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Commodity risk assessment of *Crataegus monogyna* plants from the UK

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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: *Crataegus monogyna* bare root plants and rooted plants in pots imported into the EU from the UK. A list of pests potentially associated with the commodities was compiled. The relevance of any pest was assessed based on evidence following defined criteria. Only the quarantine pest *Erwinia amylovora* was selected for further evaluation. For *E. amylovora* the special requirements specified in the Commission Implementing Regulation (EU) 2019/2072 are fulfilled by the UK and no other pests for further evaluation were selected.

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1. Introduction

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

1.1.1. Background

The Plant Health Regulation (EU) 2016/2031¹, on the protective measures against pests of plants, has been applied from December 2019. Provisions within the above Regulation are in place for the listing of 'high risk plants, plant products and other objects' (Article 42) on the basis of a preliminary assessment, and to be followed by a commodity risk assessment. A list of 'high risk plants, plant products and other objects' has been published in Regulation (EU) 2018/2019². Scientific opinions are therefore needed to support the European Commission and the Member States in the work connected to Article 42 of Regulation (EU) 2016/2031, as stipulated in the terms of reference.

1.1.2. Terms of Reference

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002³, the Commission asks EFSA to provide scientific opinions in the field of plant health.

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

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

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

In view of the above and in accordance with Article 29 of Regulation (EC) No. 178/2002, the Commission asked EFSA to provide scientific opinion in the field of plant health for *Crataegus monogyna* from the UK taking into account the available scientific information, including the technical dossier provided by the UK.

1.2. Interpretation of the Terms of Reference

The EFSA Panel on Plant Health (from this point onwards referred to as 'the Panel') was requested to conduct a commodity risk assessment of *Crataegus monogyna* from the UK following the Guidance on commodity risk assessment for the evaluation of high-risk plant dossiers (EFSA PLH Panel, 2019) taking into account the available scientific information, including the technical information provided by the UK. In accordance with the Agreement on the withdrawal of the UK 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 the United Kingdom do not include Northern Ireland.

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

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

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

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.

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 UK (except Northern Ireland⁵)).

Consequently, for those countries,

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

Pests listed as 'Regulated Non-Quarantine Pest' (RNQP) in Annex IV of the Commission Implementing Regulation (EU) 2019/2072, and deregulated pests [i.e. pest which were listed as quarantine pests in the Council Directive 2000/29/EC and were deregulated by Commission Implementing Regulation (EU) 2019/2072] were not considered for further evaluation. In case a pest is at the same time regulated as a RNQP and as a Protected Zone Quarantine pest, in this Opinion it should be evaluated as quarantine pest.

In its evaluation the Panel:

- Checked whether the provided information in the technical dossier (from this point onwards referred to as 'the Dossier') provided by the applicant (UK, Department for Environment Food and Rural Affairs – from this point onwards referred to as 'DEFRA') 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) 2019/2072⁶, from this point onwards referred to as 'EU quarantine pests'] and other relevant pests present in the UK 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 the UK 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.

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, pp. 1–279.

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 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, pp. 1–279.

- 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 the UK and other relevant pests present in the UK 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 DEFRA of the UK.

2. Data and methodologies

2.1. Data provided by DEFRA of the UK

The Panel considered all the data and information (from this point onwards called 'the Dossier') provided by DEFRA of the UK in April 2022 including the additional information provided by DEFRA of the UK in December 2022, in January and February 2023 after EFSA's request. The Dossier is managed by EFSA.

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

Table 1: Structure and overview of the Dossier

Dossier section	Overview of contents	Filename
1.0	Technical dossier	Crataegus monogyna commodity information Final
2.0	Pest list	Crataegus_UK_pest_list.xlsx
3.0	Additional information	Dec 2022 Crataegus reply additional questions.pdf
4.0	Reply to the request of specific information	EFSA-Q-2022-00349_UK_Crataegus_monogyna_Annex1_Defra_response.xls
5.0	Reply to the request of specific information	RE Crataegus monogyna.msg

2.2. Literature searches performed by DEFRA

The data and supporting information provided by DEFRA of the UK formed the basis of the commodity risk assessment. Table 2 shows the main data sources used by DEFRA of the UK to compile the Dossier (Dossier Sections 1.0 and 2.0).

Table 2: Databases used in the literature searches by DEFRA of the UK

Database	Platform/Link
Aphids on The world's plants	http://www.aphidsonworldsplants.info/
Aphid Species File	http://aphid.speciesfile.org/
APS (American Phytopathological Society)	https://www.apsnet.org/Pages/default.aspx
Beetles of Britain and Ireland	https://www.coleoptera.org.uk/species/batophila-rubi
Biological Records Centre	https://www.brc.ac.uk/
British Leafminers	http://www.leafmines.co.uk/html/plants.htm
CABI Crop Protection Compendium	https://www.cabi.org/cpc/
CABI Plantwise Knowledge Bank	https://www.plantwise.org/knowledgebank/
CABI Publishing	https://www.cabi.org/what-we-do/publishing/
Checklist of Aphids of Britain	https://influentialpoints.com/aphid/Checklist_of_aphids_in_Britain.htm
Database of the World's Lepidopteran Host Plants	http://www.nhm.ac.uk/our-science/data/hostplants/
EPPO Global Database	https://gd.eppo.int/
Fauna Europaea	https://fauna-eu.org/t/
Field Mycology	https://basidiochecklist.science.kew.org/BritishFungi/index.htm
FRDBI (The Fungal Records Database of Britain and Ireland)	http://www.frdbi.info/

Database	Platform/Link
GBIF (Global Biodiversity Information Facility)	https://www.gbif.org/
ICAR – National Bureau of Agricultural Insect Resources	https://www.nbair.res.in/
Identification of Common <i>Phytophthora</i> Species	http://hpc.ilri.cgiar.org/beca/training/IMBB_2016/Phytophthora_CD_update/start.html
Index Fungorum	http://www.indexfungorum.org/
L'Inventaire national du patrimoine naturel (INPN)	https://inpn.mnhn.fr/accueil/index
MycoBank	http://www.mycobank.org/
National Collection of Plant Pathogenic Bacteria	https://www.fera.co.uk/ncppb
NBA Atlas	https://species.nbnatlas.org/
Scalenet	https://scalenet.info/
The British Mycological Society Fungal Records Database	https://www.britmycolsoc.org.uk/field_mycology/fungal_recording
The GB Checklist of Fungal Names	https://basidiochecklist.science.kew.org/BritishFungi/GBCHKLST/gbchklist.htm
The Royal Horticultural Society	https://www.rhs.org.uk/
The Sawflies (Symphyta) of Britain and Ireland	https://www.sawflies.org.uk/
UK moths	https://ukmoths.org.uk/
UK Plant Health Information Portal	https://planthealthportal.defra.gov.uk/
USDA Forest Service	https://www.srs.fs.usda.gov/
USDA fungal database	https://nt.ars-grin.gov/fungaldatabases/

2.3. Literature searches performed by EFSA

Literature searches in different databases were undertaken by EFSA to complete a list of pests potentially associated with *Crataegus* genus. The following searches were combined: (i) a general search to identify pests reported on *Crataegus* genus in the databases and subsequently (ii) a tailored search to identify whether the above pests are present or not in the UK. The searches were run on 29 September 2022. No language, date or document type restrictions were applied in the search strategy.

The Panel used the databases indicated in Table 3 to compile the list of pests associated with *Crataegus* genus. 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.

Table 3: Databases used by EFSA for the compilation of the pest list associated with *Crataegus* spp

Database	Platform/Link
Aphids on World Plants	http://www.aphidsonworldsplants.info/C_HOSTS_AAIntro.htm
CABI Crop Protection Compendium	https://www.cabi.org/cpc/
Database of Insects and their Food Plants	http://www.brc.ac.uk/dbif/hosts.aspx
Database of the World's Lepidopteran Hostplants	https://www.nhm.ac.uk/our-science/data/hostplants/search/index.dsm1
EPPO Global Database	https://gd.eppo.int/
EUROPHYT	https://webgate.ec.europa.eu/europhyt/
Leafminers	http://www.leafmines.co.uk/html/plants.htm
Nemaplex	http://nemaplex.ucdavis.edu/Nemabase2010/PlantNematodeHostStatusDDQuery.aspx
New Zealand Fungi	https://nzfungi2.landcareresearch.co.nz/default.aspx?NavControl=search&selected=NameSearch
NZFUNGI – New Zealand Fungi (and Bacteria)	https://nzfungi.landcareresearch.co.nz/html/mycology.asp?ID=
Plant Pest Information Network	https://www.mpi.govt.nz/news-and-resources/resources/registers-and-lists/plant-pest-information-network/

Database	Platform/Link
Plant Viruses Online	http://www1.biologie.uni-hamburg.de/b-online/e35/35tmv.htm#Range
Scalenet	http://scalenet.info/associates/
Spider Mites Web	https://www1.montpellier.inra.fr/CBGP/spmweb/advanced.php
USDA ARS Fungal Database	https://nt.ars-grin.gov/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	http://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 and the relevant literature and legislation (e.g. Regulation (EU) 2016/2031; Commission Implementing Regulations (EU) 2018/2019; (EU) 2018/2018 and (EU) 2019/2072) were taken into account.

2.4. Methodology

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

In the first step, pests potentially associated with the commodity in the country of origin (EU-quarantine pests and other pests) that may require risk mitigation measures are identified. The EU non-quarantine pests not known to occur in the EU 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, if applicable, the implemented risk mitigation measures for each relevant pest are evaluated.

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

2.4.1. Commodity data

Based on the information provided by DEFRA of the UK the characteristics of the commodity were summarised.

2.4.2. Identification of pests potentially associated with the commodity

To evaluate the pest risk associated with the importation of the commodity from the UK, a pest list was compiled. The pest list is a compilation of all identified plant pests reported as associated with all species of *Crataegus* based on information provided in the Dossier Sections 1.0 and 2.0 and on searches performed by the Panel. The search strategy and search syntax were adapted to each of the databases listed in Table 3, according to the options and functionalities of the different databases and CABI keyword thesaurus.

The scientific names of the host plants (i.e. *Crataegus*) were used when searching in the European and Mediterranean Plant Protection Organisation (EPPO, online) Global database and CABI Crop Protection Compendium (CABI, online). The same strategy was applied to the other databases excluding EUROPHYT and Web of Science.

EUROPHYT was investigated by searching for the interceptions associated with *Crataegus* species imported from the whole world from 1995 to May 2020 and TRACES-NT from May 2020 to 7 March 2023, respectively. For the pests selected for further evaluation, a search in the EUROPHYT and/or TRACES-NT was performed for the years between 1995 and March 2023 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 of plant diseases and the scientific and English common names of the commodity and excluding pests which were identified using searches in other databases. The established search string is detailed in Appendix A and was run on 29 September 2022.

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

The compiled pest list (see Microsoft Excel[®] in Appendix B) includes all identified pests that use as host species of *Crataegus*.

