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SCIENTIFIC OPINION

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Pest categorisation of *Malacosoma parallela*

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Abstract

The EFSA Panel on Plant Health performed a pest categorisation of *Malacosoma parallela* (Staudinger) (Lepidoptera: Lasiocampidae) for the territory of the European Union, following commodity risk assessments of *Berberis thunbergii*, *Malus domestica*, *Prunus persica* and *P. dulcis* plants for planting from Türkiye, in which *M. parallela* came to attention as of possible concern. *M. parallela* is commonly known as the mountain ring silk moth and is a polyphagous leaf-eating pest in west-central Asia, primarily feeding on deciduous trees and shrubs, and known to cause serious damage to *Malus, Prunus,* and *Quercus* species. It is found at a range of altitudes from 130 m to 3000 m although most common above 1000 m. It is a univoltine species. Eggs are laid in masses on twigs and branches in the summer and larvae hatch the following spring to feed on buds and fresh leaves. Host plants can be completely defoliated. Plants for planting and cut branches provide pathways for entry, especially if infested with egg masses. Host availability and climate suitability suggest that parts of the EU would be suitable for establishment. Adults can fly and the pest could spread naturally within the EU although adults only live for a few days. Faster and more extensive spread is therefore more likely via egg masses moved on plants for planting. The introduction of *M. parallela* into the EU could lead to outbreaks causing damage to deciduous trees and shrubs in forests and orchards. Phytosanitary measures are available to inhibit the entry and spread of this species. *M. parallela* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest.

KEYWORDS

mountain spring silk moth, pest risk, plant health, plant pest, quarantine

CONTENTS

1 | INTRODUCTION

1.1 | Background and Terms of Reference as provided by the requestor

1.1.1 | Background

The new Plant Health Regulation (EU) 2016/2031, on the protective measures against pests of plants, is applying from 14 December 2019. Conditions are laid down in this legislation in order for pests to qualify for listing as Union quarantine pests, protected zone quarantine pests or Union regulated non-quarantine pests. The lists of the EU regulated pests together with the associated import or internal movement requirements of commodities are included in Commission Implementing Regulation (EU) 2019/2072. Additionally, as stipulated in the Commission Implementing Regulation 2018/2019, certain commodities are provisionally prohibited to enter in the EU (high risk plants, HRP). EFSA is performing the risk assessment of the dossiers submitted by exporting to the EU countries of the HRP commodities, as stipulated in Commission Implementing Regulation 2018/2018. Furthermore, EFSA has evaluated a number of requests from exporting to the EU countries for derogations from specific EU import requirements.

In line with the principles of the new plant health law, the European Commission with the Member States are discussing monthly the reports of the interceptions and the outbreaks of pests notified by the Member States. Notifications of an imminent danger from pests that may fulfil the conditions for inclusion in the list of the Union quarantine pest are included. Furthermore, EFSA has been performing horizon scanning of media and literature.

As a follow-up of the above-mentioned activities (reporting of interceptions and outbreaks, HRP, derogation requests and horizon scanning), a number of pests of concern have been identified. EFSA is requested to provide scientific opinions for these pests, in view of their potential inclusion by the risk manager in the lists of Commission Implementing Regulation (EU) 2019/2072 and the inclusion of specific import requirements for relevant host commodities, when deemed necessary by the risk manager.

1.1.2 | Terms of Reference

EFSA is requested, pursuant to Article 29(1) of Regulation (EC) No 178/2002, to provide scientific opinions in the field of plant health.

EFSA is requested to deliver 53 pest categorisations for the pests listed in Annex 1A, 1B, 1D and 1E (for more details see mandate M-2021-00027 on the Open.EFSA portal). Additionally, EFSA is requested to perform pest categorisations for the pests so far not regulated in the EU, identified as pests potentially associated with a commodity in the commodity risk assessments of the HRP dossiers (Annex 1C; for more details see mandate M-2021-00027 on the Open.EFSA portal). Such pest categorisations are needed in the case where there are not available risk assessments for the EU.

When the pests of Annex 1A are qualifying as potential Union quarantine pests, EFSA should proceed to phase 2 risk assessment. The opinions should address entry pathways, spread, establishment, impact and include a risk reduction options analysis.

Additionally, EFSA is requested to develop further the quantitative methodology currently followed for risk assessment, in order to have the possibility to deliver an express risk assessment methodology. Such methodological development should take into account the EFSA Plant Health Panel Guidance on quantitative pest risk assessment and the experience obtained during its implementation for the Union candidate priority pests and for the likelihood of pest freedom at entry for the commodity risk assessment of High Risk Plants.

1.2 | Interpretation of the Terms of Reference

Malacosoma parallela is one of a number of pests covered by Annex 1C to the Terms of Reference (ToRs) to be subject to pest categorisation to determine whether it fulfils the criteria of a potential Union quarantine pest (QP) for the area of the EU excluding Ceuta, Melilla and the outermost regions of Member States referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores, and so inform EU decision making as to its appropriateness for potential inclusion in the lists of pests of Commission Implementing Regulation (EU) 2019/2072. If a pest fulfils the criteria to be potentially listed as a Union QP, risk reduction options will be identified.

1.3 | Additional information

This pest categorisation was initiated following the commodity risk assessments of *Berberis thunbergii* potted plants from Türkiye (EFSA PLH Panel, 2022a), *Malus domestica* plants for planting from Türkiye (EFSA PLH Panel, 2022b), and *Prunus persica* and *P. dulcis* plants from Türkiye (EFSA PLH Panel, 2023) in which *M. parallela* came to attention as an actionable pest. It is noteworthy that EPPO recommended *M. parallela* for regulation in 2003 when it was added to the EPPO A2 list of pests recommended for regulation in the EPPO region.

2 | DATA AND METHODOLOGIES

2.1 | Data

2.1.1 | Literature search

A literature search on *M. parallela* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the pest as search term. Papers relevant for the pest categorisation were reviewed, and further references and information were obtained from experts, as well as from citations within the references and grey literature.

2.1.2 | Database search

Pest information, on host(s) and distribution, was retrieved from the European and Mediterranean Plant Protection Organization (EPPO) Global Database (EPPO, online), the CABI databases and scientific literature databases as referred above in Section 2.1.1.

