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## Commodity risk assessment of *Juglans regia* plants from Moldova

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### Abstract

The European Commission requested the EFSA Panel on Plant Health to prepare and deliver risk assessments for commodities listed in Commission Implementing Regulation (EU) 2018/2019 as 'High risk plants, plant products and other objects'. 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 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. None of the pests in the list fulfilled all relevant criteria and therefore none were selected for further evaluation. As a result, risk mitigation measures proposed in the technical dossier from Moldova were listed, but not further evaluated.

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## 1. Introduction

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

#### 1.1.1. Background

The new Plant Health Regulation (EU) 2016/2031<sup>1</sup>, on the protective measures against pests of plants, has been applied from December 2019. Provisions within the above Regulation are in place for the listing of 'high risk plants, plant products and other objects' (Article 42) on the basis of a preliminary assessment, and to be followed by a commodity risk assessment. A list of 'high risk plants, plant products and other objects' has been published in Regulation (EU) 2018/2019<sup>2</sup>. Scientific opinions are therefore needed to support the European Commission and the Member States in the work connected to Article 42 of Regulation (EU) 2016/2031, as stipulated in the Terms of Reference.

#### 1.1.2. Terms of Reference

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002<sup>3</sup>, 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) 2019/2072 were considered and evaluated separately at species level.

Annex II of Implementing Regulation (EU) 2019/2072 lists certain pests as non-European populations or isolates or species. These pests are regulated quarantine pests. Consequently, the respective European populations, or isolates, or species are non-regulated pests.

Annex VII of the same Regulation, in certain cases (e.g. point 32) makes reference to the following countries that are excluded from the obligation to comply with specific import requirements 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,

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

<sup>2</sup> 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

<sup>3</sup> 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.

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 United Kingdom (except Northern Ireland<sup>4</sup>). Those countries are historically linked to the reference to 'non-European countries' existing in the previous legal framework, Directive 2000/29/EC. Consequently, for those countries, 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.

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<sup>5</sup>, 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.

## 2. Data and methodologies

### 2.1. Data provided by ANSA

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.

<sup>4</sup> 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 Annex, references to Member States include the United Kingdom in respect of Northern Ireland.

<sup>5</sup> Commission Implementing Regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031 of the European Parliament and the Council, as regards protective measures against pests of plants, and repealing Commission Regulation (EC) No 690/2008 and amending Commission Implementing Regulation (EU) 2018/2019, OJ L 319, 10.12.2019, p. 1–279.

**Table 1:** Structure and overview of the Dossier

Dossier section	Overview of contents	Filename
1.0	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 – 15.01.2021
4.0.	Clarification on pests status for selected pests received on 3 February 2021	EFSA depistarea organismelor 03.02.2021.docx

The data and supporting information provided by ANSA formed the basis of the commodity risk assessment. The below overview shows the sources of information used by ANSA to compile the Dossier as specified in the Dossier Section 2.