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

2.4.3. Listing and evaluation of risk mitigation measures

As the Panel did not identify any relevant pest for this Opinion (see Sections 4.1 and 4.2), the proposed risk mitigation measures were listed but 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

The commodity consists of the following type of plants of *C. monogyna*:

- Bare root plants/‘whips’, ranging from 1–2 years (whips) or 2–7 years old bare root trees;
- Rooted plants in pots, ranging from 1–15 years old.

Table 4: Range of stem diameter of the exported plants (Dossier Section 3.0)

Type of plants	Minimum (cm)	Maximum (cm)	Age
Cell-grown and field grown ‘whips’	0.4	0.8	1–2 years old
Bare-rooted trees	1.0	6.5	2–7 years old
Rooted plants in pots	1.0	13	1–15 years old



Source: Dossier Section 1.0 (UK National Plant Protection Office)

Figure 1: Examples of cell grown and potted plants of *C. monogyna*.



Source: Dossier Section 1.0 (UK National Plant Protection Office)

Figure 2: Examples of Bare rooted *C. monogyna*.

According to ISPM 36 (FAO, 2019) the commodity can be classified as 'bare root plants' or 'rooted plants in pots'.

According to the Dossier Section 1.0 the trade volume is estimated to be 450.000 bare root plants and 210.000 potted plants (Table 5).

Table 5: Trade volume

Type of plant	Number of items	Seasonal timing
Bare root plants	450,000	November to April
Rooted plants in pots	210,000	Mainly September to May

Trade of all plant types will mainly be to Northern Ireland and Ireland.

- Bare root plants will be lifted from late autumn until early spring (October to April) to be able to lift plants from the field and because this is the best time to move/export dormant plants.
- Rooted plants in pots can be moved/exported at any time in the year to fulfil consumer demand, but more usually from September to May. These will probably be destined for amenity or garden centre trade rather than nurseries.

3.2. Description of the production areas

The nurseries producing the commodity are distributed throughout Great Britain. All nurseries are registered as professional operators with the UK NPPO, either by the Animal and Plant Health Agency (APHA) in England and Wales, or by the Scottish Government, and are authorised to issue UK plant passports and phytosanitary certificates for export.

Producers do not set aside separate areas for export production. All plants within UK nurseries are grown under the same phytosanitary measures, meeting the requirements of the UK Plant Passporting regime.

3.3. Production and handling processes

3.3.1. Source of planting material

C. monogyna plants are grown from seeds. These are not certified or tested before use (Dossier Section 3.0).

3.3.2. Production cycle

The growing conditions are as follows (as defined in Annex 1 of ISPM 36 (FAO, 2019)):

- grown in containers (cells, pots, tubs, etc.) outdoors/in the open air;
- field grown.

Cell grown plants may be cultivated in greenhouses initially, however, most plants will be field grown, or field grown in containers.

Any plants in pots with organic growing medium being exported from UK to the EU need to meet the requirements for growing media in EU Regulation 2019/2072, Annex VII, and the UK already has exports to EU MSs meeting this requirement.

In the production or procurement of plants, the use of growing media is assessed for the potential to harbour and transmit plant pests. Growers use virgin peat or peat-free compost, which is a mixture of coir, tree bark, wood fibre, etc. This is compost is heat-treated by commercial suppliers during production to eliminate pests and diseases. It is supplied in sealed bulk bags or shrink-wrapped bales and stored off the ground on pallets, these are completely hygienic and free from contamination. Where delivered in bulk, compost is kept in a dedicated bunker, either indoors, or covered by tarpaulin outdoors, and with no risk of contamination with soil or other material.

Bare root plants are planted from autumn until spring (October to April – Table 6); rooted plants in pots can be planted at any time of year, though winter is most common. Flowering occurs during late spring (April–June), depending upon the variety and weather conditions.

Lifting:

- Bare root plants are harvested in winter to be able to lift plants from the field and because this is the best time to move/export dormant plants.
- Rooted plants in pots can be moved at any point in the year to fulfil consumer demand.

Table 6: The period of the year when the commodity is produced and the phenology of the plants (including sowing/planting, flowering, leaf drop and lifting/harvesting periods - in light grey are indicated the periods of less intense activity)

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Planting												
Flowering												
Leaf drop												
Lifting												

3.3.3. Export procedure

The post-harvest processes and transport system are the following:

- Bare rooted plants are wrapped in bundles and distributed on ISPM 15 (FAO, 2018) certified wooden pallets, or metal pallets.
- Rooted plants in pots are transported in bundles on Danish trolleys for smaller containers, or on ISPM 15 certified wooden pallets/metal pallets, or individually, for larger containers.
- Small-volume orders may be packed in waxed cardboard cartons or polythene bags and dispatched via courier.

Plants are transported by lorry and ferry (size dependent on load quantity).

The UK NPPO carries out inspections and testing when required by the country of destination's plant health legislation, to ensure all requirements are fulfilled and a valid phytosanitary certificate with the correct additional declarations is issued.

4. Identification of pests potentially associated with the commodity

The search for potential pests associated with *Crataegus* species rendered 1,517 species (see Microsoft Excel[®] file in Appendix B).

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

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

The 36 EU-quarantine species that are reported to use *Crataegus* spp. as a host plant were evaluated (Table 7) for their relevance of being included in this Opinion.

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

- a) the pest is present in the UK;
- b) the commodity is a host of the pest;
- c) one or more life stages of the pest can be associated with the specified commodity.

Pests that fulfilled all criteria are selected for further evaluation.

Of the 36 EU-quarantine pest species evaluated, three species are present in the UK. However, for the reasons detailed below these species were not selected for further evaluation.

Table 7: Overview of the evaluation of the 36 EU-quarantine pest species known to use *Crataegus* species as host plants for their relevance for this Opinion

No.	Pest name according to EU legislation ^(a)	EPPO Code	Group	Pest present in the UK	<i>Crataegus</i> confirmed as a host (reference)	Pest can be associated with the commodity (NA = Not Assessed)	Pest relevant for the Opinion
1	<i>Acleris nivisellana</i>	ACLRNV	Insects	No	<i>Crataegus</i> sp. (Database of the World's Lepidopteran Hostplants)	NA	No
2	<i>Anoplophora chinensis</i>	ANOLCN	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
3	<i>Anthonomus quadrigibbus</i>	TACYQU	Insects	No	<i>Crataegus</i> spp. (WoS)	NA	No
4	Apple necrotic mosaic virus	APNMV0	Virus	No	<i>Crataegus</i> sp. (EPPO)	NA	No
5	<i>Apriona rugicollis</i>	APRIJA	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
6	<i>Carposina sasakii</i>	CARSSA	Insects	No	<i>Crataegus</i> sp., <i>Crataegus monogyna</i> (EPPO GD)	NA	No
7	<i>Choristoneura rosaceana</i>	CHONRO	Insects	No	<i>Crataegus</i> sp. (Database of the World's Lepidopteran Hostplants)	NA	No
8	<i>Conotrachelus nenuphar</i>	CONHNE	Insects	No	<i>Crataegus</i> spp. (WoS)	NA	No
9	<i>Erwinia amylovora</i>	ERWIAM	Bacteria	Yes	<i>Crataegus monogyna</i> , <i>Crataegus laevigata</i> (EPPO)	Yes	Yes*
10	<i>Grapholita inopinata</i>	CYDIIN	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
11	<i>Grapholita packardii</i>	LASPPA	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
12	<i>Grapholita prunivora</i>	LASPPR	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
13	<i>Gymnosporangium asiaticum</i> as <i>Gymnosporangium</i> spp.	GYMNAS	Fungi	No	<i>Crataegus</i> sp. (EPPO, CABI, USDA, GBIF)	NA	No
14	<i>Gymnosporangium bethelii</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus</i> sp. (USDA)	NA	No
15	<i>Gymnosporangium clavipes</i> as <i>Gymnosporangium</i> spp.	GYMNCL	Fungi	No	<i>Crataegus monogyna</i> , <i>Crataegus</i> sp. (EPPO, CABI, USDA, GBIF)	NA	No
16	<i>Gymnosporangium connersii</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus</i> sp. (USDA)	NA	No
17	<i>Gymnosporangium exiguum</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus</i> sp. (USDA)	NA	No
18	<i>Gymnosporangium globosum</i> as <i>Gymnosporangium</i> spp.	GYMNGL	Fungi	No	<i>Crataegus monogyna</i> , <i>Crataegus</i> sp. (EPPO, CABI, USDA)	NA	No
19	<i>Gymnosporangium hyalinum</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus</i> spp. (USDA)	NA	No

No.	Pest name according to EU legislation ^(a)	EPPO Code	Group	Pest present in the UK	<i>Crataegus</i> confirmed as a host (reference)	Pest can be associated with the commodity (NA = Not Assessed)	Pest relevant for the Opinion
20	<i>Gymnosporangium inconspicuum</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus douglasii</i> (USDA)	NA	No
21	<i>Gymnosporangium juniperi-virginianae</i> as <i>Gymnosporangium</i> spp.	GYMNJV	Fungi	No	<i>Crataegus</i> sp. (USDA)	NA	No
22	<i>Gymnosporangium mespili</i> as <i>Gymnosporangium</i> spp.	GYMNCO	Fungi	No	<i>Crataegus monogyna</i> (USDA)	NA	No*
23	<i>Gymnosporangium nelsonii</i> as <i>Gymnosporangium</i> spp.	GYMNNE	Fungi	No	<i>Crataegus</i> sp. (USDA)	NA	No
24	<i>Gymnosporangium trachysorum</i> as <i>Gymnosporangium</i> spp.	No results	Fungi	No	<i>Crataegus monogyna</i> , <i>Crataegus</i> sp. (USDA)	NA	No
25	<i>Gymnosporangium unicornae</i> as <i>Gymnosporangium</i> spp.	GYMNAS	Fungi	No	<i>Crataegus</i> sp. (EPPO, USDA)	NA	No
26	<i>Liriomyza trifolii</i>	LIRITR	Insects	No	<i>Crataegus</i> sp. (Plant Parasites of Europe)	NA	No
27	<i>Margarodes vitis</i>	MARGVI	Insects	No	<i>Crataegus</i> sp. (EPPO GD)	NA	No
28	<i>Oeona hirta</i>	OEMOHI	Insects	No	<i>Crataegus monogyna</i> (Plant Pest Information Network New Zealand)	NA	No
29	<i>Phyllosticta solitaria</i>	PHYSSL	Fungi	No	<i>Crataegus</i> sp. (CABI, USDA)	NA	No
30	<i>Phymatotrichum omnivorum</i>	PHMPOM	Fungi	No	<i>Crataegus</i> sp. (EPPO, CABI)	NA	No
31	<i>Rhagoletis indifferens</i> as <i>Rhagoletis</i> spp.	RHAGIN	Insects	No	<i>Crataegus douglasii</i> (WoS)	NA	No
32	<i>Rhagoletis pomonella</i>	RHAGPO	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
33	<i>Saperda candida</i>	SAPECN	Insects	No	<i>Crataegus monogyna</i> (EPPO GD)	NA	No
34	<i>Thaumetopoea processionea</i>	THAUPR	Insects	Yes	<i>Crataegus monogyna</i> (EPPO GD)	No	No*
35	<i>Tobacco ringspot virus</i>	TRSV00	Virus	Yes	<i>Crataegus</i> sp. (EPPO)	No	No*
36	<i>Toxoptera citricidus</i>	TOXOCI	Insects	No	<i>Crataegus</i> sp. (EPPO GD)	NA	No

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

For the pests marked with an asterisk (*), further information is provided in the Section 4.2.

