *J. regia* are intended for export to the EU: 'Carpatica', 'Chandler', 'Chisinau', 'Cogalniceanu', 'Femor', 'Franquette', 'Ovata', 'Pescianski', 'Rubin' (ongoing registration in Romania) and 'Serr'.

Depending on the nursery, the grafted walnut trees intended for export are 1 year old (the time from grafting until uprooting is 8 months) or 2 years old (the time from grafting until uprooting is 20 months). The 1-year-old grafted trees at the time of export range in height, measured from the graft point, from 0.3 to 1.5 m, depending on the variety vigour. The diameter at the base of the tree measured roughly 10 cm above the first lateral roots ranges from 1.5 to 3 cm. The 2-year-old walnut trees varied in height from 1.5 to 2.5 m, possibly depending on the variety vigour. The diameter of these trees, measured at 10 cm above the graft union, ranged from 2.5 to 3.5 cm. The age of rootstocks at the time of export is not specified in the Dossier.

The intended total annual export volume to the EU is estimated to be between 40 and 75,000 grafted walnut trees and between 100 and 150,000 walnut rootstocks (Dossier Section 3.0). In the importing country, both commodities are used to establish fruit production plantations (Dossier Section 1.0).

The nurseries currently intend to export Regular or CAC (Conformitas Agraria Communitatis) material. However, in the future, some nurseries plan to develop a production of certified trees (Dossier Section 3.0).

3.2. Description of the production areas

Dossier Section 3.0 specifies the following three nurseries that intend to export *J. regia* plants for planting from Moldova to the EU:

- 1) SRL Pepeniera Pomicola Voinesti in Hîncești District (coordinates: 46.668056, 28.306193),
- 2) SRL Gospodarul, Rediu in Fălești District (coordinates: 47.509926, 27.601773),
- 3) SRL Agronuts in Telenești District (coordinates: 47.733873, 28.510438).

All three nurseries grow exclusively *Juglans* species and the last two nurseries strictly specialised in *J. regia*. In all three nurseries, the commodity is grown in open fields. The nurseries produce the plant material for the local market as well as for export to the EU and other countries. The production is adapted to comply with EU standards and regulations. All three nurseries intend to export grafted walnut trees to the EU and one nursery (SRL Pepeniera Pomicola Voinesti in Hîncești District) intends also to export walnut rootstock to the EU. The sizes of the three nurseries are comparable, the grafted walnut trees intended for export to the EU occupy in the nurseries on average an area between 0.3 and 1 hectare. Walnut rootstocks produced for export to the EU grow on an area ranging from 1 to 1.5 hectares (Dossier Section 3.0).

In the surrounding areas of the nurseries, windbreaks consisting of either walnut trees or *Gleditsia* spp. hedgerows are used. In one case, the *Gleditsia* spp. hedgerow also surrounds an adjacent walnut orchard belonging to the nursery (Dossier Section 3.0).

Based on the global Köppen–Geiger climate zone classification (Kottek et al., 2006), the climate of the production areas of Moldova is classified as warm-summer humid continental (Dfb) [main climate D (continental); no dry season (f); warm summer (b)] (Dossier Section 1.0).

3.3. Production and handling processes

3.3.1. Growing conditions

In the three nurseries, plantation density of the grafted walnut plants ranges from 3 to 5 plants/m² and for walnut rootstocks from 8 to 11 plants/m².

In the first nursery (SRL Pepeniera Pomicola Voinesti in Hînceşti District), most of the fields are irrigated. The rootstock parcels are irrigated from the beginning of July until the end of August by a sprinkler system every 20–30 days from the last irrigation or rainfall. The fields where the 1-year-old grafted walnut trees are produced are prepared as raised beds covered with plastic mulch with drip line running under the mulch. The irrigation takes place from the end of April until the beginning of September once every week. The mother plants are irrigated by micro-drippers running along the tree rows. These trees are irrigated every 12–14 days. The irrigation water is pumped directly from the Prut river and before application is filtered by a sand filter and a disk filter. This river's water is known for its good irrigation qualities and is not treated further.

In the second nursery (SRL Gospodarul, Rediu in Făleşti District), none of the production parcels are irrigated.

In the third nursery (SRL Agronuts in Teleneşti District), the production fields are irrigated by dripping lines. The grafted walnuts are irrigated between March and September, with a frequency that depends on rainfall and temperature, but on average 3–5 times/month. The water source is a pond that depends on rain and snow and springs. Before irrigation, the water is filtered but is not treated.

In general, all nurseries and the surrounding fields are kept free of weeds all the time. Because walnuts are sensitive to herbicides, mechanic methods of controlling weeds are applied (Dossier Section 3.0).

3.3.2. Source of planting material

According to the Dossier Section 3.0, the planting material, both rootstocks and scions, is produced within each nursery.

3.3.3. Production cycle

Seeds for production of rootstocks and scions are obtained from mother plants grown in the nurseries. Grafting of 1-year-old rootstocks is performed from February throughout to the end of March. The nurseries use the 'Cadillac', the 'whip & tongue' or the 'omega' grafting systems. The rootstock used is common walnut (*J. regia*). The grafting point presents a certain vulnerability to infection. To reduce the risk of infection, both rootstocks and scions are washed before grafting with pressurised tap water or disinfected with a hydrogen peroxide solution or with a 5% solution of calcium hypochlorite. After stratification, the callused grafted plants go through a phase of acclimatisation before being planted in the nursery fields (Dossier Section 3.0).

3.3.4. Pest monitoring during production

Biological and phytosanitary visual control of the plants during the vegetation period is carried out by the inspectors of the territorial units of the National Agency for Food Safety (hereinafter ANSA).

Mother plants for production of rootstocks and scions are subjected to at least three field inspections, which focus on:

- the origin of the material used for the establishment;
- observance of technology and physiological condition of plants;
- phytosanitary status of plants;
- virus testing;
- the absence of harmful organisms, including quarantine organisms.

In the nursery fields, at least three inspections are carried out during the vegetation period, which verify:

- the origin of the material used for the establishment in the field and of the graft branches;
- authenticity and biological purity;
- observance of technology and physiological condition of plants;
- phytosanitary status and virus testing;
- marking rootstocks, varieties, rows on plots and their registration in the Nursery Register.

In the process of producing the material of the category 'Ordinary', which is expected to be exported to the EU (referred in Section 3.1 as 'Regular'), the same inspections are carried out in the field and after harvesting the grafted plants, except for the collection of samples for testing for viruses in the laboratory (Dossier Section 3.0).

3.3.5. Harvest and post-harvest processes and export procedure

Dossier Section 3.0. provides the following details on general harvest and post-harvest processes and export procedures.

Removal of the trees is carried out when their vegetative tops go into dormancy. Removal, sorting and transport of the trees is allowed at times when the air temperature is not below +3°C. If leaves have not fallen by the beginning of the tree removal, manual defoliation is carried out. In large proportions, defoliation is carried out by spraying with chemical defoliant solutions approximately 25–30 days before removing the trees. The trees are removed with the VPN-2 suspended plough. A vibrator is mounted on the VPN-2 plough, which ensures that the soil layer loosens with roots, thus making it easier to remove the trees. After pruning, the roots with a plough to a depth of 30–35 cm, the trees are removed manually. The vibration system enables the excess soil to be shaken off the roots.

Sorting trees is done by people who are fully aware of the provisions of the morphological and growth standards as described in 'Government Decision no. 415/2013 for the approval of the Norm of production, control, certification and marketing of fruit propagating and planting material, fruit propagating and planting material' and who can visually distribute them on first, second and non-standard quality categories. During sorting, attention is drawn to the physiological and phytosanitary condition of the trees, especially the root system, which could not be verified in the field controls. As the trees are sorted of each special quality category on the pomological varieties, trees are tied in packages of 10 pieces each. Two labels are attached to each package: one closer to the package and another on the axis of a tree. The label indicates the pomological name of the variety and rootstock.

Certification of the planting material follows after packing and is performed by ANSA specialists from the territory according to the regulation in force and the transport to the place for storage. Certification consists of verifying the origin of the propagating material produced within the certification schemes and ensures the traceability of this material at all production stages. By monitoring the production of the material, from the establishment of the mother plantations to the dispatch of the grafted trees from the nursery, this certification brings additional guarantees on the authenticity and varietal purity, and the phytosanitary and physiological condition of the certified trees.

The general harvest and post-harvest processes also indicate a storage step after uprooting. However, based on information provided by the three nurseries intending to export to the EU, that storage step is not applied. Further information on the storage step is given in Dossier Section 3.0.

The roots are washed with pressurised water before export. During marketing and transport of the planting material, special attention is paid to avoid its dehydration, especially of the roots, which are more sensitive to wilting. Before loading the trees into trucks, the rear edge of the body is opened and is secured well at an angle of 45°. Wet straw is laid on the base of the body, and the sides are lined with mats or other materials to protect the trees from damage. The trees, starting from the last board, are placed inside, at an inclined position, opposite to the direction of movement of the transport, as a rule, with the roots staggered in two stages to increase the load. Wet straw is placed between the roots of each row of trees (in bundles of approximately 10 plants). The body is covered with a waterproof cloth and tied with string so that the trees are not traumatised and dehydrated. Every 3–4 h, the trees are wetted. If the trees are shipped over long distances, it is recommended that they are transported in refrigerated containers. Brought to the intended place and until planting, the planting material is kept in the same way as after it was removed from the nursery, especially watered abundantly. Delivery, transportation, other works with walnut trees in the open air are not recommended to be performed at a temperature lower than +3°C.

Completion of the phytosanitary certificate for export/re-export is carried out in accordance with the operational procedure based on ISPM 12: Phytosanitary certificates.

3.4. Phytosanitary surveillance and monitoring system in Moldova

The Dossier Section 1.0 states that in accordance with the provisions of ISPM-6 (Guidelines for surveillance), ANSA of Moldova implements programmes for the surveillance and monitoring of organisms harmful to plants and plant products:

- General surveillance: a process for collection of information on pests in Moldova;
- Specific surveillance: collection of information on harmful organisms in the area during the plant vegetation period. The data relate to specific types of damage to plants and species by

harmful organism. Including surveys to determine the specific characteristics of pest populations or the presence/absence of pests in the area.

The monitoring plan for organisms harmful to plants and plant products is reviewed annually. All samples taken under the monitoring plan are examined in the phytosanitary laboratory, in accordance with EPPO PM7 diagnostic protocols (EPPO Standards – PM7 Diagnostics). The phytosanitary laboratory has international accreditation under ISO:17025 Testing and calibration laboratories.

Phytosanitary inspectors within the local subsections are responsible for phytosanitary surveillance:

- Permanent monitoring during the vegetation period involves systematic and continuous observation and research into the development of pests, diseases and weeds affecting plants according to their development stage, by:
 - 1) phenological observations of crops (phenological stages, pests (development stages)) and diseases;
 - 2) numerical evidence of the density of pest populations and disease development, by tracing, periodic control and surveys. The range of species on a particular crop is identified, various methods are used according to the biology and ecology of the species within the biocenoses;
 - 3) records of the biology of harmful organisms, successions of stages and generations;
 - 4) identification of useful fauna (parasites and predators);
 - 5) agrotechnical and hydro-meteorological information;
 - 6) production and distribution to agricultural holdings and local authorities of warning bulletins on the combating of harmful species, drawn up on the basis of the following criteria:
 - phenological – relationship between the appearance of a pest and the development;
 - stage of the host plant;
 - biological – establishing the ideal time to apply treatments according to certain aspects of the life cycle of the species in question;
 - ecological – establishing warning time limits according to certain aspects of the harmful organism's development cycle, such as effective temperature, certain thermal constants, length of the cycle and development stages.
 - 7) full, characteristic and qualitative determination of the pest population and plant diseases;
 - 8) measures for the assessment, documentation and communication of phytosanitary risk associated with the spread of harmful organisms;
 - 9) inspection and control over the performance by landowners and tenants, irrespective of their subordination or type of ownership, of plant protection measures and outbreak eradication.

All data, in accordance with the approved methodological indicators, are recorded by inspectors in the context of phytosanitary monitoring, field registers: tracing and field register: phenological observations. On a weekly basis, information for generalisation and evaluation is submitted for operational processing.

Pheromone traps are also used for phytosanitary monitoring, these are placed for farmers to implement the monitoring and self-control plan.

Furthermore, during the phytosanitary inspection before export, samples of plant production are taken for laboratory examinations.

3.5. Pest prevention and control implemented for the commodity

Details on chemical treatments and other mitigation measures proposed to be implemented by the applicant country are presented in the Dossier and summarised in Table 5 in Section 5.1.

4. Identification of pests potentially associated with the commodity

The search for potential pests associated with the commodity species rendered 696 species (see Microsoft Excel[®] file in Appendix C).

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

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

Twenty-six EU-quarantine pests that are reported to use *Juglans* as a host were evaluated (Table 3) for their relevance of being included in this Opinion.

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

- 1) The pest is present in Moldova;
- 2) The commodity is a host of the pest;
- 3) One or more life stages of pest can be associated with the specified commodity.

Out of the 26 EU quarantine pests evaluated, 24 were not present in Moldova. One (*Thaumetopoea processionea*) is present in Moldova, but it is not associated with the commodity and therefore was not selected for further evaluation. Based on the results of the commodity risk assessment on *Malus domestica* from Moldova (EFSA PLH Panel, 2022), the EU quarantine pest *Xiphinema rivesi* non-EU populations was selected for further evaluation, because there is uncertainty about its presence in Moldova: *Xiphinema rivesi* was reported from Moldova by peer-reviewed publications (Poiras, 2012; Poiras et al., 2013, 2014, 2015) and conference proceedings (Iurcu-Străistaru et al., 2021); however, the NPPO of Moldova did not find this nematode during official surveys carried out between 2019 and 2021 (EFSA PLH Panel, 2022).

Table 3 presents an overview of the evaluation of the 26 EU-quarantine pest species that are reported as associated with the commodity.

Table 3: Overview of the evaluation of the 26 EU quarantine pest species known to use *Juglans regia* or *Juglans* as a host plant for their relevance for this Opinion

| N | Pest name according to EU legislation ^(a) | EPPO code | Group | Pest present in Moldova | <i>Juglans regia</i> / <i>Juglans</i> confirmed as a host (reference) | Pest can be associated with commodity ^(b) | Pest relevant for the Opinion |
|----|---|--|---------|-------------------------|--|--|-------------------------------|
| 1 | <i>Anastrepha fraterculus</i> | ANSTFR | Insects | No | Yes (CABI, online) | Not evaluated | No |
| 2 | <i>Anastrepha ludens</i> | ANSTLU | Insects | No | Yes (EPPO, online) | Not evaluated | No |
| 3 | <i>Anoplophora chinensis</i> | ANOLCN | Insects | No | Yes, as <i>Juglans</i> (EPPO, online) | Not evaluated | No |
| 4 | <i>Aromia bungii</i> | AROMBU | Insects | No | Yes (CABI, online; EPPO, online) | Not evaluated | No |
| 5 | <i>Bactrocera tryoni</i> | DACUTR | Insects | No | Yes (CABI, online) | Not evaluated | No |
| 6 | <i>Cnestus mutilatus</i> as Scolytinae non-European | XYLSMU | Insects | No | Yes, as <i>Juglans</i> (EPPO, 2020) | Not evaluated | No |
| 7 | <i>Euwallacea fornicatus sensu lato</i> | XYLBFO, EUWAWH, EUWAFO, EUWAKU, EUWAPE | Insects | No | Yes, as <i>Juglans</i> (EPPO, online) | Not evaluated | No |
| 8 | <i>Euwallacea validus</i> as Scolytinae non-European | XYLBVA | Insects | No | Yes, as <i>Juglans</i> (EPPO, 2020) | Not evaluated | No |
| 9 | <i>Geosmithia morbida</i> | GEOHMO | Fungi | No | Yes (CABI, online; EPPO, online; Farr and Rossman, online) | Not evaluated | No |
| 10 | <i>Gymnosporangium libocedri</i> as <i>Gymnosporangium</i> spp. | GYMNL | Fungi | No | Yes, as <i>Juglans</i> (Farr and Rossman, online) | Not evaluated | No |
| 11 | <i>Hypothenemus erectus</i> as Scolytinae non-European | HYOTER | Insects | No | Yes (Wen-tian, 2001) | Not evaluated | No |

| N | Pest name according to EU legislation ^(a) | EPPO code | Group | Pest present in Moldova | <i>Juglans regia</i> / <i>Juglans</i> confirmed as a host (reference) | Pest can be associated with commodity ^(b) | Pest relevant for the Opinion |
|----|---|-----------|-----------|-------------------------|--|--|-------------------------------|
| 12 | <i>Lopholeucaspis japonica</i> | LOPLJA | Insects | No | Yes (García Morales et al., online) | Not evaluated | No |
| 13 | <i>Monarthrum mali</i> as Scolytinae non-European | MNTHMA | Insects | No | Yes (EPPO, 2020) | Not evaluated | No |
| 14 | <i>Oeomona hirta</i> | OEMOHI | Insects | No | Yes, as <i>Juglans</i> (EPPO, online) | Not evaluated | No |
| 15 | <i>Phymatotrichopsis omnivora</i> (synonyms: <i>Phymatotrichum omnivorum</i> , <i>Phymatotrichopsis omnivore</i>) | PHMPOM | Fungi | No | Yes (CABI, online; Farr and Rossman, online) | Not evaluated | No |
| 16 | <i>Pityophthorus juglandis</i> | PITOJU | Insects | No | Yes (CABI, online; EPPO, online) | Not evaluated | No |
| 17 | <i>Popillia japonica</i> | POPIJA | Insects | No | Yes, as <i>Juglans</i> (EPPO, online) | Not evaluated | No |
| 18 | <i>Rhagoletis suavis</i> | RHAGSU | Insects | No | Yes (EPPO, online) | Not evaluated | No |
| 19 | <i>Scolytus nitidus</i> as Scolytinae non-European | – | Insects | No | Yes (Sharma et al., 2012) | Not evaluated | No |
| 20 | <i>Spodoptera frugiperda</i> | LAPHFR | Insects | No | Yes (EPPO, online) | Not evaluated | No |
| 21 | <i>Thaumatotibia leucotreta</i> | ARGPLE | Insects | No | Yes (EPPO, online) | Not evaluated | No |
| 22 | <i>Thaumetopoea processionea</i> | THAUPR | Insects | Yes | Yes (Robinson et al., online) | No ^(c) | No |
| 23 | <i>Xiphinema americanum sensu stricto</i> | XIPHAA | Nematodes | No | Yes | Not evaluated | No |

| N | Pest name according to EU legislation ^(a) | EPPO code | Group | Pest present in Moldova | <i>Juglans regia/ Juglans</i> confirmed as a host (reference) | Pest can be associated with commodity ^(b) | Pest relevant for the Opinion |
|----|--|-----------|-----------|-------------------------|--|--|-------------------------------|
| 24 | <i>Xiphinema rivesi</i> (non-EU populations) | XIPHRI | Nematodes | Uncertain | (CABI, online) Yes, as genus <i>Juglans</i> (species not specified) (Ferris, online; Lamberti and Bleve Zacheo, 1979) | Yes | Yes |
| 25 | <i>Xyleborinus artestriatus</i> as Scolytinae non-European | XYBIAR | Insects | No | Yes (EPPO, 2020) | Not evaluated | No |
| 26 | <i>Xylella fastidiosa</i> | XYLEFA | Bacteria | No | Yes (EPPO, online) | Not evaluated | No |

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

(b): The question if the pest can be associated with the commodity is evaluated only if the questions on the presence in Moldova were answered with 'yes'.

