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SCIENTIFIC OPINION

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Pest categorisation of *Morganella longispina*

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The declarations of interest of all scientific experts active in EFSA's work are available at https://open.efsa.europa.eu/experts

Abstract

Following the commodity risk assessment of *Acer palmatum* plants grafted on *Acer davidii* from China, in which *Morganella longispina* (Hemiptera: Diaspididae) was identified as a pest of possible concern, the European Commission requested the EFSA Panel on Plant Health to conduct a pest categorisation of *M. longispina* for the territory of the European Union (EU). The origin of the scale insect *M. longispina* is uncertain, with either South America or eastern Asia suggested as the native range. The geographic distribution of the species includes many countries of the continents of Africa, North and South America, Asia and Oceania. *M. longispina* is polyphagous, feeding on plants assigned to 86 genera in 42 families. Important crops of the EU that may be affected by this insect are avocado, citrus, fig, peach, plum, olive and walnut. It is a viviparous insect with several generations per year in Algeria. Host availability and climate suitability indicate that the southern EU countries would support the establishment of *M. longispina*. The introduction of this pest would likely have an economic impact on several crops in the EU as it can cause significant damage to host plants. Uncertainty exists, however, about the magnitude of yield and quality losses due to the insect, and this is a key uncertainty. *M. longispina* is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072. Phytosanitary measures are available to reduce the likelihood of entry, establishment and spread of the pest into the EU. All criteria assessed by EFSA for consideration as a potential quarantine pest are met.

KEYWORDS

Diaspididae, Hemiptera, Maskell scale, pest risk, plant health, plant pest, quarantine

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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

Morganella longispina (Morgan) is one of a number of pests relevant to Annex 1C of the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a potential Union quarantine pest 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 quarantine pest, risk reduction options will be identified.

1.3 | Additional information

This pest categorisation was initiated following the commodity risk assessments of *Acer palmatum* plants grafted on *Acer davidii* from China (EFSA PLH Panel, 2022), in which *M. longispina* was identified as a relevant pest of possible concern for the EU, not yet regulated, which could potentially enter the EU on *Acer* plants.

2 | DATA AND METHODOLOGIES

2.1 | Data

2.1.1 | Literature search

A literature search on *M. longispina* was conducted at the beginning of the categorisation (21/5/2024) in the ISI Web of Science and Scopus bibliographic databases, using the scientific name of the pest, the synonyms, other scientific names and the international common names as search terms. 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 papers retrieved during scientific literature search in databases referred above (Section 2.1.1).

Data about the import of commodity types that could potentially provide a pathway for the pest to enter the EU and about the area of hosts grown in the EU were obtained from EUROSTAT (Statistical Office of the European Communities).

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. longispina* 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 October 2024 (release version 263.0) contained over 36.5 trillion base pairs from over 5.13 billion nucleotide sequences representing a wide range of formally described species (Sayers et al., 2024).

2.2 | Methodologies

The Panel performed the pest categorisation for *M. longispina* 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), the protocol for pest categorisations as presented in the EFSA standard protocols for scientific assessments (EFSA PLH Panel, 2024; Kertesz et al., 2024) and the International Standards for Phytosanitary Measures No. 11 (FAO, 2013).

The criteria to be considered when categorising a pest as a potential Union quarantine pest (QP) are 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. Whilst 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 quarantine pest 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.
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

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 pest is established and *Morganella longispina* (Morgan, 1889) is the accepted name.

3.1.1 | Identity and taxonomy

Morganella longispina (Morgan, 1889), known also as the maskell scale, is an insect within the order Hemiptera, suborder Sternorrhyncha, family Diaspididae. *M. longispina* was first described as *Aspidiotus longispina* by Morgan in 1889 on *Cupania supida* in the area Demerara of Guyana. It was also described by Cockerell in 1897 as *Aspidiotus* (*Morganella*) *maskelli* from Ohia tree in Kailua, N. Kona, Hawaii, USA. Moreover, Maskell in 1898 described the species as *A. longispina ornata* from various trees in Hawaii, USA and on an undetermined plant in Mauritius (García Morales et al., 2016). Leonardi in 1900 transferred the species *A. longispina ornata* and *Aspidiotus* (*Morganella*) *maskelli* to the genus *Hamiberlesia*. Lastly, Fernand in 1903 transferred the species *A. longispina* and *Aspidiotus* (*Morganella*) *maskelli* to the genus *Morganella*. The species *M. longispina* and *M. maskelli* were found to be the same species by Borchs in 1966 who declared the later one as junior synonym of *M. longispina*. Other common name of the species is plumose scale. The EPPO code of the species is MORGLO (EPPO, 2019; Griessinger & Roy, 2015).

3.1.2 | Biology of the pest

M. longispina is a polyphagous insect of uncertain origin, probably from either South America (Miller & Davidson, 2005) or eastern Asia (Takagi, 2007). It is viviparous and completes several generations per year in Algeria (Miller & Davidson, 2005). Its lifecycle includes egg, two nymphal instars and adult for females, while it includes for males, egg, two nymphal instars, prepupa, pupa and adult (Rosen, 1990). In armoured scale insects (Diaspididae) such as *M. longispina*, the first-instar nymphs, known also as crawlers are the only stage able to disperse (by wind or hitchhiking on humans or animals) and colonise new plants. Mortality due to abiotic factors is high in this stage (Watson, 2002). Once crawlers locate a suitable feeding site, they insert their mouthparts into the host plant and the females remain there for the rest of their lives. Adult males have a pair of wings and can fly short distances (Magsig-Castillo et al., 2010). Moreover, they lack functional mouth parts and have a very short life span (Watson, 2002). Scales may be found throughout the year in Miami (Hamon, 1981). According to Ooi et al. (2002), in Florida, the number of *M. longispina* infested branches of carambola plants (*Averrhoa carambola*) peaked during November and was reduced between the months of June and July. Takagi (2003) reported that *M. longispina* occurs only on the twigs and branches of various plants. However, Miller and Davidson (2005) stated

that the insects occur also on fruits of their host plants and on the roots of *Nerium*, several feet underground in Bermuda. Hamon (1981) also reported that this scale insect has been found on the fruits of *Citrus* spp. in Florida. The scale has also been recorded to feed on avocado and *Aleurites moluccanus* leaves in Hawaii (Swezey, 1950).

3.1.3 | Host range/species affected

M. longispina is polyphagous, feeding on 153 plant species assigned to 86 genera in 42 families. The full list of host plant species is presented in Appendix A. There are many important crops in the EU that are hosts such as avocado (*Persea americana*) (Swezey, 1950), *Citrus* spp. (Claps et al., 2001; Claps & Dos Santos Wolff, 2003; Cohic, 1958; Nakahara, 1982), fig (*Ficus carica*) (Cohic, 1958; Saighi et al., 2005), peach (*Prunus persica*), plum (*Prunus domestica*) (Claps & Dos Santos Wolff, 2003), olive (*Olea europaea*) (Saighi et al., 2005) and walnut (*Juglans regia*) (Verma & Dinabandhoo, 2005).

3.1.4 | Intraspecific diversity

To the best of the Panel's knowledge, no intraspecific diversity of ecological significance is reported for this species.

3.1.5 | Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, there are methods available for detection and morphological and molecular identification of *M. longispina*.

Detection

Careful visual examination of the bark of the hosts plants for circular, highly convex, almost black scale covers, each with dark central exuviae and a thick ventral scale should be conducted to detect *M. longispina* (Watson, 2002). However, nymphs and adult females are very small and often difficult to detect. Thus, the inspections may not be successful when the insect density is low, and the signs of presence are scarce.

Identification

The identification of *M. longispina* requires microscopic examination of slide-mounted adult females and verification of the presence of key morphological characteristics. A detailed morphological description and illustration of the adult female can be found in Miller and Davidson (2005).

Molecular diagnostic protocols for species identification have been suggested by Schneider et al. (2018), Normark et al. (2019) and Peterson et al. (2020), based on partial sequences of Cytochrome Oxidase I (COI) and/or Cytochrome Oxidase II (COII), 28S ribosomal RNA and Elongation Factor 1 alpha (EF1α) genes (NCBI, 2024).