The Europhyt and TRACES databases were consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network run by the Directorate General for Health and Food Safety (DG SANTÉ) of the European Commission as a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. TRACES is the European Commission's multilingual online platform for sanitary and phytosanitary certification required for the importation of animals, animal products, food and feed of non-animal origin and plants into the European Union, and the intra-EU trade and EU exports of animals and certain animal products. Up until May 2020, the Europhyt database managed notifications of interceptions of plants or plant products that do not comply with EU legislation, as well as notifications of plant pests detected in the territory of the Member States and the phytosanitary measures taken to eradicate or avoid their spread. The recording of interceptions switched from Europhyt to TRACES in May 2020.

GenBank was searched to determine whether it contained any nucleotide sequences for *M. parallela* which could be used as reference material for molecular diagnosis. GenBank® (www.ncbi.nlm.nih.gov/genbank/) is a comprehensive publicly available database that as of August 2019 (release version 227) contained over 6.25 trillion base pairs from over 1.6 billion nucleotide sequences for 450,000 formally described species (Sayers et al., 2020).

2.2 | Methodologies

The Panel performed the pest categorisation for *M. parallela*, following guiding principles and steps presented in the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018), the EFSA guidance on the use of the weight of evidence approach in scientific assessments (EFSA Scientific Committee, 2017) and the International Standards for Phytosanitary Measures No. 11 (FAO, 2013).

The criteria to be considered when categorising a pest as a potential Union QP is given in Regulation (EU) 2016/2031 Article 3 and Annex I, Section 1 of the Regulation. Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. In judging whether a criterion is met the Panel uses its best professional judgement (EFSA Scientific Committee, 2017) by integrating a range of evidence from a variety of sources (as presented above in Section 2.1) to reach an informed conclusion as to whether or not a criterion is satisfied.

The Panel's conclusions are formulated respecting its remit and particularly with regard to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU) No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, deemed to be a risk management decision, the Panel will present a summary of the observed impacts in the areas where the pest occurs, and make a judgement about potential likely impacts in the EU. While the Panel may quote impacts reported from areas where the pest occurs in monetary terms, the Panel will seek to express potential EU impacts in terms of yield and quality losses and not in monetary terms, in agreement with the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018). Article 3 (d) of Regulation (EU) 2016/2031 refers to unacceptable social impact as a criterion for QP status. Assessing social impact is outside the remit of the Panel.

TABLE 1 Pest categorisation criteria under evaluation, as derived from Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column).

Criterion of pest categorisation	Criterion in regulation (EU) 2016/2031 regarding union quarantine pest (article 3)
Identity of the pest (Section 3.1)	Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and to be transmissible?
Absence/presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.

(Continues)

TABLE 1 (Continued)

Criterion of pest categorisation	Criterion in regulation (EU) 2016/2031 regarding union quarantine pest (article 3)
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways for entry and spread.
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?
Available measures (Section 3.6)	Are there measures available to prevent pest entry, establishment, spread or impacts?
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met.

3 | PEST CATEGORISATION

3.1 | Identity and biology of the pest

3.1.1 | Identity and taxonomy

Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and/or to be transmissible?

Yes. The identity of the species is established and ***M. parallela*** (Staudinger) is the accepted name.

M. parallela is an insect within the order Lepidoptera and family Lasiocampidae. It is commonly known as the mountain ring silk moth.

The EPPO code[1] (EPPO, 2019; Griessinger & Roy, 2015) for this species is: MALAPA (EPPO, online).

3.1.2 | Biology of the pest

Much of the literature describing the biology of *M. parallela* is in Russian, e.g. Daricheva and Dubatolov (1990), Degtyareva (1964), Grechkin (1956), Maslov (1988), Romanenko (1981), Sangov (2011), and Sarkissyan (1972), and difficult to access. Nevertheless, parts of the original texts in Russian were translated and datasheets in English based on Russian literature are provided by EPPO (2005) and CABI (2014). The text below is based on EPPO and CABI datasheets and supplemented with additional information from accessible literature.

M. parallela is univoltine (one generation per year) with six larval instars. The first instar larvae hatch in early spring (late March) from overwintered egg masses that were laid the previous year on branches and twigs of host plants. The larvae feed and build a nest of webbing among the twigs and branches just as the leaves of hosts are flushing. Initially, there is usually one nest per egg mass. During evenings and overnight, larvae feed on tender leaves close to the nest and they shelter in the nest during the day when not feeding. By the time larvae have developed to reach the third or fourth instar, many of the leaves close to their original nest will have been consumed and larvae need to move to feed on new leaves and build a new nest. When they develop into the fifth or sixth instar, the larvae leave the communal nest and begin a solitary life, presumably to avoid feeding competition. By early summer (May–early June) sixth instar larvae have completed their development and form pupae inside cocoons attached to host leaves and branches. Pupae develop during the early summer and adults emerge from early June until the end of July. Mating occurs soon after emergence; males die shortly after mating and females live for only 2 or 3 days during which they lay a single, cylindrical egg mass of 100–500 eggs encircling twigs (Sangov, 2011). Some females may lay two or three egg masses. Eggs laid during the summer will overwinter and the cycle begins again the following spring. *M. parallela* is found between 130 and 3000 m (Zolotuhin & Didmanidze, 2009). Development and timing of phenological events are strongly influenced by altitude, temperature and host plants. The literature is unclear with regard to the range in altitude that *M. parallela* prefers. CABI (2014) report that optimal conditions for development occur between 1000 and 1800 m although it can occur at altitudes of up to 2400 m. This contrasts with Zolotuhin and Didmanidze (2009) who reports that *M. parallela* is usually found at altitudes between 1600 and 3000 m.