(c): The pest is not associated with the commodity because there is no oviposition on small plants of walnut.

4.2. Selection of other relevant pests (not regulated in the EU) associated with the commodity

The information provided by ANSA of Moldova, integrated with the search EFSA performed, was evaluated to assess whether there are other potentially relevant pests of *J. regia* present in the country of export. For these potential pests not regulated in the EU, pest risk assessment information on the probability of introduction, establishment, spread and impact is usually lacking. Therefore, these pests that are potentially associated with *J. regia* were also evaluated to determine their relevance for this Opinion based on evidence that:

- 1) The pest is present in Moldova;
- 2) The pest is (i) absent or (ii) has a limited distribution in the EU and phytosanitary measures are in place in at least of one of the relevant EU MS or all evidence of introduction is recent (no older than 5 years);
- 3) *Juglans regia* is a host of the pest;
- 4) One or more life stages of the pest can be associated with the specified commodity;
- 5) The pest may have an impact in the EU.

Based on the information collected, 640 non-regulated potential pests known to be associated with *J. regia* were evaluated for their relevance to this Opinion. Pests were excluded from further evaluation when at least one of the conditions listed above (1–5) was not met. Details can be found in Appendix C (Microsoft Excel® file). None of the pests not regulated in the EU was selected for further evaluation because none of them met all selection criteria. It is worth noting that many pests largely distributed in Europe have not been reported in Moldova.

4.3. Overview of interceptions

Data on the interception of harmful organisms on plants of *J. regia* can provide information on some of the organisms that can be present on *J. regia* despite the measures taken.

According to EUROPHYT online (accessed on 1 September 2020) and TRACES-NT online (accessed on 5 February 2021), there were no interceptions of plants for planting of *J. regia* from Moldova destined to the EU Member States due to the presence of harmful organisms between 1995 and January 2021.

4.4. List of potential pests not further assessed

The Panel did not find any pest that, while meeting most of the criteria to be considered as relevant for the Opinion, showed uncertainty in the remaining criteria.

4.5. Summary of pests selected for further evaluation

One pest (i.e. *Xiphinema rivesi* non-EU populations) was reported to occur in Moldova, based on peer-reviewed publications, although surveys carried out by the NPPO of Moldova did not confirm its presence. Thus, the presence of this pest was considered uncertain (Table 3). This nematode has the potential for association with the commodity destined for export to the EU. The effectiveness of the risk mitigation measures proposed to be applied to the commodity was evaluated for the selected pest.

Table 4: List of relevant pests selected for further evaluation

| Number | Current scientific name | EPPO code | Name used in the EU legislation | Taxonomic information | Group | Regulatory status |
|--------|-------------------------|-----------|--|-----------------------------|-----------|---|
| 1 | <i>Xiphinema rivesi</i> | XIPHRI | <i>Xiphinema rivesi</i> (non-EU populations) | Dorylaimida Longidoridae | Nematodes | EU Quarantine Pest according to Commission Implementing Regulation (EU) 2019/2072 |

5. Risk mitigation measures

For the selected pest (Table 4), the Panel evaluated the likelihood that it could be present in *Juglans regia* nurseries by evaluating the possibility that the commodity in the export nurseries is infested either by:

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

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. Risk mitigation measures proposed

The Dossier Section 1.0 contains information on the proposed mitigation measures related to the plant of interest (*J. regia*) and is reported as follows:

In the process of cultivating plants, and the import, export, storage, transport, marketing and use of plants, plant products and related goods subject to phytosanitary quarantine rules, natural and legal persons, regardless of the type of ownership or legal form of organisation, are obliged to:

- a) carry out systematic research into sowing and planting, and monitor plant production for the timely detection of quarantine pests;
- b) implement phytosanitary measures with a view to preventing the appearance and spread of pests;
- c) keep premises where plants, plant products and related goods subject to phytosanitary quarantine rules are stored and processed in an appropriate phytosanitary condition;
- d) meet the requirements on the import, storage, transport, marketing and use of plant protection products to prevent the entry of contamination into the environment and agricultural production;
- e) at the request of specialists from the phytosanitary control body, provide the necessary information on the phytosanitary condition of agricultural land, the protection measures taken and the application of protective products to plants and the storage and marketing of plant protection products;
- f) create the conditions to enable staff of the phytosanitary control body to apply the provisions of the law unhindered;
- g) comply with the rules on protected areas, endangered areas and phytosanitary quarantine;
- h) immediately inform the phytosanitary control body, within 7 calendar days, of the unusual presence of pests, symptoms or any other anomaly in plant development. Failure to comply with the legal provisions incurs disciplinary measures and administrative, civil and criminal (including material) liability, in accordance with the legislation in force.

Infringements are identified and sanctioned in accordance with the Contravention Code. In accordance with the Contravention Code, the following actions include penalties:

- a) infringement of the rules on the production, recording, storage and/or transport of plants, plant products and plant protection products;
- b) marketing, import, export, transport of plants and plant products without the accompanying documents required by legislation;
- c) import and/or marketing of plant protection products without licence;
- d) production, import, marketing, publicising, repackaging and use of plant protection products not subject to research–testing–experimentation, approval and certification by the State, or those whose use–by–dates has expired or have been removed from the State Register of plant protection products and fertilisers permitted for use in the Republic of Moldova;
- e) infringement of the rules on the implementation of measures to control pests or failure to implement such measures such as to cause the mass appearance and spread of those pests;
- f) introduction into the country of plants, plant products and related goods subject to phytosanitary quarantine rules whose introduction is prohibited;

- g) collection of plants, plant products and related goods subject to phytosanitary quarantine rules from points of entry without phytosanitary import/export documents;
- h) obstruction of the phytosanitary control body in the exercise of its duties relating to control of compliance with phytosanitary rules and standards by importers, exporters, marketers, producers, owners and/or keepers of storage facilities, dispatch centres and any other persons involved in the production and movement of plants, plant products, plant protection products and related goods subject to phytosanitary quarantine rules;
- i) prevention of staff of the phytosanitary control body from performing their duties;
- j) failure to provide the written information requested by staff of the phytosanitary control body within the deadline set by them;
- k) refusal to allow access to staff of the phytosanitary control body to the premises of railway stations, ports and river jetties, civil aviation airports, merchant fleet vessels, civilian aircraft, passenger and freight wagons, automobiles, the premises of agricultural producers, nurseries, orchards and vineyards, plant product stores, the premises of scientific research institutes and other locations, and access to related assets subject to phytosanitary regulations, where phytosanitary checks are required to be carried out.

The imposition of administrative or criminal penalties is subject to the civil liability of persons responsible for damage with regard to other countries, the State and the authorities of central and local public administrations.

Furthermore, to monitor the spread of plant and plant product pests, maintain the Republic of Moldova's phytosanitary status and prevent the entry of quarantine plant pests, the phytosanitary control body (ANSA) adopts the plant pest monitoring plan on an annual basis.

Based on international standards drawn up and approved by the International Plant Protection Convention, ISPM 04: Requirements for the establishment of pest-free zones, ISPM 06: Surveillance, ISPM 08: Establishment of area pest status, ISPM 10: Requirements for the establishment of pest-free production locations and consignments have been drawn up and approved and are applied by producers, Special Procedure (PS/FS-MSD-05/01): Establishing and/or maintaining the status of 'plant pest-free production location and or area'.

During the vegetation period, inspectors of ANSA's local subsections perform the following:

- diagnosis, forecast and monitoring of pests, alerting agricultural producers and natural and legal persons to their occurrence and development;
- organisation of the forecasting and warning system;
- production and dissemination of warning notices;
- surveys to determine the area of spread of diseases and pests in terms of their density, frequency and intensity of attack, the damage caused and mortality caused by entomophagy or environmental conditions;
- determination of whether treatments are appropriate, depending on the economic threshold of the damage;
- reporting any observations on changes to the biology of pests, with a view to the launch of specialist studies;
- drawing up and providing technical documentation and instructions on harmful organisms (diseases, pests, weeds) and recommendations for controlling them;
- taking samples for official control by laboratory assessment of plants, plant products and related goods subject to phytosanitary quarantine rules, imported, exported and marketed, in specialised accredited laboratories;
- production and publishing of monthly and annual forecasts on the spread of the main pests and diseases among agricultural plants, participation in the drawing up of instructions and recommendations in the field of plant protection and health. Furthermore, at the request of the phytosanitary control body of the importing country, additional treatments are carried out on shipments intended for export.

With the information provided by ANSA of Moldova (Dossier Sections 1.0 and 3.0), the Panel summarised the risk mitigation measures (see Table 5) that are proposed in the nurseries producing the commodity to be exported in the EU.

Table 5: Overview of proposed risk mitigation measures for *J. regia* plants designated for export to the EU from Moldova

| No. | Risk mitigation measure | Description |
|-----|---|---|
| 1 | Registration of production sites | Nurseries producing material for export are registered following the Moldovan legislation (Dossier Section 1.0). |
| 2 | Certification of propagation material | <p>Mother plants for production of rootstocks and scions are subjected to at least three field inspections, which focus on:</p> <ul style="list-style-type: none"> – the origin of the material used for the establishment; – observance of technology and physiological condition of plants; – phytosanitary status of plants; – virus testing; – the absence of harmful organisms, including quarantine pests. <p>In the nursery fields, at least three inspections are carried out during the vegetation period, which verify:</p> <ul style="list-style-type: none"> – the origin of the material used for the establishment in the field and of the graft branches; – authenticity and biological purity; – observance of technology and physiological condition of plants; – phytosanitary status and virus testing; – marking rootstocks, varieties, rows on plots and their registration in the Nursery Register. <p>In the process of producing the material of the category 'Ordinary', which is expected to be exported to the EU (referred in Section 3.1 as 'Regular'), the same inspections are carried out in the field and after harvesting the grafted plants, except for the collection of samples for testing for viruses in the laboratory (Dossier Section 3.0).</p> |
| 3 | Sanitation and inspection of field sites for virus-vector nematodes | Cultivation occurs in registered sites, the field sites hosting mother material are inspected prior to cultivation for the presence of virus vectored by nematodes. Sanitation may be applied if nematodes are detected, but no detailed information is provided on sanitation and soil disinfestation (Dossier Sections 1.0 and 3.0). |
| 4 | Surveillance, monitoring and sampling | <p>For nut trees in Moldova, most production is classified as Regular (CAC). 'Regular' material category originates from: (1) mother plantations (or solitary mother plants) that have not been virus-tested or retested; (2) planting material originating from mother plantations (or mother plants).</p> <p>The Regular material plantations are checked for quarantine pests and visually inspected.</p> <p>Mother plantations for rootstocks and scions are inspected in the field at least three times. After grafting, production fields are inspected twice a year.</p> <p>Field inspectors also perform a visual inspection of the plant material after harvest.</p> <p>Diagnosis protocols are following ISPM standards; however, no details on these were provided in the Dossier (Dossier Section 3.0).</p> |
| 5 | Forecasting of pest and diseases incidence and warning | ANSA of Moldova seems to monitor and communicate pest outbreaks, but no specific details are provided as to how this affects production of plants for planting. |
| 6 | Application of phytosanitary products (pesticides) | <p>The following active ingredients are used: Bifenthrin, Chlorantraniliprole, Copper sulfate neutralised with calcium hydroxide, Copper hydroxide, Deltamethrin, Hexythiazox, Lufenuron, Nissorun, Pyridaben, Pyriproxyfen, Spirodiclofen, Spirotetramat, Tebufenpyrad and Zeta-cypermethrin (Dossier Section 1.0).</p> <p>The measures are specific against following pests: <i>Archips rosana</i>, <i>Cydia pomonella</i>, <i>Gnomonia juglandis</i>, <i>Hyphantria cunea</i>, <i>Lepidosaphes ulmi</i>, <i>Lymantria dispar</i>, <i>Panonychus ulmi</i>, <i>Quadraspidiotus perniciosus</i>, <i>Tetranychus viennensis</i>, <i>Xanthomonas campestris</i> pv. <i>juglandis</i> (Dossier Section 1.0). No specific pesticide treatment against <i>X. rivesi</i> is listed in the Dossier.</p> <p>Details on timing, doses and target pest are summarised in the Dossier.</p> |

| No. | Risk mitigation measure | Description |
|-----|---|--|
| 7 | Other mitigation measures (other than pesticides) | Details of other mitigation measures (other than pesticides) are described in the Dossier; however, they are not specific against <i>X. rivesi</i> . The measures are specific against following pests: <i>Archips rosana</i> , <i>Cydia pomonella</i> , <i>Gnomonia juglandis</i> , <i>Hyphantria cunea</i> , <i>Lepidosaphes ulmi</i> , <i>Lymantria dispar</i> , <i>Panonychus ulmi</i> , <i>Quadraspidiotus perniciosus</i> , <i>Tetranychus viennensis</i> , <i>Xanthomonas campestris</i> pv. <i>juglandis</i> (Dossier Section 1.0). |
| 8 | Field sanitation | Removal, cutting and destruction of symptomatic or infested/infected material (shoots, leaves, fruits) (Dossier Sections 1.0 and 3.0). |
| 9 | Post-harvest treatments | Defoliation of plant material. Root washing and application of pesticides during the washing (Dossier Sections 1.0 and 3.0). |
| 10 | Sorting and storage | Material for export is sorted, labelled and packed before export (Dossier Sections 1.0 and 3.0). |

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

For the pest selected for further evaluation, the relevant risk mitigation measures acting on the pest were identified. Any limiting factors on the effectiveness of the measures were documented.

All the relevant information including the related uncertainties deriving from the limiting factors used in the evaluation are summarised in a pest data sheet provided in Appendix A.

An overview of the evaluation of a relevant pest is given in Section 5.2.1. The outcome of the EKE regarding pest freedom after the evaluation of the currently proposed risk mitigation measures is summarised in Section 5.2.2.