4.2. Additional information for selected pests

For four pest species the Panel evaluated if there were sufficient evidence to select them for further evaluation. These four pests were *Thaumetopoea processionea*, Tobacco ringspot virus, *Erwinia amylovora*, *Gymnosporangium mespilii*.

The reasons for excluding these pests from further evaluation are reported below:

- *Thaumetopoea processionea*

Crataegus is mentioned in the host list of *T. processionea* (EFSA, 2009); however, there is no evidence that adults oviposit on *C. monogyna*. Larvae may be found on neighbouring defoliated oak trees and may disperse to *Crataegus* plants in the occasion of extend defoliation of oak trees, but there is no complete larval development reported. *T. processionea* is a quarantine species in the UK and larvae present on oak plants are expected to be detected by nursery staff or at plants for export inspection. Given the unlikely scenario that *T. processionea* larvae can be present on *Crataegus* plants with leaves and be exported to the EU, the panel concluded that *C. monogyna* is not a feasible pathway for *T. processionea*.

- *Tobacco ringspot virus*

Crataegus (genus level) is mentioned in the host list of TRSV (EPPO GD, online), based on surveys performed by Shiel and Castello (1985) using enzyme-linked immunosorbent assay (ELISA) tests. However, the authors report non-specific reaction in the performed tests and subsequently a failure to confirm ELISA positive results by bioassays (mechanical inoculations). At this time, host status of a plant species needs to be confirmed by two independent methods; therefore, the host status of *Crataegus* spp. (and furthermore *C. monogyna*) is uncertain. In addition, even though the virus seems to be present in Pelargonium (according to UK PRA), no nematode vector species, which is necessary for spread, is present in the UK.

- *Erwinia amylovora*

As special requirements or emergency measures are specified for *C. monogyna* with regard to *E. amylovora*, in Annex X, Item 9 of Commission Implementing Regulation (EU) 2019/2072, the evaluation for that pest consisted of checking whether or not the exporting country applies these measures. Since Brexit, the UK still applied exactly the same measures applied in the EU for Protected Zone Quarantine Pests (PZQP).

- *Gymnosporangium mespilii*

There is very little information for this pest and there is uncertainty about taxonomic status that it is not clear whether or not it is a synonym of *G. confusum*, which is present in UK and EU (EFSA PLH Panel, 2018).

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

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

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

For non-regulated species with a limited distribution (i.e. present in one or a few EU MSs) and fulfilling the other criteria (i.e. c, d and e), either one of the following conditions should be additionally fulfilled for the pest to be further evaluated:

- official phytosanitary measures have been adopted in at least one EU MS;
- any other reason justified by the working group (e.g. recent evidence of presence).

There were no pests that fulfilled the above listed criteria and consequently no pests were selected for further evaluation.

Based on the information collected, 1,481 potential pests (non-EU quarantine) known to be associated with the species commodity were evaluated for their relevance to this Opinion. Species were excluded from further evaluation when at least one of the conditions listed above (a–e) was not met. Details can be found in the Appendix B (Microsoft Excel® file). None of the evaluated EU non-quarantine pests was selected for further evaluation.

4.4. Overview of interceptions

Data on the interception of harmful organisms on plants of *Crataegus* spp. can provide information on some of the organisms that can be present on *Crataegus* spp. despite the current measures taken. According to EUROPHYT, online (accessed on 7 March 2023) and TRACES-NT, online (accessed on 7 March 2023), there were no interceptions of harmful organisms on plants for planting of *Crataegus* from the UK destined to the EU.

5. Risk mitigation measures

As the Panel did not identify any relevant pest associated to the evaluated commodity, the proposed risk mitigation measures were not further evaluated. However, an overview of the risk mitigation measures, as described in the Dossier, is reported in the following section.

5.1. Risk mitigation measures applied in the UK

With the information provided by the UK (Dossier Sections 1.0, and 3.0), the Panel summarised the risk mitigation measures (see Table 7) that are implemented in the production nursery (Table 8).

Table 8: Overview of implemented risk mitigation measures for *Crataegus monogyna* plants designated for export to the EU from the UK

Number	Risk mitigation measure	Implementation in the UK
1	Registration of production sites	All nurseries are registered as professional operator with the UK NPPO, by the Animal and Plant Health Agency (APHA) and is authorised to issue UK plant passports (Dossier Section 1.0).
2	Certification of substrates	In the production or procurement of plants, the use of growing media is assessed for the potential to harbour and transmit plant pests. Growers most commonly use virgin peat or peat-free compost, which is a mixture of coir, tree bark, wood fibre, etc. The compost is heat-treated by commercial suppliers during production to eliminate pests and diseases. It is supplied in sealed bulk bags or shrink-wrapped bales and stored off the ground on pallets, these are completely hygienic and free from contamination. Where delivered in bulk, compost is kept in a dedicated bunker, either indoors, or covered by tarpaulin outdoors, and with no risk of contamination with soil or other material (Dossier Section 1.0).
3	Surveillance, monitoring and sampling	The Competent Authority inspects crops at least once a year to check they meet the standards set out in the guides. Assessments are normally made based on visual examinations, but samples may be taken for laboratory analysis to get a definitive diagnosis (Dossier Section 1.0). All producers are subject to regular inspections by plant health inspectors as part of either Plant Passporting audits, or a programme of general surveillance of all registered producers. Plant material is regularly monitored for plant health issues. This monitoring is carried out by trained nursery staff via regular crop walking and records kept of this monitoring. Qualified agronomists also undertake regular crop walks to verify the producer's assessments. Curative or preventative actions are implemented together with an assessment of phytosanitary risks. Unless a pest can be immediately and definitively identified as non-quarantine, growers are

Number	Risk mitigation measure	Implementation in the UK
		<p>required to treat it as a suspect quarantine pest and notify the competent authority.</p> <p>The quarantine surveillance programme centres on a risk-based selection of premises to visit, based on size, types of plants grown, source of plants, and the producer's track record of pest and disease issues. Guidance on visit frequency is given to inspectors to ensure that those sites which present the greatest risk are visited more frequently than those of lower risk. The risk category assigned to a premise determines the frequency of visit.</p> <ul style="list-style-type: none"> • very high risk (multiple visits per year) • high risk (two/three visits per year) • medium risk (annual visit) • low risk (once every 3 years) <p>Growers designate trained or qualified personnel responsible for the plant health measures within their business. Training records of internal and external training must be maintained, and evidence of continuing professional development (CPD) to maintain awareness of current plant health issues.</p> <p>The soil of production fields are not routinely monitored unless a problem is suspected (Dossier Section 3.0, point 4)</p> <p>Special provision for surveillance and monitoring of <i>Erwinia amylovora</i> are in place. (Dossier Section 1.0).</p>
4	Hygiene measures	<p>All nurseries have plant hygiene and housekeeping rules and practices in place, which are communicated to all relevant employees. The rules will be dependent on the plants handled and the type of business. Prunings and weeds are all removed from the nursery to reduce the number of over wintering sites for pests and diseases.</p> <p>A general practice on all nurseries is that waste plant material (of any species) is taken to a disposal area well away from any growing areas. Sometimes stock may be incinerated or sent to landfill if a notifiable disease has been found or if instructed by the UK plant health service.</p> <p>All nurseries must designate an area away from normal growing and production areas where they are able to quarantine any plants on which they suspect a regulated pest may be present. Any such plants must be reported to the UK Competent Authority and not moved until such time as they have been inspected and tested.</p> <p>Hygiene practices and rules are communicated to and complied with by visitors, and any areas that are restricted for plant health reasons are clearly delineated and signposted.</p>
5	Irrigation water	<p>Growers are required to assess water sources, irrigation and drainage systems used in the plant production for the potential to harbour and transmit plant pests. Water may be obtained from the mains water supply, bore holes, rivers, or reservoirs/lagoons. Water is routinely sampled and sent for analysis. No quarantine pests have been found. (Dossier Section 1.0).</p>
6	Application of pest control products	<p>Crop protection is achieved using a combination of measures including approved plant protection products, biological control or physical measures. Plant protection products are only used when necessary and records of all plant protection treatments are kept. (Dossier Section 1.0).</p>
7	Inspections and management of plants before export	<p>The UK NPPO carries out inspections and testing where required by the country of destination's plant health legislation, to ensure all requirements are fulfilled and a valid phytosanitary certificate with the correct additional declarations is issued.</p> <p>Separate to any official inspection, plant material is checked by growers for plant health issues before dispatch.</p> <p>Special provision for inspection of <i>Erwinia amylovora</i> are in place.</p>

5.2. Evaluation of the application of specific measures in the United Kingdom

Annex X of the Commission Implementing Regulation (EU) 2019/2072 specifies a list of plants, plant products and other objects, originating from third countries and the corresponding special requirements for their introduction into the Union territory or Protected Zones. According to the above-mentioned annex special measures are required for the import of the commodity from UK related to *Erwinia amylovora*. Based on the information provided in the dossier, including the supplementary information, the Panel concluded that the exporting country does meet the specific requirements for a certificate regarding *E. amylovora*.

6. Conclusions

After a thorough analysis of the Dossier on *C. monogyna* plants to be exported to the EU as submitted by DEFRA of the UK and after the evaluation of the compiled pest list, the Panel identify *E. amylovora* as a pest relevant for this Opinion, but the special requirements specified for it in the Commission Implementing Regulation (EU) 2019/2072 are fulfilled by the UK. As no other pests were selected for further evaluation, the proposed risk mitigation measures were not further evaluated and no Expert Knowledge Elicitation on pest freedom was performed.

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Abbreviations

APHA	Animal and Plant Health Agency
CABI	Centre for Agriculture and Bioscience International
CPD	continuing professional development
DEFRA	Department for Environment Food and Rural Affairs
EKE	expert knowledge elicitation
ELISA	enzyme-linked immunosorbent assay

EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
ISPM	International Standards for Phytosanitary Measures
NPPO	National Plant Protection Organisation
PLH	Plant Health
PRA	pest risk assessment
PZQP	protected zone quarantine pests
RNQPs	regulated non-quarantine pests

Glossary

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

In the Table B.1, the search string for *Crataegus* used in Web of Science is reported. Totally, 329 papers were retrieved. Titles and abstracts were screened, and 64 pests were added to the list of pests (see Appendix B).