[1]An EPPO code, formerly known as a Bayer code, is a unique identifier linked to the name of a plant or plant pest important in agriculture and plant protection. Codes are based on genus and species names. However, if a scientific name is changed the EPPO code remains the same. This provides a harmonised system to facilitate the management of plant and pest names in computerised databases, as well as data exchange between IT systems (EPPO, 2019; Griessinger & Roy, 2015)

3.1.3 | Host range/species affected

M. parallela is polyphagous with larvae feeding and damaging a range of deciduous trees and shrubs. Appendix A provides a detailed list of hosts and groups them into four categories in descending order of the seriousness of damage caused by *M. parallela*. For example, *Malus* (apple), *Prunus dulcis* (almond), and *Quercus robur* (English oak) are among the hosts most seriously damaged. *Prunus armeniaca* (apricot), *P. avium* (sweet cherry), *P. persica* (peach), and *Pyrus communis* (pear) can suffer significant damage. *Juglans regia* (walnut), *Populus tremula* (European aspen), *Ribes nigrum* (blackcurrant), *Rubus idaeus* (raspberry), and *Ulmus minor* (European field elm) can occasionally be damaged (EPPO, 2005).

3.1.4 | Intraspecific diversity

A subspecies named *M. parallela iranica* Zolotuhin & Zahiri has been reported (Zolotuhin & Zahiri, 2008). It is slightly smaller and a bit darker; it occurs mostly above 1600–1800 m but is found between 130 and 3000 m; there is little other information on the biology of the organism. There is no evidence to suggest that the subspecies presents a different risk to the EU. As such, this pest categorisation considers *M. parallela* as a whole and does not differentiate between the species and subspecies.

3.1.5 | Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, egg masses and nests of larvae can be detected during visual inspections of infested material. Adults can be captured in light traps. Morphological keys are available for species identification.

Symptoms

Symptoms of infestation include defoliation, which can be severe.

Detection

Eggs occur in masses encircling small twigs on host plants (Ashimov, 2010) and can be detected by visual inspection. However, webbing and silken nests, that are created by larvae, are up to 25 cm long and 17 cm wide (CABI, 2014) can be seen more easily. Adults fly at night and are attracted to light sources so they can be detected in conventional light traps.

Identification and description

Egg: Eggs are laid in a mass of up to 500 eggs (Sangov, 2011). Individual eggs are grey, approximately 1.1 mm long and 0.8 mm wide. They are covered by a female secretion (spumaline). The egg mass is initially white but darkens over time (Ashimov, 2010); the spumaline prevents eggs from desiccating and freezing (Darling & Johnson, 1982).

Il'insky (1962) provides a key for the identification of Russian forest pest Lepidoptera based on the morphology of their eggs.

Larva: Newly hatched larvae are between 2.0 and 2.5 mm long with a headwidth of 0.3 mm. Sixth instar larvae are between 40 and 50 mm long with a headwidth of 4.5 mm and are covered by long light-grey setae. Each larva has an ochre-orange coloured stripe along the dorsal surface with thin black lines crossing it. Black spots occur on each body segment. Ashimov (2010) and EPPO (2005) provide more detailed descriptions.

Pupa: brown 15–18 mm long and 4.8–6.0 mm wide, found inside a light-yellow cocoon 19–30 mm long and 9–14 mm wide.

Adult: wingspan approximately 30–45 mm, front wings are yellowish-ochre to brown-red with two transverse stripes. Zolotuhin and Zahiri (2008) provide a detailed morphological description of adults.

Daricheva and Dubatolov (1990) provide a morphological key for the identification of Lasiocampidae in Turkmenistan.

In Europe the related species *Malacosoma neustria* (lackey moth) is widespread and common. The eggs and early-instar larvae of the two species are similar in appearance and could be confused by non-experts.

Molecular identification: When Genbank was searched 21 November 2023, there were no accessions of *M. parallela*.

3.2 | Pest distribution

3.2.1 | Pest distribution outside the EU

M. parallela occurs in western and central parts of Asia, from eastern regions of Türkiye to Xinjiang Province in China and from Kazakhstan in the north to Iran in the south (Figures 1 and 2). It is also found in the Caucasus in the southern part of European Russia.

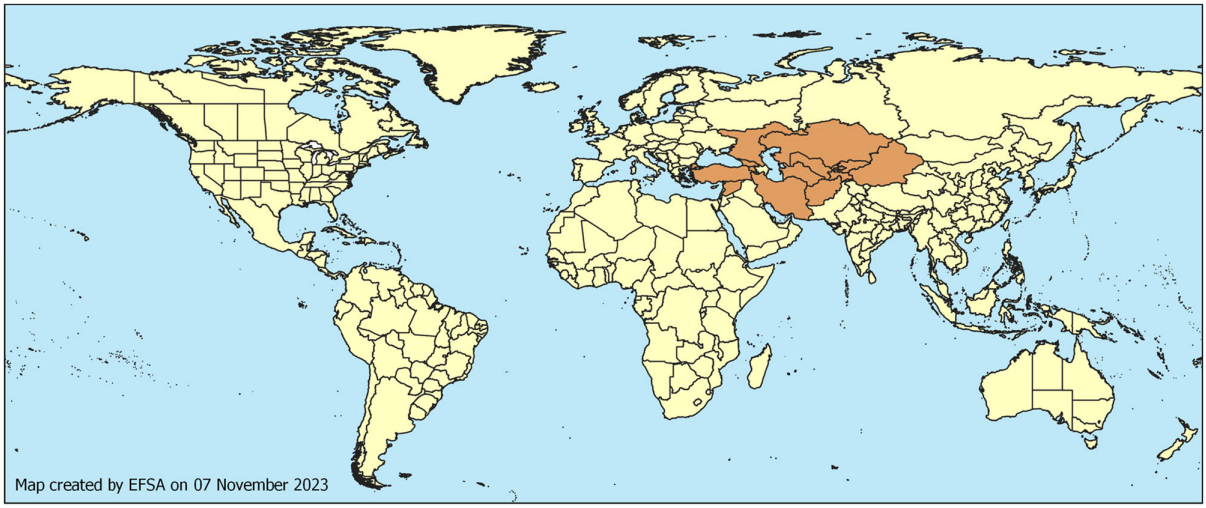

FIGURE 1 Global distribution of *Malacosoma parallela* (Source: EPPO Global Database EPPO, online) accessed on 29/10/2023 and literature; for details see Appendix B).