5.2.1. Overview of the evaluation of *Xiphinema rivesi* non-EU populations (*Dorylaimida*; *Longidoridae*)

| | | | | | |
|---|--|---------------------------------------|---------------------------------------|---------------------------------------|---|
| Rating of the likelihood of pest freedom | Pest free with some exceptional cases (based on the Median). | | | | |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of pest-free bundles | 9,959 out of 10,000 bundles | 9,976 out of 10,000 bundles | 9,987 out of 10,000 bundles | 9,995 out of 10,000 bundles | 9,999.2 out of 10,000 bundles |
| Percentile of the distribution | 5% | 25% | Median | 75% | 95% |
| Proportion of infested bundles | 0.8 out of 10,000 bundles | 5 out of 10,000 bundles | 13 out of 10,000 bundles | 24 out of 10,000 bundles | 41 out of 10,000 bundles |
| Summary of the information used for the evaluation | <p>Possibility that the pest could become associated with the commodity</p> <p>The pest is reported in Moldova from forests, riverbanks and horticultural fields of apple, peach, grape, raspberry and currant in several peer-reviewed papers (Poiras, 2012; Poiras et al., 2013, 2014, 2015) and conference proceedings (Iurcu-Străistaru et al., 2021); however, the NPPO of Moldova did not find this nematode during official surveys carried out between 2019 and 2021 (EFSA PLH Panel, 2022); therefore, there is uncertainty about its presence in Moldova. The nematode could be introduced into the nurseries by nematode infested soil, attached to machinery, tools and footwear. The nematode can also enter with contaminated surface water.</p> <p>Measures taken against the pest and their efficacy</p> <p>The relevant proposed measures are: (a) inspection of production sites for virus-vector nematodes, (b) sanitation, (c) certification of propagation material, (d) testing, (e) root pruning and washing.</p> | | | | |

- a) Inspection of production sites is efficient with correct sampling methods.
- b) Sanitation with chemicals is not efficient against *X. rivesi*, because the nematodes may be present in deep soil layers, not reached by the chemical product.
- c) Certification of propagation material would be efficient when relying on good sampling and laboratory practices; however, majority of Moldovan certification for nut trees is only for the category 'Regular' which includes only visual inspection. In case sampling and testing would detect *X. rivesi* in the nursery, it is stated that the fields infested with the pest would not be cultivated and discarded for production, a practice which is considered of high efficacy.
- d) Testing would be efficient using the right methods, such as recommended in EPPO PM7/119(1) (EPPO, 2013); however, method used for testing is not provided.
- e) Root pruning and washing with high pressure water jets can reduce nematode infestation of the commodity.

Interception records

In the EUROPHYT/TRACES-NT database, there are no records of notifications of interceptions of *Juglans regia* plants for planting neither from Moldova nor from other countries due to the presence of *Xiphinema rivesi* between the years 1995 and February 2022 (EUROPHYT/TRACES-NT, online).

Shortcomings of current measures/procedures

- Inspection methods may overlook low populations of nematodes.
- No chemical treatments are applied against *Xiphinema rivesi*
- Root pruning and washing may fail to remove nematodes completely.

Main uncertainties

There is a lack of details in the Dossier on following aspects

- Hygiene procedures of the nurseries.
- Inspection procedures (time and sampling method).
- The degree to which roots are inspected.
- Time and procedures used for root washing.

There is a lack of knowledge on

- The degree to which symptoms of *X. rivesi* are visible on above parts of plants.

For more details, see relevant pest data sheet on *Xiphinema rivesi* non-EU populations (Section A.1 in Appendix A)

5.2.2. Outcome of Expert Knowledge Elicitation

Table 6 and Figure 2 show the outcome of the EKE regarding pest freedom after the evaluation of the currently proposed risk mitigation measures for the evaluated pest.

Figure 3 provides an explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the currently proposed risk mitigation measures for *Juglans regia* plants for planting designated for export to the EU using the example of *Xiphinema rivesi* non-EU populations.

Table 6: Assessment of the likelihood of pest freedom following evaluation of current risk mitigation measures against selected relevant pests on *Juglans regia* plants for planting 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>Xiphinema rivesi</i> non-EU populations | | | | | | LM | | U |

PANEL A

| Pest freedom category | | Pest-free bundles out of 10,000 | Legend of pest freedom categories | |
|-----------------------|---------------------------------------|---------------------------------|-----------------------------------|--|
| | Sometimes pest free | ≤ 5,000 | L | Pest freedom category includes the elicited lower bound of the 90% uncertainty range |
| | More often than not pest free | 5,000 to ≤ 9,000 | M | Pest freedom category includes the elicited median |
| | Frequently pest free | 9,000 to ≤ 9,500 | U | Pest freedom category includes the elicited upper bound of the 90% uncertainty range |
| | 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 | | |

PANEL B

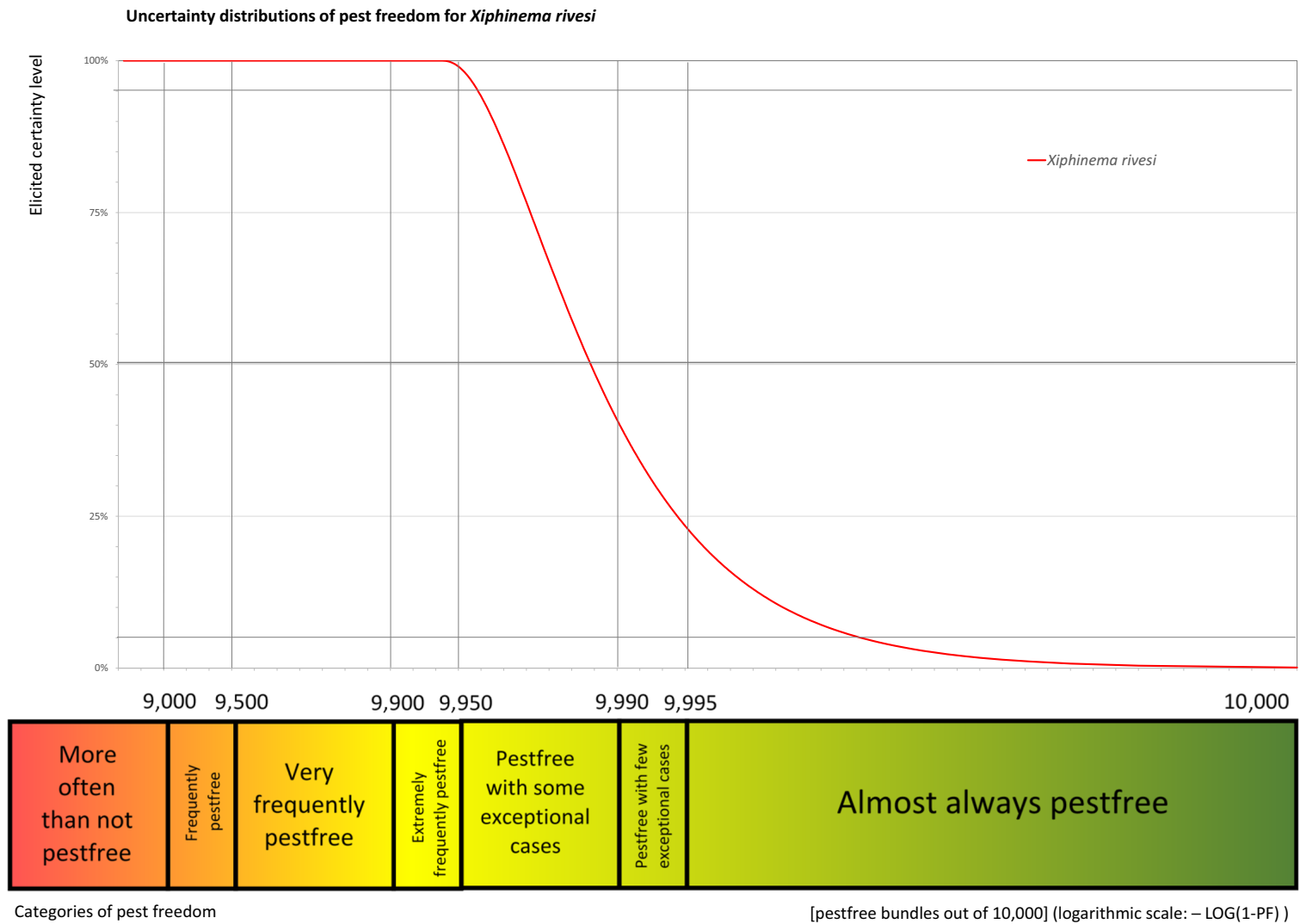


Figure 2: Elicited certainty (y-axis) of the number of pest-free *Juglans regia* bundles (x-axis; log-scaled) out of 10,000 bundles designated for export to the EU from Moldova for the evaluated pest visualised as descending distribution function. Horizontal lines indicate the percentiles (starting from the bottom 5%, 25%, 50%, 75%, 95%). The Panel is 95% confident that 9,959 or more bundles per 10,000 will be free from *Xiphinema rivesi* non-EU populations

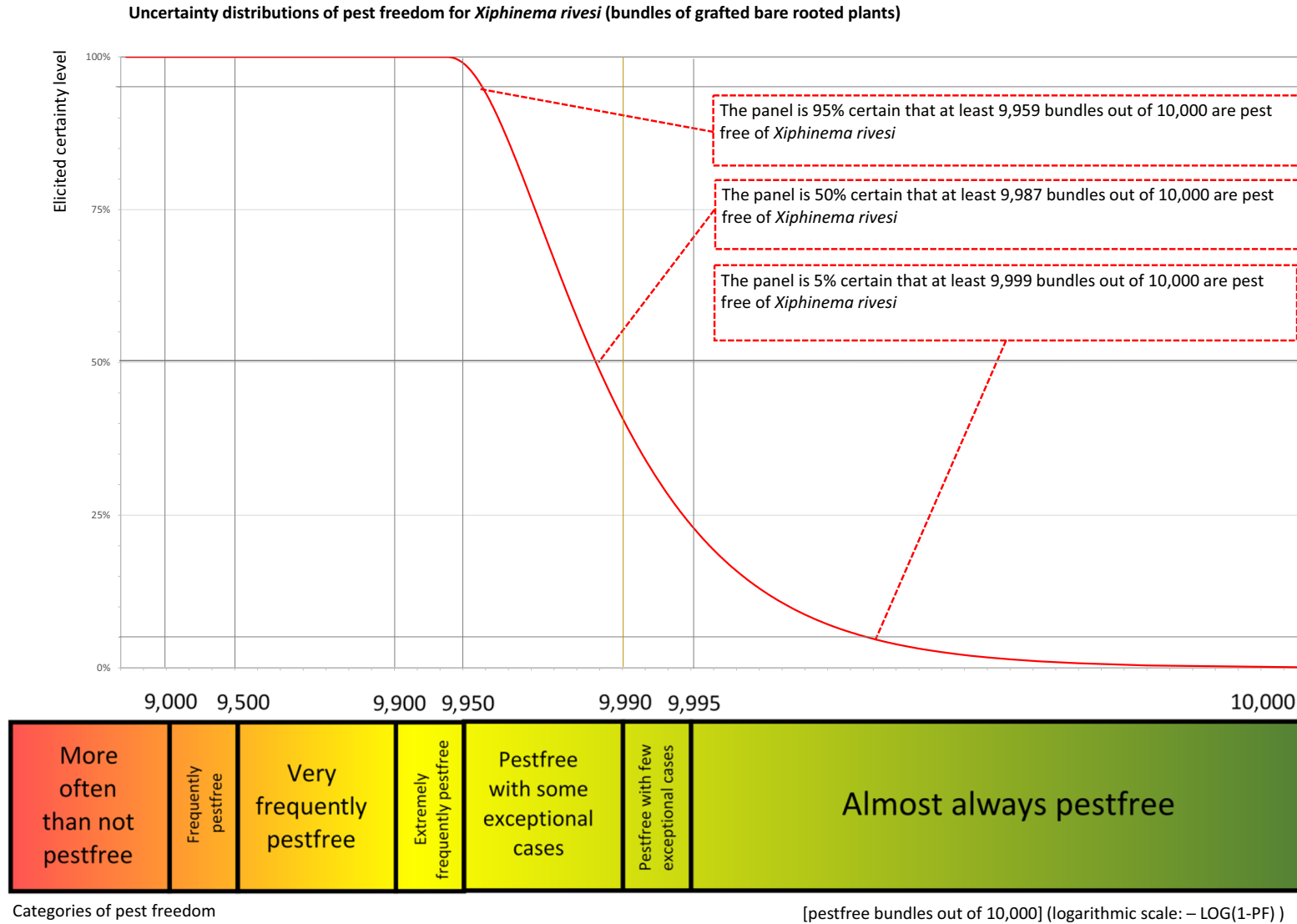


Figure 3: Explanation of the descending distribution function describing the likelihood of pest freedom after the evaluation of the proposed risk mitigation measures for plants designated for export to the EU based on based on the example of *Xiphinema rivesi* non-EU populations

6. Conclusions

There is one pest (*Xiphinema rivesi* non-EU populations) whose presence in Moldova is uncertain and which is considered to be potentially associated with grafted bare-rooted plants for planting of *Juglans regia* imported from Moldova and relevant for the EU.

For *Xiphinema rivesi* non-EU populations, the likelihood of the pest freedom, after the evaluation of the currently proposed risk mitigation measures for plants for planting of *Juglans regia* designated for export to the EU, was estimated as 'pest free with some exceptional cases' with the 90% uncertainty ranging from 'pest free with some exceptional cases' to 'almost always pest free'. The Expert Knowledge Elicitation indicated, with 95% certainty, that 9,959 or more bundles of grafted bare-rooted plants per 10,000 will be free from *X. rivesi* non-EU populations.

References

- CABI (Centre for Agriculture and Bioscience International), online. CABI (Centre for Agriculture and Bioscience International), online. Crop Protection Compendium. Available online: <https://www.cabi.org/cpc/> [Accessed: 15 January 2021].
- 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), 2019. 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), Bragard C, Baptista P, Chatzivassiliou E, Gonthier P, Jaques Miret JA, Fejer Justesen A, 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, Zappalà L, Di Serio F, Gómez P, Urek G, Lucchi A, Carluccio AV, Chiumenti M, Fanelli E, Bernardo U, Marzachi C, Bubici G, de la Peña E, Gardi C and Yuen J, 2022. Scientific Opinion on the commodity risk assessment of grafted plants of *Malus domestica* from Moldova. EFSA Journal 2022;20(3):7021, 39 pp. <https://doi.org/10.2903/j.efsa.2022.7201>
- 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.2018.5122>
- EPPO (European and Mediterranean Plant Protection Organization), online. EPPO. Global Database. Available online: <https://gd.eppo.int/> [Accessed: 15 January 2021].
- EPPO (European and Mediterranean Plant Protection Organization), 2013. Diagnostics, PM 7/119 (1) Nematode extraction. EPPO Bulletin, 43, 471–495.
- EPPO (European and Mediterranean Plant Protection Organization), 2020. EPPO Technical Document No. 1081, EPPO Study on the risk of bark and ambrosia beetles associated with imported non-coniferous wood, EPPO Paris. Available online: https://www.eppo.int/RESOURCES/eppo_publications
- EUROPHYT, online. European Union Notification System for Plant Health Interceptions – EUROPHYT. Available online: https://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/index_en.htm [Accessed: 1 September 2020].
- 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, Rossman AY, online. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Available online: <https://nt.ars-grin.gov/fungalatabases/> [Accessed: 15 January 2021].
- Ferris H, online. Nemaplex (The Nematode-Plant Expert Information System). Available online: <http://nemalex.ucdavis.edu/> [Accessed: 15 January 2021].
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y, Hardy NB, online. ScaleNet: a literature-based model of scale insect biology and systematics. Available online: <https://scalenet.info/associates/> [Accessed: 15 January 2021].
- Iurcu-Străistaru E, Toderas I, Bivol A, Rusu S and Andoni C, 2021. Cercetări comparative asupra nematodelor parazite și vectori de virusuri patogene în livezile intensive de măr din diferite zone ale Republicii Moldova. In: Patrimoniul de ieri – implicații în dezvoltarea societății durabile de mâine. Ediția a III-a, 11–12 februarie, 2021. Chișinău, Academia de Științe a Moldovei, Iași, România. pp. 235–244.
- Kottek M, Grieser J, Beck C, Rudolf B and Rubel F, 2006. World map of Köppen-Geiger climate classification updated. Meteorologische Zeitschrift, 15, 259–263. <https://doi.org/10.1127/0941-2948/2006/0130>
- Lamberti F and Bleve-Zacheo T, 1979. Studies on *Xiphinema americanum sensu lato* with description of fifteen new species (Nematoda, Longidoridae). Nematologia mediterranea, 7, 51–106.
- Poiras L, 2012. Species diversity and distribution of free-living and plant parasitic nematodes from order Dorylaimida (Nematoda) in different habitats of the Republic of Moldova. Oltenia-studii Si Comunicari Stiintele Naturii, 28, 35–42.

- Poiras L, Iurcu-Străistaru E, Poiras N, Bivol A and Cerneț A, 2013. Plant parasitic and free-living nematodes of some orchards (peach, apple) in the Republic of Moldova. *Oltenia-studii Si Comunicari Stiintele Naturii*, 29, 166–171.
- Poiras L, Cerneț A, Bivol A, Poiras N and Iurcu-Străistaru E, 2014. Preliminary analysis of plant parasitic nematodes associated with strawberry and raspberry crops in the Republic of Moldova. *Oltenia-studii Si Comunicari Stiintele Naturii*, 30, 98–104.
- Poiras L, Iurcu-Străistaru E, Poiras N, Bivol A and Cerneț A, 2015. Phytoparasitic nematode fauna of perennial fruit crops in Republic of Moldova. In: *Lucrări științifice, Univ. Agrară de Stat din Moldova*. 2015, vol. 42(2): Horticultură, viticultură și vinificație, silvicultură și grădini publice, protecția plantelor, 376–382.
- Robinson GS, Ackery PR, Kitching IJ, Beccaloni GW and Hernández LM, online. HOSTS – A Database of the World's Lepidopteran Hostplants. Natural History Museum, London. Available online: <https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsml> [Accessed: 15 January 2021].
- Sharma RM, Pandey MK and Shankar U, 2012. Pest management in walnut: an overview. In: Abrol DP and Shankar U (eds.), *Ecologically Based Integrated Pest Management*, New India Publishing Agency, New Delhi, India. 765–785.
- TRACES-NT, online. TRAdE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 5 February 2021].
- Wen-tian XIE, 2001. Species and control of bark beetles attacking *Juglans regia*. *Forest Pest and Disease*, 4, 13.