Symptoms

M. longispina may feed on twigs, branches, fruits, roots (Miller & Davidson, 2005) and leaves (Swezey, 1950). According to Swezey (1950), Peña (1993), Cohic (1958) and Guerout (1969), the main symptoms of infestation are:

- Leaves with yellowing spots on the upper surface, caused by the presence of the scales beneath (Swezey, 1950).
- Bark cracking in mango (Peña, 1993).
- Exudation of sap in mango (Peña, 1993).
- Decline and wilting of upper branches in mango (Peña, 1993).
- Formation of cankerous tumours on fig (Cohic, 1958).
- Trunk crusting that can lead to local necrosis on papaya (Guerout, 1969).
- Drying out of branches (Cohic, 1958).
- Plant death (Cohic, 1958; Miller & Davidson, 2005).

Note that the above symptoms are common to other plant-sap feeding insects and should not be considered as species-specific.

Description

The adult female's scale cover is convex, circular to slightly oval, grey to black. It is unusually thick, with the ventral cover as thick as the dorsal cover, bivalved, shed skins central to subcentral, black when rubbed. The male scale cover is similar in texture and colour to the female cover, elongate, shed skin submarginal, black when rubbed. The body of the young adult female is white, turning light yellow in older females. The eggs and the crawlers are yellow (Miller & Davidson, 2005).

3.2 | Pest distribution

3.2.1 | Pest distribution outside the EU

The geographic distribution of the species includes several countries of the continents of Africa, North and South America, Asia and Oceania (Figure 1). For a detailed list of countries where *M. longispina* is known to be present, see Appendix B.

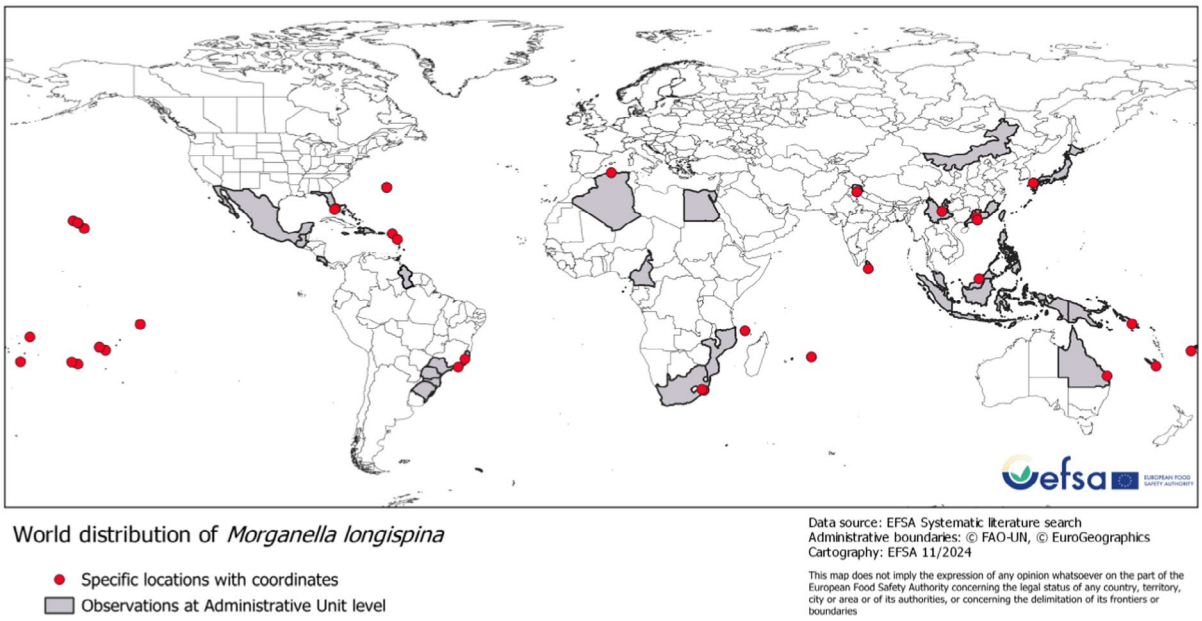

FIGURE 1 Global distribution of *Morganella longispina* (Source: Literature; for details see Appendix B).

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. longispina* is not known to be present in the EU territory.

3.3 | Regulatory status

3.3.1 | Legislation addressing the pest

M. longispina is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072, an implementing act of Regulation (EU) 2016/2031, or amendments to high risk plants Regulation (EU) 2018/2019 or in any emergency plant health legislation.

3.3.2 | Legislation addressing the hosts

TABLE 2 List of plants, plant products and other objects that are *Morganella longispina* 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**
3.	Plants of *Populus* 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	Canada, Mexico, United States
4.	Isolated bark of *Castanea* Mill.	ex 1404 90 00 ex 4401 40 90	All third countries
7.	Isolated bark of *Populus* L.	ex 1404 90 00 ex 4401 40 90	The Americas
8.	Plants for planting of […] *Prunus* 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: 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 (Severo-Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Türkiye, Ukraine and the United Kingdom
9.	Plants for planting of […] *Malus* Mill., *Prunus* L. […], 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: Albania, Algeria, Andorra, Armenia, Australia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canada, Canary Islands, Egypt, Faeroe Islands, Georgia, Iceland, Israel, Jordan, Lebanon, Libya, Liechtenstein, Moldova, Monaco, Montenegro, Morocco, New Zealand, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny 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, Syria, Tunisia, Türkiye, Ukraine, the United Kingdom and United States other than Hawaii.
11.	Plants of *Citrus* L., […] and their hybrids, other than fruits and seeds	ex 0602 10 90 ex 0602 20 20 0602 20 30 ex 0602 20 80 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 50 ex 0602 90 70 ex 0602 90 91 ex 0602 90 99 ex 0604 20 90 ex 1404 90 00	All third countries
18.	Plants for planting of Solanaceae other than seeds and the plants covered by entries 15, 16 or 17	ex 0602 90 30 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: Albania, Algeria, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Egypt, Faeroe Islands, Georgia, Iceland, Israel, Jordan, Lebanon, Libya, Liechtenstein, Moldova, Monaco, Montenegro, Morocco, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo-Zapadny 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, Syria, Tunisia, Türkiye and Ukraine and the United Kingdom.

Plants for planting of *Acacia* Mill., *Acer* L., *Bauhinia* L., *Castanea* Mill., *Corylus* L., *Ficus carica* L., *Fraxinus* L., *Jasminum* L., *Juglans* L., *Ligustrum* L., *Malus* Mill., *Nerium* L., *Persea* Mill., *Populus* L., *Prunus* L. and *Salix* L. which are hosts of *M. longispina* (Appendix A), are considered High Risk Plants for the EU and their import is prohibited pending risk assessment (EU 2018/2019).

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, the pest could enter the EU territory. Possible pathways of entry are plants for planting, fruits, cut flowers and cut branches.

Comment on plants for planting as a pathway.

Plants for planting are one of the main pathways for *M. longispina* to enter the EU although many of the host plants from some third countries are prohibited (Table 3).

TABLE 3 Potential pathways for *Morganella longispina* into the EU.

Pathways	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI), special requirements (Annex VII) or phytosanitary certificates (Annex XI) within Implementing Regulation 2019/2072]
Plants for planting	Eggs, nymphs and adults	Plants for planting that are hosts of *M. longispina* and are prohibited from being imported from third countries (Regulation 2019/2072, Annex VI) are listed in Table 2. The host plants which are considered high risk plants (EU 2018/2019) for the EU and their import is prohibited until a full risk assessment has been carried out are listed below Table 2 in Section 3.3.2. A phytosanitary certificate is required for plants for planting from third countries to be imported into the EU (Regulation 2019/2072, Annex XI, Part A).
Cut flowers or cut branches	Eggs, nymphs and adults	Cut flowers and flower buds of a kind suitable for bouquets or for ornamental purposes and foliage, branches and other parts of plants, without flowers or flower buds, being goods of a kind suitable for bouquets or for ornamental purposes from third countries where the species occur require a phytosanitary certificate (Regulation 2019/2072, Annex XI, Part A).
Fruits	Eggs, nymphs and adults	A phytosanitary certificate is required for fruits from third countries to be imported into the EU (2019/2072, Annex XI, Part A).