Table A.1: String for *Crataegus*

Web of Science All databases	<p>TOPIC:</p> <p>"Crataegus" OR "hawthorn" OR "quickthorn"</p> <p>AND</p> <p>TOPIC:</p> <p>pathogen* OR "pathogenic bacteria" OR fung* OR oomycet* OR myce* OR bacteri* OR virus* OR viroid* OR insect\$ OR mite\$ OR phytoplasm* OR arthropod* OR nematod* OR disease\$ OR infecti* OR damag* OR symptom* OR pest\$ OR vector OR hostplant\$ OR "host plant\$" OR host OR "root lesion\$" OR decline\$ OR infestation\$ OR damage\$ OR symptom\$ OR dieback* OR "die back*" OR malaise OR aphid\$ OR curculio OR thrip\$ OR cicad\$ OR miner\$ OR borer\$ OR weevil\$ OR "plant bug\$" OR spittlebug\$ OR moth\$ OR mealybug\$ OR cutworm\$ OR pillbug\$ OR "root feeder\$" OR caterpillar\$ OR "foliar feeder\$" OR virosis OR viruses OR blight\$ OR wilt\$ OR wilted OR canker OR scab\$ OR rot OR rots OR rotten OR "damping off" OR "damping-off" OR blister\$ OR smut OR mould OR mold OR "damping syndrome\$" OR mildew OR scald\$ OR "root knot" OR "root-knot" OR rootkit OR cyst\$ OR dagger OR "plant parasitic" OR "parasitic plant" OR plant\$parasitic OR "root feeding" OR root\$feeding OR acari OR host\$ OR gall OR gall\$ OR whitefly OR whitefl* OR aleyrodidae OR thysanoptera OR moths OR scale OR scale\$ OR thripidae OR leafhoppers OR leafhopper\$ OR "plant pathogens" OR fungal OR aphididae OR Scolytinae OR "bark beetle"</p> <p>NOT</p> <p>"heavy metal\$" OR pollut* OR weather OR propert* OR probes OR spectr* OR antioxidant\$ OR transformation OR "Secondary plant metabolites" OR metabolite\$ OR Postharvest OR Pollin* OR Ethylene OR Thinning OR fertil* OR Mulching OR Nutrient\$ 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 cancer OR therapeutic OR psoriasis OR blood OR "medicinal ethnobotany" OR "Nitrogen-fixing" OR patients OR "Probiotic drugs" OR Antioxidant OR "Anti-Inflammatory" OR "plasma levels" OR ethnomedicinal OR "traditional uses of medicinal plants" OR Antitumor OR Neuroprotective OR Hypoglycemic OR "Mexican petunia" OR "ozone sensitivity" OR cardiotionic</p> <p>NOT</p> <p>TOPIC:</p> <p>"Abagrotis placida" OR "Abraxas grossulariata" OR "Acalles misellus" OR "Acanthococcus azaleae" OR "Acanthosoma haemorrhoidale" OR "Acastis viretata" OR "Acleris comariana" OR "Acleris cristana" OR "Acleris holmiana" OR "Acleris laterana" OR "Acleris nivisellana" OR "Acleris rhombana" OR "Acleris umbrana" OR "Acleris variegana" OR "Acmaeodera pilosellae" OR "Acrobasis grossbecki" OR "Acrobasis indigenella" OR "Acronicta alni" OR "Acronicta americana" OR "Acronicta auricoma" OR "Acronicta clarescens" OR "Acronicta dactylina" OR "Acronicta fragilis" OR "Acronicta funeralis" OR "Acronicta impleta" OR "Acronicta interrupta" OR "Acronicta menyanthidis" OR "Acronicta morula" OR "Acronicta psi" OR "Acronicta radcliffei" OR "Acronicta rumicis" OR "Acronicta strigosa" OR "Acronicta superans" OR "Acronicta tridens" OR "Actias selene" OR "Aculops crataegumplicans" OR "Aculus schlechtendali" OR "Aglaope infausta" OR "Aglaope labasi" OR "Aglia tau" OR "Agrilus margotanae" OR "Agrilus roscidus" OR "Agrilus sinuatus" OR "Agriopsis aurantiaria" OR "Agriopsis bajaria" OR "Agriopsis marginaria" OR "Agrochola helvola" OR "Agrochola litura" OR "Agrochola lychnidis" OR "Agrochola macilenta" OR "Agrotis ipsilon" OR "Alcis jubata" OR "Alcis repandata" OR "Alebra wahlbergi" OR "Aleucis distinctata" OR "Allophyes alfaroi" OR "Allophyes oxyacanthae" OR "Allygus modestus" OR "Alnetoidia alneti" OR "Alsophila</p>
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aescularia" OR "*Alsophila pometaria*" OR "*Ametrodiplosis medialis*" OR "*Amorbia humerosana*" OR "*Amphipyra berbera*" OR "*Amphipyra perflua*" OR "*Amphipyra pyramidea*" OR "*Amphipyra pyramidoides*" OR "*Amphipyra tragopoginis*" OR "*Amphitetranychus viennensis*" OR "*Anacamptis karmeliella*" OR "*Anaglyptus mysticus*" OR "*Anavitrinella pampinaria*" OR "*Ancylis achatana*" OR "*Ancylis apicana*" OR "*Ancylis fuscociliana*" OR "*Ancylis nubeculana*" OR "*Ancylis selenana*" OR "*Ancylis tineana*" OR "*Angerona prunaria*" OR "*Anomoia purmunda*" OR "*Anoplophora chinensis*" OR "*Anthaxia ghazi*" OR "*Anthaxia nitidula*" OR "*Anthaxia plicata*" OR "*Anthaxia salicis*" OR "*Anthaxia semicuprea*" OR "*Anthaxia signaticollis*" OR "*Anthaxia suzannae*" OR "*Antheraea pernyi*" OR "*Antheraea polyphemus*" OR "*Antherina suraka*" OR "*Anthonomus bituberculatus*" OR "*Anthonomus chevrolati*" OR "*Anthonomus conspersus*" OR "*Anthonomus pedicularius*" OR "*Anthonomus pomorum*" OR "*Anthonomus rubi*" OR "*Anthonomus sorbi*" OR "*Anthonomus spilotus*" OR "*Anthonomus ulmi*" OR "*Anthribus nebulosus*" OR "*Anticlea derivata*" OR "*Antitype chi*" OR "*Aphelia alleniana*" OR "*Aphis craccivora*" OR "*Aphis fabae*" OR "*Aphis frangulae* ssp. *gossypii*" OR "*Aphis gossypii*" OR "*Aphis pomi*" OR "*Aphis spiraeicola*" OR "*Apion vorax*" OR "*Apocheima hispidaria*" OR "*Apocheima pilosaria*" OR "*Aporia crataegi*" OR "*Aporophyla lutulenta*" OR "*Aporophyla lutulenta* ssp. *lutulenta*" OR "*Aporophyla nigra*" OR "*Apriona rugicollis*" OR "*Apterygothrips piceatus*" OR "*Archips argyrospila*" OR "*Archips cerasivorana*" OR "*Archips crataegana*" OR "*Archips grisea*" OR "*Archips mortuana*" OR "*Archips podana*" OR "*Archips rosana*" OR "*Archips xylosteanus*" OR "*Arctia caja*" OR "*Arge melanochoa*" OR "*Arge ustulata*" OR "*Argynnis paphia*" OR "*Argyresthia bonnetella*" OR "*Argyresthia conjugella*" OR "*Argyresthia curvella*" OR "*Argyresthia oreasella*" OR "*Argyresthia semifusca*" OR "*Argyrotaenia citrana*" OR "*Argyrotaenia quadrifasciana*" OR "*Artheneis alutacea*" OR "*Aspidiotus nerii*" OR "*Asterobemisia carpini*" OR "*Asteroscopus sphinx*" OR "*Athrips mouffetella*" OR "*Athrips rancidella*" OR "*Atractotomus amygdali*" OR "*Atractotomus mali*" OR "*Aulacaspis mali*" OR "*Aulacaspis rosae*" OR "*Aulacorthum solani*" OR "*Autographa jota*" OR "*Automeris illustris*" OR "*Automeris io*" OR "*Automeris metzli*" OR "*Balsa tristrigella*" OR "*Barypeithes trichopterus*" OR "*Basilarchia archippus*" OR "*Basilarchia arthemis*" OR "*Basilarchia lorquini*" OR "*Batia lunaris*" OR "*Batophila aerata*" OR "*Batophila rubi*" OR "*Batrachedra curvilineella*" OR "*Biston betularia*" OR "*Blastobasis confamulella*" OR "*Blastobasis decolorella*" OR "*Blastodacna atra*" OR "*Blastodacna curvilineella*" OR "*Blastodacna hellerella*" OR "*Blastodacna libanotica*" OR "*Blepharita adusta*" OR "*Blepharita satura*" OR "*Brachionycha nubeculosa*" OR "*Brachionycha sphinx*" OR "*Brachycaudus helichrysi*" OR "*Brachylochia viminalis*" OR "*Bryobia lagodechiana*" OR "*Bryobia praetiosa*" OR "*Bryobia rubrioculus*" OR "*Bucculatrix bechsteinella*" OR "*Bucculatrix crataegi*" OR "*Bucculatrix pomifoliella*" OR "*Byctiscus betulae*" OR "*Byturus tomentosus*" OR "*Cacopsylla crataegi*" OR "*Cacopsylla melanoneura*" OR "*Calepitrimerus armatus*" OR "*Calepitrimerus crataegi*" OR "*Caligula cachara*" OR "*Caligula japonica*" OR "*Caligula simla*" OR "*Caliroa annulipes*" OR "*Caliroa cerasi*" OR "*Callisto coffeella*" OR "*Callisto denticulella*" OR "*Calliteara pudibunda*" OR "*Campaea margaritata*" OR "*Capnodis tenebrionis*" OR "*Carcina quercana*" OR "*Cardiastethus fasciventris*" OR "*Carposina fernaldana*" OR "*Carposina sasakii*" OR "*Catostegia aceriella*" OR "*Catocala blandula*" OR "*Catocala crataegi*" OR "*Catocala dulciola*" OR "*Catocala fulminea*" OR "*Catocala grynea*" OR "*Catocala mira*" OR "*Catocala miranda*" OR "*Catocala praeclara*" OR "*Catocala texarkana*" OR "*Catocala titania*" OR "*Cenopalpus bakeri*" OR "*Cenopalpus lanceolatisetae*" OR "*Ceraleptus gracilicornis*" OR "*Cerambyx dux*" OR "*Cerambyx miles*" OR "*Cerambyx nodulosus*" OR "*Cerambyx pisi*" OR "*Ceratonia undulosa*" OR "*Cerma cerintha*" OR "*Cerococcus koebelei*" OR "*Cerococcus parrotti*" OR "*Ceroplastes ceriferus*" OR "*Ceroplastes floridensis*" OR "*Ceroplastes grandis*" OR "*Ceroplastes japonicus*" OR "*Ceroplastes pseudoceriferus*" OR "*Ceroplastes ruscii*" OR "*Ceroplastes sinensis*" OR "*Ceroplastes utilis*" OR "*Cerostegia ruscii*" OR "*Cerylon histeroides*" OR "*Chilotomina nigratarsis*" OR "*Chilotomina oberthuri*" OR "*Chionaspis americana*" OR "*Chionaspis furfura*" OR "*Chionaspis nyssae*" OR "*Chionaspis salicis*" OR "*Chlorissa cloraria*" OR "*Chlorissa viridata*" OR "*Chloroclysta truncata*" OR "*Chloroclystis rectangulata*" OR "*Chloroclystis v-ata*" OR "*Choreutis pariana*" OR "*Choristoneura rosaceana*" OR "*Chrysobothris affinis*" OR "*Chrysobothris femorata*" OR "*Chrysoclista flavicaput*" OR "*Chrysomphalus dictyospermi*" OR "*Chrysomphalus pinnulifer*" OR "*Cicadetta montana*" OR "*Cilix asiatica*" OR "*Cilix glaucata*" OR "*Cimbex quadrimaculatus*" OR "*Cingilia catenaria*" OR "*Cixius nervosus*" OR "*Cladius brullei*" OR "*Clepsis consimilana*" OR "*Closterotomus fulvomaculatus*" OR