Abbreviations

| | |
|------|--|
| ANSA | Agentia Nationala Pentru Siguranta Alimentor, National Food Safety Agency of the Republic of Moldova |
| CABI | Centre for Agriculture and Bioscience International |
| CAC | Conformitas Agraria Communitatis |
| EPPO | European and Mediterranean Plant Protection Organization |
| FAO | Food and Agriculture Organization |
| ISPM | International Standards for Phytosanitary Measures |
| NPPO | National Plant Protection Organization |
| PLH | Plant Health |
| RNQP | Regulated Non-Quarantine Pest |

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) Measures | The entry of a pest resulting in its establishment (FAO, 2017). 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 Reduction Options 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 zones (PZ) | A Protected zone is an area recognised at EU level to be free from a harmful organism, which is established in one or more other parts of the Union. |

| | |
|-------------------------------|---|
| Quarantine pest | A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2017). |
| Regulated non-quarantine pest | A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing contracting party (FAO, 2017). |
| Risk mitigation measure | A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A risk mitigation measure may become a phytosanitary measure, action or procedure according to the decision of the risk manager. |
| Spread (of a pest) | Expansion of the geographical distribution of a pest within an area (FAO, 2017). |

Appendix A – Data sheets of pests selected for further evaluation

A.1. *Xiphinema rivesi* non-EU populations

A.1.1. Organism information

| | |
|--|---|
| Taxonomic information | <p>Current valid scientific name: <i>Xiphinema rivesi</i></p> <p>Synonyms: –</p> <p>Name used in the EU legislation: <i>Xiphinema rivesi</i> (non-EU populations)</p> <p>Order: Dorylaimida</p> <p>Family: Longidoridae/Xiphinematidae</p> <p>Common name: dagger nematode</p> <p>Name used in the Dossier: –</p> |
| Group | Nematods |
| EPPO code | XIPHRI |
| Regulated status | <p>The pest is listed in Annex II of Regulation (EU) 2019/2072 as <i>Xiphinema rivesi</i> (non-EU populations) Dalmasso [XIPHRI].</p> <p>The pest is included in the EPPO A2 list (EPPO, online_a).</p> <p><i>Xiphinema rivesi</i> is a quarantine pest in Mexico and Morocco; it is reported on A1 list of Brazil, Egypt, Georgia, Turkey, United Kingdom and EAEU (=Eurasian Economic Union – Armenia, Belarus, Kazakhstan, Kyrgyzstan and Russia) (EPPO, online_a).</p> |
| Pest status in Moldova | <p>According to Moldovan Food Safety Agency (ANSA) <i>X. rivesi</i> has not been detected during official monitoring activities in the last three years (Musteata, 2021). However, there is uncertainty on the occurrence as this nematode is reported from Moldova in the literature (Poiras, 2012; Poiras et al., 2013, 2014, 2015; Iurcu-Străistaru et al., 2021).</p> |
| Pest status in the EU | <p>EU populations of <i>Xiphinema rivesi</i> are present in Croatia, France, Germany, Italy, Portugal, Slovakia, Slovenia and Spain (CABI, online_b; EPPO, online_b).</p> |
| Host status on <i>Juglans regia</i> | <p>No report at species level for <i>Juglans regia</i> as a host of <i>Xiphinema rivesi</i> is available; <i>Juglans</i> genus is reported as a host by Ferris (online) citing Lamberti and Bleve-Zacheo (1979) who collected specimens from 'walnut, oak and hackberry soil' in Kansas (USA).</p> |
| PRA information | <p>Pest Risk Assessments available:</p> <ul style="list-style-type: none"> – Pest Risk Analysis for <i>Xiphinema americanum</i> s.l. (van der Gaag et al., 2010), – Rapid Pest Risk Analysis for <i>Xiphinema americanum</i> s.l. (European populations) (FERA, 2014), – Rapid Pest Risk Analysis for: Tobacco ringspot virus (TRSV) (FERA, 2018), – Scientific Opinion on the pest categorisation of <i>Xiphinema americanum sensu lato</i> (EFSA PLH Panel, 2018), – Scientific Opinion on the commodity risk assessment of black pine (<i>Pinus thunbergii</i> Parl.) bonsai from Japan (EFSA PLH Panel, 2019), – Scientific Opinion on commodity risk assessment of grafted plants of <i>Malus domestica</i> from Moldova (EFSA PLH Panel, 2022), – UK Risk Register Details for <i>Xiphinema rivesi</i> (European populations) (DEFRA, online_a), – UK Risk Register Details for <i>Xiphinema rivesi</i> (non-European populations) (DEFRA, online_b). |
| Other relevant information for the assessment | |
| Biology | <p><i>Xiphinema rivesi</i> belongs to the <i>X. americanum</i> s.l. species complex, a group of 61 morphologically very similar nematode species. Six species are vectors of plant viruses of economic importance, <i>X. rivesi</i> among them (EFSA PLH Panel, 2018). The nematode is polyphagous, occurring in association with a number of woody and herbaceous plant species.</p> <p><i>Xiphinema rivesi</i> is currently present in North America (2 Canada states and 23 USA states); South America (Argentina, Chile, Guadeloupe and Peru); Europe (8 EU member states); Africa (Egypt); Asia (Iran and Pakistan); Oceania (Western Australia, Samoa and Tonga) (EPPO, online_b).</p> <p><i>Xiphinema rivesi</i> has five stages of development (egg, three juvenile stages, adult), and its life cycle lasts about 1 year (Halbrendt and Brown, 1992; EPPO, online_c). As in all <i>Xiphinema</i> species, adult males are very rare and females mainly reproduce parthenogenetically. Both juvenile and adult stages have a long 'stylet' which is used to</p> |

| | | |
|-----------------|--|---|
| | <p>feed on roots as ectoparasites. The ectoparasitic feeding mode allows the nematode to move freely in the soil through its life cycle in search of a suitable host. During stylet penetration, the nematode secretes enzymes that cause hypertrophy and thickening of the cells. The feeding process on a particular part of the plant root may take several hours to several days (Bitterlin and Gonsalves, 1987; EFSA PLH Panel, 2018). All stages live and reproduce in moist soil, at optimum temperature of 20–24°C, surviving for years at cooler temperatures but not in dry soils (Bitterlin and Gonsalves, 1987; EFSA PLH Panel, 2018). All stages can overwinter, but in low winter temperature areas, eggs are the main overwintering stage (EPPO, online_c). During feeding, juveniles and adults can acquire and transmit viruses that can persist in the nematode body for several months and up to 2 years (Bitterlin and Gonsalves, 1987; EFSA PLH Panel, 2018).</p> <p><i>Xiphinema rivesi</i> is known to transmit several economically important nepoviruses included in the EU list of quarantine organisms (EPPO, 2017; EFSA PLH Panel, 2018). However, these viruses are not reported to infect <i>Juglans</i> species.</p> <p>As root ectoparasite, the nematode cannot spread with plants without soil; moreover, it has only poor active capacity of movement in the soil (< 1 m/year) (EPPO, online_c), even if run-off water can be a help for spreading. However, it is very easily transported over short and long distances with growing media or soil attached to plants, machinery, shoes, tools, etc. (EFSA PLH Panel, 2018). All nematodes belonging to <i>Xiphinema americanum</i> complex are frequently intercepted, mainly in plants with soil (EUROPHYT, online; TRACES-NT, online).</p> | |
| Symptoms | Main type of symptoms | <p>No information is available about symptoms on <i>Juglans</i>.</p> <p>In general, above-ground symptoms of <i>X. rivesi</i> infestation in host plants may consist of a general reduction in growth, which is easily confused with other plant stresses caused by water or nutrient deficiencies. Direct damage may occur only at high population densities, indicated by characteristic depressed growth patches that correspond to the highest concentration of nematodes. Swelling, stunting and destroyed tips can be observed on the roots (CABI, online_a).</p> <p>The most commonly recognised symptoms are those resulting from the transmission of the associated plant viruses, none of which relate to <i>Juglans</i>.</p> |
| | Presence of asymptomatic plants | <p>In general, symptoms caused by <i>X. rivesi</i> on plants are inconspicuous and can be easily overlooked. <i>Xiphinema rivesi</i> may also go undetected when nematode infestation in the roots of host plants is low.</p> |
| | Confusion with other pests | <p><i>Xiphinema rivesi</i> may be confused with other species in the group of <i>X. americanum sensu lato</i>. Differentiation of species from the group is based on morphological and morphometric analyses, but it is extremely difficult due to only minor differences (EFSA PLH Panel, 2018). Several morphological descriptions and identification keys for <i>Xiphinema rivesi</i> are available, mainly based on morphometric analyses (Jaffee et al., 1987; Loof et al., 1993; Lamberti et al., 2000; Akinbade et al., 2014; Handoo et al., 2015; FAO, 2016; EPPO, 2017) but only specialists are able to confidently identify the nematode.</p> <p>Due to the difficulties in distinguishing the species of <i>X. americanum sensu lato</i> based on their morphology, the use of molecular approaches is recommended (Lamberti et al., 2000; EFSA PLH Panel, 2018). However, there is currently no reliable molecular test for routine diagnosis. Such a molecular diagnostic method is available on the Q-Bank website but has not yet been included in the relevant IPPC and EPPO diagnostic protocols (FAO, 2016; EPPO, 2017; EFSA PLH Panel, 2018).</p> <p>It is not possible to distinguish EU populations of <i>X. rivesi</i> from non-EU populations (EFSA PLH Panel, 2018).</p> |

| | |
|---|---|
| Host plant range | <p><i>Xiphinema rivesi</i> is a polyphagous nematode known to be associated with a wide range of herbaceous and woody hosts, including <i>Acer negundo</i>, <i>Allium sativum</i>, <i>Citrus sinensis</i>, <i>Cucumis sativus</i>, <i>Juglans</i> sp., <i>Juniperus</i> sp., <i>Liquidambar</i> sp., <i>Mangifera indica</i>, <i>Medicago sativa</i>, <i>Prunus persica</i>, <i>Sorghum bicolor</i> (Ferris, online), <i>Malus domestica</i>, <i>Poa</i> sp., <i>Rubus idaeus</i>, <i>Zea mays</i> (Wojtowicz et al., 1982), <i>Celtis australis</i>, <i>Quercus</i> sp. (Lamberti and Bleve-Zacheo, 1979), <i>Solanum tuberosum</i> (Hafez et al., 1992), <i>Populus deltoides</i>, <i>Vitis vinifera</i> (Malek, 1969; Bello et al., 2005; Handoo et al., 2015) and <i>Ribes</i> sp. (Poiras et al., 2015). Lamberti and Bleve-Zacheo (1979) collected <i>Xiphinema rivesi</i> specimens from walnut soil (however, the species of <i>Juglans</i> was not reported in the paper), oak soil and hackberry soil in Kansas (USA). No specific information about <i>Juglans regia</i> as a host of <i>Xiphinema rivesi</i> is available.</p> <p>In Moldova, <i>Xiphinema rivesi</i> is reported to infest <i>Malus domestica</i> (apple), <i>Prunus persica</i> (peach), <i>Rubus idaeus</i> (raspberry) <i>Ribes</i> sp. (currant) and <i>Vitis</i> sp. (grape) (Poiras, 2012; Poiras et al., 2015; Iurcu- Străistaru et al., 2021).</p> |
| Reported evidence of impact | <p><i>Xiphinema rivesi</i> feeds on roots of host plants causing swelling, stunting and destruction of root tips (Ferris, online). However, the greatest damage caused by this species is transmission of viruses.</p> <p>In Moldova, symptoms of virus diseases potentially vectored by <i>X. rivesi</i> in fruit orchards and nurseries (apple, peach, raspberry and currant) were described, but without details (Poiras et al., 2015; Iurcu- Străistaru et al., 2021).</p> <p>The introduction of non-EU populations of <i>X. rivesi</i> from third countries into the EU may lead to the introduction of viruses that can be transmitted also by <i>X. rivesi</i> populations already present in the EU (<i>X. rivesi</i> EU populations). However, the viruses known to be transmitted by <i>X. rivesi</i> (TRSV, ToRSV, PRMV and CRLV) have not been reported in literature to be associated with <i>Juglans</i> species.</p> |
| Evidence that the commodity is a pathway | <p>The commodity consists of grafted walnut plants and walnut rootstocks 1–2 years old, 1.5–2.5 m height, 2.5–3.5 diameter, with bare roots washed with high pressure water before export (Dossier Sections 1.0 and 3.0).</p> <p><i>Xiphinema rivesi</i> cannot spread with plants without soil (EFSA PLH Panel, 2018). However, according to EFSA PLH Panel (2019), washing roots with water jets may not be effective enough to remove strongly attached nematodes.</p> |
| Surveillance information | <p>The nurseries for walnut plant production for export in Moldova are inspected for the presence of virus-transmitting nematodes prior to planting and, if necessary, treated or removed from the production process if the nematode density or presence cannot be controlled (Dossier Section 1.0 and 3.0); however, threshold for intervention was not mentioned and details on treatment were not provided.</p> |

A.1.2. Possibility of pest presence in the nurseries

A.1.2.1. Possibility of entry from the surrounding environment

In Moldova, *Xiphinema rivesi* has been observed on several fruit crops (apple, grape, raspberry, strawberry, currant, vineyards), riverbanks and forests (Poiras, 2012; Poiras et al., 2013, 2014, 2015; Iurcu-Străistaru et al., 2021). According to Moldovan Food Safety Agency (ANSA), *X. rivesi* has not been detected during official monitoring activities in the last 3 years (Musteata, 2021).

All the three walnut production nurseries are adequately isolated from fruit plantations or potential natural reservoirs of virus infections. Nurseries are also inspected for the presence of virus-transmitted nematodes 1 year prior to planting; if nematodes are detected in the soil, the production site may be discarded or a sanitation measure can be implemented; however, no details on this measure are provided (Dossier Sections 1.0 and 3.0).

Xiphinema rivesi can actively move in the soil from plant to plant, but only over short (< 1 m per year) distances (EPPO, online_c; EFSA PLH Panel, 2018). Transmission from the surrounding area to the production field is only passive through the spread of contaminated soil (mainly attached to agricultural machinery, tools, etc.) and run-off rainwater.

Uncertainties

- The presence of *Xiphinema rivesi* in the areas where the nurseries are located. There is no report in literature on the presence of *Xiphinema rivesi* in the areas where the *Juglans* nurseries are located.
- No detailed information on methods applied for sanitation measures and soil decontamination in the nurseries is provided.
- The possibility of entry of the nematode in the nurseries with soil attached to machinery, tools, shoes, etc.
- As there is only one report of *Xiphinema rivesi* being associated with walnut (*Juglans* sp.), there is an uncertainty whether *Juglans regia* is a host. However, *Xiphinema* species are generally very polyphagous.

Given the above evidence and uncertainties, the Panel considers that *Xiphinema rivesi* could be present in the environment (although not reported so far from these areas) and it could enter *Juglans regia* nurseries with soil attached to machinery and tools (if previously used in infested locations) or other human activities.

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

All planting material (seeds, scions and rootstocks) is produced from mother plants within each nursery (Dossier Sections 1.0 and 3.0). The nurseries only produce *Juglans regia* plants for export (EU and third countries) and domestic market. No other species of plants are cultivated. Some of grafts and scions and walnut plants have been introduced from the EU (Italy, France, Romania and the Netherlands) (grafts and scions: in 2010, 2011, 2015 and 2019; plants in 2016) (Dossier Section 3.0).

Uncertainties

- No uncertainties

Considering the above evidence and uncertainties, the Panel considers that the nematode (non-EU populations of *Xiphinema rivesi*) cannot be introduced into walnut nurseries with new plants/seeds as the planting material is produced inside the nurseries.

A.1.2.3. Possibility of spread within the nurseries

Xiphinema rivesi actively moves only short distances (< 1 m/year) (EPPO, online_c). The main routes of spread within the nurseries are usually human assisted. The nematode can be spread with moist soil or growing media (soil as such or soil attached to plants, machinery, tools, shoes, etc.) or run-off water.

Uncertainties

- No detailed information on sanitation measures and soil decontamination in the nurseries is provided.

In view of the above evidence and uncertainties, the Panel considers that *X. rivesi* could spread within the nurseries once entered.