FIGURE 2 Close up of distribution of *Malacosoma parallela* in Asia. Darker shaded areas indicate countries in which *Malacosoma parallela* occurs; brown spots indicate specific locations of findings where available. *Note*: Map created by EFSA on 28th November 2023

Appendix B provides a table listing country distribution.

3.2.2 | Pest distribution in the EU

Is the pest present in the EU territory?

If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.

No, *M. parallela* is not known to occur in the EU.

3.3 | Regulatory status

3.3.1 | Commission implementing regulation 2019/2072

Malacosoma parallela is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072, an implementing act of Regulation (EU) 2016/2031. It is not known to be in any emergency EU plant health legislation either.

3.3.2 | Hosts or species affected that are prohibited from entering the union from third countries

A number of *M. parallela* hosts are prohibited from entering the EU (Table 2).

TABLE 2 List of plants, plant products and other objects that are *Malacosoma parallela* hosts whose introduction into the Union from certain third countries is prohibited (Source: Commission Implementing Regulation (EU) 2019/2072, Annex VI).

List of plants, plant products and other objects whose introduction into the union from certain third countries is prohibited			
	Description	**CN code**	**Third country, group of third countries or specific area of third country**
2.	Plants of […] *Quercus* L., with leaves, other than fruit and seeds	ex 0602 10 90 ex 0602 20 20 ex 0602 20 80 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 48 ex 0602 90 50 ex 0602 90 70 ex 0602 90 99 ex 0604 20 90 ex 1404 90 00	Third countries other than: […], Georgia, […], Russia (only the following parts: […], Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), […], Türkiye […]
8.	Plants for planting of […], *Crateagus* L., *Cydonia* Mill., *Malus* Mill., *Prunus* L., *Pyrus* L. and *Rosa* L., other than dormant plants free from leaves, flowers and fruits	ex 0602 10 90 ex 0602 20 20 ex 0602 20 80 ex 0602 40 00 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 48 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99	Third countries other than: […] Armenia, […], Georgia, […], Russia (only the following parts: […], Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), […], Türkiye […]
9.	Plants for planting of *Cydonia* Mill., *Malus* Mill., *Prunus* L. and *Pyrus* L. and their hybrids, […], other than seeds	ex 0602 10 90 ex 0602 20 20 ex 0602 90 30 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 48 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99	Third countries, other than: […], Armenia, […], Georgia, […], Russia (only the following parts: […], Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), […], Türkiye, […].

Points to note from Table 2: although a number of host genera are prohibited from entering into the EU, some are permitted from Armenia, Georgia, parts of Russia (the Southern Federal District, the North Caucasian Federal District and the Volga Federal District) and Türkiye, countries or regions of countries where *M. parallela* occurs.

The following *M. parallela* host genera are listed in Commission implementing regulation (EU) 2018/2019 as high-risk plants for planting, whose introduction into the Union is prohibited pending risk assessment other than as seeds, in vitro material, or naturally or artificially dwarfed woody plants:

- *Berberis* L.
- *Crataegus* L.
- *Fraxinus* L.
- *Juglans* L.
- *Lonicera* L.
- *Malus* Mill.
- *Populus* L.
- *Prunus* L.
- *Quercus* L.
- *Salix* L.
- *Sorbus* L.
- *Ulmus* L.

3.4 | Entry, establishment and spread in the EU

3.4.1 | Entry

Is the pest able to enter into the EU territory? If yes, identify and list the pathways.

Yes, *M. parallela* could enter the EU via the import of host plants for planting (excluding seed) or on cut branches.

Comment on plants for planting as a pathway.

Plants for planting provide the most likely pathway for entry into, and spread within, the EU.

Table 3 provides broad descriptions of potential pathways for the entry of *M. parallela* into the EU.

TABLE 3 Potential pathways for *Malacosoma parallela* into the EU.

Pathways description (e.g. host/intended use/source)	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI), special requirements (Annex VII) or phytosanitary certificates (Annex XI) within implementing regulation 2019/2072]
Host plants for planting (dormant/without leaves) (excluding seed)	Eggs	Annex VI prohibitions apply. Prohibitions on high-risk plants (EU 2018/2019) apply.
Host plants for planting (with buds or leaves)	Eggs, larvae, pupae	Annex VI prohibitions apply. Prohibitions on high-risk plants (EU 2018/2019) apply.
Host cut branches	Eggs, larvae, pupae	Annex VI prohibitions apply.

Egg masses are laid around thin twigs and not on thicker branches (Ashimov, 2010; Il'insky, 1962). Therefore, isolated bark, which is not harvested from twigs, is not considered a plausible pathway.

Appendix A lists the hosts of *M. parallela*. Some hosts are prohibited from entering the EU. Host plants such as *Chaenomeles*, *Cotoneaster* and *Rosa* are not prohibited from entering the EU.

Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As of 24 August 2023, there were no records of interceptions of *M. parallela* in the Europhyt and TRACES databases. The PLH Panel found no evidence that *M. parallela* had been intercepted. Noting that larvae (instars I–IV) are gregarious and that their nests are conspicuous, the PLH Panel considered such factors likely to mean that hosts infested with larvae would be detected prior to export. Egg masses, which are more difficult to detect, are the life stage most likely to enter the EU.

3.4.2 | Establishment

Is the pest able to become established in the EU territory?

Yes, biotic factors (host availability) and abiotic factors (climate suitability) suggest that parts of the EU would be suitable for establishment. Climate types found in countries where *M. parallela* occurs are also found in the EU.

Based on climate matching, large parts of the EU correspond to climate types that occur in countries where *M. parallela* occurs. Given the limited amount of data regarding detailed distribution of *M. parallela*, identifying the most suitable parts of the EU where establishment is possible is a challenge, and suggestions for specific areas would be highly uncertain.

Climatic mapping is the principal method for identifying areas that could provide suitable conditions for the establishment of a pest taking key abiotic factors into account (Baker, 2002; Baker et al., 2000). Availability of hosts is considered in Section 3.4.2.1. Climatic factors are considered in Section 3.4.2.2.