Closterotomus reuteri OR *Clytra quadripunctata* OR *Clytus arietis* OR *Cnephasia asseclana* OR *Cnephasia incertana* OR *Coccurea suwakoensis* OR *Coccus hesperidum* OR *Coleophora adjectella* OR *Coleophora anatipennella* OR *Coleophora cerasivorella* OR *Coleophora chicanensis* OR *Coleophora coracipennella* OR *Coleophora hemerobiella* OR *Coleophora nigricella* OR *Coleophora potentillae* OR *Coleophora prunifoliae* OR *Coleophora serratella* OR *Coleophora siccifolia* OR *Coleophora spinella* OR *Coleophora trigeminella* OR *Coleophora violacea* OR *Colocasia coryli* OR *Colostygia pectinataria* OR *Colotois pennaria* OR *Comstockaspis perniciosus* OR *Conistra ligula* OR *Conistra rubiginosa* OR *Conistra rubiginosa* OR *Conistra vaccinii* OR *Contarinia anthobia* OR *Contigaspis kochiae* OR *Contigaspis zillae* OR *Copaxa syntheratoides* OR *Coptodisca splendoriferella* OR *Corythucha arcuata* OR *Cosmia pyralina* OR *Cosmia trapezina* OR *Cricula andrei* OR *Crocallis elinguaris* OR *Crocallis tusciaria* OR *Crociosema plebejana* OR *Croesia holmiana* OR *Cryptocephalus frontalis* OR *Cryptocephalus nitidulus* OR *Cryptocephalus pusillus* OR *Cryptocephalus querceti* OR *Cryptocephalus sexpunctatus* OR *Cryptothelea gloverii* OR *Ctenopseustis obliquana* OR *Cydia janthinana* OR *Cydia molesta* OR *Cydia pomonella* OR *Dasineura crataegi* OR *Dasineura fusca* OR *Dasineura oxyacanthae* OR *Dasychira vagans* OR *Datana integerrima* OR *Datana ministra* OR *Deraeocoris flavilinea* OR *Deraeocoris olivaceus* OR *Diaphora mendica* OR *Diarsia dahlii* OR *Diarsia mendica* OR *Diaspidiotus africanus* OR *Diaspidiotus ancylus* OR *Diaspidiotus bumeliae* OR *Diaspidiotus forbesi* OR *Diaspidiotus marani* OR *Diaspidiotus osborni* OR *Diaspidiotus ostreaeformis* OR *Diaspidiotus pyri* OR *Diaspidiotus uvae* OR *Dicallomera fascelina* OR *Dicerca berlinensis* OR *Dichomeris derasella* OR *Diloba caeruleocephala* OR *Dineura stilata* OR *Dineura testaceipes* OR *Diptacus gigantorhynchus* OR *Dirphia avia* OR *Diurnea lipsiella* OR *Diurnea phryganella* OR *Dryobotodes eremita* OR *Duplaspidotus lacinioides* OR *Dysaphis angelicae* OR *Dysaphis apiifolia* OR *Dysaphis apiifolia ssp. petroselini* OR *Dysaphis apiifolia ssp. petroselini* OR *Dysaphis bononii* OR *Dysaphis crataegi* OR *Dysaphis crataegi ssp. heraclei* OR *Dysaphis crataegi ssp. kunzei* OR *Dysaphis crataegi ssp. pallens* OR *Dysaphis crataegi ssp. pallida* OR *Dysaphis crataegi ssp. aethusae* OR *Dysaphis crategi* OR *Dysaphis incognita* OR *Dysaphis laserpitii* OR *Dysaphis lauberti* OR *Dysaphis munirae* OR *Dysaphis plantaginea* OR *Dysaphis ramani* OR *Dysaphis ranunculi* OR *Dysaphis sorbierum* OR *Dysaphis virgata* OR *Dysaphis laserpitii* OR *Dysmicoccus wistariae* OR *Eacles imperialis* OR *Earophila badiata* OR *Ectoedemia atricollis* OR *Ectropis bistortata* OR *Edwardsiana crataegi* OR *Edwardsiana frustrator* OR *Edwardsiana lethierryi* OR *Edwardsiana rosae* OR *Eilema depressa* OR *Eilema lurideola* OR *Elasmostethus interstinctus* OR *Elasmucha ferrugata* OR *Elasmucha grisea* OR *Electrophaes corylata* OR *Enarmonia albicana* OR *Ennomos autumnaria* OR *Ennomos magnaria* OR *Ennomos quercinaria* OR *Ennomos subsignaria* OR *Eotetranychus tiliarum* OR *Eotetranychus uncatu* OR *Epagoge grotiana* OR *Epiblema trimaculana* OR *Epidiaspis leperii* OR *Epinotia signatana* OR *Epinotia sp.* OR *Epinotia vertumnana* OR *Epinotia zandana* OR *Epiphyas postvittana* OR *Epirrita autumnata* OR *Epirrita christyi* OR *Epirrita dilutata* OR *Epirrita filigrammaria* OR *Episimus argutana* OR *Erannis defoliaria* OR *Erannis tiliaria* OR *Eremocoris fenestratus* OR *Eremocoris praenotatus* OR *Ericaphis gentneri* OR *Eriogaster catax* OR *Eriogaster lanestris* OR *Eriogyna pyretorum* OR *Eriophyes albaespinae* OR *Eriophyes calycobius* OR *Eriophyes crataegi* OR *Eriosoma crataegi* OR *Eriosoma lanigerum* OR *Eriosoma lanuginosum* OR *Erythroneura angusta* OR *Euchlaena johnsonaria* OR *Euchlaena mollisaria* OR *Euclea delphinii* OR *Eudemis porphyra* OR *Eufidonia discospilata* OR *Eulecanium ciliatum* OR *Eulecanium kunoense* OR *Eulecanium nocivum* OR *Eulecanium rugulosum* OR *Eulecanium tiliae* OR *Eulithis prunata* OR *Euluperus major* OR *Euphyia unangulata* OR *Eupithecia abbreviata* OR *Eupithecia dodoneata* OR *Eupithecia exigua* OR *Eupithecia innotata* OR *Eupithecia insigniata* OR *Eupithecia irriguata* OR *Eupithecia subfuscata* OR *Eupithecia virgaureata* OR *Eupithecia vulgata* OR *Euproctis chrysothorax* OR *Euproctis kargalika* OR *Euproctis similis* OR *Eupsilia transversa* OR *Exapate congelatella* OR *Fagocyba cruenta* OR *Filatima epulatrix* OR *Filatima spurcella* OR *Fixsenia ontario* OR *Fixsenia thalia* OR *Fonscolombia rotunda* OR *Fruticidia bisignata* OR *Fruticidia sanguinosa* OR *Furcipes rectirostris* OR *Gastropacha quercifolia* OR *Gastrophysa polygoni* OR *Globiceps horvathi* OR *Gonimbrasia tyrreha* OR