A.1.3. Information from interceptions

In the EUROPHYT/TRACES-NT database, there are no records of notifications of *Juglans regia* plants for planting neither from Moldova nor from other countries due to the presence of *Xiphinema rivesi* between the years 1995 and February 2022 (EUROPHYT, online; TRACES-NT, online).

A.1.4. Evaluation of the risk mitigation measures

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

| No. | Risk mitigation measure | Effect on the pest | Evaluation and uncertainties |
|-----|---|--------------------|--|
| 1 | Registration of production sites | No | Not applicable. |
| 2 | Certification of propagation material | Yes | <p>Mother plants are inspected and tested for viruses, and for the absence of quarantine pests</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> – Details of the inspection and monitoring have not been described. – It is stated by NPPO of Moldova that majority of certification for nut trees is only for the category 'Regular' (see point 4 below). |
| 3 | Sanitation and inspection of field sites for virus-vector nematodes | Yes | <p>Nurseries are checked for the presence of nematodes known as virus vectors before planting and if necessary treated or discarded for production if nematode densities/presence cannot be managed.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> – Details of this measure were not provided. – Threshold for intervention was not mentioned in the Dossier. |
| 4 | Surveillance, monitoring and sampling | Yes | <p>The presence of nematodes known as virus vectors in nurseries is checked before planting (see above).</p> <p>The 'Regular' material nurseries are visually inspected for quarantine pests. However, there is no information on how sampling and laboratory testing are carried out for this material. There is also no information on whether nematode-transmitted viruses are systematically monitored in Moldova in walnut nurseries.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> – The lack of details of inspection, monitoring and sampling and laboratory testing in the Dossier causes uncertainties on the effectiveness of surveillance, monitoring and sampling. |
| 5 | Forecasting of pest and diseases incidence and warning | No | Not applicable. |
| 6 | Application of phytosanitary products (pesticides) | No | Not applicable. |
| 7 | Other mitigation measures (other than pesticides) | No | Not applicable. |
| 8 | Field sanitation | No | Not applicable. |
| 9 | Post-harvest treatments | Yes | <p>Root washing can effectively reduce the risk of nematode infestation in plants intended for planting.</p> <p><u>Uncertainties:</u></p> <ul style="list-style-type: none"> – It is uncertain how effectively root washing is carried out to reduce the risk of 'free living' nematodes infestations. |
| 10 | Sorting and storage | No | Not applicable. |

A.1.5. Overall likelihood of pest freedom for bundles of grafted bare-rooted plants for planting

A.1.5.1. Reasoning for a scenario which could lead to a reasonably low number of infested bundles of grafted bare-rooted plants for planting

Monitoring is effective and would detect *X. rivesi*. The nematode is absent in the regions of the nurseries. *J. regia* is not a host of the nematode. There are little exchanges between the nurseries and the surrounding areas, thus reducing the risk of infestation originating from outside the nurseries. Plant material is not entering from the outside. Root tip galls are visible early in the infection process. Root pruning and washing are effective in removing nematodes. Root systems of *J. regia* are less than 35 cm in depth.

A.1.5.2. Reasoning for a scenario which would lead to a reasonably high number of infested bundles of grafted bare-rooted plants for planting

Xiphinema rivesi is widespread in Moldova and is a polyphagous pest with a preference for trees. Monitoring methods fail in detecting the nematode. *Juglans regia* is host of the nematode, which is a parasite of many trees. The pest enters by machinery, soil and human activities. Some external plant material enters the nurseries. No specific symptoms are visible on infected plants and symptoms may be confused with general stress. Nematodes occur deep in soil. Pesticides have no effect on the nematodes. Small particles of soil may remain after washing and some nematodes may still occur in the inner parts of the root ball.

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

The pest is not so far reported in the areas of *J. regia* nurseries. This species is not known as a host of *X. rivesi*. Inspections and certifications are successful in reducing nematode infestations of the plants. Root pruning and washing contributes in pushing nematode infestations to lower values. Hence, the median is set to the lower range of the distribution.

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

The position of Q1 and Q3 reflects a high degree of uncertainty relating to the occurrence and geographic distribution of *X. rivesi* in Moldova, the lack of precise information on sampling procedures for statements on pest freedom from the production fields and techniques applied for cleaning of *J. regia* roots from *X. rivesi*.

A.1.5.5. Elicitation outcomes of the assessment of the pest freedom for *Xiphinema rivesi* non-EU populations on bundles of grafted bare rooted plants for planting

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 *Xiphinema rivesi* non-EU populations 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 | | | | | 6 | | 12 | | 25 | | | | | 50 |
| EKE | 0.137 | 0.384 | 0.839 | 1.851 | 3.35 | 5.42 | 7.70 | 13.1 | 19.9 | 24.1 | 29.4 | 35.0 | 41.0 | 45.6 | 49.9 |

The EKE results are the BetaGeneral (0.89141, 2.423, 0, 59.5) distribution fitted with @Risk version 7.6.

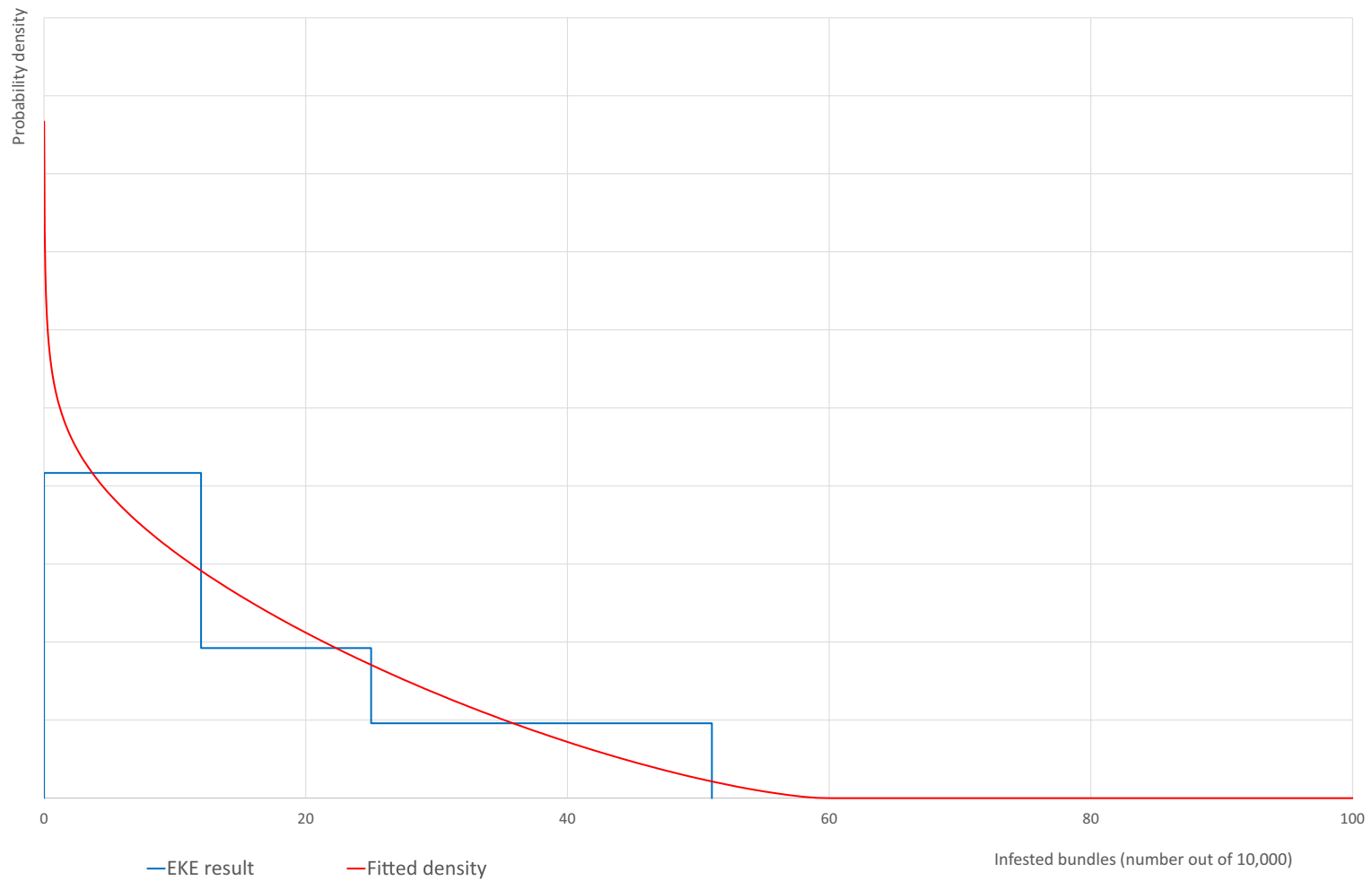
Based on the numbers of estimated infested bundles, the pest freedom was calculated (i.e. = 10,000 – number of infested bundles per 10,000). The fitted values of the uncertainty distribution of the pest freedom are shown in Table A.2.

Table A.2: The uncertainty distribution of bundles free of *Xiphinema rivesi* non-EU populations 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 | 9,950 | | | | | 9,975 | | 9,988 | | 9,994 | | | | | 10,000 |
| EKE results | 9,950 | 9,954 | 9,959 | 9,965 | 9,971 | 9,976 | 9,980 | 9,987 | 9,992 | 9,995 | 9,997 | 9,998 | 9,999.2 | 9,999.6 | 9,999.9 |

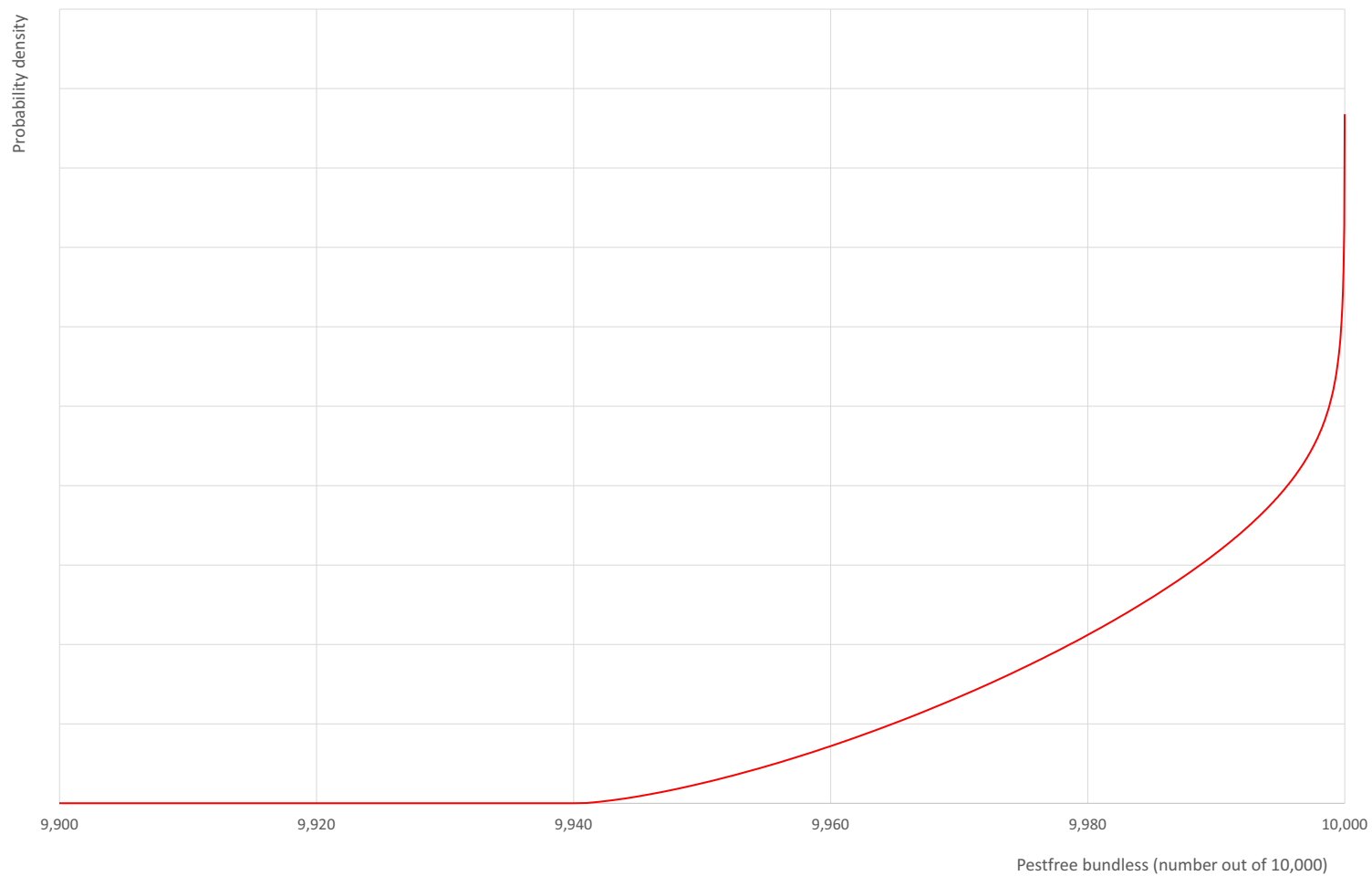
The EKE results are the fitted values.

Xiphinema rivesi



(a)

Xiphinema rivesi



(b)

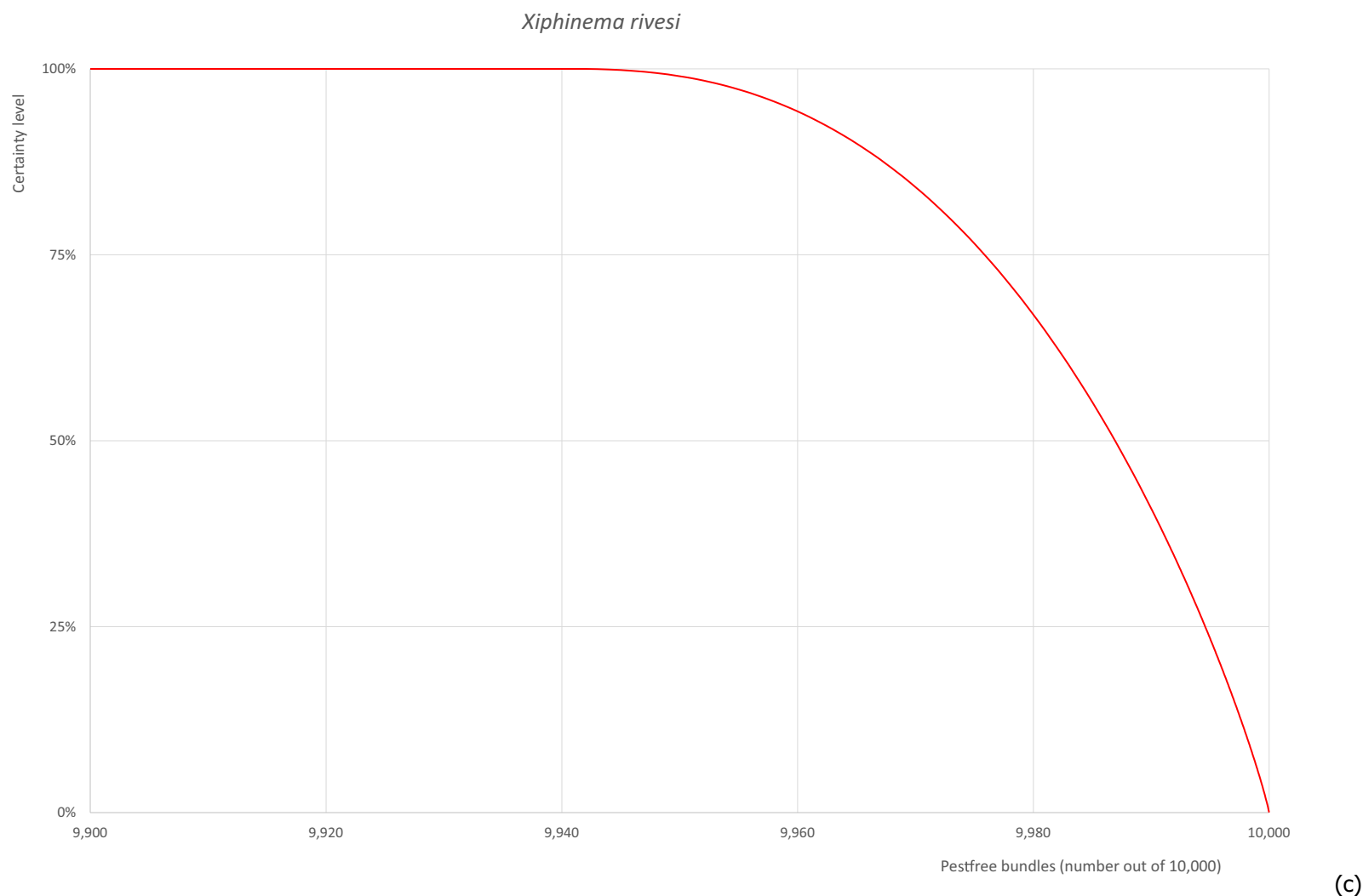


Figure A.1: (a) Elicited uncertainty of pest infestation for *X. rivesi* non-EU populations per 10,000 bundles (histogram in blue– vertical blue line indicates the elicited percentile in the following order: 1%, 25%, 50%, 75%, 99%) and distributional fit (red line); (b) uncertainty of the proportion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