M. longispina has many plant species as hosts (Appendix A). Although some import prohibitions exist for certain host plants from third countries (Regulation 2019/2072, Annex VI and Regulation 2018/2019, Annex I), there are many other hosts (e.g. *Olea europaea, Platanus* sp.) that can be imported into the EU.

Fruits of some host plants of *M. longispina* (citrus, olive, avocado, peach, plum, guava, mango, papaya and fig) are imported into the EU from areas where the pest occurs. A phytosanitary certificate for fruits that are imported into the EU is required (Regulation 2019/2072, Annex XI, Part A and Regulation 2018/2019, Annex II). However, fruits may carry insects and this may be a pathway for their entry. Banana (*Musa* spp.) which is a host for *M. longispina*, is exempt by Regulation 2019/2072, Annex XI, Part C and a phytosanitary certificate is not required for its introduction into the Union territory. Detailed data of the annual imports of host plant commodities into the EU from countries where the pest occurs are provided in Appendix C.

Notifications of interceptions of harmful organisms began to be compiled in EUROPHYT in May 1994 and in TRACES in May 2020. As at 10/07/2024 there were no records of interception of *M. longispina* in the EUROPHYT and TRACES databases (EUROPHYT, 2024).

M. longispina was intercepted in South Korea on citrus fruit from USA (Suh et al., 2013) and in the UK on *Annona muricata* from Saint Lucia (Malumphy, 2014).

3.4.2 | Establishment

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

Yes, in the southern EU countries the climate is suitable and there are many available hosts that can support establishment.

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). One of the approaches used in EFSA pest categorisations is based on the Köppen–Geiger climate classification (version of Kottek et al., 2006; Rubel et al., 2017) which gives a first global estimate of potentially suitable areas based on the climate types present in the EU. 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*

M. longispina is a polyphagous pest feeding on a wide range of crops (Appendix A). The main cultivated host plants of the pest which are economically important in the EU are avocado, banana, citrus, fig, olive, stone fruits and walnut. Their production data in the EU between 2019 and 2023 are shown in Table 4.

TABLE 4 Crop area of *Morganella longispina* hosts in EU in 1000 ha (Eurostat accessed on 14/6/2024).

Crop	2019	2020	2021	2022	2023
Avocados	17.50	19.58	22.86	25.05	–
Bananas	18.27	22.11	22.00	21.27	–
Citrus	512.83	522.10	519.96	520.86	523.71
Figs	25.59	27.63	25.79	26.29	28.58
Olives	5071.59	5104.20	5007.50	4986.66	5086.54
Stone fruits	612.67	–	608.91	602.90	603.92
Walnuts	87.62	99.21	97.00	102.44	100.81

3.4.2.2 | *Climatic conditions affecting establishment*

M. longispina is a cosmopolitan species distributed in some tropical and sub-tropical areas of the continents of Africa, South and North America (Florida), Asia and Oceania, mainly under climate types that are not present in the EU. However, it has been reported in regions with climate types occurring also in the EU such as Cfa (certain areas of Brazil and Australia), BSh (in Australia) and Csa (in Algeria). The biology of this pest is little studied and no temperature thresholds for development have been reported. Consequently, there is some uncertainty regarding the climatic requirements of the insect. Figure 2 shows the world distribution of selected Köppen–Geiger climate types (Kottek et al., 2006) that occur in the EU, and which occur in countries where *M. longispina* has been reported. Climate types Cfb and Cfc were removed from the figure due to their very limited occurrence. Dfb and Dfc were also removed as they occur in the Kullu Valley (India) which is characterised by a sub-tropical climate delimited by the Himalayan ranges.

Southern EU countries include favourable climate types that support the establishment of *M. longispina*. There is uncertainty if warmer areas of Cfb climate in central EU countries may also support establishment. Establishment could also occur in glasshouses and on indoor plantings in cooler areas.

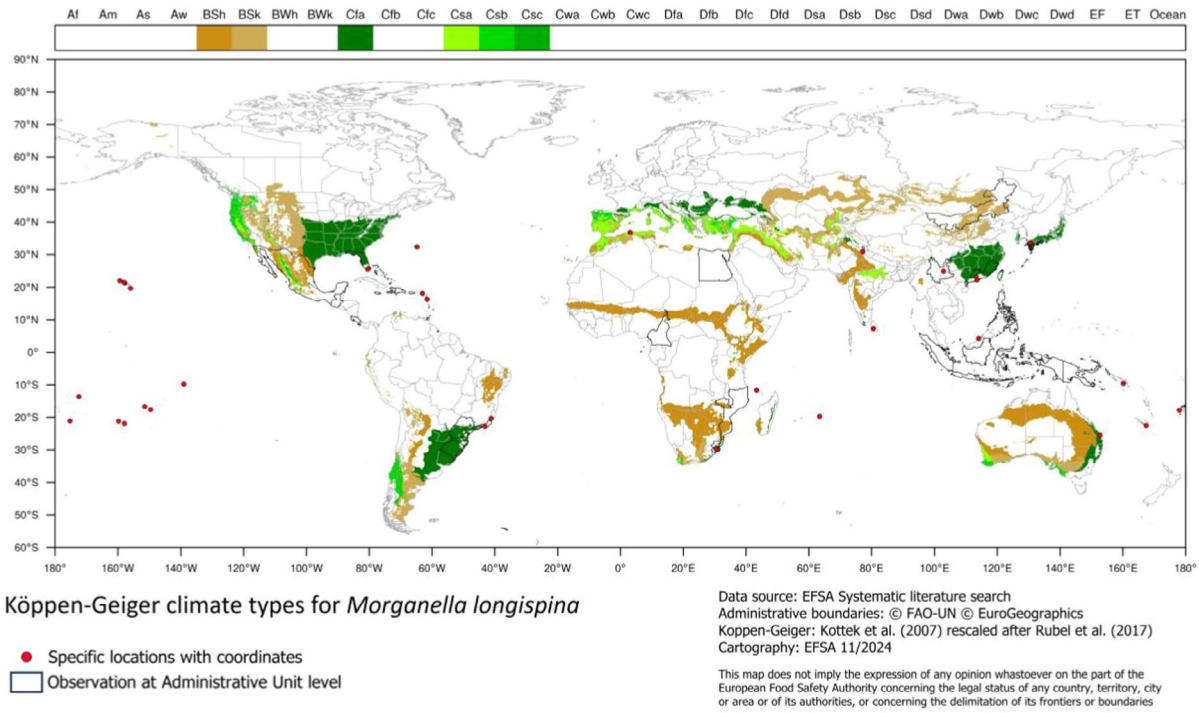

FIGURE 2 World distribution of Köppen–Geiger climate types that occur in the EU and in countries, regions and locations (red dots) where *Morganella longispina* has been reported. Climate types Cfb, Cfc, Dfb and Dfc were removed due to their very limited occurrence in the distribution area of *M. longispina*.

3.4.3 | Spread

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

Comment on plants for planting as a mechanism of spread.

The trade of infested plants for planting and other plant material are the main pathways of *M. longispina* spread within the EU territory.

The first-instar nymphs (crawlers) of the pest are mobile and they can spread over short distances and colonise new areas. For dispersal over longer distances crawlers make use of air currents (Magsig-Castillo et al., 2010). *M. longispina* may also be dispersed by animal contact. Mortality due to abiotic factors is high in this stage. Infested plants for planting and other plant material are the main pathways of *M. longispina* long distance dispersal.

3.5 | Impacts

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

Yes, if *M. longispina* established in the EU, it would most probably have an economic impact on its host species. Uncertainty exists about the magnitude of yield and quality losses, and this is a key uncertainty.