- 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 (<http://cstsp.md/uploads/files/RegistrulText2018.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) <http://pomicol.wordpress.com>
- 8) <https://www.weatheronline.co.uk/reports/climate/Moldova.htm>
- 9) [https://en.wikipedia.org/wiki/Codling\\_moth](https://en.wikipedia.org/wiki/Codling_moth)
- 10) [http://www.agroatlas.ru/ru/content/pests/Quadraspidotus\\_perniciosus/index.html](http://www.agroatlas.ru/ru/content/pests/Quadraspidotus_perniciosus/index.html)
- 11) [https://ru.wikipedia.org/wiki/AmepwkaHckas\\_6enas\\_6a6o\\_a](https://ru.wikipedia.org/wiki/AmepwkaHckas_6enas_6a6o_a)
- 12) [https://wikivisually.com/wiki/Lepidosaphes\\_ulmi](https://wikivisually.com/wiki/Lepidosaphes_ulmi)
- 13) [https://animaldiversity.org/accounts/Lymantria\\_dispar](https://animaldiversity.org/accounts/Lymantria_dispar)
- 14) [https://ru.wikipedia.org/wiki/Henapimiii\\_wenkonpsta](https://ru.wikipedia.org/wiki/Henapimiii_wenkonpsta)
- 15) <https://kccc.ru/en/handbookipests/archips-rosana>
- 16) <https://en.wikipedia.org/wiki/Archipsrosana>
- 17) <https://agrobases.com/australlaklisease/vvalnut-blight>
- 18) <https://www.rno.skiskyrnitosti-orechovych-listovi>
- 19) <https://www.botanistii.ro/blogiantracnoza-nucului-gnornonia-juglandis/>
- 20) <http://www.legis.md>
- 21) [http://ansa.gov.md/uploads/files/Protectia%20plantelor/CertifFitos\\_an/fitoCertMoldova.pdf](http://ansa.gov.md/uploads/files/Protectia%20plantelor/CertifFitos_an/fitoCertMoldova.pdf)
- 22) <http://www.pesticide.md/registru-cautarei>
- 23) <https://www.ippc.int/en/core-activities/standards-sefting/ispms/>
- 24) <https://gd.eppo.int/>
- 25) [https://www.eppo.int/RESOURCES/eppo\\_standards](https://www.eppo.int/RESOURCES/eppo_standards)
- 26) [https://eur-lex.europa.eu/lea\\_a\\_I-content/RO/TXT/?uri=CELEX:32019R2072](https://eur-lex.europa.eu/lea_a_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 A). 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	<a href="http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm">http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm</a>
CABI Crop Protection Compendium	<a href="https://www.cabi.org/cpc/">https://www.cabi.org/cpc/</a>
Database of Insects and Their Food Plants	<a href="http://www.brc.ac.uk/dbif/hosts.aspx">http://www.brc.ac.uk/dbif/hosts.aspx</a>
Database of plant pests in Israel	<a href="https://www.moag.gov.il/en/Pages/SearchNegaim.aspx">https://www.moag.gov.il/en/Pages/SearchNegaim.aspx</a>
Database of the World's Lepidopteran Hostplants	<a href="https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm/">https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm/</a>
EPPO Global Database	<a href="https://gd.eppo.int/">https://gd.eppo.int/</a>
EUROPHYT	<a href="https://webgate.ec.europa.eu/europhyt/">https://webgate.ec.europa.eu/europhyt/</a>
Leaf-miners	<a href="http://www.leafmines.co.uk/html/plants.htm">http://www.leafmines.co.uk/html/plants.htm</a>
Nemaplex	<a href="http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx">http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx</a>
New Zealand Fungi	<a href="https://nzfungi2.landcareresearch.co.nz/default.aspx?NavControl=search&amp;selected=NameSearch">https://nzfungi2.landcareresearch.co.nz/default.aspx?NavControl=search&amp;selected=NameSearch</a>
NZFUNGI - New Zealand Fungi(and Bacteria)	<a href="https://nzfungi.landcareresearch.co.nz/html/mycology.asp?ID=">https://nzfungi.landcareresearch.co.nz/html/mycology.asp?ID=</a>
Plant Pest Information Network New Zealand	<a href="https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/">https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/</a>
Plant Viruses Online	<a href="http://bio-mirror.im.ac.cn/mirrors/pvo/vide/famindex.htm">http://bio-mirror.im.ac.cn/mirrors/pvo/vide/famindex.htm</a>
Scalenet	<a href="http://scalenet.info/associates/">http://scalenet.info/associates/</a>
Spider Mites Web	<a href="https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php">https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php</a>
TRACES	<a href="https://webgate.ec.europa.eu/tracesnt/login">https://webgate.ec.europa.eu/tracesnt/login</a>
USDA ARS Fungi Database	<a href="https://nt.ars-grin.gov/fungalDATABASES/fungushost/fungushost.cfm">https://nt.ars-grin.gov/fungalDATABASES/fungushost/fungushost.cfm</a>
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 <a href="https://www.webofknowledge.com">https://www.webofknowledge.com</a>
World Agroforestry	<a href="http://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749">http://www.worldagroforestry.org/treedb2/speciesprofile.php?Spid=1749</a>

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 and the relevant literature and legislation [e.g. Regulation (EU) 2016/2031; Commission Implementing Regulations (EU) 2018/2019; (EU) 2018/2018<sup>6</sup>, (EU) 2019/2072] were taken into account.

### 2.3. Methodology

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

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

<sup>6</sup> 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.

impact in the EU. After the first step, all the relevant pests that may need risk mitigation measures were identified.

In the second step, if applicable, 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, if any, was achieved and uncertainties were identified. 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 2.3.3.

### 2.3.1. Commodity data

Based on the information provided by ANSA 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 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.

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 A 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<sup>®</sup> file in Appendix B) 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

The proposed risk mitigation measures were listed.

As the Panel did not identify any relevant pest for this Opinion (see Sections 4.1, 4.2 and 4.5), the proposed risk mitigation measures were not further evaluated and for the same reason Expert Knowledge Elicitation on pest freedom was not performed.

## 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 – 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/m<sup>2</sup> and for walnut rootstocks from 8 to 11 plants/m<sup>2</sup>.