A.1.6. Reference list

- Akinbade SA, Mojtahedi H, Guerra L, Eastwell K, Villamor DEV, Handoo ZA and Skantar AM, 2014. First Report of *Xiphinema rivesi* (Nematoda, Longidoridae) in Washington State. *Plant Disease*, 98, 1018. <https://doi.org/10.1094/pdis-09-13-0961-pdn>
- Bello A, Robertson L, Díez-Rojo MA and Arias M, 2005. A re-evaluation of the geographical distribution of quarantine nematodes reported in Spain. *Nematología Mediterránea*, 33, 209–216.
- Bitterlin MW and Gonsalves D, 1987. Spatial distribution of *Xiphinema rivesi* and persistence of tomato ringspot virus and its vector in soil. *Plant Disease* 71, 408–411. <https://doi.org/10.1094/pd-71-0408>
- CABI (Centre for Agriculture and Bioscience International), online_a. *Xiphinema rivesi* (dagger nematode). Available online: <https://www.cabi.org/isc/datasheet/57034> [Accessed: 20 February 2022].
- CABI (Centre for Agriculture and Bioscience International), online_b. CABI Plantwise Knowledge Bank. Available online: <https://www.plantwise.org/knowledgebank/datasheet/57034> [Accessed: 20 February 2022].
- DEFRA (Department for Environment, Food and Rural Affairs), online_a. UK Risk Register Details for *Xiphinema rivesi* (European populations). Available online: <https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?csref=10800&riskId=10800> [Accessed: 22 February 2022].
- DEFRA (Department for Environment, Food and Rural Affairs), online_b. UK Risk Register Details for *Xiphinema rivesi* (non-European populations). Available online: <https://secure.fera.defra.gov.uk/phiw/riskRegister/viewPestRisks.cfm?csref=10800&riskId=27746> [Accessed: 22 February 2022].
- EFSA PLH Panel (EFSA Panel on Plant Health), Jeger M, Bragard C, Caffier D, Candresse T, Chatzivassiliou E, Dehnen-Schmutz K, Gilioli G, Grégoire J-C, Jaques Miret JA, MacLeod A, Navajas Navarro M, Parnell S, Potting R, Rafoss T, Rossi V, Urek G, Van Bruggen A, Van der Werf W, West J, Winter S, Kaluski T and Niere B, 2018. Scientific Opinion on the pest categorisation of *Xiphinema americanum sensu lato*. *EFSA Journal* 2018;16 (7):5298, 43 pp. <https://doi.org/10.2903/j.efsa.2018.5298>
- 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, Battisti A, Vettraino AM, Leuschner R, Mosbach-Schulz O, Rosace MC and Potting R, 2019. Scientific Opinion on the 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, Gonthier P, Jaques Miret JA, Fejer Justesen A, 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, Zappalà L, Di Serio F, Gómez P, Urek G, Lucchi A, Carluccio AV, Chiumenti M, Fanelli E, Bernardo U, Marzachi C, Bubici G, de la Peña E, Gardi C and Yuen J, 2022. Scientific Opinion on the commodity risk assessment of grafted plants of *Malus domestica* from Moldova. *EFSA Journal* 2022;20 (3):7021, 39 pp. <https://doi.org/10.2903/j.efsa.2022.7201>
- EPPO (European and Mediterranean Plant Protection Organization), online_a. *Xiphinema rivesi* (XIPHRI), Categorization. Available online: <https://gd.eppo.int/taxon/XIPHRI/categorization> [Accessed: 20 February 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_b. *Xiphinema rivesi* (XIPHRI), Distribution. Available online: <https://gd.eppo.int/taxon/XIPHRI/distribution> [Accessed: 20 February 2022].
- EPPO (European and Mediterranean Plant Protection Organization), online_c. Data sheet on *Xiphinema americanum sensu lato*. Available online: <https://gd.eppo.int/taxon/XIPHRI/documents> [Accessed: 22 February 2022].
- EPPO (European and Mediterranean Plant Protection Organization), 2017. PM 7/95(2). *Xiphinema americanum sensu lato*. *EPPO Bulletin*, 47, 198–210. <https://doi.org/10.1111/epp.12382>
- 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: 28 February 2022].
- FAO, 2016. Diagnostic protocols for regulated pests DP 11: *Xiphinema americanum sensu lato*. 26. FAO, Rome, 36 pp.
- FERA (Food and Environment Research Agency), 2014. Rapid Pest Risk Analysis (PRA) for *Xiphinema americanum s.l.* (European populations) Available online: <https://secure.fera.defra.gov.uk/phiw/riskRegister/downloadExternalPra.cfm?id=4175>
- FERA (Food and Environment Research Agency), 2018. Rapid Pest Risk Analysis (PRA) for: Tobacco ringspot virus (TRSV). Available online: <https://pra.eppo.int/pr/6e693e88-1a57-4e43-9bea-823b143c8a8c>
- Ferris H, online. Nemaplex (The Nematode-Plant Expert Information System). Available online: <https://nemaplex.ucdavis.edu/> [Accessed: 22 February 2022].
- Hafez SL, Golden AM, Rashid F and Handoo Z, 1992. Plant-parasitic nematodes associated with crops in Idaho and eastern Oregon. *Nematropica*, 22, 193–204.

- Halbrendt JM and Brown DJF, 1992. Morphometric evidence for three juvenile stages in some species of *Xiphinema americanum sensu lato*. *Journal of Nematology*, 24, 305–309.
- Handoo ZA, Ibrahim IKA, Chitwood DJ and Mokbel AA, 2015. First report of *Xiphinema rivesi* Dalmasso, 1969 on citrus in northern Egypt. *Pakistan Journal of Nematology*, 33, 161–165.
- Iurcu-Străistaru E, Toderas I, Bivol A, Rusu S and Andoni C, 2021. Cercetări comparative asupra nematodelor parazite și vectori de virusuri patogene în livezile intensive de măr din diferite zone ale Republicii Moldova. In: Patrimoniul de ieri – implicații în dezvoltarea societății durabile de mâine. Ediția a III-a, 11-12 februarie 2021, Chișinău. Iași, România: Academia de Științe a Moldovei, 235–244.
- Jaffee BA, Harrison MB, Shaffer RL and Strang MB, 1987. Seasonal population fluctuation of *Xiphinema americanum* and *X. rivesi* in New York and Pennsylvania orchards. *Journal of Nematology*, 19, 369–378.
- Lamberti F and Bleve-Zacheo T, 1979. Studies on *Xiphinema americanum sensu lato* with description of fifteen new species (Nematoda, Longidoridae). *Nematologia mediterranea*, 7, 51–106.
- Lamberti F, Molinari S, Moens M and Brown DJF, 2000. The *Xiphinema americanum* group. I. Putative species, their geographical occurrence and distribution, and regional polytomous identification keys for the group. *Russian Journal of Nematology*, 8, 65–84.
- Loof PAA, Luc M and Coomans A, 1993. The *Xiphinema americanum* group (Nematoda: Dorylaimida): 1. Comments upon the key to species published by Lamberti and Carone (1992). *Fundamentals of Applied Nematology*, 16, 355–358.
- Malek RB, 1969. Population fluctuations and observations of the life cycle of *Xiphinema americanum* associated with cottonwood (*Populus deltoides*) in South Dakota. *Proceedings of the Helminthological Society of Washington*, 36, 270–274.
- Musteata R, 2021. Reply letter n. 01-6/3143 on 14.12.2021 from R. Musteata (Director General of National Food Safety Agency – Republic of Moldova) to N.G. Kriz (Head of Animal and Plant Health Unit – EFSA).
- Poiras L, 2012. Species diversity and distribution of free-living and plant parasitic nematodes from order Dorylaimida (Nematoda) in different habitats of the Republic of Moldova. *Oltenia-studii si comunicari stiintele naturii*, 28, 35–42.
- Poiras L, Iurcu-Străistaru E, Poiras N, Bivol A and Cerneț A, 2013. Plant parasitic and free-living nematodes of some orchards (peach, apple) in the Republic of Moldova. *Oltenia-studii si comunicari stiintele naturii*, 29, 166–171.
- Poiras L, Cerneț A, Bivol A, Poiras N and Iurcu-Străistaru E, 2014. Preliminary analysis of plant parasitic nematodes associated with strawberry and raspberry crops in the Republic of Moldova. *Oltenia-studii si comunicari stiintele naturii*, 30, 98–104.
- Poiras L, Iurcu-Străistaru E, Poiras N, Bivol A and Cerneț A, 2015. Phytoparasitic nematode fauna of perennial fruit crops in Republic of Moldova. In: *Lucrări științifice, Univ. Agrară de Stat din Moldova*. 2015, 42, Horticultură, viticultură și vinificație, silvicultură și grădini publice, protecția plantelor, 376–382.
- TRACES-NT, online. TRAdE Control and Expert System. Available online: <https://webgate.ec.europa.eu/tracesnt> [Accessed: 28 February 2022].
- van der Gaag DJ, Karssen G and Werkman A, 2010. Pest Risk analysis for *Xiphinema americanum s.l.* Version 1.0. Plant Protection Service, Ministry of Economic Affairs, Agriculture and Innovation, The Netherlands, 77 pp.
- Wojtowlcz M, Golden A, Forer L and Stouffer R, 1982. Morphological comparisons between *Xiphinema rivesi* Daimasso and *X. americanum* Cobb populations from the eastern United States. *Journal of nematology*, 14, 511–516.

Appendix B – Web of Science All Databases Search String

In the table below, the search string used in Web of Science is reported. In total, 513 papers were retrieved. Titles and abstracts were screened, and 117 pests were added to the list of pests (see Appendix C).

| | |
|------------------------------|---|
| Web of Science All Databases | <p>TOPIC: ("Juglans regia" OR "common walnut" OR "Juglans duclouxiana" OR "Juglans fallax" OR "Juglans kamaonica" OR "Juglans orientis" OR "Juglans sinensis")</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 viroses OR blight\$ OR wilt\$ OR wilted OR canker OR scab\$ OR rot OR rots OR rotten OR "damping off" OR "damping-off" OR blister\$ OR "smut" OR mould OR mold OR "damping syndrome\$" OR mildew OR scald\$ OR "root knot" OR "root-knot" OR rootknot OR cyst\$ OR "dagger" OR "plant parasitic" OR "parasitic plant" OR "plant\$parasitic" OR "root feeding" OR "root\$feeding")</p> <p>NOT</p> <p>TOPIC: ("winged seeds" OR metabolites OR *tannins OR climate OR "maple syrup" OR syrup OR mycorrhiz* OR "carbon loss" OR pollut* OR weather OR propert* OR probes OR spectr* OR antioxidant\$ OR transformation OR RNA OR DNA OR "Secondary plant metabolite\$" OR metabol* OR "Phenolic compounds" OR Quality OR Abiotic OR Storage OR Pollen* OR fertil* OR Mulching OR Nutrient* OR Pruning OR drought OR "human virus" OR "animal disease*" OR "plant extracts" OR immunological OR "purified fraction" OR "traditional medicine" OR medicine OR mammal* OR bird* OR "human disease*" OR biomarker\$ OR "health education" OR bat\$ OR "seedling\$ survival" OR "anthropogenic disturbance" OR "cold resistance" OR "salt stress" OR salinity OR "aCER method" OR "adaptive cognitive emotion regulation" OR nitrogen OR hygien* OR "cognitive function\$" OR fossil\$ OR *toxicity OR Miocene OR postglacial OR "weed control" OR landscape)</p> <p>NOT</p> <p>TOPIC: ("Abagrotis alternata" OR "Abortiporus biennis" OR "Acalitus brevitarsus" OR "Aceria erineae" OR "Aceria erineus" OR "Achatia distincta" OR "Acherontia atropos" OR "Acremonium sp." OR "Acria" OR "Acrobasis caryae" OR "Acrobasis caryivorella" OR "Acrobasis demotella" OR "Acrobasis juglandis" OR "Acrobasis nuxvorella" OR "Acrobasis stigmella" OR "Acrocercops transecta" OR "Acronicta afflicta" OR "Acronicta americana" OR "Acronicta anaedina" OR "Acronicta impleta" OR "Acronicta lithospila" OR "Acronicta major" OR "Actias" OR "Actias artemis" OR "Actias luna" OR "Actias selene" OR "Actias truncatipennis" OR "Actinothecium juglandis" OR "Aeolesthes sarta" OR "Agaricus hispidus" OR "Agaricus melleus" OR "Aglia tau" OR "Agrobacterium tumefaciens" OR "Aleurodiscus diffissus" OR "Allotria elonympha" OR "Alternaria alternata" OR "Alternaria arborescens" OR "Alternaria nucis" OR "Alternaria sp." OR "Alternaria tenuissima" OR "Ambulyx sericeipennis" OR "Amorpha juglandis" OR "Ampedus cinnabarinus" OR "Amphipyra pyramidoides" OR "Amyeloides transitella" OR "Amyeloides transitella" OR "Anapulvinaria pistaciae" OR "Anastrepha fraterculus" OR "Annaphila arvalis" OR "Anoplophora chinensis" OR "Antennaria pannosa" OR "Antheraea oclea" OR "Antheraea polyphemus" OR "Aonidiella aurantii" OR "Aonidiella aurantii" OR "Aphis spiraeicola" OR "Aphis spiraeicola" OR "Aplosporella juglandina" OR "Aplosporella juglandis" OR "Aplosporella longipes" OR "Apochima juglansaria" OR "Apomyeloides ceratoniae" OR "Aporia crataegi" OR "Aporpium caryae" OR "Apriona germari" OR "Araragi enthea" OR "Archips argyrospila" OR "Archips fuscocupreanus" OR "Archips fuscocupreanus" OR "Archips podana" OR "Archips rileyana" OR "Archips subsidiaria" OR "Arctia caja" OR "Argema besanti" OR "Argema mimosae" OR "Argyrotaenia citrana" OR "Armillaria mellea" OR "Armillaria mellea" OR "Armillaria sp." OR "Armillariella tabescens" OR "Aromia bungii" OR "Aromia bungii" OR "Arthrobotryum</p> |
|------------------------------|---|