M. longispina is a common pest on mango trees in Florida (USA), infesting the trunk, branches and buds. Severe infestations cause cracking of the bark, exudation of sap and decline of upper branches (Peña, 1993). On papaya trees, it causes crusting of the trunk which can lead to local necrosis (Guerout, 1969). Cohic (1958) noted that *M. longispina* is a pest in New Caledonia and infestation can sometimes cause the death of plants of the genera *Bauhinia* and *Jasminum*. Additionally, on fig trees, the insect causes the formation of cankerous tumours and drying out of many branches (Cohic, 1958). Balachowsky (1927) noted that it is a serious pest of fig and *Fraxinus berlanderiana* in Algeria. Swezey (1950) found the species to be abundant on avocado leaves in Hawaii, causing yellow spots on the upper surface, which were caused by the scale's sucking activity

in the lower surface. In French Polynesia, *M. longispina* infest grapefruit, lemon and fig causing significant damage (Watson, 2002). According to Brimblecombe (1955) the insect may sometimes be in dense populations in cultivated figs and control measures are required. However, it is reported as a pest of minor importance of citrus in Brazil and China (Hamon, 1981; Miller & Davidson, 2005). There is no recent information on impact, and no quantitative data regarding yield losses (either in volume or in quality of the harvested product) have been found. However, according to the aforementioned evidence from literature, the pest is able to cause damage and at least in the past it has been considered as a pest in its current areas of distribution. In these areas, activity by natural enemies might have contributed to mitigating its impact and damage potential. Uncertainty exists about the magnitude of yield and quality losses, and this is a key uncertainty.

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, there are phytosanitary measures that prohibit several plant genera as plants for planting from third countries (Section 3.3.2), and requirements for a phytosanitary certificate for other species and fruits to be imported into the EU territory (Section 3.4.1). There are also additional measures (Section 3.6.1) to eliminate the likelihood of *M. longispina* entry, establishment and spread within the EU.

3.6.1 | Identification of potential additional measures

Phytosanitary measures (prohibitions) are currently applied to some host plants for planting (see Section 3.3.2).

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 control measures are listed in Table 5.

TABLE 5 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	As a pest with low mobility, a risk reduction option could be to source plants from a pest free area, or place of production or production site.	Entry/Spread
Growing plants in isolation	Plants could be grown in insect proof places such as glass or plastic greenhouses or in places with complete physical isolation. That measure could mitigate the likelihood of entry and spread of *M. longispina*.	Entry/Spread
Roguing and pruning	Roguing (removal of infested plants) and pruning (removal of infested plant parts only without affecting the viability of the plant) can reduce the population density of the pest.	Entry/Establishment/Spread/Impact
Biological control and behavioural manipulation	There are two parasitoids, *Encarsia koebelei* and *Pteroptrix perkinsi* which have been reported to parasitise *M. longispina* in Hawaii (Swezey, 1950). Moreover, Fullaway (1918) reported that *Pseudopteroptrix imitatrix* bred from that insect.	Spread/Impact
Chemical treatments on crops including reproductive material	Used to mitigate likelihood of infestation of pests susceptible to chemical treatments. Pesticide sprays can reduce infestations. Pesticide sprays are generally more effective against crawlers and less effective against the other stages of scale insects because of the scale covering their body. According to Peña and Duncan (1999) buprofezin, pymetrozine, pyriproxyfen and imidacloprid effectively reduce the density of *M. longispina*. However, insecticide applications do not completely reach the hidden parts of the tree where the insects can be found (EFSA PLH Panel, 2022).	Entry/Establishment/Spread/Impact
Chemical treatments on consignments or during processing	The chemical compounds that may be applied to plants or to plant products after harvest, during process or packaging operations and storage could mitigate the likelihood of infestation of pests susceptible to chemical treatment.	Entry/Spread

(Continues)

TABLE 5 (Continued)

Control measure/risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/establishment/spread/impact)
Physical treatments on consignments or during processing	Brushing, washing and other mechanical cleaning methods can be used to reduce the likelihood of the presence of the pest in consignments to be exported to be planted.	Entry/Spread
Heat and cold treatments	Controlled temperature treatments aimed to kill or inactivate pests without causing any unacceptable prejudice to the treated material itself.	Entry/Spread
Controlled atmosphere	Treatment of plants by storage in a modified atmosphere (including modified humidity, O_2, CO_2, temperature, pressure) could mitigate the likelihood of entry and spread of the pest. Controlled atmosphere storage can be used in commodities such as fresh and dried fruits, cut flowers and vegetables.	Entry/Spread (via commodity)

3.6.1.2 | *Additional supporting measures*

Potential additional supporting measures are listed in Table 6.

TABLE 6 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	ISPM 5 (FAO, 2023) defines inspection as the official visual examination of plants, plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations. The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques. Any shipments of fresh plant material from an infested country to another that is not infested should be inspected thoroughly to detect *M. longispina*.	Entry/Establishment/Spread/Impact
Laboratory testing	Examination, other than visual, to determine if pests are present using official diagnostic protocols. Diagnostic protocols describe the minimum requirements for reliable diagnosis of regulated pests.	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 sampling methodology.	Entry/Spread
Phytosanitary certificate and plant passport	According to ISPM 5 (FAO, 2023) a phytosanitary certificate and a plant passport are official paper documents or their official electronic equivalents, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements: (a) export certificate (import) (b) plant passport (EU internal trade)	Entry/Spread
Certified and approved premises	Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by the NPPO in order to guarantee the fulfilment of plant health requirements of plants and plant products intended for trade. Key property of certified or approved premises is the traceability of activities and tasks (and their components) inherent the pursued phytosanitary objective. Traceability aims to provide access to all trustful pieces of information that may help to prove the compliance of consignments with phytosanitary requirements of importing countries.	Entry/ Spread
Certification of reproductive material (voluntary/official)	Plants come from within an approved propagation scheme and are certified pest free (level of infestation) following testing; Used to mitigate against pests that are included in a certification scheme.	Entry/Spread
Surveillance	Surveillance to guarantee that plants and produce originate from a pest free area could be an option.	Entry/Spread

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

- *M. longispina* has many host plants, making the inspections of all consignments containing hosts from countries where the pest occurs difficult.
- *M. longispina* nymphs and adult females are very small and are difficult to detect by visual inspection when the infestation level is low.
- Some insecticide treatments may not be effective because of the waxy cover.

3.7 | Uncertainty

The magnitude of impact is a key uncertainty.

4 | CONCLUSIONS

M. longispina satisfies all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest. Table 7 provides a summary of the PLH Panel conclusions.

TABLE 7 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
Identity of the pest (Section 3.1)	The identity of the pest is clearly defined and *Morganella longispina* (Morgan, 1889) is the accepted name.	None
Absence/presence of the pest in the EU (Section 3.2)	The pest is not known to be present in the EU territory.	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	*M. longispina* is able to enter into, become established and spread within the EU territory especially in southern countries. The main pathways are: • plants for planting • cut flowers or cut branches • fruits	None
Potential for consequences in the EU (3.5)	The pests' introduction could have an economic impact on several crops in EU such as avocado, banana, citrus, fig, olive, stone fruits and walnut.	Uncertainty on the magnitude of impact
Available measures (Section 3.6)	There are measures available to prevent the entry, establishment and spread of *M. longispina* within the EU.	None
Conclusion (Section 4)	All criteria assessed by EFSA for consideration as a potential quarantine pest are met.	Uncertainty on the magnitude of impact
Aspects of assessment to focus on/scenarios to address in future if appropriate:		

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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APPENDIX A

Morganella longispina host plants/species affected

Host plant records based on literature.