In the first nursery (SRL Pepeniera Pomicola Voinesti in Hîncești 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 one-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 microdrippers 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 Fălești District), none of the production parcels are irrigated.

In the third nursery (SRL Agronuts in Telenești 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 pressurized 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 acclimatization 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 the 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 are 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 (bundles). 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 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 sub-sections 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.

#### 4. Identification of pests potentially associated with the commodity

The compiled pest list (see Microsoft Excel<sup>®</sup> file in Appendix B) including all agents associated with *J. regia* and all EU quarantine pests associated with *Juglans* yielded 696 pests. This list also included 27 RNQPs and 3 deregulated pests that were subsequently excluded from the evaluation as indicated in Section 1.2.

##### 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 in the compiled pest list were evaluated (Table 3).

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

- 1) the pest is present in Moldova;
- 2) *Juglans regia* or other species in the genus *Juglans* are hosts 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, 25 were not present in Moldova. One (*Thaumetopoea processionea*) is present in Moldova, but it is not associated with the commodity. Therefore, no pest was selected for further evaluation.

**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 <sup>(a)</sup>	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 <sup>(b)</sup>	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 Scolytidae non-European	XYLSMU	Insects	No	Yes, as <i>Juglans</i> (EPPO, 2020)	Not evaluated	No
7	<i>Euwallacea fornicatus</i> as Scolytidae non-European	EUWAWH, EUWAKU	Insects	No	Yes, as <i>Juglans</i> (EPPO, online)	Not evaluated	No
8	<i>Euwallacea validus</i> as Scolytidae 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 Scolytidae non-European	HYOTER	Insects	No	Yes (Wen-tian, 2001)	Not evaluated	No
12	<i>Lopholeucaspis japonica</i>	LOPLJA	Insects	No	Yes (García Morales et al., online)	Not evaluated	No
13	<i>Monarthrum mali</i> as Scolytidae non-European	MNTHMA	Insects	No	Yes (EPPO, 2020)	Not evaluated	No
14	<i>Oemona 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

N	Pest name according to EU legislation <sup>(a)</sup>	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 <sup>(b)</sup>	Pest relevant for the Opinion
16	<i>Pityophthorus juglandis</i>	PITOUJ	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 Scolytidae 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 <sup>(c)</sup>	No
23	<i>Xiphinema americanum sensu stricto</i>	XIPHAA	Nematodes	No	Yes (CABI, online)	Not evaluated	No
24	<i>Xiphinema rivesi</i> (non-EU populations)	XIPHRI	Nematodes	No	Yes, as <i>Juglans</i> (Ferris, online)	Not evaluated	No
25	<i>Xyleborinus artestriatus</i> as Scolytidae 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 it 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 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 the Appendix B (Microsoft Excel<sup>®</sup> 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 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

After a thorough analysis of the Dossier on *J. regia* submitted by ANSA of the Republic of Moldova and after evaluation of the compiled pest list, the Panel did not identify any pest relevant for this Opinion.

# 5. Risk mitigation measures

As the Panel did not identify any relevant pest for this opinion, the proposed risk mitigation measures were not further evaluated and, for the same reason, Expert Knowledge Elicitation on pest freedom was not performed. However, an overview of the risk mitigation measures, as described in the Dossier Section 1.0, is reported in the following section.

## 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 are 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 sub-sections 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 (Dossier Sections 1.0), the Panel summarised the risk mitigation measures (see Table 4) that are proposed in the nurseries producing the commodity to be exported in the EU.

**Table 4:** Overview of proposed risk mitigation measures for *J. regia* plants designated for export to the EU from Moldova

N	Risk mitigation measure	Implementation in Moldova
1	<b>Pesticide treatment</b>	<p>Details of pesticide treatments are described in Table E1 in the Dossier Section 1.0.</p> <p>The measures are specific against following pests:</p> <p><i>Panonychus ulmi</i>  <i>Cydia pomonella</i>  <i>Quadraspidiotus perniciosus</i>  <i>Hyphantria cunea</i>  <i>Tetranychus viennensis</i>  <i>Lepidosaphes ulmi</i>  <i>Lymantria dispar</i>  <i>Archips rosana</i>  <i>Xanthomonas campestris</i> pv. <i>juglandis</i>  <i>Gnomonia juglandis</i></p>