stilboideum OR "*Ascochyta juglandis*" OR "*Ascochyta lichenoides*" OR "*Ascochyta pisi*" OR "*Ascochyta* sp." OR "*Aspergillus niger*" OR "*Aspidiotus juglandis*" OR "*Asterosporium asterospermum*" OR "*Athous hirtus*" OR "*Auricularia auricula*" OR "*Auricularia auricula-judae*" OR "*Auricularia auricularis*" OR "*Auricularia mesenterica*" OR "*Automeris io*" OR "*Bactrocera tryoni*" OR "*Berkleasium concinnum*" OR "*Berkleasium opacum*" OR "*Biscogniauxia mediterranea*" OR "*Biston regalis*" OR "*Botryodiplodia congesta*" OR "*Botryodiplodia theobromae*" OR "*Botryosphaeria berengeriana*" OR "*Botryosphaeria dothidea*" OR "*Botryosphaeria dothidea*" OR "*Botryosphaeria lutea*" OR "*Botryosphaeria melanops*" OR "*Botryosphaeria obtusa*" OR "*Botryosphaeria parva*" OR "*Botryosphaeria quercuum*" OR "*Botryosphaeria ribis*" OR "*Botryosphaeria sinensis*" OR "*Botrytis cinerea*" OR "*Bourdolia eyrei*" OR "*Brenneria nigrifluens*" OR "*Brenneria rubrificiens*" OR "*Brevipalpus lewisi*" OR "*Brevipalpus yothersi*" OR "*Bryobia praetiosa*" OR "*Bryobia rubrioculus*" OR "*Bulgaria inquinans*" OR "*Cacopaurus pestis*" OR "*Cacopaurus* sp." OR "*Cadophora* sp." OR "*Cadra cautella*" OR "*Cadra cautella*" OR "*Caligula cachara*" OR "*Caligula japonica*" OR "*Caligula simla*" OR "*Callaphis juglandis*" OR "*Callaphis juglandis*" OR "*Calliteara horsfieldii*" OR "*Calliteara pudibunda*" OR "*Calonectria kyotensis*" OR "*Calonectria morganii*" OR "*Caloptilia blandella*" OR "*Caloptilia juglandiella*" OR "*Caloptilia roscipennella*" OR "*Caloptilia roscipennella*" OR "*Camarosporium juglandis*" OR "*Cameraria caryaefoliella*" OR "*Capnodium salicinum*" OR "*Caryospora putaminum*" OR "*Catocala amatrux*" OR "*Catocala habilis*" OR "*Catocala judith*" OR "*Catocala lacrymosa*" OR "*Catocala maestosa*" OR "*Catocala neogama*" OR "*Catocala palaeogama*" OR "*Catocala piatrix*" OR "*Catocala robinsonii*" OR "*Catocala serena*" OR "*Catocala vidua*" OR "*Cenopalpus pulcher*" OR "*Ceratitidis capitata*" OR "*Ceratocystis alba*" OR "*Ceratocystis* sp." OR "*Cercospora forsteriana*" OR "*Cercospora fusca*" OR "*Cercospora juglandis*" OR "*Cercospora* sp." OR "*Cercospora* sp." OR "*Cercospora* sp." OR "*Cerrena unicolor*" OR "*Ceuthospora juglandicola*" OR "*Chaetomium* sp." OR "*Chaetophea crossata*" OR "*Chaetoprocta odata*" OR "*Chaetosphaeria innumera*" OR "*Chalara thielavioides*" OR "*Characoma ruficirra*" OR "*Characoma ruficirra*" OR "*Cheromettia apicata*" OR "*Cherry leaf roll nepovirus*" OR "*Cherry leaf roll virus*" OR "*Chionaspis caryae*" OR "*Chionaspis furfura*" OR "*Chionaspis lintneri*" OR "*Chromaphis hirsutustibis*" OR "*Chromaphis juglandicola*" OR "*Chromaphis juglandicola*" OR "*Chromaphis juglandicola*" OR "*Citheronia brissotii*" OR "*Citheronia mexicana*" OR "*Citheronia regalis*" OR "*Citheronia splendens*" OR "*Cladosporium astroideum* var. *astroideum*" OR "*Cladosporium caryigenum*" OR "*Cladosporium delicatulum*" OR "*Cladosporium herbarum*" OR "*Cladosporium juglandinum*" OR "*Cladosporium juglandis*" OR "*Cladosporium pericarpium*" OR "*Cladosporium* sp." OR "*Clavaspis disclusa*" OR "*Clavaspis ulmi*" OR "*Cnethodonta grisea*" OR "*Coccus pseudomagnoliarum*" OR "*Coleodictyospora micronesica*" OR "*Coleophora pruniella*" OR "*Colletotrichum acutatum*" OR "*Colletotrichum fiorinae*" OR "*Colletotrichum fiorinae*" OR "*Colletotrichum fructicola*" OR "*Colletotrichum gloeosporioides*" OR "*Colletotrichum glucocorticoides*" OR "*Colletotrichum siamense*" OR "*Colletotrichum* sp." OR "*Comstockaspis perniciosa*" OR "*Comstockaspis perniciosa*" OR "*Coniophora arida*" OR "*Coniothecium effusum*" OR "*Coniothecium* sp." OR "*Coniothyrium incrustans*" OR "*Coniothyrium olivaceum*" OR "*Conoplea globosa*" OR "*Conoplea sphaerica*" OR "*Coprinus micaceus*" OR "*Coptodisca*" OR "*Coptodisca juglandiella*" OR "*Coptodisca lucifluella*" OR "*Coriolus hirsutus*" OR "*Coriolus versicolor*" OR "*Coronophora angustata*" OR "*Corticium caeruleum*" OR "*Corticium confluens*" OR "*Corticium portentosum*" OR "*Cossus cossus*" OR "*Cossus cossus*" OR "*Crenulaspidiotus lahillei*" OR "*Crepidotus nephrodes*" OR "*Criconema mutabile*" OR "*Criconemella*" OR "*Criconemella xenoplax*" OR "*Criconemoides* sp." OR "*Crisiccoccus matsumotoi*" OR "*Cristella sulphurea*" OR "*Cristulariella pyramidalis*" OR "*Cryptodiaporthe castanea*" OR "*Cryptophaeella trematosphaericiicola*" OR "*Cryptosphaeria eunomia*" OR "*Cryptosphaeria juglandina*" OR "*Cryptosporium nigrum*" OR "*Cryptovalsa ampelina*" OR "*Cryptovalsa extorris*" OR "*Cryptovalsa nitschkei*" OR "*Cucurbitaria elongata*" OR "*Cucurbitaria juglandina*" OR "*Cucurbitaria juglandis*" OR "*Cucurbitaria obducens*" OR "*Curculio caryae*" OR "*Cyclothyrium juglandis*" OR "*Cydia amplana*" OR "*Cydia caryana*" OR "*Cydia latiferreana*" OR "*Cydia latiferreana*" OR "*Cydia pomonella*" OR "*Cydia pomonella*" OR "*Cydia pomonella*" OR "*Cydia pomonella*" OR "*Cydia splendana*" OR "*Cydia splendana*" OR "*Cydia splendana*" OR "*Cylindrocarpon destructans*" OR "*Cylindrocarpon orthosporum*" OR "*Cylindrocarpon* sp." OR "*Cylindrocladia parva*" OR "*Cylindrocladium parvum*" OR "*Cylindrocladium scoparium*" OR "*Cylindrocladium* sp." OR "*Cylindrosporium juglandis*" OR "*Cylindrosporium* sp." OR "*Cylindrosporium*

uljanishchevii" OR "*Cyphellopsis anomala*" OR "*Cytospora albiceps*" OR "*Cytospora atrocirrhatta*" OR "*Cytospora californica*" OR "*Cytospora chrysosperma*" OR "*Cytospora cincta*" OR "*Cytospora gigalocus*" OR "*Cytospora gigaspora*" OR "*Cytospora joaquinensis*" OR "*Cytospora juglandicola*" OR "*Cytospora juglandina*" OR "*Cytospora juglandina*" OR "*Cytospora juglandis*" OR "*Cytospora leucosperma*" OR "*Cytospora nivea*" OR "*Cytospora plurivora*" OR "*Cytospora sacculus*" OR "*Cytospora sp.*" OR "*Dactylonectria torresensis*" OR "*Daedalea ambigua*" OR "*Daedalea confragosa*" OR "*Daedalea quercina*" OR "*Daldinia concentrica*" OR "*Daldinia steglichii*" OR "*Dasyaphis rhusae*" OR "*Datana angusii*" OR "*Datana drexelii*" OR "*Datana integerrima*" OR "*Datana integerrima*" OR "*Dematophora necatrix*" OR "*Dendrophoma juglandina*" OR "*Dendrophoma albobadia*" OR "*Dendrosporium lobatum*" OR "*Diaporthe juglandina*" OR "*Diaporthe amygdali*" OR "*Diaporthe bicincta*" OR "*Diaporthe biguttulata*" OR "*Diaporthe cotoneastri*" OR "*Diaporthe eres*" OR "*Diaporthe foeniculina*" OR "*Diaporthe juglandicola*" OR "*Diaporthe juglandina*" OR "*Diaporthe juglandis*" OR "*Diaporthe medusaea*" OR "*Diaporthe medusaea var. viburni*" OR "*Diaporthe neotheicola*" OR "*Diaporthe rhusicola*" OR "*Diaporthe rostrata*" OR "*Diaporthe shennongjiaensis*" OR "*Diaporthe spiculosa*" OR "*Diaporthe tibetensis*" OR "*Diaspidiotus aesculi*" OR "*Diaspidiotus ancylus*" OR "*Diaspidiotus juglansregiae*" OR "*Diaspidiotus osborni*" OR "*Diaspidiotus ostreaeformis*" OR "*Diaspidiotus zonatus*" OR "*Diatrype albobruinosa*" OR "*Diatrypella eutypaeformis*" OR "*Diatrypella favacea*" OR "*Diatrypella sp.*" OR "*Dichomera juglandis*" OR "*Dichomeris sparsella*" OR "*Dictyosporium solanii*" OR "*Diplocladia scalaroides*" OR "*Diplodia juglandina*" OR "*Diplodia juglandis*" OR "*Diplodia mutila*" OR "*Diplodia seriata*" OR "*Diplodia sp.*" OR "*Discosia artocreas var. juglandis*" OR "*Discosphaerina fagi*" OR "*Dothiorella gregaria*" OR "*Dothiorella iberica*" OR "*Dothiorella juglandis*" OR "*Dothiorella omnivora*" OR "*Dothiorella sp.*" OR "*Dryocoetes himalayensis*" OR "*Eacles ducalis*" OR "*Eacles imperialis*" OR "*Eacles oslari*" OR "*Eacles penelope*" OR "*Ectropis crepuscularia*" OR "*Ectropis excursaria*" OR "*Elfvigia applanata*" OR "*Elsinoe randii*" OR "*Ennomos subsignaria*" OR "*Eotetranychus uncatius*" OR "*Ephestia kuehniella*" OR "*Ephestia parasitella*" OR "*Epidiaspis leperii*" OR "*Epidiaspis leperii*" OR "*Epinotia timidella*" OR "*Erannis tiliaria*" OR "*Eriophyes erineus*" OR "*Eriophyes tristriatus*" OR "*Eriophyes tristriatus*" OR "*Erschoviella musculana*" OR "*Erschoviella musculana*" OR "*Erwinia nigrifluens*" OR "*Erysiphe juglandis*" OR "*Erysiphe juglandis-nigrae*" OR "*Erysiphe polygoni*" OR "*Eulecanium caryae*" OR "*Eulecanium ciliatum*" OR "*Eulecanium excrescens*" OR "*Eulecanium giganteum*" OR "*Eulecanium kostylevi*" OR "*Eulecanium kunoense*" OR "*Eulecanium kuwanae*" OR "*Eulecanium rugulosum*" OR "*Eulecanium tiliae*" OR "*Eulecanium tiliae*" OR "*Euproctis celebensis*" OR "*Euproctis chrysorrhoea*" OR "*Eurhizococcus brasiliensis*" OR "*Eutetranychus orientalis*" OR "*Eutypa lata*" OR "*Eutypa lata*" OR "*Eutypa ludibunda*" OR "*Eutypella dissepta*" OR "*Eutypella juglandina*" OR "*Eutypella juglandicola*" OR "*Eutypella leprosa*" OR "*Eutypella stellulata*" OR "*Euzophera batangensis*" OR "*Euzophera bigella*" OR "*Euzophera bigella*" OR "*Euzophera bigella*" OR "*Euzophera osseatella*" OR "*Euzophera semifuneralis*" OR "*Exosporina fawcettii*" OR "*Exosporium stylobatum*" OR "*Exosporium tiliae*" OR "*Exosporium tiliae*" OR "*Favolus squamosus*" OR "*Ferrisia gilli*" OR "*Fomes conchatus*" OR "*Fomes everhartii*" OR "*Fomes fasciatus*" OR "*Fomes fomentarius*" OR "*Fomes fomentarius*" OR "*Fomes ignarius*" OR "*Fomes marginatus*" OR "*Fomes scruposus*" OR "*Fomes ulmarius*" OR "*Fomitopsis pinicola*" OR "*Funalia hispida*" OR "*Fusarium avenaceum*" OR "*Fusarium incarnatum*" OR "*Fusarium incarnatum*" OR "*Fusarium lateritium*" OR "*Fusarium oxysporum*" OR "*Fusarium oxysporum*" OR "*Fusarium pallidroseum*" OR "*Fusarium sambucinum*" OR "*Fusarium semitectum*" OR "*Fusarium semitectum var. majus*" OR "*Fusarium solani*" OR "*Fusarium sp.*" OR "*Fuscoporia cryptacantha*" OR "*Fusicladium effusum*" OR "*Fusicoccum amygdali*" OR "*Fusicoccum dimidiatum*" OR "*Fusicoccum juglandinum*" OR "*Fusicoccum juglandis*" OR "*Ganoderma applanatum*" OR "*Ganoderma lipsiense*" OR "*Garella musculana*" OR "*Gastrolina depressa*" OR "*Geosmithia flava*" OR "*Geosmithia lavendula*" OR "*Geosmithia morbida*" OR "*Geosmithia morbida*" OR "*Geosmithia morbida*" OR "*Geosmithia putterillii*" OR "*Geosmithia sp.*" OR "*Gibberella baccata*" OR "*Gliomastix maseei*" OR "*Gloeocystidiellum lactescens*" OR "*Gloeosporium epicarpi*" OR "*Gloeosporium epicarpi*" OR "*Gloeosporium fructigenum*" OR "*Gloeosporium sp.*" OR "*Glomerella cingulata*" OR "*Gloniopsis curvata*" OR "*Gloniopsis curvata*" OR "*Gnomonia caryae*" OR "*Gnomonia ischnostyla*" OR "*Gnomonia juglandis*" OR "*Gnomonia leptostyla*" OR "*Gnomonia nervisequa*" OR "*Gnomonia sp.*" OR "*Grapholita funebrana*" OR "*Gretchena bolliana*" OR "*Gretchena concitaticana*" OR "*Grifola frondosa*" OR

"Grovesinia pyramidalis" OR "Grovesinia pyramidalis" OR "Guignardia endophyllicola"
 OR "Guignardia juglandis" OR "Gymnosporangium libocedri" OR "Haematonectria
 haematococca" OR "Hagapteryx mirabilior" OR "Haploa reversa" OR "Helianthus ciliaris"
 OR "Helicobasidium brebissonii" OR "Helicobasidium mompa" OR "Helicobasidium
 tanakae" OR "Helicoma morgani" OR "Helicoma tenuifilum" OR "Helicomycetes bellus"
 OR "Helicotylenchus digonicus" OR "Helicotylenchus dihystra" OR "Helicotylenchus
 erythrinae" OR "Helicotylenchus microlobus" OR "Helicotylenchus sp." OR "Heliothrips
 haemorrhoidalis" OR "Helminthosporium hispanicum" OR "Helminthosporium
 juglandinum" OR "Helminthosporium microsorum" OR "Helminthosporium sp." OR
 "Helminthosporium velutinum" OR "Hemiberlesia lataniae" OR "Hemiberlesia lataniae"
 OR "Hemiberlesia neodiffinis" OR "Hemiberlesia rapax" OR "Hemicriconemoides
 chitwoodi" OR "Hemicriconemoides sp." OR "Hemicyclophora koreana" OR
 "Hendersonia biseptata" OR "Hendersonia juglandina" OR "Hendersonula toruloidea"
 OR "Heridium erinaceus" OR "Heterocampa guttivitta" OR "Heterodera mediterranea"
 OR "Heterodera sp." OR "Homona coffearia" OR "Howardia biclavis" OR "Hyalophora
 cecropia" OR "Hylesia nigricans" OR "Hylesinus crenatus" OR "Hymenochaete
 rubiginosa" OR "Hymenoscyphus fructigenus" OR "Hypena madefactalis" OR "Hypena
 sordidula" OR "Hyphantria cunea" OR "Hyphantria cunea" OR "Hyphantria cunea" OR
 "Hyphodontia arguta" OR "Hyphodontia spathulata" OR "Hypochnicium geogonium" OR
 "Hypocrea subpachybasioidea" OR "Hypoxyton mediterraneum" OR "Hypoxyton
 multiforme" OR "Hypoxyton quadratum" OR "Hypoxyton rubiginosum" OR
 "Hysterographium mori" OR "Ilyonectria liriodendri" OR "Ilyonectria robusta" OR
 "Inonotus hispidus" OR "Inonotus hispidus" OR "Irpex lacteus" OR "Jobellisia
 rhynchostoma" OR "Juglanconis appendiculata" OR "Juglanconis juglandina" OR
 "Juglanconis oblonga" OR "Kirschsteiniethelia aethiops" OR "Lachnodocheium juglandis"
 OR "Laeticorticium canfieldii" OR "Laeticorticium roseum" OR "Laetiporus sulphureus"
 OR "Lasiodiplodia trifolii" OR "Lasiodiplodia citricola" OR "Lasiodiplodia iraniensis" OR
 "Lasiodiplodia pseudotheobromae" OR "Lecanidion atratum" OR "Lecanodiaspis
 prosopidis" OR "Leipos nebulosus" OR "Lemonniera terrestris" OR "Lentinellus ursinus"
 OR "Leperisinus varius" OR "Lepidosaphes beckii" OR "Lepidosaphes conchiformis" OR
 "Lepidosaphes conchyiformis" OR "Lepidosaphes malicola" OR "Lepidosaphes salicina"
 OR "Lepidosaphes ulmi" OR "Lepidosaphes ulmi" OR "Lepidosaphes yanagicola" OR
 "Leptosphaeria depressa" OR "Leptosphaeria leucoplaca" OR "Leptosphaeria petiolaris"
 OR "Leucodiaporthe juglandis" OR "Lochmaeus manteo" OR "Longidorus juglandicola"
 OR "Longidorus juglans" OR "Longidorus sp." OR "Lophocampa caryae" OR
 "Lopholeucaspis japonica" OR "Lucanus cervus" OR "Lycia graecarius" OR "Lyctus
 brunneus" OR "Lymantria dispar" OR "Lymantria juglandis" OR "Lymantria mathura" OR
 "Lymantria obfusca" OR "Lymantria obfusca" OR "Machimia tentoriferella" OR
 "Malacosoma disstria" OR "Malacosoma parallela" OR "Marasmius candidus" OR
 "Marssonina californica" OR "Marssonina juglandis" OR "Marssonina juglandis"
 "Marssonina californica" OR "Marssonina juglandis" OR "Marssonina manschurica" OR
 "Marssonina sp." OR "Megaplatypus mutatus" OR "Melanaspis inopinata" OR
 "Melanaspis obscura" OR "Melanaspis tenebricosa" OR "Melanconis carthusiana" OR
 "Melanconis juglandis" OR "Melanconis juglandis" OR "Melanconium juglandinum" OR
 "Melanconium juglandis" OR "Melanconium oblongum" OR "Melanconium sp." OR
 "Melanopsamma pomiformis" OR "Meloidogyne arenaria" OR "Meloidogyne hapla" OR
 "Meloidogyne incognita" OR "Meloidogyne javanica" OR "Meloidogyne partityla" OR
 "Meloidogyne sp." OR "Merlinius brevidens" OR "Merulius rufus" OR "Mesocriconema
 rusticum" OR "Mesocriconema teres" OR "Mesocriconema xenoplax" OR "Microblepsis
 sp." OR "Microdiplodia juglandis" OR "Microsphaera alni" OR "Microsphaera
 himalayensis" OR "Microsphaera juglandis" OR "Microsphaera juglandis var. juglandis"
 OR "Microsphaera juglandis-nigrae" OR "Microsphaera penicillata" OR "Microsphaera
 yamadae" OR "Microsphaera yatagan" OR "Microstroma brachysporum" OR
 "Microstroma juglandis" OR "Microstroma juglandis" OR "Microstroma juglandis" OR
 "Monema flavescens" OR "Monodictys fluctuata" OR "Monodictys juglandis" OR
 "Montagnula obtusa" OR "Mycena excisa" OR "Mycena luteopallens" OR "Mycena
 speirea" OR "Mycosphaerella juglandis" OR "Mycosphaerella saccardoana" OR
 "Mycosphaerella woronowii" OR "Myxosporium juglandinum" OR "Myzus persicae" OR
 "Naemospora microspora" OR "Naemospora sp." OR "Nathrius brevipennis" OR
 "Nattrassia mangiferae" OR "Naupactus xanthographus" OR "Nectria cinnabarina" OR
 "Nectria cinnabarina" OR "Nectria coccinea" OR "Nectria ditissima" OR "Nectria
 galligena" OR "Nectria haematococca" OR "Nectria pseudotrichia" OR "Nectria punicea"