3.4.2.1 | *EU distribution of main host plants*

Many genera and species of *M. parallela* hosts are present or are grown widely across the EU (e.g. *Malus, Populus, Prunus, Quercus* and *Ulmus*). Appendix C provides maps of distribution (frequency of occurrences within the field observations as reported by the National Forest Inventories) for *Q. robur* and *P. avium*. *P. avium*, a host on which *M. parallela* can cause significant damage, grows into montane zones although at its highest altitudes it often grows only as a shrub (Welk et al., 2016). The polyphagous nature of the pest and wide host availability would support establishment in the EU.

3.4.2.2 | *Climatic conditions affecting establishment*

The countries in which *M. parallela* occurs have Köppen–Geiger climate types (Kottek et al., 2006) that also occur in the EU (Figure 3). The EPPO datasheet on *M. parallela* suggests that it could establish in the 'south and east of the European part of the EPPO region where its host plants are important forest, ornamental and fruit trees'. There is no mention of establishment in relation to mountainous regions. Of 26 mountain ranges partially or entirely in the EU, 14 extend above 1600 m (Appendix D) the altitude above which *M. parallela* is most commonly found in west-central Asia (Zolotuhin & Didmanidze, 2009; Zolotuhin & Zahiri, 2008). Whether *M. parallela* would establish in the EU at altitudes below those where it is normally found in Asia is uncertain.

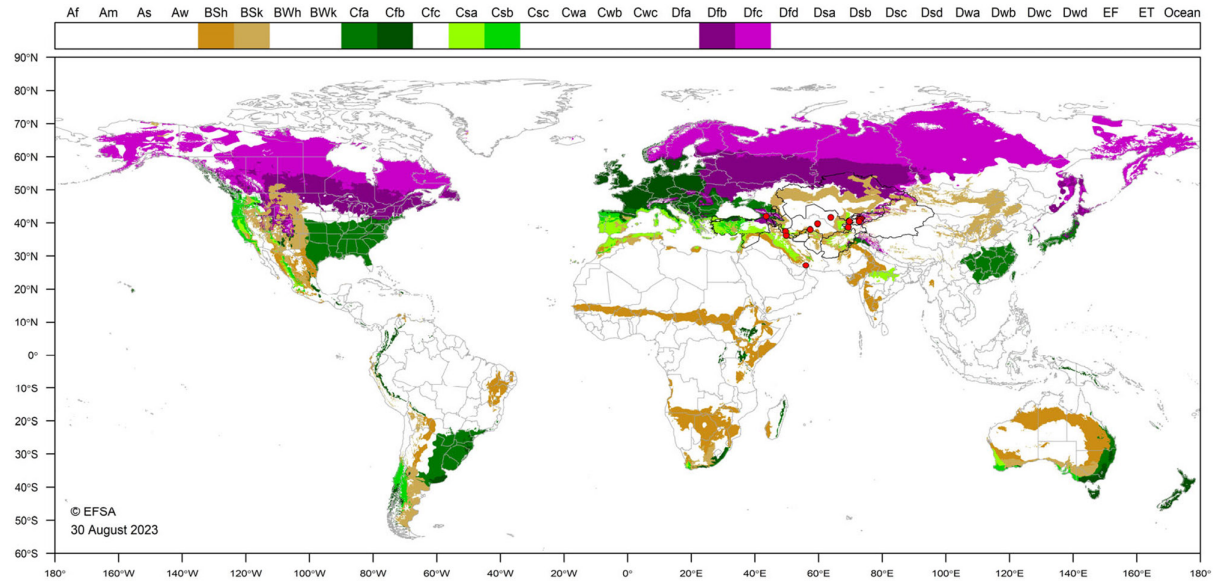

FIGURE 3 World distribution of eight Köppen-Geiger climate types that occur in the EU and in countries where *Malacosoma parallela* occurs.

3.4.3 | Spread

Describe how the pest would be able to spread within the EU territory following establishment?

M. parallela is a free-living organism that could spread naturally within the EU. However, adults are short lived (females live for only two or three days) so would not spread far.

Comment on plants for planting as a mechanism of spread.

Juvenile stages (eggs, larvae, pupae) could be carried with plants for planting. Eggs on dormant plants are the most likely life stage to be transported.

Adults of both sexes are nocturnal fliers but are short lived. During the day adults shelter on the trunk and branches of hosts.

M. parallela does not appear to have spread internationally in the past two decades; the current distribution of *M. parallela* as reported by EPPO (online) matches that reported in 2004 by CABI (CABI, 2004).

3.5 | Impacts

Would the pests' introduction have an economic or environmental impact on the EU territory?

Yes, the introduction of *M. parallela* into the EU could lead to serious outbreaks causing significant damage to forest, orchard, and amenity trees, including in mountainous areas.

M. parallela is regarded as an important defoliator of many deciduous trees; it can feed on stressed and healthy trees of different ages. In the mountains of Armenia, it is noted as a particular pest of oaks (*Quercus*) (EPPO, 2005). In the mountains of Tajikistan it is a pest of forests, fruit trees (e.g. almonds, apricots, cherries), and shrubs (Degtyareva, 1964; Grechkin, 1956). Daricheva and Dubatolov (1990) stated *M. parallela* could seriously harm fruit crops (e.g. apples, almonds, cherries) in Tajikistan.

Outbreaks can occur over large areas and result in host mortality. In China, Yang et al. (2005) lists *M. parallela* as one of the serious pests of apricot in Xinjiang where it feeds on the leaves. While regarded as a serious pest in west-central Asia, *M. parallela* is one pest among a suite of Lepidoptera that feed on the same hosts. For example, feeding by *Lymantria dispar* L. (Lepidoptera: Erebidae) (gypsy moth) and *M. parallela* larvae can cause 100% defoliation of wild fruit trees (Grechkin, 1956).

Sangov (2011) estimated that at altitudes from 1200 m to 1500 m, between 30% and 80% of almond trees in the Hissar mountains (Uzbekistan-Tajikistan) could be infested by *M. parallela*. There was a lower frequency of infestation at higher altitude, e.g. at 2300 m, between 10% and 15% of almond trees were affected. No measure of yield impact was provided.