Host status	Host name	Plant family	Common name	References
Cultivated hosts	*Acacia arabica*	Fabaceae	Arabic tree, Indian gum-arabic-tree, thorny acacia	Saighi et al. (2005)
	Acacia floribunda	Fabaceae	Gossamer wattle, weeping acacia, white sallow wattle	Saighi et al. (2005)
	Acer palmatum	Sapindaceae	Japanese maple, palmate maple, smooth Japanese maple	Normark et al. (2019)
	Aesculus californica	Sapindaceae	California buckeye, California horse-chestnut	Saighi et al. (2005)
	Aglaia sp.	Meliaceae	–	Jansen and Alferink (2023)
	Aleurites moluccana	Euphorbiaceae	Kukui, candlenut tree, candleberry, Indian walnut	Swezey (1950), Nakahara (1981), Williams and Watson (1988), Saighi et al. (2005)
	Aleurites palmatae	Euphorbiaceae	Candleberry, Indian walnut, kemiri, varnish tree, godou, kukui nut tree	Saighi et al. (2005)
	Aleurites sp.	Euphorbiaceae	–	Miller and Davidson (2005)
	Annona muricata	Annonaceae	Soursop, graviola, guyabano, America guanábana	Malumphy (2014)
	Artocarpus integer	Moraceae	Chempedak, cempedak	Balachowsky (1948)
	Artocarpus integrifolius (in the paper is cited as *A. integrifolia)*	Moraceae	Jack fruit, tjampedak	Varshney (2002)
	Artocarpus sp.	Moraceae	–	Miller and Davidson (2005)
	Aucoumea sp.	Burseraceae	–	Miller and Davidson (2005)
	Averrhoa carambola	Oxalidaceae	Carambola, star fruit	Williams and Watson (1988), Claps et al. (2001), Claps and Dos Santos Wolff (2003)
	Averrhoa sp.	Oxalidaceae	–	Hamon (1981)
	Bauhinia purpurea	Fabaceae	Orchid tree, purple bauhinia, camel's foot, butterfly tree, Hawaiian orchid tree	Swezey (1950), Nakahara (1981), Saighi et al. (2005)
	Bauhinia sp.	Fabaceae	–	Balachowsky (1948), Hamon (1981)
	Bauhinia variegata	Fabaceae	Orchid tree, mountain ebony	Cohic (1958), Williams and Watson (1988)
	Blighia sapida (cited in the paper as *Cupania sapida)*	Sapindaceae	Ackee, acki, akee, ackee apple	Takagi (2007)
	Broussonetia papyrifera	Moraceae	Paper mulberry, tapa cloth tree	Rutherford (1915)
	Bruguiera gymnorhiza	Rhizophoraceae	Large-leafed orange mangrove, oriental mangrove	Takagi et al. (2011) (as cited by García Morales et al. (2016))
	Bruguiera sp	Rhizophoraceae	–	Takagi et al. (2011) (as cited by García Morales et al. (2016))
	Buddleja davidii	Scrophulariaceae	Summer lilac, butterfly-bush, orange eye	Saighi et al. (2005)
	Callistemon sp.	Myrtaceae	Bottlebrushes	
	Callistemon viminalis	Myrtaceae	Weeping bottlebrush, creek bottlebrush	Hamon (1981)
	Calodendrum sp.	Rutaceae	–	Hamon (1981)
	Camellia japonica	Theaceae	Common camellia, Japanese camellia	Lepage (1938) (as cited by García Morales et al. (2016))

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Host status	Host name	Plant family	Common name	References
	Camellia sp.	Theaceae	Camellia	Brain (1918), Balachowsky (1948), Hamon (1981), Claps et al. (2001), Claps and Dos Santos Wolff (2003), Miller and Davidson (2005), Claps and Dos Santos Wolff (2003)
	Cananga odorata	Annonaceae	Ylang-ylang, cananga tree	Matile (1978)
	Carica papaya	Caricaceae	Papaya, papaw, pawpaw	Cohic (1958), Williams and Watson (1988), Claps and Dos Santos Wolff (2003), Claps et al. (2001), Brain (1918), Guerout (1969), Bovell (1921), Brimblecombe (1955), Brimblecombe (1961)
	Carica sp.	Caricaceae	–	Hamon (1981), Miller and Davidson (2005)
	Castanea sativa	Fagaceae	Sweet chestnut, Spanish chestnut, chestnut	Saighi et al. (2005)
	Catalpa fargesii	Bignoniaceae	Chinese bean tree	Saighi et al. (2005)
	Cedrela sp.	Meliaceae	–	Hamon (1981)
	Celtis sp.	Ulmaceae	Hackbery, nettle tree	Hamon (1981), Ferris (1953)
	Celtis australis	Ulmaceae	European hackberry	Verma and Dinabandhoo (2003)
	Ceratonia siliqua	Fabaceae	Carob tree, St John's-bread, locust bean	Saighi et al. (2005)
	Cestrum foetidissimum	Solanaceae	Palqui, green cestrum, Chilean cestrum, green poisonberry, willow-leaved jessamine	Saighi et al. (2005), Biche et al. (2022)
	Cestrum futibum	Solanaceae	–	Saighi et al. (2005)
	Cestrum nocturnum	Solanaceae	Lady of the night, night-blooming jasmine, night-blooming jessamine, night-scented jessamine, night-scented cestrum, poisonberry	Saighi et al. (2005)
	Cinnamomum verum (cited as *C. zeylanica* in the paper)	Lauraceae	True cinnamon tree, Ceylon cinnamon tree	Rutherford (1915)
	Citrus aurantium	Rutaceae	Bitter orange, sour orange	Williams and Watson (1988)
	Citrus limon	Rutaceae	Lemon	Hamon (1981), Nakahara (1981), Williams and Watson (1988), Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Citrus maxima	Rutaceae	Pomelo	Williams and Watson (1988)
	Citrus paradisi	Rutaceae	Grapefruit	Nakahara (1981), Claps et al. (2001), Nakahara (1981)
	Citrus reticulata	Rutaceae	Mandarin orange, mandarin, mandarine	Williams and Watson (1988)
	Citrus sinensis	Rutaceae	Sweet orange	Claps and Dos Santos Wolff (2003), Claps et al. (2001), Anonymous (1914), Anonymous (1962), Maskew (1915b), Maskew (1915c), Maskew (1916a), Maskew (1916b), Maskew (1917), Maskew (1918)
	Citrus sp.	Rutaceae	Citrus	Balachowsky (1948), Cohic (1958), Hamon (1981), Miller and Davidson (2005), Nakahara (1982), Williams and Watson (1988), Claps and Dos Santos Wolff (2003), Claps et al. (2001), Brain (1918), Balachowsky (1926), Maskew (1915a), Varshney (2002), Silvestri (1929)

(Continued)

Host status	Host name	Plant family	Common name	References
	Coffea sp.	Rubiaceae	–	Hamon (1981)
	Cordia myxa	Boraginaceae	Assyrian plum	Saighi et al. (2005)
	Cordia nodosa	Boraginaceae	–	Saighi et al. (2005)
	Corylus avellana	Betulaceae	Common hazel	Saighi et al. (2005)
	Cupania sapida	Sapindaceae	Ackee, acki, akee, ackee apple	Takagi (2007), Balachowsky (1926)
	Cupania sp.	Sapindaceae	–	Hamon (1981)
	Dimocarpus longan	Sapindaceae	Longan, dragon's eye	EFSA PLH Panel (2022)
	Elaeagnus sp.	Elaeagnaceae	Silverberry, oleaster	Hamon (1981)
	Eriobotrya japonica	Rosaceae	Loquat, Japanese plum, Chinese plum	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Erythrina sp.	Fabaceae	Coral tree	García Morales et al. (2016)
	Eucalyptus sp.	Myrtaceae	Eucalypts	Hamon (1981)
	Eugenia sp.	Myrtaceae	–	Williams and Watson (1988)
	Ficus carica	Moraceae	Common fig tree	Cohic (1958), Saighi et al. (2005), Claps and Dos Santos Wolff (2003), Claps et al. (2001), Martins et al. (2022), Williams and Watson (1988), Balachowsky (1927), Balachowsky (1926), Brimblecombe (1955), Bondar (1938), Waterston (1940)
	Ficus elastica	Moraceae	Rubber fig, rubber bush, rubber tree, rubber plant, Indian rubber bush, Indian rubber tree	Saighi et al. (2005)
	Ficus macrophylla	Moraceae	Moreton Bay fig, Australian banyan	Saighi et al. (2005), Brimblecombe (1955)
	Ficus retusa	Moraceae	Indian laurel	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Ficus sp.	Moraceae	Fig trees, figs	Cohic (1958), Hamon (1981), Miller and Davidson (2005), Nakahara (1981), Saighi et al. (2005)
	Fraxinus angustifolia	Oleaceae	Narrow-leaved ash	Saighi et al. (2005)
	Fraxinus berlandieriana	Oleaceae	Mexican ash	Balachowsky (1927)
	Fraxinus excelsior	Oleaceae	Common ash	Biche et al. (2022)
	Fraxinus sp.	Oleaceae	Ash	Hamon (1981), Saighi et al. (2005)
	Gleditsia delavayi	Fabaceae	Honey locust	Ferris (1953)
	Gleditsia sinensis	Fabaceae	Chinese honey locust, black locust	Saighi et al. (2005)
	Gleditsia triacanthos	Fabaceae	Thorny locust, thorny honeylocust	Saighi et al. (2005)
	Gramatophyllum	Orchidaceae	–	Tao (1999)
	Hibiscus rosa-sinensis	Malvaceae	Chinese hibiscus, China rose, Hawaiian hibiscus, rose mallow, shoeblack plant	Cohic (1958), Claps and Dos Santos Wolff (2003), Claps et al. (2001), Williams and Watson (1988)
	Hibiscus sp.	Malvaceae	Rose mallow, hardy hibiscus, rose of sharon, tropical hibiscus	Hamon (1981), Miller and Davidson (2005), Nakahara (1981)
	Hibiscus syriacus	Malvaceae	Rose of Sharon, Syrian ketmia, shrub althea, althea, rose mallow	Ferris (1953)
	Iochroma cyaneum	Solanaceae	Violet Churcu	Biche et al. (2022)
	Jasminum sambac	Oleaceae	Arabian jasmine, Sambac jasmine	Cohic (1958), Williams and Watson (1988)
	Jasminum sp.	Oleaceae	Jasmine	Hamon (1981), Mille et al. (2016), Nakahara (1981), Williams and Watson (1988)
	Juglans regia	Juglandaceae	Persian walnut, English walnut, Carpathian walnut, Madeira walnut, common walnut	Verma and Dinabandhoo (2005)

