SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 21 June 2018

doi: 10.2903/j.efsa.2018.5353

Pest categorisation of *Lopholeucaspis japonica*

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Abstract

Following a request from the European Commission, the EFSA Plant Health Panel performed a pest categorisation of *Lopholeucaspis japonica* (Hemiptera: Diaspididae), an armoured scale which preferentially feeds on smooth barked woody trees and shrubs. The pest occurs in Asia, North America and non-EU Europe (Caucasus region and Ukraine). The pest is regulated in Council Directive 2000/29/EC as *Leucaspis japonica*, a junior synonym. Its introduction into the EU is banned on plants of *Citrus*, *Fortunella*, *Poncirus* and their hybrids, other than fruit and seeds. Additional host plants comprise 60 species in 35 botanical families, including deciduous fruit trees, ornamental and forest plants. *L. japonica* could enter the EU via host plants for planting (excluding seeds) and cut branches. It has been intercepted on plants for planting from China, including artificially dwarfed plants. Spread is most likely via plants for planting, rather than via natural spread as most diaspidid life stages are sessile. Impacts could occur in citrus, other fruit crops, ornamentals and forest trees. Sourcing plants from pest-free areas, pest-free places of production or pest-free production sites would decrease the likelihood of introduction. Because suitable hosts occur across the EU in climatic areas matching those where the pest is known to occur, biotic and abiotic conditions are conducive to establishment. The main uncertainty concerns its current distribution in the EU. *L. japonica* was found in Greece in 1983, but there have been no other reports since then. *L japonica* satisfies the criteria assessed by EFSA that enable it to be considered a potential quarantine pest. *L. japonica* does not satisfy the criteria assessed by EFSA for it to be considered a potential regulated non-quarantine pest (RNQP).

Keywords: European Union, Japanese long scale, pest risk, plant health, plant pest, quarantine

Requestor: European Commission

Question number: EFSA-Q-2018-00021

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Acknowledgements: The Panel wishes to acknowledge all European competent institutions, Member State bodies and other organisations that provided data for this scientific output.

Suggested citation: EFSA PLH Panel (EFSA Panel on Plant Health), Jeger M, Bragard C, Caffier D, Candresse T, Chatzivassiliou E, Dehnen-Schmutz K, Gilioli G, Grégoire J-C, Jaques Miret JA, Navajas Navarro M, Niere B, Parnell S, Potting R, Rafoss T, Rossi V, Urek G, Van Bruggen A, Van der Werf W, West J, Winter S, Kertész V and MacLeod A, 2018. Scientific Opinion on the pest categorisation of *Lopholeucaspis japonica.* EFSA Journal 2018;16(7):5353, 23 pp. https://doi.org/10.2903/j.efsa.2018.5353

ISSN: 1831-4732

Table of contents

1. Introduction

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

1.1.1. Background

Council Directive 2000/29/EC[1] on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community establishes the present European Union plant health regime. The Directive lays down the phytosanitary provisions and the control checks to be carried out at the place of origin on plants and plant products destined for the Union or to be moved within the Union. In the Directive's 2000/29/EC annexes, the list of harmful organisms (pests) whose introduction into or spread within the Union is prohibited, is detailed together with specific requirements for import or internal movement.

Following the evaluation of the plant health regime, the new basic plant health law, Regulation (EU) 2016/2031[2] on protective measures against pests of plants, was adopted on 26 October 2016 and will apply from 14 December 2019 onwards, repealing Directive 2000/29/EC. In line with the principles of the above mentioned legislation and the follow-up work of the secondary legislation for the listing of EU regulated pests, EFSA is requested to provide pest categorizations of the harmful organisms included in the annexes of Directive 2000/29/EC, in the cases where recent pest risk assessment/ pest categorisation is not available.

1.1.2. Terms of Reference

EFSA is requested, pursuant to Article 22(5.b) and Article 29(1) of Regulation (EC) No 178/2002[3], to provide scientific opinion in the field of plant health.

EFSA is requested to prepare and deliver a pest categorisation (step 1 analysis) for each of the regulated pests included in the appendices of the annex to this mandate. The methodology and template of pest categorisation have already been developed in past mandates for the organisms listed in Annex II Part A Section II of Directive 2000/29/EC. The same methodology and outcome is expected for this work as well.