Whether *M. parallela* would cause impacts at altitudes below those where impacts are normally reported in Asia is uncertain. However, much of the EU is further north than the countries where *M. parallela* occurs and based on an altitude-for-latitude model of temperature, similarity, an increase in 10 km latitude equates to an altitude increase of approximately 10 m (e.g. Jump et al., 2009). Tashkent (41.2995° N, 69.2401° E, 465 m asl, Uzbekistan) close to the centre of current *M. parallela* distribution, is approximately 970 km further south than Prague (50.0737° N, 14.4185° E, about 300 m above sea level). This represents an '*equivalent altitude*' of 1270 m, which is within the altitudes that Sangov (2011) reported damage to almond trees.

3.6 | Available measures and their limitations

Are there measures available to prevent pest entry, establishment, spread or impacts such that the risk becomes mitigated?

Yes, some hosts are already prohibited from entering the EU (see Section 3.3.2). Hosts that are permitted to enter require a phytosanitary certificate and a proportion of consignments are inspected. Additional options are available to reduce the likelihood of pest entry into the EU.

3.6.1 | Identification of potential additional measures

Phytosanitary measures are currently applied to a number of host genera (e.g. prohibitions – see Section 3.3.2). EPPO recommend that host plants for planting and cut branches originate in pest free areas (EPPO, 2005).

Additional potential risk reduction options and supporting measures are shown in Sections 3.6.1.1 and 3.6.1.2.

3.6.1.1 | *Additional potential risk reduction options*

Potential additional risk reduction and control measures are listed in Table 4.

TABLE 4 Selected control measures (a full list is available in EFSA PLH Panel, 2018) for pest entry/establishment/spread/impact in relation to currently unregulated hosts and pathways. Control measures are measures that have a direct effect on pest abundance.

Control measure/Risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/establishment/spread/impact)
Require pest freedom	Pest-free area for *Malacosoma parallela* (EPPO, 2017)	Entry/Spread
Growing plants in isolation	Young hosts could be raised in dedicated structures such as glass or plastic greenhouses. Place of production is insect proof.	Entry/Spread
Managed growing conditions	Plants should not be taken from the wild and be grown in officially registered nurseries, which are subject to an officially supervised control regime	Entry/Spread
Roguing and pruning	During nursery inspections, any egg masses on twigs or branches of plants detected could be pruned. However, whether such a measure would be practical on larger hosts is uncertain.	Entry/Spread
Chemical treatments on crops including reproductive material	Insecticides (e.g. systemic, biopesticides) could be used in nurseries. Widespread use of insecticides in forestry is prohibitively expensive but could be considered if eradicating a small outbreak in the EU.	Entry/Establishment/Spread/Impact
Chemical treatments on consignments or during processing	Fumigation (EPPO, 2017)	Entry/Spread
Waste management	Treatment of the waste (deep burial, composting, incineration, chipping, production of bioenergy, etc.) in authorised facilities and official restriction on the movement of waste.	Establishment/Spread
Conditions of transport	Plants providing a pathway should be transported outside of *M. parallela* flight periods or not transported through areas infested with *M. parallela* or transported in closed containers, to prevent infestation of harvested material (EPPO, 2017)	Entry/Spread
Post-entry quarantine and other restrictions of movement in the importing country	Could be used for dormant plants for planting potentially infested with egg masses although other measures would probably be more practical.	Entry/Spread

3.6.1.2 | *Additional supporting measures*

Potential additional supporting measures are listed in Table 5.

TABLE 5 Selected supporting measures (a full list is available in EFSA PLH Panel, 2018) in relation to currently unregulated hosts and pathways. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk reduction options that do not directly affect pest abundance.

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/spread/impact)
Inspection and trapping	Egg masses, larvae and pupae are visible and could be detected during visual inspections. Light traps could be used at sites of production.	Entry/Spread
Laboratory testing	Required to confirm diagnosis and identification of the pest.	Entry/Spread
Sampling	According to ISPM 31 (FAO, 2008), it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing. For inspection, testing and/or surveillance purposes the sample may be taken according to a statistically based or a non-statistical based sampling methodology.	Entry/Spread

(Continues)

TABLE 5 (Continued)

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/establishment/spread/impact)
Phytosanitary certificate and plant passport	Required to attest that a consignment meets phytosanitary import requirements a. phytosanitary certificate (imports) b. plant passport (EU internal trade)	Entry/Spread
Certified and approved premises	Certification of premises to ensure the phytosanitary compliance of consignments; for example, to enable traceability and provide access to information that can help prove the compliance of consignments with phytosanitary requirements of importing countries.	Entry/Spread
Delimitation of Buffer zones	ISPM 5 (FAO, 2023) defines a buffer zone as 'an area surrounding or adjacent to an area officially delimited for phytosanitary purposes in order to minimise the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate' (ISPM 5). The objectives for delimiting a buffer zone can be to prevent spread from the outbreak area and to maintain a pest free production place (PFPP), site (PFPS) or area (PFA).	Spread
Surveillance	Necessary to inform phytosanitary decision making	Spread/Establishment

3.6.1.3 | *Biological or technical factors limiting the effectiveness of measures*

Egg masses may be difficult to detect on large trees.

- Lack of specific adult attractants.
- Wide range of host plants (e.g. making inspection of buffer zones very difficult).

3.7 | Uncertainty

No key uncertainties were identified.

4 | CONCLUSIONS

M. parallela is a central Asian polyphagous pest, primarily affecting deciduous forest and orchard trees and shrubs. *M. parallela* satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union QP (Table 6).

TABLE 6 The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column).