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Host status	Host name	Plant family	Common name	References
	Lagerstroemia sp.	Lythraceae	Crape myrtle	Hamon (1981), Brain (1918)
	Lagerstroemia speciosa	Lythraceae	Giant crepe-myrtle, Queen's crepe-myrtle, banabá plant, pride of India, Queen's Flower, Jarul	Williams and Watson (1988)
	Lagunaria patersonii	Malvaceae	Pyramid tree, Norfolk Island hibiscus, Queensland white oak, sally wood, white oak	Saighi et al. (2005)
	Leucas aspera	Lamiaceae	Thumbai	Varshney (2002)
	Ligustrum japonicum	Oleaceae	Wax-leaf privet, Japanese privet	Hamon (1981), Saighi et al. (2005)
	Ligustrum lucidum	Oleaceae	Broad-leaf privet, Chinese privet, glossy privet, tree privet, wax-leaf privet	Hamon (1981)
	Ligustrum sinense	Oleaceae	Chinese privet	Hamon (1981), Brimblecombe (1955)
	Ligustrum sp.	Oleaceae	Privet	Balachowsky (1948), Hamon (1981), Miller and Davidson (2005), Nakahara (1981), Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Litchi chinensis	Sapindaceae	Lychee	EFSA PLH Panel (2022)
	Macadamia sp.	Proteaceae	Macadamia nut, macademia, Queensland nut, bush nut, maroochi nut, bauple nut, Hawaii nut	Hamon (1981)
	Macadamia ternifolia	Proteaceae	Small-fruited Queensland nut, gympie nut	Nakahara (1981), Brimblecombe (1955)
	Magnolia ashtonii	Magnoliaceae	–	Peterson et al. (2020)
	Magnolia champaca	Magnoliaceae	Champak	Nakahara (1981), Brain (1918)
	Magnolia sp.	Magnoliaceae	–	Normark et al. (2019)
	Malus sylvestris	Rosaceae	European crab apple, European wild apple, crab apple	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Mangifera sp.	Anacardiaceae	Mango	Hamon (1981), Miller and Davidson (2005), Peña (1993)
	Mangifera indica	Anacardiaceae	Mango	Mille et al. (2016), Nakahara (1981), Brain (1918), Balachowsky (1926)
	Malaleuca sp.	Myrtaceae	–	Anonymous (1914)
	Mespilus germanica	Rosaceae	Medlar, common medlar	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Michelia flava	Magnoliaceae	–	Anonymous (1914)
	Michelia sp.	Magnoliaceae	–	Hamon (1981), Miller and Davidson (2005)
	Morus nigra	Moraceae	Black mulberry	Saighi et al. (2005)
	Morus pomifera	Moraceae	–	Saighi et al. (2005)
	Morus sp.	Moraceae	Mulberry	Hamon (1981), Anonymous (1981)
	Musa sp.	Musaceae	Banana plant	Saighi et al. (2005)
	Nerium oleander	Apocynaceae	Oleander, rosebay	Hamon (1981), Brimblecombe (1955), Anonymous (1981)
	Nerium sp.	Apocynaceae	–	Hamon (1981), Miller and Davidson (2005)
	Olea europaea	Oleaceae	Olive tree	Saighi et al. (2005)
	Olea sp.	Oleaceae	–	Hamon (1981), Verma and Dinabandhoo (2005)
	Paliurus spina-christi	Rhamnaceae	Jerusalem thorn, garland thorn, Christ's thorn, crown of thorns	Saighi et al. (2005)
	Pelagodoxa sp.	Arecaceae	–	Miller and Davidson (2005)

(Continued)

Host status	Host name	Plant family	Common name	References
	Persea americana	Lauraceae	Avocado, alligator pear, avocado pear	Mille et al. (2016), Nakahara (1981), Williams and Watson (1988), Swezey (1950), De Seabea and Vayssiere (1918)
	Persea sp.	Lauraceae	–	Hamon (1981), Nakahara (1981)
	Platanus sp.	Platanaceae	Planes, plane trees	Hamon (1981)
	Populus nigra	Salicaceae	Black poplar	Saighi et al. (2005)
	Prunus domestica	Rosaceae	Plum	Claps and Dos Santos Wolff (2003), Claps et al. (2001), Anonymous (1981)
	Prunus dulcis	Rosaceae	Almond	Anonymous (1981)
	Prunus persica	Rosaceae	Peach	Claps and Dos Santos Wolff (2003), Anonymous (1981)
	Prunus sp.	Rosaceae	–	Saighi et al. (2005)
	Psidium cattleyanum	Myrtaceae	Cattley guava, strawberry guava, cherry guava	Williams and Watson (1988)
	Psidium guajava	Myrtaceae	Common guava, yellow guava, lemon guava, apple guava	Mille et al. (2016), Williams and Watson (1988)
	Psidium sp.	Myrtaceae	–	Miller and Davidson (2005)
	Punica granatum	Lythraceae	Pomegranate	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Punica sp.	Lythraceae	–	Hamon (1981)
	Salix alba	Salicaceae	White willow	Saighi et al. (2005)
	Salix sp.	Salicaceae	Willows, sallows, osiers	Claps and Dos Santos Wolff (2003), Claps et al. (2001)
	Severinia buxifolia	Rutaceae	Chinese box-orange, box orange, boxthorn	Hamon (1981)
	Severinia sp.	Rutaceae	–	Kondo and Watson (2022)
	Sterculia sp.	Malvaceae	Tropical chestnuts	Kondo and Watson (2022)
	Tecoma sp.	Bignoniaceae	–	Hamon (1981)
	Tecoma stans	Bignoniaceae	Yellow trumpetbush, yellow bells, yellow elder, ginger Thomas	Cohic (1958), Williams and Watson (1988)
	Theobroma sp.	Malvaceae	–	Kondo and Watson (2022)
	Toona ciliata	Meliaceae	Red cedar, tone, toon, Australian red cedar, Burma cedar, Indian cedar, Moulmein cedar, Queensland red cedar, Indian mahogany	Brimblecombe (1955)
	Trichilia sp.	Meliaceae		Kondo and Watson (2022)
	Tristania sp.	Myrtaceae	–	Hamon (1981)
Wild weed hosts	*Alectryon conatus*	Sapindaceae	Hairy alectryon	Brimblecombe (1955)
	Allanthospermum borneense	Ixonanthaceae	–	Peterson et al. (2020)
	Bauhinia racemosa	Fabaceae	Bidi leaf tree	Varshney (2002), Saighi et al. (2005)
	Endospermum diadenum	Euphorbiaceae	-	Peterson et al. (2020)
	Loranthus sp.	Loranthaceae	–	Miller and Davidson (2005)
	Luehea divaricata	Malvaceae	–	Saighi et al. (2005)
	Moraea sp.	Iridaceae	Cape tulips	Nakahara (1982)
	Orania sp.	Arecaceae	-	Miller and Davidson (2005)
	Peddiea sp.	Thymelaeaceae	–	Kondo and Watson (2022)

APPENDIX B

Distribution of *Morganella longispina*

Distribution records based on literature.