OR "Nectria sp." OR "Nemania quadrata" OR "Nemoria bistraria" OR "Neoclytus caprea" OR "Neocucurbitaria juglandicola" OR "Neofusicoccum australe" OR "Neofusicoccum mediterraneum" OR "Neofusicoccum mediterraneum" OR "Neofusicoccum nonquaesitum" OR "Neofusicoccum parvum" OR "Neofusicoccum vitifusiforme" OR "Neonectria radiculata" OR "Neopinnaspis harperi" OR "Neopulvinaria innumerabilis innumerabilis" OR "Neoscytalidium dimidiatum" OR "Neoscytalidium hyalinum" OR "Nesothrips alexandrae" OR "Nola distributa" OR "Oeomona hirta" OR "Oidium sp." OR "Olethreutes inornatana" OR "Oligonychus bicolor" OR "Oligonychus ilicis" OR "Oligonychus kobachidzei" OR "Oligonychus platani" OR "Oligonychus punicae" OR "Oligonychus ununguis" OR "Oncopodiella doliiformis" OR "Oncopodiella felis" OR "Oncopodiella trigonella" OR "Operophtera brumata" OR "Ophiocera ophiens" OR "Ophiognomonia clavignenti-juglandacearum" OR "Ophiognomonia clavignenti-juglandacearum" OR "Ophiognomonia ischnostyla" OR "Ophiognomonia leptostyla" OR "Ophiognomonia leptostyla" OR "Ophiognomonia vasiljevae" OR "Ophiognomonia vasiljevae" OR "Ophiostoma quercus" OR "Ophiovalsa caryae" OR "Opogona xanthocrita" OR "Orbilina milinana" OR "Orgyia leucostigma" OR "Orgyia leucostigma" OR "Orgyia vetusta" OR "Ormiscodes rufosignata" OR "Palaeolecanium bituberculatum" OR "Panaphis juglandis" OR "Panaphis nepalensis" OR "Pandemis heparana" OR "Panonychus ulmi" OR "Panonychus ulmi" OR "Panopoda rufimargo" OR "Pantoea agglomerans" OR "Pantomorus cervinus" OR "Panus strigosus" OR "Paralipsa gularis" OR "Pararoussoella juglandicola" OR "Parasa consocia" OR "Paratrachodorus minor" OR "Paratrachodorus porosus" OR "Paratylenchus hamatus" OR "Paratylenchus nanus" OR "Paratylenchus paraperaticus" OR "Paratylenchus sp." OR "Parlatoreopsis chinensis" OR "Parlatoria oleae" OR "Parthenolecanium corni" OR "Parthenolecanium corni" OR "Parthenolecanium corni corni" OR "Parthenolecanium persicae" OR "Parthenolecanium putmani" OR "Peniophora cinerea" OR "Peniophora crenea" OR "Peniophora greschikii" OR "Peniophora heterocystidia" OR "Peniophora incarnata" OR "Peniophora mutata" OR "Peniophora nuda" OR "Peniophora sambuci" OR "Peniophora tamaricicola" OR "Periconia cookei" OR "Pestalotia affinis" OR "Pestalotia pezizoides" OR "Pestalotia sp." OR "Pestalotiopsis guepinii" OR "Pezicula abdita" OR "Phaeoacremonium sicilianum" OR "Phaeostoma vitis" OR "Phanerochaete allantopora" OR "Phanerochaete burtii" OR "Phanerochaete chrysorhiza" OR "Phanerochaete fuscomarginata" OR "Phanerochaete tuberculata" OR "Phellinus alni" OR "Phellinus gilvus" OR "Phellinus ignarius" OR "Phellinus robustus" OR "Phellinus weirianus" OR "Phenacoccus aceris" OR "Phenacoccus transcaucasicus" OR "Phialophora richardsiae" OR "Phigalia plumogeraria" OR "Phigalia titea" OR "Phloeospora multimaculans" OR "Phlyctinus callosus" OR "Phoma juglandicola" OR "Phoma juglandina" OR "Phoma juglandis" OR "Phomopsis albobestita" OR "Phomopsis eleagni" OR "Phomopsis juglandina" OR "Phomopsis juglandina" OR "Phomopsis sp." OR "Phomopsis viticola Taxon 1" OR "Phyllactinia alnicola" OR "Phyllactinia corylea" OR "Phyllactinia fraxini" OR "Phyllactinia guttata" OR "Phyllactinia juglandis" OR "Phyllactinia juglandis var. juglandae" OR "Phyllactinia juglandis-mandshuricae" OR "Phyllactinia sp." OR "Phyllactinia suffulta" OR "Phyllobius oblongus" OR "Phyllonorycter juglandicola" OR "Phyllonorycter nicellii" OR "Phyllosticta juglandina" OR "Phyllosticta juglandis" OR "Phyllosticta sp." OR "Phymatotrichopsis omnivora" OR "Phymatotrichum omnivorum" OR "Physalospora juglandis" OR "Physalospora obtusa" OR "Physarum polycephalum" OR "Physcia aipolia" OR "Physcia millegrana" OR "Physcia stellaris" OR "Phytophthora cactorum" OR "Phytophthora cambivora" OR "Phytophthora chlamydospora" OR "Phytophthora cinnamomi" OR "Phytophthora cinnamomi" OR "Phytophthora cinnamomi" OR "Phytophthora cinnamomi" OR "Phytophthora citricola" OR "Phytophthora citricola" OR "Phytophthora citrophthora" OR "Phytophthora citrophthora" OR "Phytophthora cryptogea" OR "Phytophthora cryptogea" OR "Phytophthora drechsleri" OR "Phytophthora gonapodyides" OR "Phytophthora gonapodyides" OR "Phytophthora gonapodyides" OR "Phytophthora megasperma" OR "Phytophthora megasperma" OR "Phytophthora nicotianae" OR "Phytophthora nicotianae var. parasitica" OR "Phytophthora palmivora var. palmivora" OR "Phytophthora parasitica" OR "Phytophthora plurivora" OR "Phytophthora sp." OR "Phytophythium litorale" OR "Phytophythium mercuriale" OR "Phytophythium vexans" OR "Pityophthorus juglandis" OR "Pityophthorus juglandis" OR "Plagionotus arcuatus" OR "Planococcus ficus" OR "Platynota stultana" OR "Platynota stultana" OR "Platynota stultana" OR "Pleospora juglandina" OR "Pleospora juglandis" OR "Pleospora multimaculans" OR "Pleurotus ostreatus" OR "Plodia interpunctella" OR

"Plum pox virus" OR "Poculum firmum" OR "Poculum juglandis" OR "Poculum nucicola"
 OR "Polygonum aviculare" OR "Polyporus admirabilis" OR "Polyporus adustus" OR
 "Polyporus bififormis" OR "Polyporus cinnabarinus" OR "Polyporus delectans" OR
 "Polyporus fumosogriseus" OR "Polyporus gilvus" OR "Polyporus hirsutus" OR
 "Polyporus hispidus" OR "Polyporus nidulans" OR "Polyporus sp." OR "Polyporus
 spumeus" OR "Polyporus squamosus" OR "Polyporus sulphureus" OR "Polyporus
 versicolor" OR "Polystictus unicolor" OR "Popillia japonica" OR "Poria ambigua" OR
 "Poria apacheriensis" OR "Poria medulla-panis" OR "Poria pulchella" OR "Poria
 punctata" OR "Poria purpurea" OR "Poria rancida" OR "Poria reticulata" OR "Poria
 rhodella" OR "Poria tenuis var. pulchella" OR "Poria tenuis var. tenuis" OR "Poria
 tulipiferae" OR "Poria versipora" OR "Porodisculus pendulus" OR "Porothelium
 fimbriatum" OR "Pratylenchus brachyurus" OR "Pratylenchus coffeae" OR "Pratylenchus
 neglectus" OR "Pratylenchus penetrans" OR "Pratylenchus pratensis" OR "Pratylenchus
 sp." OR "Pratylenchus sp." OR "Pratylenchus thornei" OR "Pratylenchus thornei" OR
 "Pratylenchus vulnus" OR "Pratylenchus vulnus" OR "Prochoerodes forficaria" OR
 "Psaphida electilis" OR "Pseudaulacaspis pentagona" OR "Pseudaulacaspis pentagona"
 OR "Pseudocercospora juglandicola" OR "Pseudocercospora pterocaryae" OR
 "Pseudocercospora juglandis" OR "Pseudococcus calceolariae" OR "Pseudococcus
 calceolariae" OR "Pseudococcus dispar" OR "Pseudococcus longispinus" OR
 "Pseudococcus meridionalis" OR "Pseudococcus viburni" OR "Pseudococcus viburni" OR
 "Pseudomonas syringae pv. syringae" OR "Pulvinaria juglandii" OR "Pulvinaria regalis"
 OR "Pulvinaria vitis" OR "Pycnoporus sanguineus" OR "Pythium debaryanum" OR
 "Pythium oligandrum" OR "Pythium sp." OR "Pythium sp." OR "Pythium ultimum" OR
 "Quadraspidiotus zonatus" OR "Ramularia sp." OR "Retithrips syriacus" OR
 "Rhabdospora juglandis" OR "Rhagium mordax" OR "Rhagoletis completa" OR
 "Rhagoletis completa" OR "Rhagoletis suavis" OR "Rhizobium radiobacter" OR
 "Rhizobium rhizogenes" OR "Rhizoctonia solani" OR "Rhizoctonia sp." OR "Rhizopus
 stolonifer" OR "Rhodinia newara" OR "Rhodococcus turanicus" OR "Rosellinia aquila"
 OR "Rosellinia necatrix" OR "Rosellinia necatrix" OR "Rosellinia sp." OR "Rosellinia
 thelena" OR "Sabalodes aegrotata" OR "Sabalodes caberata" OR "Samia cynthia" OR
 "Saperda scalaris" OR "Saperda scalaris" OR "Sarcinella heterospora" OR "Sarcoscypha
 occidentalis" OR "Saturnia lindia" OR "Saturnia pavonia" OR "Saturnia pavonia" OR
 "Saturnia pyri" OR "Saturnia pyri" OR "Satyrium calanus" OR "Schizophyllum commune"
 OR "Schizotetranychus smirnovi" OR "Schizoxylon alboatrum" OR "Schizoxylon insigne"
 OR "Schizura concinna" OR "Schizura leptinoides" OR "Sclerotium rolfsii" OR
 "Sclerotium rollieri" OR "Scolytus scolytus" OR "Scutellonema sp." OR "Septobasidium
 bogoriense" OR "Septobasidium tanakae" OR "Septogloeum juglandis" OR "Septoria
 epicarpium" OR "Septoria juglandis" OR "Septoria letendreaana" OR "Septoria
 nigromaculans" OR "Septoria sp." OR "Sheathospora cornuta" OR "Sirococcus
 clavignenti-juglandacearum" OR "Sirococcus clavignenti-juglandacearum" OR
 "Sparganothis directana" OR "Sphaceloma sp." OR "Sphaeronaema infuscans" OR
 "Sphaeronaema japonicum" OR "Sphaeropsis druparum" OR "Sphaeropsis juglandis"
 OR "Sphaerulina juglandis" OR "Spilonota ocellana" OR "Spilosoma virginica" OR
 "Spongipellis lits-cages" OR "Spongipellis litschaueri" OR "Stachybotrys alternans" OR
 "Stachybotrys chartarum" OR "Stachybotrys kampalensis" OR "Stauropus fagi" OR
 "Steccherinum ochraceum" OR "Stegonsporium piriforme" OR "Stenella triseptata" OR
 "Stereum fasciatum" OR "Stereum hirsutum" OR "Stereum sp." OR "Stictis stellata" OR
 "Stigmatolemma poriiforme" OR "Stigmella floslactella" OR "Stigmella juglandifoliella"
 OR "Stigmella longisacca" OR "Stigmella microtheriella" OR "Stomaphis juglandis" OR
 "Stomaphis mordvilkoii" OR "Stomaphis wojciechowskii" OR "Strangalia aurulenta" OR
 "Suturaspis archangelskyae" OR "Synanthedon vespiformis" OR "Synanthedon
 vespiformis" OR "Takahashia japonica" OR "Taphrotychus bicolor" OR "Teichospora
 juglandis" OR "Teleiopsis brevisvalva" OR "Tetramorium grassii" OR "Tetranychus
 desertorum" OR "Tetranychus ludeni" OR "Tetranychus pacificus" OR "Tetranychus
 turkestani" OR "Tetranychus urticae" OR "Tetranychopsis horridus" OR "Tetropium
 castaneum" OR "Thaumatotibia leucotreta" OR "Thaumatotibia leucotreta" OR
 "Thaumatopoea processionea" OR "Tomentella chlorina" OR "Tomentella ferruginea"
 OR "Tomentella sublilacina" OR "Tomentella viridescens" OR "Tomentella viridis" OR
 "Trametes dickinsii" OR "Trametes gallica" OR "Trametes hirsuta" OR "Trametes
 versicolor" OR "Trechispora sphaerocystis" OR "Trematosphaeria communis" OR
 "Tremellochaete japonica" OR "Tremex fuscicornis" OR "Tribolium castaneum" OR
 "Trichocladium canadense" OR "Trichoderma sp." OR "Trichoderma" OR "Trichoderma"

porosus" OR "Trichodorus sp." OR "Trichothecium roseum" OR "Trichothecium sp." OR "Trirachys sartus" OR "Trogoderma granarium" OR "Tubercularia sp." OR "Tubercularia vulgaris" OR "Turanoclytus namanganensis" OR "Tylenchorhynchus acutus" OR "Tylenchorhynchus capitatus" OR "Tylenchorhynchus clarus" OR "Tylenchorhynchus claytoni" OR "Tylenchorhynchus sp." OR "Tylolaimophorus rotundicauda" OR "Valsa ambiens" OR "Valsa ambiens subsp. Ambiens" OR "Valsa ceratophora" OR "Valsa ceratosperma" OR "Valsa juglandicola" OR "Valsa juglandina" OR "Valsa sordida" OR "Vararia effusata" OR "Verticillium sp." OR "Volutella fructi" OR "Volutella fruit" OR "Vuilleminia cystidiata" OR "Xanthochrous hispidus" OR "Xanthomonas arboricola pv. Juglandis" OR "Xanthomonas arboricola pv. juglandis" OR "Xanthomonas juglandis" OR "Xestobium rufovillosum" OR "Xiphinema americanum" OR "Xiphinema americanum" OR "Xiphinema index" OR "Xiphinema pachtaicum" OR "Xiphinema rivesi" OR "Xiphinema sp." OR "Xyleborinus saxesenii" OR "Xyleborus dispar" OR "Xyleborus dispar" OR "Xylella fastidiosa" OR "Xylella fastidiosa subsp. fastidiosa" OR "Xylosandrus germanus" OR "Xylosandrus germanus" OR "Xylotrechus namanganensis" OR "Zeuzera coffeae" OR "Zeuzera pyrina" OR "Zeuzera pyrina")

Appendix C – Excel file with the pest list of *Juglans regia*

Appendix C can be found in the online version of this output (in the 'Supporting information' section): <https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2021.6570#support-information-section>

Appendix D – Original version of the Scientific Opinion

Appendix D can be found in the online version of this output (in the 'Supporting information' section): <https://efsa.onlinelibrary.wiley.com/doi/10.2903/j.efsa.2021.6570#support-information-section>