Criterion of pest categorisation	Panel's conclusions against criterion in regulation (EU) 2016/2031 regarding union quarantine pest	Key uncertainties (casting doubt on the conclusion)
Identity of the pest (Section 3.1)	The identity of the species is established and *Malacosoma parallela* is the accepted name.	None
Absence/presence of the pest in the EU (Section 3.2)	*M. parallela* is not known to be present in the EU.	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	*M. parallela* could enter the EU via the import of host plants for planting that are not prohibited such as *Chaenomeles, Cotoneaster* and *Rosa* (excluding seed) and on cut branches. Biotic factors (host availability) and abiotic factors (climate suitability) suggest that parts of the EU would be suitable for establishment. Adults can fly and the pest could spread naturally within the EU although adults are short lived and so more extensive spread is likely via eggs on plants for planting.	None
Potential for consequences in the EU (Section 3.5)	The introduction of *M. parallela* into the EU could lead to outbreaks causing damage to forests, orchards and shrubs.	None
Available measures (Section 3.6)	Some hosts are already prohibited from entering the EU. Additional options are available to reduce the likelihood of pest entry and/or spread.	None

TABLE 6 (Continued)

Criterion of pest categorisation	Panel's conclusions against criterion in regulation (EU) 2016/2031 regarding union quarantine pest	Key uncertainties (casting doubt on the conclusion)
Conclusion (Section 4)	*M. parallela* satisfies all the criteria assessed by EFSA for consideration as a potential Union quarantine pest.	None
Aspects of assessment to focus on/ scenarios to address in future if appropriate:	A detailed assessment of the biology of the pest and the distribution of hosts in the EU could better inform magnitude of impacts.	

ABBREVIATIONS

EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MS	Member State
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

GLOSSARY

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 2023)
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 2023)
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2023)
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2023)
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2023)
Greenhouse	A walk-in, static, closed place of crop production with a usually translucent outer shell, which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products (PPPs) into the environment.
Hitchhiker	An organism sheltering or transported accidentally via inanimate pathways including with machinery, shipping containers and vehicles; such organisms are also known as contaminating pests or stowaways (Toy & Newfield, 2010).
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2023)
Pathway	Any means that allows the entry or spread of a pest (FAO, 2023)
Phytosanitary measures	Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2023)
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2023)
Risk reduction option (RRO)	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 RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO, 2023)

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CONFLICT OF INTEREST

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

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APPENDIX A

Malacosoma parallela host plants/species affected

Hosts are grouped into four categories in descending order of the seriousness of damage caused by *M. parallela*, based on the EPPO datasheet (2005), the CABI Crop Protection Compendium (2014), and literature.

Host status	Family	Pref_name	Common name	Reference
Most serious damage	Rosaceae	*Malus domestica*	Apple	EPPO (2005)
	Rosaceae	*Malus sieversii*	Crabapple	EPPO (2005)
	Rosaceae	*Prunus bucharica*	Bokhara almond	EPPO (2005)
	Rosaceae	*Prunus dulcis*	Almond	EPPO (2005)
	Fagaceae	*Quercus boissieri*		EPPO (2005)
	Fagaceae	*Quercus infectoria*	Aleppo oak	EPPO (2005)
	Fagaceae	*Quercus macranthera*	Caucasian oak	EPPO (2005)
	Fagaceae	*Quercus robur*	English oak	EPPO (2005)
Significant damage	Berberidaceae	*Berberis integerrima*	seedless Barberry	EPPO (2005)
	Rosaceae	*Chaenomeles japonica*	Japanese quince	EPPO (2005)
	Rosaceae	*Cotoneaster insignis*	–	EPPO (2005)
	Rosaceae	*Cotoneaster suavis*	–	EPPO (2005)
	Rosaceae	*Crataegus hissarica*	–	EPPO (2005)
	Rosaceae	*Crataegus pontica*	–	EPPO (2005)
	Rosaceae	*Crataegus turkestanica*	–	EPPO (2005)
	Rosaceae	*Cydonia oblonga*	Quince	EPPO (2005)
	Rosaceae	*Prunus armeniaca*	Apricot	EPPO (2005)
	Rosaceae	*Prunus avium*	Sweet cherry	EPPO (2005)
	Rosaceae	*Prunus cerasus*	Sour cherry	EPPO (2005)
	Rosaceae	*Prunus divaricata*	–	EPPO (2005)
	Rosaceae	*Prunus mahaleb*	Mahaleb cherry	EPPO (2005)
	Rosaceae	*Prunus padus*	Bird cherry	EPPO (2005)
	Rosaceae	*Prunus persica*	Peach	EPPO (2005)
	Rosaceae	*Pyrus communis*	Pear	EPPO (2005)
	Rosaceae	*Rosa canina*	Dog rose	EPPO (2005)
	Rosaceae	*Rosa corymbifera*	–	EPPO (2005)
	Rosaceae	*Rosa kokanica*	–	EPPO (2005)
	Rosaceae	*Rosa maracandica*	–	EPPO (2005)
	Salicaceae	*Salix excelsa*	Crack willow	EPPO (2005)
	Salicaceae	*Salix tenuijulis*	–	EPPO (2005)
	Rosaceae	*Sorbus persica*	–	EPPO (2005)
	Rosaceae	*Sorbus turkestanica*	–	EPPO (2005)
Occasional damage	Polygonaceae	*Atraphaxis pyrifolia*	Pear-leaved atraphaxis	EPPO (2005)
	Elaeagnaceae	*Elaeagnus angustifolia*	Russian olive	EPPO (2005)
	Oleaceae	*Fraxinus sogdiana*	–	EPPO (2005)
	Elaeagnaceae	*Hippophae rhamnoides*	Sea buckthorn	EPPO (2005)
	Juglandaceae	*Juglans regia*	Walnut	EPPO (2005)
	Caprifoliaceae	*Lonicera korolkowii*	–	EPPO (2005)
	Caprifoliaceae	*L. nummulariifolia*	–	EPPO (2005)
	Tamaricaceae	*Myricaria bracteata*	–	EPPO (2005)
	Salicaceae	*Populus alba*	Silver-leaf poplar	EPPO (2005)
	Salicaceae	*Populus tremula*	European aspen	EPPO (2005)
	Grossulariaceae	*Ribes nigrum*	Blackcurrant	CABI (2014)
	Grossulariaceae	*Ribes rubrum*	Red currant	EPPO (2005)
	Rosaceae	*Rubus idaeus*	Raspberry	EPPO (2005)
	Rosaceae	*Rubus turkestanicus*	–	EPPO (2005)
	Ulmaceae	*Ulmus minor*	European field elm	EPPO (2005)

(Continued)

Host status	Family	Pref_name	Common name	Reference
Host	Betulaceae	*Carpinus*	Hornbeam	Zolotuhin and Didmanidze (2009)
	Caprifoliaceae	*Lonicera*	Honeysuckle	Zolotuhin and Didmanidze (2009)
	Tamaricaceae	*Myricaria*	–	Zolotuhin and Didmanidze (2009)
	Rosaceae	*Rosa dumetorum*	–	EPPO (online)
	Vitaceae	*Vitis*	Grapevine	Zolotuhin and Didmanidze (2009)

APPENDIX B

Distribution of *Malacosoma parallela*

Distribution records based on EPPO Global Database (EPPO, online) and literature.