Region	Country	Sub-national (e.g. State)	Status	Reference
Africa	Algeria		Present	Hamon (1981), Nakahara (1982), Saighi et al. (2005), Biche et al. (2022)
	Cameroon		Present	Nakahara (1982)
	Comoros		Present	Matile (1978)
	Egypt		Present	Abd-Rabou and Evans (2021)
	Mauritius		Present	Balachowsky (1948), Hamon (1981)
		Rodriques Island	Present	Nakahara (1982)
	Mozambique		Present	Nakahara (1982)
	Sao Tome		Present	Nakahara (1982), De Seabea and Vayssiere (1918)
	South Africa		Present	Brain (1918), Hamon (1981), Anonymous (1924)
North America	Bermuda		Present	Nakahara (1982)
	Mexico		Present	Balachowsky (1948)
	USA	Florida	Present	Hamon (1981), Nakahara (1982), Miller and Davidson (2005), Schuh (2024), Peña (1993)
Central America	Costa Rica		Present	Nakahara (1982)
	Guatemala		Present	Nakahara (1982)
Caribbean	Antigua and Barbuda		Present	Hamon (1981), Nakahara (1982)
	Bahamas		Present	Hamon (1981), Nakahara (1982)
	Barbados		Present	Hamon (1981), Nakahara (1982)
	Dominican Republic		Present	Hamon (1981), Nakahara (1982)
	Guadeloupe		Present	Meurgey and Ramage (2020)
	Haiti		Present	Hamon (1981), Nakahara (1982), Anonymous (1962)
	Jamaica		Present	Hamon (1981), Nakahara (1982)
	Puerto Rico		Present	Balachowsky (1948), Hamon (1981), Nakahara (1982)
	Saint Lucia		Present	Malumphy (2014)
	St. Martin		Present	Nakahara (1982)
	Trinidad and Tobago		Present	Hamon (1981), Nakahara (1982)
South America	Brazil	Espirito Santo	Present	Martins et al. (2022)
		Parana	Present	Claps et al. (2001)
		Rio Grande do Sul	Present	Claps et al. (2001)
		Rio de Janeiro	Present	Claps et al. (2001)
		Santa Catarina	Present	Claps et al. (2001)
		Sao Paulo	Present	Claps et al. (2001)
	Chile	Isla de Pascua	Present	Claps et al. (2001)
	Guyana		Present	Hamon (1981), Nakahara (1982), Takagi (2007), Balachowsky (1926)
	Sandwich Islands		Present	Balachowsky (1926)

(Continued)

Region	Country	Sub-national (e.g. State)	Status	Reference
Asia	China	Hong Kong	Present	Nakahara (1982)
		Yunnan	Present	Ferris (1953)
		Fujian	Present	Tao (1999)
		Guangdong	Present	Tao (1999)
		Inner Mongolia	Present	Tao (1999)
		Macao	Present	Silvestri (1929)
	India	Himachal Pradesh	Present	Verma and Dinabandhoo (2005)
		Tamil Nadu	Present	Varshney (2002)
	Indonesia		Present	Nakahara (1982)
	Japan		Present	Nakahara (1982), Normark et al. (2019), Takagi (2003)
		Kyushu	Present	Takagi (2007)
		Shikoku	Present	Takagi (2007)
		Ryukyu Islands	Present	Kinjo et al. (1996)
	Malaysia	Sarawak	Present	Peterson et al. (2020)
	Philippines		Present	Nakahara (1982), Canu and Bas-Sler (1929)
	Sri Lanka		Present	Hamon (1981), Nakahara (1982), Varshney (2002), Balachowsky (1948)
	Taiwan		Present	Nakahara (1982)
Oceania	Australia	Queensland (Western Australia[1]	Present	Nakahara (1982), Brimblecombe (1955), Brimblecombe (1961)
	Cook Islands		Present	Williams and Watson (1988)
	Fiji		Present	Nakahara (1982), Williams and Watson (1988)
	French Polynesia	Marquesas Islands	Present	Nakahara (1982)
		Society Islands	Present	Williams and Watson (1988)
		Tahiti	Present	Balachowsky (1948), Hamon (1981), Nakahara (1982), Williams and Watson (1988), Anonymous (1914), Brugiroux (1928), Maskew (1915c)
		Tuamotu Islands	Present	Williams and Watson (1988)
	New Caledonia		Present	Cohic (1958), Nakahara (1982), Mille et al. (2016)
	New Zealand[2]		Present	Brimblecombe (1955)
	Papua New Guinea		Present	Nakahara (1982), Williams and Watson (1988)
	Solomon Islands	Guadalcanal	Present	Nakahara (1982)
	Tonga		Present	Williams and Watson (1988)
	United States	Hawaiian Islands (Hawaii)	Present	Balachowsky (1948), Nakahara (1981), Nakahara (1982), Maskew (1916c)
		Hawaiian Islands (Kauai)	Present	Swezey (1950)
		Hawaiian Islands (Oahu)	Present	Nakahara (1981)
	Western Samoa		Present	Nakahara (1982), Williams and Watson (1988), Maskew (1916a)

[1]There was a report by Anonymous (1914) in Western Australia, but the pest is considered absent and declared prohibited in 2013 by the Government of Australia in this state.

[2]This is an old paper and there is no recent report confirming this record (Brimblecombe, 1955). Based on MPI report of New Zealand, there are measures applied against *M. longispina* from countries where the pest has been reported (https://www.mpi.govt.nz/dmsdocument/48226-Draft-commodity-country-pest-lists-Fresh-citrus-fruit-for-human-consumption).

APPENDIX C

Import data

TABLE C.1 Apricots, cherries, peaches incl. nectarines, plums and sloes, fresh (CN code: 0809) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Australia	372.26	631.59	181.66	33.89	82.76
Brazil	22.65	40.40	28.84	12.78	17.60
Chile	294,880.21	233,758.01	195,681.13	173,330.35	94,360.04
China	3.24		0.14	19.79	44.59
Costa Rica	319.01				
Dominican Republic				1.00	
Algeria			10.00		
Egypt	1457.95	906.27	219.27	1313.83	1446.18
India			3.76	0.81	2.80
Japan	2.82		37.40	4.11	1.94
Mauritius	67.75	140.00	135.15	145.44	
Mexico				209.18	
South Africa	242,780.96	271,615.89	441,938.18	518,155.88	373,441.24
United States	923.44	216.12	243.65	290.23	2237.16

TABLE C.2 Fresh or dried avocados (CN code: 080440) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Australia	0.01		0.31	0.22	
Brazil	78,673.73	48,183.83	50,802.56	49,331.50	157,909.60
Chile	799,464.88	600,603.64	554,946.05	605,683.48	548,379.95
China	1.23	0.04	0.12	5.51	0.40
Costa Rica	428.45	686.40	201.60	205.36	1355.35
Dominican Republic	95,531.91	100,024.05	103,897.54	101,614.24	140,781.34
Algeria			0.52	1.52	0.22
Egypt	79.92	363.95	38.44	230.92	255.80
Guatemala	17,084.09	15,383.92	24,717.32	19,286.13	36,040.01
India	0.06		2.35	5.72	2.68
Jamaica				0.82	
Mauritius	24.28	15.23	0.45		3.47
Mexico	767,878.48	716,113.14	751,530.02	217,701.63	237,295.10
Mozambique	7134.23	8014.81	10737.78	10,844.26	39,180.35
New Caledonia	2.09				1.00
Philippines		0.05		0.04	0.66
South Africa	401,352.79	416,290.22	418,962.17	469,942.40	573,434.76
United States	0.02	4.66	45.38	53.52	5.51

TABLE C.3 Fresh or dried bananas (CN code: 0803) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 14/6/2024).