"Gonioctena theae" OR "Gonocerus acuteangulatus" OR "Gracilia minuta" OR
 "Grammoptera ruficornis" OR "Graphiphora augur" OR "Grapholita inopinata" OR
 "Grapholita janthinana" OR "Grapholita molesta" OR "Grapholita packardii" OR
 "Grapholita prunivora" OR "Grynobius planus" OR "Gymnoscelis ruffasciata" OR
 "Gynandrophthalma affinis" OR "Gypsonoma dealbana" OR "Habrosyne pyritoides" OR
 "Hadrobregmus denticollis" OR "Halysidota tessellaris" OR "Hedya chionosema" OR
 "Hedya dimidioalba" OR "Hedya nubiferana" OR "Hedya pruniana" OR "Hedya
 separatana" OR "Heliococcus bohemicus" OR "Hemaris thysbe" OR "Hemiberlesia
 lataniae" OR "Hemileuca nevadensis" OR "Hemithea aestivaria" OR "Herminia grisealis"
 OR "Heterocampa guttivitta" OR "Heterotoma merioptera" OR "Hoplocampa
 chrysothorax" OR "Hoplocampa crataegi" OR "Hoplocampa pectoralis" OR "Hyalesthes
 scotti" OR "Hyalomyzus collinsoniae" OR "Hyalomyzus eriobotryae" OR "Hyalomyzus
 jussiaeae" OR "Hyalomyzus sensorius" OR "Hyalophora cecropia" OR "Hyalophora
 columbia" OR "Hyalophora euryalus" OR "Hyphantria cunea" OR "Hypomecis
 punctinalis" OR "Icerya seychellarum" OR "Idaea aversata" OR "Idaea contiguaria" OR
 "Idaea dimidiata" OR "Imbrasia alcinoe" OR "Imbrasia cleoris" OR "Imbrasia cytherea"
 OR "Incurvaria mascullella" OR "Involvulus cupreus" OR "Iphiclides feisthamelii" OR
 "Iphiclides podalirius" OR "Iridopsis larvaria" OR "Isotrias hybridana" OR "Isotrias
 rectifasciana" OR "Itame coortaria" OR "Itame exauspicata" OR "Janus compressus" OR
 "Jodis lactearia" OR "Kalotermeis browni" OR "Kyboasca maligna" OR "Lacanobia
 thalassina" OR "Lambdina fiscellaria" OR "Lamprosticta culta" OR "Laothoe populi" OR
 "Lasiocampa quercus" OR "Lasiocampa trifolii" OR "Laspeyria flexula" OR "Leiopus
 nebulosus" OR "Lepidargyrus pollinosus" OR "Lepidosaphes conchiformis" OR
 "Lepidosaphes crataegicola" OR "Lepidosaphes granati" OR "Lepidosaphes ulmi" OR
 "Leptotes pirithous" OR "Leucoptera malifoliella" OR "Leucoptera scitella" OR "Ligdia
 adustata" OR "Liriomyza trifolii" OR "Lissodema quadripustulata" OR "Lithomoia
 solidaginis" OR "Lithophane bethunei" OR "Lithophane georgii" OR "Lobobunaea
 acetes" OR "Lochmaea crataegi" OR "Lochmaeus manteo" OR "Loepa katinka" OR
 "Lomographa bimaculata" OR "Lomographa glomeraria" OR "Lomographa semiclarata"
 OR "Lomographa temerata" OR "Lomographa vestaliata" OR "Lophocampa caryae" OR
 "Luperus flavipes" OR "Luperus flavus" OR "Luperus longicornis" OR "Luperus
 xanthopoda" OR "Lycia hirtaria" OR "Lycia lapponaria" OR "Lycia ursaria" OR "Lygocoris
 pabulinus" OR "Lymantria dispar" OR "Lymantria monacha" OR "Lymantria obfuscata"
 OR "Lyonetia clerkella" OR "Lyonetia prunifoliella" OR "Lytrosis unitaria" OR "Macaria
 alternata" OR "Machimia tentoriferella" OR "Maconellicoccus hirsutus" OR
 "Macrosiphum euphorbiae" OR "Macrosiphum nevskeyanum" OR "Magdalis armigera" OR
 "Magdalis barbicornis" OR "Magdalis cerasi" OR "Magdalis ruficornis" OR "Malacosoma
 americana" OR "Malacosoma americanum" OR "Malacosoma californica" OR
 "Malacosoma castrensis" OR "Malacosoma disstria" OR "Malacosoma neustria" OR
 "Margarodes vitis" OR "Meganola togatalalis" OR "Melanaspis calura" OR "Melanaspis
 inopinata" OR "Melanchra pisi" OR "Melanthrips trifasciatus" OR "Meligethes atratus"
 OR "Meligethes flavimanus" OR "Melolontha melolontha" OR "Mermitelocerus schmidtii"
 OR "Mesites tardii" OR "Mesolecanium nigrofasciatum" OR "Micropterix aruncella" OR
 "Micropterix tunbergella" OR "Miris nebrodensis" OR "Miris striatus" OR "Mniotype
 adusta" OR "Monosteira unicastata" OR "Mormo maura" OR "Muscaphis canadensis"
 OR "Muscaphis mexicana" OR "Muscaphis stroyani" OR "Mustha longispinis" OR
 "Mustha spinosula" OR "Myzodium mimulicola" OR "Myzus ornatus" OR "Myzus
 persicae" OR "Nacophora quernaria" OR "Naenia typica" OR "Nearctaphis bakeri" OR
 "Nearctaphis clydesmithi" OR "Nearctaphis crataegifoliae" OR "Nearctaphis nigrescens"
 OR "Nearctaphis sclerosa" OR "Nematocampa limbata" OR "Nematocampa resistaria"
 OR "Nematus lucidus" OR "Nemoria mimosaria" OR "Neopealius rubi" OR
 "Neopinnaspis harperi" OR "Neopulvinaria innumerabilis innumerabilis" OR
 "Neosphaleroptera nubilana" OR "Nephoterix crassifasciella" OR "Neurotoma saltuum"
 OR "Newsteadia floccosa" OR "Noctua comes" OR "Noctua fimbriata" OR "Noctua
 interjecta" OR "Noctua interjecta ssp. caliginosa" OR "Noctua janthe" OR "Noctua
 janthina" OR "Nola confusalis" OR "Nola cucullatella" OR "Notocelia cynosbatella" OR
 "Notocelia trimaculana" OR "Nudaurelia cytherea" OR "Numonia advenella" OR
 "Numonia marmorea" OR "Nychiodes amygdalaria" OR "Nychiodes aphrodite" OR
 "Nymphalis polychloros" OR "Nymphalis polychloros" OR "Odontopera bidentata" OR
 "Oeomona hirta" OR "Olethreutes malana" OR "Oligocentria semirufescens" OR
 "Oligonychus newcomeri" OR "Oligonychus propetes" OR "Olindia rectifasciana" OR
 "Operophtera brumata" OR "Operophtera fagata" OR "Opisthograptis luteolata" OR

"Oreana unicolora" OR "Orgyia antiqua" OR "Orgyia leucostigma" OR "Orgyia recens"
 OR "Orgyia vetusta" OR "Orothrips priesneri" OR "Orsodacne cerasi" OR "Orsodacne
 humeralis" OR "Orsodacne lineola" OR "Orthosia cerasi" OR "Orthosia cruda" OR
 "Orthosia gothica" OR "Orthosia incerta" OR "Orthosia miniosa" OR "Osphya
 bipunctata" OR "Ossiannilssonola callosa" OR "Otiornychus crataegi" OR
 "Otiornychus desertus" OR "Otiornychus fullo" OR "Otiornychus rugosostriatus" OR
 "Otiornychus veterator" OR "Ourapteryx sambucaria" OR "Ovatus crataegarius" OR
 "Ovatus insitus" OR "Ovatus malisuctus" OR "Palaeolecanium bituberculatum" OR
 "Paleacrita vernata" OR "Palomena prasina" OR "Palomena viridissima" OR "Pammene
 agnotana" OR "Pammene crataegicola" OR "Pammene crataegophila" OR "Pammene
 germana" OR "Pammene rhediella" OR "Pammene spiniana" OR "Pamphilius
 stramineipes" OR "Pamphilius sylvaticus" OR "Pandemis cerasana" OR "Pandemis
 heparana" OR "Panonychus ulmi" OR "Paonias excaecata" OR "Paonias myops" OR
 "Paophilus afflatus" OR "Papilio eurymedon" OR "Papilio glaucus" OR "Paracolax
 tristalis" OR "Paradiarsia sobrina" OR "Parasaissetia nigra" OR "Paraswammerdamia
 albicapitella" OR "Paraswammerdamia lutarea" OR "Parectropis similaria" OR
 "Parlatoresia chinensis" OR "Parlatoria oleae" OR "Parlatoria theae" OR "Parornix
 anglicella" OR "Parornix crataegifoliella" OR "Parornix inusitatumella" OR "Parornix
 melanotella" OR "Parthenolecanium corni" OR "Parthenolecanium corni corni" OR
 "Parthenolecanium rufulum" OR "Pasiphila rectangulata" OR "Pechipoga plumigeralis"
 OR "Pentatoma rufipes" OR "Peribalus strictus" OR "Peribatodes rhomboidaria" OR
 "Perigrapha rorida" OR "Periphoba hircia" OR "Peritelus sphaeroides" OR "Perotis
 lugubris" OR "Petrobia latens" OR "Phaecasiophora niveiguttana" OR "Phenacoccus
 aceris" OR "Phenacoccus dearnesi" OR "Phenacoccus silvanae" OR "Phenacoccus
 tataricus" OR "Phenacoccus transcaucasicus" OR "Phigalia pilosaria" OR "Phigalia titea"
 OR "Phloeophagus gracilis" OR "Phyllobius calcaratus" OR "Phyllobius glaucus" OR
 "Phyllobius maculicornis" OR "Phyllobius oblongus" OR "Phyllobius pomaceus" OR
 "Phyllobius pyri" OR "Phyllobius roboretanus" OR "Phyllobius vespertinus" OR
 "Phyllocoptes goniothorax" OR "Phylloidesma americana" OR "Phyllonorycter
 corylifoliella" OR "Phyllonorycter crataegella" OR "Phyllonorycter elmaella" OR
 "Phyllonorycter jozanae" OR "Phyllonorycter leucographella" OR "Phyllonorycter
 macedonica" OR "Phyllonorycter malella" OR "Phyllonorycter mespilella" OR
 "Phyllonorycter oxyacanthae" OR "Phyllonorycter sorbi" OR "Physatocheila danielae" OR
 "Physatocheila dumetorum" OR "Physatocheila smreczynskii" OR "Phytobia carbonaria"
 OR "Phytocoris dimidiatus" OR "Phytocoris hirsutulus" OR "Phytocoris longipennis" OR
 "Phytocoris reuteri" OR "Phytocoris scitulus" OR "Phytocoris tiliae" OR "Phytocoris ulmi"
 OR "Phytoptus calicobius" OR "Phytoptus pyri" OR "Piezodorus lituratus" OR "Plagodis
 pulveraria" OR "Plemyria rubiginata" OR "Poecilocampa populi" OR "Polia nebulosa" OR
 "Polia trimaculosa" OR "Polydrusus cervinus" OR "Polydrusus impressifrons" OR
 "Polydrusus marginatus" OR "Polydrusus mollis" OR "Polydrusus picus" OR "Polydrusus
 pterygomalis" OR "Polydrusus undatus" OR "Polyphaenis sericata" OR "Priophorus
 pallipes" OR "Priophorus pilicornis" OR "Pristiphora crassicornis" OR "Pristiphora
 ruficornis" OR "Prociphilus corrugatus" OR "Prociphilus crataegicola" OR "Prociphilus
 crataegistrobi" OR "Prociphilus kuwanai" OR "Prociphilus pini" OR "Prociphilus pini" OR
 "Prolauthia circumdata" OR "Prolimacodes badia" OR "Psallus ambiguus" OR "Psallus
 collaris" OR "Psallus lucanicus" OR "Psallus perrisi" OR "Psallus skylla" OR "Psallus
 variabilis" OR "Psallus varians" OR "Psallus wagneri" OR "Pseudaulacaspis pentagona"
 OR "Pseudexentera mali" OR "Pseudexentera maracana" OR "Pseudococcus
 calceolariae" OR "Pseudococcus viburni" OR "Pseudodirphia eumedide" OR
 "Pseudomylocerus sinuatus" OR "Pseudothyatira cymatophoroides" OR "Psorosina
 hammondi" OR "Psylla melanoneura" OR "Psylla peregrina" OR "Psylla subferruginea"
 OR "Ptilodon capucina" OR "Ptinomorphus imperialis" OR "Ptosima undecimmaculata"
 OR "Ptycholoma lecheana" OR "Pulvinaria borchsenii" OR "Pulvinaria kuwacola" OR
 "Pulvinaria minuscula" OR "Pulvinaria occidentalis" OR "Pulvinaria oxyacanthae" OR
 "Pulvinaria regalis" OR "Pulvinaria terrestris" OR "Pulvinaria vitis" OR "Purpuricenus
 interscapillatus" OR "Quadraspidotus ostreaeformis" OR "Quadraspidotus pyri" OR
 "Ramphus oxyacanthae" OR "Recurvaria leucateella" OR "Recurvaria nanella" OR
 "Reptalus panzeri" OR "Resseliella crataegi" OR "Rhagades predotae" OR "Rhagades
 pruni" OR "Rhagium bifasciatum" OR "Rhagium mordax" OR "Rhagoletis completa" OR
 "Rhagoletis pomonella" OR "Rhamphus oxyacanthae" OR "Rhamphus subaeneus" OR
 "Rhaphigaster nebulosa" OR "Rhodinina newara" OR "Rhodococcus turanicus" OR
 "Rhodophaga advenella" OR "Rhogogaster punctulata" OR "Rhopalomesites tardyi" OR