N	Risk mitigation measure	Implementation in Moldova
2	<b>Other mitigation measures (other than pesticides)</b>	<p>Details of other mitigation measures (other than pesticides) are described in Table E2 in the Dossier Section 1.0.</p> <p>The measures are specific against following pests:</p> <p><i>Panonychus ulmi</i>  <i>Cydia pomonella</i>  <i>Quadraspidiotus perniciosus</i>  <i>Hyphantria cunea</i>  <i>Tetranychus viennensis</i>  <i>Lepidosaphes ulmi</i>  <i>Lymantria dispar</i>  <i>Archips rosana</i>  <i>Xanthomonas campestris</i> pv. <i>juglandis</i>  <i>Gnomonia juglandis</i></p>

## 6. Conclusions

After a thorough analysis of the Dossier on *J. regia* submitted by ANSA of the Republic of Moldova and after evaluation of the compiled pest list, the Panel did not identify any pest relevant for this opinion. Therefore, the proposed risk mitigation measures were not further evaluated and for the same reason Expert Knowledge Elicitation on pest freedom was not performed.

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## Glossary

Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 1995, 2017).
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2017).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2017).
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units.
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2017).
Measures	Control (of a pest) is defined in ISPM 5 (FAO, 2017) as 'Suppression, containment or eradication of a pest population' (FAO, 1995). Control measures are measures that have a direct effect on pest abundance. Supporting measures are organisational measures or procedures supporting the choice of appropriate Risk 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).

## 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
PLH	Plant Health
RNQP	Regulated Non-Quarantine Pest

## Appendix A – 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 B).

Web of Science All Databases	<p><b>TOPIC:</b> ("Juglans regia" OR "common walnut" OR "Juglans duclouxiana" OR "Juglans fallax" OR "Juglans kamaonica" OR "Juglans orientis" OR "Juglans sinensis")</p> <p><b>AND</b></p> <p><b>TOPIC:</b> (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><b>NOT</b></p> <p><b>TOPIC:</b> ("winged seeds" OR metabolites OR *tannins OR climate OR "maple syrup" OR syrup OR mycorrhiz* OR "carbon loss" OR pollut* OR weather OR proper* 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><b>NOT</b></p> <p><b>TOPIC:</b> ("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 oculatea" OR "Antheraea polyphemus" OR "Aonidiella aurantii" OR "Aonidiella aurantii" OR "Aphis spiraecola" OR "Aphis spiraecola" OR "Aplosporella juglandina" OR "Aplosporella juglandis" OR "Aplosporella longipes" OR "Apochima juglansiarum" OR "Apomyeloides ceratoniae" OR "Aporia crataegi" OR "Aporium 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>
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*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 "*Bourdotia eyrei*" OR "*Brenneria nigrifluens*" OR "*Brenneria rubrifaciens*" 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 morgani*" 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 amatrix*" 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 "*Ceratitis 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 "*Chaetoplea 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 "*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 grisescens*" 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 "*Crenulaspidotus lahillei*" OR "*Crepidotus nephrodes*" OR "*Criconema mutabile*" OR "*Criconemella*" OR "*Criconemella xenoplax*" OR "*Criconemoides sp.*" OR "*Crisicoccus matsumotoi*" OR "*Cristella sulphurea*" OR "*Cristulariella pyramidalis*" OR "*Cryptodiaporthe castanea*" OR "*Cryptophaeella trematosphaeriicola*" 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 "*Cylothryium 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 "*Cylindrocladiella 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 ancyclus" OR "Diaspidiotus juglansregiae" OR "Diaspidiotus osborni" OR "Diaspidiotus ostreaeformis" OR "Diaspidiotus zonatus" OR "Diatrype albopruinosa" 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 kuwana" 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 pallidoroseum" 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 "Glioniopsis curvata" OR "Glioniopsis 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 chitwoodii" OR "Hemicriconemoides sp." OR "Hemicycliophora 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 biclavata" 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 spatulata" OR "Hypochnicium geogenium" OR "Hypocrea subpachybasioidea" OR "Hypoxyton mediterraneum" OR "Hypoxyton multifforme" OR "Hypoxyton quadratum" OR "Hypoxyton rubiginosum" OR "Hysterographium mori" OR "Ilyonectria liriiodendri" 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 "Kirschsteiniotelia aethiops" OR "Lachnodoichium 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 "Leiopus nebulosus" OR "Lemoniera 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 "Marsoniella juglandis" OR "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 bistriaria" 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 radiculicola" 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 allantospora" OR "Phanerochaete burtti" 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 biformis" 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 "Sphaeloma 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 mordvilkoi" OR "Stomaphis wojciechowskii" OR "Strangalia aurulenta" OR  
 "Suturaspis archangelskyae" OR "Synanthedon vespiformis" OR "Synanthedon  
 vespiformis" OR "Takahashia japonica" OR "Taphrorychus 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 B – Excel file with the pest list of *Juglans regia***

Appendix B 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>