Region	Country	Sub-national (e.g. state)	Status
North America			No records, assumed absent
Central America			No records, assumed absent
South America			No records, assumed absent
Europe	Georgia[a]		Present, no details
	Russia	Southern European Russia (Caucasus including Dagestan and Chechnya)	Present, restricted distribution
Africa			No records, assumed absent
Asia	Afghanistan		Present, no details
	Armenia		Present, no details
	China		Present, restricted distribution
		Xinjiang	Present, no details
	Iran[b]		Present, restricted distribution
	Kazakhstan		Present, restricted distribution
	Kyrgyzstan		Present, no details
	Syria		Present, no details
	Tajikistan		Present, no details
	Türkiye[c]	Ağri, Erzincan, Erzurum, Kars and Sivas (eastern/Asian Türkiye)	Present, no details
	Turkmenistan		Present, no details
	Uzbekistan		Present, no details
Oceania			No records, assumed absent

[a] Didmanidze (2008) described *M. parallela* as rare in Eastern Georgia (Tbilisi and Borjomi).

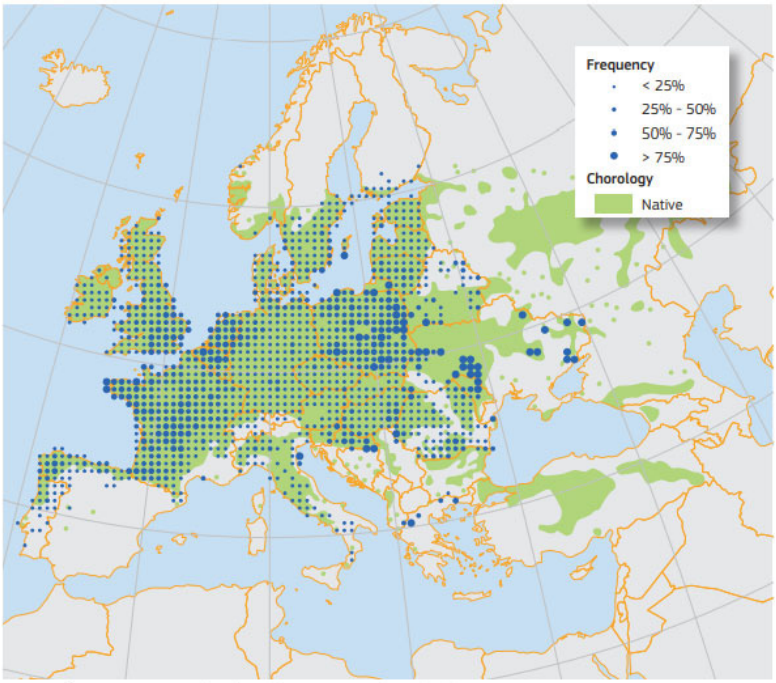
[b] North, west and central regions of Iran (Mohammadian, 2006).

[c] While the most western part of Türkiye is in Europe, *M. parallela* is reported only from regions in eastern (Asian) Türkiye (Koçak & Kemal, 2006).

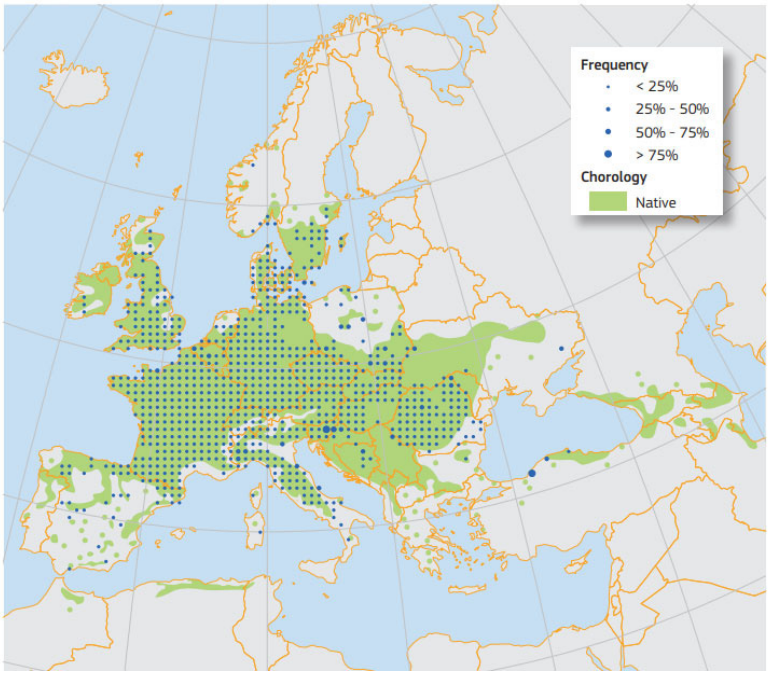
The presence of *M. parallela* in Azerbaijan (as reported by Didmanidze (2008) and Dubatolov and Zolotuhin (1992)) was declared as invalid by the NPPO of Azerbaijan (EPPO, online).

APPENDIX C

Distribution of two *Malacosoma parallela* hosts



Plot distribution and simplified chorology map for *Quercus robur*. Frequency of *Quercus robur* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *Q. robur* is derived after EUFORGEN (2008a).



Plot distribution and simplified chorology map for *Prunus avium*. Frequency of *Prunus avium* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *P. avium* is derived after EUFORGEN (2008b).

Top: https://ies-ows.jrc.ec.europa.eu/efdac/download/Atlas/pdf/Quercus_robur_petraea.pdf.
Bottom: https://ies-ows.jrc.ec.europa.eu/efdac/download/Atlas/pdf/Prunus_avium.pdf.