"Rhopalosiphum insertum" OR "Rhopalosiphum nigrum" OR "Rhopalosiphum oxyacanthae" OR "Rhopalosiphum padi" OR "Rhopalosiphum rufulum" OR "Rhopalosiphum sanguinarium" OR "Rhopobota dietziana" OR "Rhopobota naevana" OR "Rhopobota unipunctana" OR "Rhyncaphytoptus immeritus" OR "Rhynchites aeneovirens" OR "Rhynchites aequatus" OR "Rhynchites auratus" OR "Rhynchites bacchus" OR "Rhynchites caeruleus" OR "Rhynchites giganteus" OR "Rhynchites olivaceus" OR "Rhynchites pauxillus" OR "Rhynchites sericeus" OR "Rhynchites slovenicus" OR "Ricania hedenborgii" OR "Ricania speculum" OR "Ripersiella kondonis" OR "Ropalopus ledereri" OR "Russellaspis pustulans pustulans" OR "Saissetia coffeae" OR "Saissetia miranda" OR "Saissetia oleae oleae" OR "Saperda candida" OR "Saturnia pavonia" OR "Saturnia pavoniella" OR "Saturnia spini" OR "Saturnia walterorum" OR "Satyrium caryaevorum" OR "Satyrium edwardsii" OR "Satyrium liparops" OR "Saundersiella hirta" OR "Schizoneurata tissoti" OR "Schizura concinna" OR "Schizura ipomoeae" OR "Schizura unicornis" OR "Sciaphilus asperatus" OR "Scolytus mali" OR "Scolytus rugulosus" OR "Scopula imitaria" OR "Scopula immutata" OR "Scythropia crataegella" OR "Selenia alciphearia" OR "Selenia dentaria" OR "Selenia lunularia" OR "Selenia tetralunaria" OR "Semioscopis packardella" OR "Semioscopis steinkellneriana" OR "Siphoninus phillyreae" OR "Smaragdina affinis" OR "Sparganothis diluticostana" OR "Sparganothis sulfureana" OR "Sparganothis unifasciana" OR "Sphecodina abbottii" OR "Sphrageidus similis" OR "Spilonota ocellana" OR "Spilonota prognathana" OR "Spilosoma luteum" OR "Spodoptera praefica" OR "Spuleria flavicaput" OR "Stauropus fagi" OR "Stephostethus angusticollis" OR "Sterrhopterix fusca" OR "Stigmella atterima" OR "Stigmella azaroli" OR "Stigmella crataegella" OR "Stigmella crataegifoliella" OR "Stigmella hybnerella" OR "Stigmella magdalenae" OR "Stigmella nylandriella" OR "Stigmella oxyacanthella" OR "Stigmella paradoxa" OR "Stigmella perpygmaeella" OR "Stigmella regiella" OR "Stigmella scintillans" OR "Strophosoma capitatum" OR "Strophosomus melanogrammus" OR "Strymon melinus" OR "Suturaspis archangelskyae" OR "Suturaspis crataegi" OR "Swammerdamia caesiella" OR "Swammerdamia compunctella" OR "Swammerdamia lutarea" OR "Swammerdamia pyrella" OR "Synanthedon culciformis" OR "Synanthedon myopaeformis" OR "Synanthedon pyri" OR "Synanthedon scitula" OR "Synanthedon stomoxiformis" OR "Synaxis jubararia" OR "Syndemis afflictana" OR "Tachycixius pilosus" OR "Taeniothrips inconsequens" OR "Teleiodes italica" OR "Teleiodes vulgella" OR "Tetranychus canadensis" OR "Tetranychus urticae" OR "Tetranychus viennensis" OR "Tetrops praeustus" OR "Thalera fimbrialis" OR "Thaumetopoea processionea" OR "Thecla betulae" OR "Theria primaria" OR "Theria rupicaprararia" OR "Thrips italicus" OR "Thrips major" OR "Thrips meridionalis" OR "Thrips minutissimus" OR "Thyridopteryx ephemeraeformis" OR "Thyronectria zanthoxyli" OR "Tischeria crataegifoliae" OR "Tischeria malifoliella" OR "Tortricodes alternella" OR "Torymus druparum" OR "Torymus varians" OR "Toumeyella crataegi" OR "Toxoptera aurantii" OR "Toxoptera citricidus" OR "Trachycera advenella" OR "Trachycera marmorea" OR "Trachycera suavella" OR "Trachys minutus" OR "Trichiosoma tibiale" OR "Trichiura crataegi" OR "Trichosea ludifica" OR "Triphosa haesitata" OR "Utamphorophora crataegi" OR "Valeria oleagina" OR "Venusia pearsalli" OR "Xanthorhoe lacustrata" OR "Xestia baja" OR "Xestia castanea" OR "Xestia ditrapezium" OR "Xestia triangulum" OR "Xestia xanthographa" OR "Xestobium rufovillosum" OR "Xyleborus dispar" OR "Xylena exsoleta" OR "Xyloterus domesticum" OR "Xylotrechus namanganensis" OR "Yponomeuta malinellus" OR "Yponomeuta meridionalis" OR "Yponomeuta padella" OR "Ypsolopha asperella" OR "Ypsolopha horridella" OR "Ypsolopha scabrella" OR "Zeuzera coffeae" OR "Zeuzera pyrina" OR "Zygina angusta" OR "Zygina flammigera" OR "Zygina ordinaria" OR "Zygina schneideri" OR "Zygina tiliae" OR "Acaulospora lacunosa" OR "Acaulospora mellea" OR "Acaulospora paulinae" OR "Acia setosa" OR "Acrospermum foliicola" OR "Actinotexis indica" OR "Aecidium patulum" OR "Alternaria alternata" OR "Alternaria arborescens" OR "Alternaria tenuissima" OR "Amphisphaeria umbrina" OR "Apiosporium salicinum" OR "Appendiculella calostroma" OR "Armillaria mellea" OR "Armillaria ostoyae" OR "Armillariella tabescens" OR "Arrhytidia enata" OR "Ascochyta crataegi" OR "Ascochyta crataegicola" OR "Ascochyta cruris-galli" OR "Asteromella vulgaris" OR "Aulographum hederiae" OR "Botryosphaeria dothidea" OR "Botryosphaeria melathroa" OR "Botryosphaeria obtusa" OR "Botryosphaeria quercuum" OR "Botrytis cinerea" OR "Camarophyllus virgineus" OR "Camarosporium propinquum" OR "Cenangium crataegi" OR "Ceratostoma graphioides" OR "Cercoseptoria crataegi" OR "Cercospora apiifoliae" OR "Cercospora confluens" OR "Cercospora crataegi" OR

"Cercospora mirabilis" OR "Cerreia unicolor" OR "Chaetosphaeria myriocarpa" OR
 "Chondrostereum purpureum" OR "Cladosporium carpophilum" OR "Cladosporium
 epiphyllum" OR "Cladosporium fumago" OR "Cladosporium herbarum" OR
 "Clasterosporium curvatum" OR "Colletotrichum gloeosporioides" OR "Coniochaeta
 ligniaria" OR "Coniophora puteana" OR "Coniosporium olivaceum" OR "Coniothecium
 phyllophilum" OR "Coniothyrium crataegi" OR "Coniothyrium olivaceum" OR
 "Coniothyrium pyrinum" OR "Coniothyrium sporulosum" OR "Coniothyrium tirolense"
 OR "Conoplea olivacea" OR "Coriolus versicolor" OR "Corniculariella harpographoidea"
 OR "Cornularia harpographoides" OR "Corticium contiguum" OR "Corticium udicola" OR
 "Coryneum crataegicola" OR "Coryneum foliicola" OR "Coryneum microstictum" OR
 "Coryneum pestalozzioides" OR "Coryneum vaccinii" OR "Crepidotus nephrodes" OR
 "Cucurbitaria acervata" OR "Cucurbitaria conglobata var. crataegi" OR "Cucurbitaria
 crataegi" OR "Cylindrosporium brevispina" OR "Cylindrosporium crataeginum" OR
 "Cylindrosporium oxyacanthae" OR "Cytospora chrysosperma" OR "Cytospora
 crataegicola" OR "Cytospora donetzica" OR "Cytospora leucosperma" OR "Cytospora
 mali" OR "Cytospora microspora" OR "Cytospora oxyacanthae" OR "Cytospora
 pulcherrima" OR "Cytospora rubescens" OR "Cytospora schulzeri" OR "Dactylonectria
 novozelandica" OR "Daedalea confragosa" OR "Daldinia concentrica" OR "Daldinia
 loculata" OR "Daldinia vernicosa" OR "Dasyscyphus pudibundus" OR "Dendrophora
 versiformis" OR "Dendrothele griseocana" OR "Dermatea crataegicola" OR "Diaporthe
 aliena" OR "Diaporthe crataegi" OR "Diaporthe eres" OR "Diatrype albopruinosa" OR
 "Diatrype decorticata" OR "Diatrype disciformis" OR "Diatrype stigma" OR "Diatrypella
 favacea" OR "Diatrypella nitschkei" OR "Diatrypella quercina" OR "Diatrypella subfulva"
 OR "Dictydiaethalium plumbeum" OR "Dimerium pulveraceum" OR "Diplocarpon
 mespili" OR "Diplodia crataegi" OR "Diplodia crataegicola" OR "Diplodia italica" OR
 "Diplodia malorum" OR "Discosia artocreas" OR "Discosia faginea" OR "Discosphaerina
 fagi" OR "Discostroma corticola" OR "Dothiorella crataegi" OR "Dothiorella
 sarmentorum" OR "Durandiella lenticellicola" OR "Eichleriella leveilliana" OR
 "Entomosporium mespili" OR "Entomosporium thuemenii" OR "Erysiphe crataegi" OR
 "Eutypa flavovirescens" OR "Eutypa lata" OR "Eutypa ludibunda" OR "Eutypa spinosa"
 OR "Eutypella tumidula" OR "Fenestella fenestrata" OR "Fenestella media" OR
 "Fenestella phaeospora" OR "Fomes annosus" OR "Fomes applanatus" OR "Fomes
 conchatus" OR "Fomes fomentarius" OR "Fomes ignarius" OR "Fomes langloisii" OR
 "Fomes noxius" OR "Fomes occidentalis" OR "Fomes pini" OR "Fomes pomaceus" OR
 "Fomes torulosus" OR "Fomes truncatosporus" OR "Fomitopsis pinicola" OR "Fumago
 vagans" OR "Funalia gallica" OR "Fusarium decemcellulare" OR "Fusarium equiseti" OR
 "Fusicladium crataegi" OR "Fusicladium pyrorum" OR "Fusicoccum viticola" OR
 "Gigaspora gigantea" OR "Gloeodes pomigena" OR "Gloeosporium crataegi" OR
 "Glomus aggregatum" OR "Glomus constrictum" OR "Glomus coronatum" OR "Glomus
 deserticola" OR "Glomus etunicatum" OR "Glomus fasciculatum" OR "Glomus
 heterosporum" OR "Glomus macrocarpum" OR "Glomus microcarpum" OR "Glomus
 mosseae" OR "Glomus pansihalos" OR "Glomus tenue" OR "Gloniopsis praelonga" OR
 "Graphostroma platystomum" OR "Gymnosporangium asiaticum" OR
 "Gymnosporangium bethelii" OR "Gymnosporangium blasdaleanum" OR
 "Gymnosporangium clavariiforme" OR "Gymnosporangium clavipes" OR
 "Gymnosporangium confusum" OR "Gymnosporangium connersii" OR
 "Gymnosporangium exiguum" OR "Gymnosporangium floriforme" OR
 "Gymnosporangium globosum" OR "Gymnosporangium gracile" OR "Gymnosporangium
 hyalinum" OR "Gymnosporangium inconspicuum" OR "Gymnosporangium juniperi-
 virginiana" OR "Gymnosporangium lianhuanaense" OR "Gymnosporangium mespili" OR
 "Gymnosporangium nelsonii" OR "Gymnosporangium orientale" OR "Gymnosporangium
 trachysorum" OR "Gymnosporangium tremelloides" OR "Gymnosporangium unicolor"
 OR "Haematomyxa rufa" OR "Helicobasidium purpureum" OR "Helicogloea lagerheimii"
 OR "Helotium citrinum" OR "Hendersonia crataegi" OR "Hendersonia crataegicola" OR
 "Hendersonia discosioides" OR "Hendersonia foliorum" OR "Hendersonia sarmentorum"
 OR "Hirudinaria macrospora" OR "Hymenoscyphus caudatus" OR "Hymenoscyphus
 crataegi" OR "Hyphoderma praetermissum" OR "Hyphoderma radula" OR "Hyphodontia
 sambuci" OR "Hypoxyton albocinctum" OR "Hypoxyton cinereolilacinum" OR "Hypoxyton
 nummularium var. pseudopachyloma" OR "Hypoxyton rubiginosum" OR "Hypoxyton
 ticinense" OR "Hysterium angustatum" OR "Inonotus hispidus" OR "Inonotus radiatus"
 OR "Irenopsis crataegi" OR "Irpex brevis" OR "Jattaea aphanospora" OR "Jattaea
 discreta" OR "Julella leopoldina" OR "Lachnum fasciculare" OR "Lactarius vellereus" OR