Country	2019	2020	2021	2022	2023
Australia		0.01	0.01	1.03	
Brazil	104,909.74	98,434.39	83,215.71	55,343.93	65,538.32
China	545.74	854.93	1158.14	1067.48	862.33
Costa Rica	9,405,488.40	10,359,546.09	10,252,244.40	10,566,376.39	10,430,273.95
Dominican Republic	2,309,348.78	2,296,268.32	2,640,152.47	2,610,586.49	1,887,679.34
Egypt					0.21
Guatemala	1,844,844.47	1,737,902.89	1,189,278.67	1,727,934.85	2,169,068.93
Hong Kong (China)			8.00	1.01	0.02
Indonesia	14.72	64.17	3.43	0.42	3.09
India	607.74	1418.91	1491.81	1086.85	2474.38
Jamaica			0.12	3.12	
Japan			3.82		0.64
Mauritius					0.95
Mexico	239,173.11	141,492.44	41,342.55	38,030.52	19,316.84
Mozambique	664.56			0.01	
New Caledonia					0.53
French Polynesia	0.02	0.38	0.01	0.16	0.02
Philippines	2160.35	1240.80	1665.89	2031.35	1573.38
Taiwan			1.06	0.01	0.18
South Africa	353.09	128.54	0.34	0.30	59.02
United States	6.32	10.37	1904.98	12,183.63	1270.50

TABLE C.4 Fresh or dried citrus (CN code: 0805) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Antigua and Barbuda	19.83				
Australia	10,645.40	2343.47	4097.42	3784.45	1675.70
Brazil	822,134.46	902,590.26	1,062,111.08	1,178,700.96	1,180,800.09
Chile	117,917.72	101,410.52	81,894.00	34,799.57	59,348.92
China	1,108,595.22	1,098,689.98	648,408.59	637,703.47	575,301.91
Costa Rica	231.20	461.60	35.20	218.70	244.80
Dominican Republic	7355.36	12,886.58	12,780.40	8464.22	10,965.02
Algeria	15.42	27.51	0.04	0.56	1170.70
Egypt	2,206,932.71	2,850,745.77	3,413,157.09	2,394,906.95	4,985,944.04
Guatemala	11,816.09	17,814.26	8712.80	8313.94	5800.77
Hong Kong (China)	2.27	1.00	0.02	0.42	7.74
Haiti	31.00	248.29	337.30	149.00	66.15
Indonesia	836.73	864.54	872.68	890.40	879.03
India	88.51	254.95	22.37	164.85	345.05
Jamaica	2409.55	1646.87	2441.76	1718.86	984.78
Japan	319.24	162.50	184.26	184.49	117.86
Mauritius		7.35			
Mexico	443,743.54	349,648.63	184,182.48	135,461.46	71,719.91
Philippines	7.71	0.10		0.08	
South Africa	6,196,837.96	7,830,147.60	7,950,857.87	7,909,065.90	8,650,599.08
United States	177,755.45	148,608.92	114,110.50	64,510.65	57,163.76

TABLE C.5 Fresh or dried figs (CN code: 080420) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Brazil	10,622.06	9115.87	11,497.78	10,377.49	11,666.74
Chile	38.38	0.01			
China	192.97	55.21	141.58	250.59	47.93
Algeria	5.90	55.76	45.98	138.33	47.52
Egypt	52.73	60.26	140.52	11.76	160.83
India	20.64	8.03	1.63	0.15	0.40
Mexico	118.92	94.08	87.54	30.77	46.22
Taiwan			0.01	3.52	
South Africa	464.30	474.60	750.49	284.77	175.44
United States	10.60	302.14	14.91	24.54	0.38

TABLE C.6 Fresh or dried guavas, mangoes and mangosteens (CN code: 080450) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Australia			0.01	0.09	1.53
Brazil	1,437,569.20	1,577,043.99	1,799,012.86	1,570,876.14	1,771,361.85
Chile			5.88	221.77	2.31
China	78.23	104.34	248.77	743.65	542.69
Costa Rica	12,830.62	14,950.59	23,984.26	17,186.82	14,036.52
Dominican Republic	118,508.00	110,481.33	161,217.09	119,947.03	175,483.54
Algeria				0.06	0.61
Egypt	6407.46	12,233.16	6222.90	13,260.37	31,828.32
Guatemala	10,953.40	8099.52	7567.28	639.43	829.42
Hong Kong (China)		6.56	8.01	1.16	3.87
Indonesia	2386.27	1406.94	1629.72	3937.95	7978.00
India	9315.51	7347.61	16,576.61	12,894.95	18,624.86
Japan		0.01	7.66	2.14	6.10
Mexico	50,935.79	51,841.89	46,677.91	45,284.10	53,407.60
Mozambique	126.65	134.13	180.99	2143.25	556.43
Philippines	368.97	128.10	153.67	254.68	315.47
Taiwan	17.34	0.92	5.28	0.43	1.14
South Africa	12,116.95	8656.28	5777.96	22,565.22	12,964.67
United States	82,580.54	82,852.21	51,111.01	62,549.63	64,911.25

TABLE C.7 Fresh or chilled olives (CN code: 070992) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Algeria	1.10	0.27		12.81	
Egypt	34.93	967.25	0.16	16.68	112.85
India	0.10	5.05	29.16	0.01	0.02
South Africa	0.31	0.01		0.16	1.77
United States		0.19	0.05	1.13	0.04

TABLE C.8 Fresh pawpaws 'papayas' (CN code: 080720) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Brazil	338,527.11	327,546.53	355,704.85	288,663.49	277,165.91
Chile	60.48				
China	3.00				
Costa Rica	873.64	839.46	32.36	1279.64	3683.25
Dominican Republic	469.03	836.85	268.90	431.30	586.70
Algeria					47.00
Egypt				0.50	20.00
Guatemala		2.00	0.00	0.02	0.04
Indonesia	62.58	42.72	0.02		
India	564.48	130.39	312.47	27.34	32.06
Mauritius					11.52
Mexico	2918.40	2191.29	3712.35	4760.54	4561.25
New Caledonia	1.00				0.64
French Polynesia	0.33			0.20	
Philippines	1.26				
Taiwan	1.99				
South Africa	478.96	14.08	4.00		
United States	19.80	42.16	106.92	30.24	483.54

TABLE C.9 Fresh tamarinds, cashew apples, lychees, jackfruit, sapodillo plums, passion fruit, carambola and pitahaya (CN code: 08109020) imported in 100 kg into the EU from regions where *Morganella longispina* is known to occur (Source: Eurostat accessed on 15/6/2024).

Country	2019	2020	2021	2022	2023
Australia		12.50			
Brazil	966.63	1220.26	1758.62	4013.69	3165.78
Chile	32.51	11.29		0.12	
China	1014.77	823.41	1497.94	1533.32	1084.92
Costa Rica	18.62		0.05	4.38	26.51
Dominican Republic	823.48	604.84	480.38	407.82	668.30
Egypt		39.05	15.45		69.74
Guatemala	8.56	60.88	15.20	5.58	0.01
Indonesia	246.67	441.64	540.65	270.08	299.06
India	1168.69	754.33	775.00	509.75	1633.02
Jamaica				1.42	
Mauritius	1167.15	1145.97	915.28	2106.07	1715.13
Mexico	669.87	2331.91	5560.83	6292.29	5739.32
Mozambique	3827.41	2844.70	3079.70	3925.09	1900.67
Philippines	0.88		0.56	1.03	5.78
Taiwan	25.97	8.97	8.20		
South Africa	27,215.68	19,903.15	23,458.08	42,383.29	16,860.41
United States		0.02	0.11	38.54	0.06

APPENDIX D

PRISMA 2009 Flow Diagram

Name of the Pest: *Morganella longispina*.
Date of the search: 21/5/2024.
Approved Literature Search String: "Morganella longispina" OR "Aspidiotus longispina" OR "Aspidiotus maskelli" OR "Hemiberlesia longispina" OR "Hemiberlesia maskelli" OR "Morganella maskelli" OR "maskell-dopluis" OR "maskell scale" OR "plumose scale" OR "cochonilha-da-figueira".