"Lecanidion clavisorum" OR "Leptosphaeria pomona f. transilvanica" OR
 "Leptosphaeria saccardiana" OR "Leptostroma herbarum" OR "Linospora
 magnagutiana" OR "Lophiostoma caespitosum" OR "Lophiostoma macrostomum" OR
 "Lophiostoma quadrinucleatum var. triseptatum" OR "Lophodermium foliicola" OR
 "Macrophoma crataegi" OR "Macrophoma kawatsukai" OR "Macrosporium trichellum"
 OR "Massaria himalayensis" OR "Massarina polymorpha" OR "Menispora ciliata" OR
 "Metasphaeria sepincola" OR "Metathyriella roupalae" OR "Microdiplodia microsporella"
 OR "Micropeltidium crataegi" OR "Mollisia melaleuca" OR "Monilia yunnanensis" OR
 "Monilinia fructicola" OR "Monilinia fructigena" OR "Monilinia johnsonii" OR
 "Monochaetia crataegi" OR "Monochaetia crataegina" OR "Monochaetia turgida" OR
 "Mycomicrothelia melanospora" OR "Mycopappus alni" OR "Mycosphaerella crataegi"
 OR "Mycosphaerella oxyacanthae" OR "Mycosphaerella punctiformis" OR
 "Mycosphaerella slaptoniensis" OR "Myriangium asterinosporum" OR "Myriangium
 duriaei" OR "Myriangium tuberculans" OR "Myriellina cydoniae" OR "Nectria
 cinnabarina" OR "Nectria dematiosa" OR "Nectria episphaeria" OR "Nectria galligena"
 OR "Nectria zanthoxyli" OR "Neocosmospora endophytica" OR "Neofusicoccum luteum"
 OR "Neosetophoma guiyangensis" OR "Oidium crataegi" OR "Oidium pirinum" OR
 "Otthia spiraeae" OR "Paraglomerus occultum" OR "Patellariopsis clavisporea" OR
 "Paurocotylis pila" OR "Peltaster fructicola" OR "Penicillium frequentans" OR
 "Peniophora crenea" OR "Peniophora incarnata" OR "Peniophora roumeguerii" OR
 "Peniophora violaceolivida" OR "Pestalotia congensis" OR "Pestalotia crataegi" OR
 "Pestalotia neglecta" OR "Pestalotiopsis maculans" OR "Pestalotiopsis mangifolia" OR
 "Pestalotiopsis palmarum" OR "Pezicula aurantiaca" OR "Pezicula crataegicola" OR
 "Pezicula sepium" OR "Phaeoacremonium iraniana" OR "Phaeoacremonium
 rufolateritius" OR "Phanerochaete laevis" OR "Phellinopsis overholtsii" OR "Phellinus
 ferreus" OR "Phellinus ferruginosus" OR "Phellinus pomaceus" OR "Phellinus torulosus"
 OR "Phlebiopsis gigantea" OR "Phloeospora oxyacanthae" OR "Phoma crataegi" OR
 "Phoma exigua var. exigua" OR "Phoma pomi" OR "Phoma leprosa" OR "Phomopsis
 perniciosa" OR "Phyllactinia babayanii" OR "Phyllactinia guttata" OR "Phyllactinia mali"
 OR "Phylloporia crataegi" OR "Phylloporia ribis f. eonymi" OR "Phyllosticta
 crataegicola" OR "Phyllosticta eriobotryae" OR "Phyllosticta grisea" OR "Phyllosticta
 michailovskoensis" OR "Phyllosticta monogyna" OR "Phyllosticta rubra" OR "Phyllosticta
 solitaria" OR "Phymatotrichum omnivorum" OR "Physalospora obtusa" OR
 "Phytophthora cactorum" OR "Phytophthora capsici" OR "Phytophthora citrophthora"
 OR "Phytophthora plurivora" OR "Phytophthora syringae" OR "Pleonectria zanthoxyli"
 OR "Pleosphaeria echinata" OR "Pleosphaerulina corticola f. crataegi" OR "Pleospora
 oxyacanthae" OR "Pleospora shepherdiae" OR "Podosphaera clandestina" OR
 "Podosphaera leucotricha" OR "Podosphaera mespilii" OR "Podosphaera setacea" OR
 "Polyporus gilvus" OR "Polyporus hirsutus" OR "Polyporus versicolor" OR "Poria ferrea"
 OR "Poria ferruginosa" OR "Pseudocercospora crataegi" OR "Pseudophacidium
 atroviolaceum" OR "Pseudosporium simplex" OR "Pseudovalsa canadensis" OR
 "Pseudoveronaea ellipsoidea" OR "Pyrigemmula aurantiaca" OR "Radulomyces
 confluens" OR "Rhizoctonia solani" OR "Roestelia atlasiana" OR "Roestelia bethelii" OR
 "Roestelia magna" OR "Roestelia malyi" OR "Roestelia patula" OR "Rosellinia necatrix"
 OR "Rosellinia nectrioides" OR "Rosellinia rosarum" OR "Rosellinia subsimilis" OR
 "Saccardoella canadensis" OR "Schizothyrium crenulatae" OR "Schizoxylon insigne" OR
 "Schizoxylum compositum" OR "Sclerotium rolfsii" OR "Scolecostigmina confluens" OR
 "Scutellospora calospora" OR "Scutellospora dipurpureascens" OR "Scutellospora
 pellucida" OR "Seimatosporium italicum" OR "Seimatosporium lichenicola" OR
 "Seimatosporium pestalozzioides" OR "Seiridium unicorne" OR "Septobasidium
 castaneum" OR "Septobasidium pseudopedicellatum" OR "Septoria crataegi" OR
 "Septoria crataegi var. crataegi-monogynae" OR "Septoria crataegicola" OR
 "Skeletocutis nivea" OR "Sordaria arctica" OR "Sphaceloma crataegi" OR
 "Sphaeronaema longirostre" OR "Sphaeropsis demersa" OR "Sphaeropsis foliicola" OR
 "Sphaerotheca macularis" OR "Sporidesmium fumago" OR "Sporidesmium quadratum"
 OR "Sporobolomyces pararoseus" OR "Stemphylium crataegi" OR "Stereum
 patelliforme" OR "Stereum purpureum" OR "Stereum roseocarneum" OR "Stereum
 rugosum" OR "Stictis radiata" OR "Strasseria geniculata" OR "Strickeria cerasi" OR
 "Strickeria megastega" OR "Strickeria obducens" OR "Strossmayeria bakeriana" OR
 "Tapesia fusca" OR "Taphrina bullata" OR "Taphrina crataegi" OR "Teichospora
 congesta" OR "Thyridium canadense" OR "Togninia crataegi" OR "Tomentella badia" OR
 "Tomentella fuscocinerea" OR "Tomentella puberula" OR "Trametes scutellata" OR

"Trametes versicolor" OR "Tremella globispora" OR "Truncospora truncatospora" OR "Uncinula crataegi" OR "Uncinula prunastri" OR "Valsa ambiens" OR "Valsa ceratophora" OR "Valsa ceratosperma" OR "Valsa cincta" OR "Valsa leucostoma" OR "Valsa malicola" OR "Valsa pustulata" OR "Vararia borealis" OR "Venturia crataegi" OR "Venturia inaequalis" OR "Vuilleminia cystidiata" OR "Wentomyces pandei" OR "Xylaria carpophila" OR "Xylaria digitata" OR "Xylaria hypoxylon" OR "Xylaria oxyacanthae" OR "Xylaria polymorpha" OR "Xyloschizon atratum" OR "Zignoella minutissima" OR "Zygophiala wisconsinensis" OR "Apple mosaic virus" OR "Apple necrotic mosaic virus" OR "Tobacco ringspot virus" OR "Emaravirus sorbi" OR "Prune dwarf virus" OR "Pear blister canker viroid" OR "Apple chlorotic leaf spot virus" OR "Grapevine Pinot gris virus" OR "Apple stem pitting virus" OR "Candidatus Liberibacter europaeus" OR "Erwinia amylovora" OR "Rhizobium radiobacter" OR "Candidatus Phytoplasma mali" OR "Pantoea agglomerans" OR "Erwinia billingiae" OR "Brenneria salicis" OR "Pseudomonas syringae pv. syringae" OR "Rhizobium rhizogenes" OR "Criconemoides informis" OR "Meloidogyne chitwoodi" OR "Meloidogyne fallax" OR "Meloidodera mexicana" OR "Longidorus crataegi" OR "Pratylenchus crenatus" OR "Pratylenchus penetrans" OR "Pratylenchus vulnus" OR "Paratylenchus steineri" OR "Xiphinema Americanum" OR "Xiphinema diversicaudatum"

Appendix B – Excel file with the pest list of *Crataegus* species

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.2023.8003#support-informationsection>