The list of the harmful organisms included in the annex to this mandate comprises 133 harmful organisms or groups. A pest categorisation is expected for these 133 pests or groups and the delivery of the work would be stepwise at regular intervals through the year as detailed below. First priority covers the harmful organisms included in Appendix 1, comprising pests from Annex II Part A Section I and Annex II Part B of Directive 2000/29/EC. The delivery of all pest categorisations for the pests included in Appendix 1 is June 2018. The second priority is the pests included in Appendix 2, comprising the group of *Cicadellidae* (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), the group of *Tephritidae* (non-EU), the group of potato viruses and virus-like organisms, the group of viruses and virus-like organisms of *Cydonia* Mill., *Fragaria* L., *Malus* Mill., *Prunus* L., *Pyrus* L., *Ribes* L., *Rubus* L. and *Vitis* L.. and the group of *Margarodes* (non-EU species). The delivery of all pest categorisations for the pests included in Appendix 2 is end 2019. The pests included in Appendix 3 cover pests of Annex I part A section I and all pests categorisations should be delivered by end 2020.

For the above mentioned groups, each covering a large number of pests, the pest categorisation will be performed for the group and not the individual harmful organisms listed under "such as" notation in the Annexes of the Directive 2000/29/EC. The criteria to be taken particularly under consideration for these cases, is the analysis of host pest combination, investigation of pathways, the damages occurring and the relevant impact.

Finally, as indicated in the text above, all references to 'non-European' should be avoided and replaced by 'non-EU' and refer to all territories with exception of the Union territories as defined in Article 1 point 3 of Regulation (EU) 2016/2031.

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

[2] Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants. OJ L 317, 23.11.2016, p. 4–104.

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

1.1.2.1. Terms of Reference: Appendix 1

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

Aleurocantus spp.
Anthonomus bisignifer (Schenkling)
Anthonomus signatus (Say)
Aschistonyx eppoi Inouye
Carposina niponensis Walsingham
Enarmonia packardi (Zeller)
Enarmonia prunivora Walsh
Grapholita inopinata Heinrich
Hishomonus phycitis
Leucaspis japonica Ckll.
Listronotus bonariensis (Kuschel)
Numonia pyrivorella (Matsumura)
Oligonychus perditus Pritchard and Baker
Pissodes spp. (non-EU)
Scirtothrips aurantii Faure
Scirtothrips citri (Moultex)
Scolytidae spp. (non-EU)
Scrobipalpopsis solanivora Povolny
Tachypterellus quadrigibbus Say
Toxoptera citricida Kirk.
Unaspis citri Comstock

(b) Bacteria

Citrus variegated chlorosis
Erwinia stewartii (Smith) Dye
Xanthomonas campestris pv. *oryzae* (Ishiyama) Dye and pv. *oryzicola* (Fang. et al.) Dye

(c) Fungi

Alternaria alternata (Fr.) Keissler (non-EU pathogenic isolates)
Anisogramma anomala (Peck) E. Müller
Apiosporina morbosa (Schwein.) v. Arx
Ceratocystis virescens (Davidson) Moreau
Cercoseptoria pini-densiflorae (Hori and Nambu) Deighton
Cercospora angolensis Carv. and Mendes
Elsinoe spp. Bitanc. and Jenk. Mendes
Fusarium oxysporum f. sp. *albedinis* (Kilian and Maire) Gordon
Guignardia piricola (Nosa) Yamamoto
Puccinia pittieriana Hennings
Stegophora ulmea (Schweinitz: Fries) Sydow & Sydow
Venturia nashicola Tanaka and Yamamoto

(d) Virus and virus-like organisms

Beet curly top virus (non-EU isolates)
Black raspberry latent virus
Blight and blight-like
Cadang-Cadang viroid
Citrus tristeza virus (non-EU isolates)
Leprosis
Little cherry pathogen (non- EU isolates)
Naturally spreading psorosis
Palm lethal yellowing mycoplasm
Satsuma dwarf virus
Tatter leaf virus
Witches' broom (MLO)

Annex IIB

(a) Insect mites and nematodes, at all stages of their development

Anthonomus grandis (Boh.)
Cephalcia lariciphila (Klug)
Dendroctonus micans Kugelan
Gilphinia hercyniae (Hartig)
Gonipterus scutellatus Gyll.
Ips amitinus Eichhof
Ips cembrae Heer
Ips duplicatus Sahlberg
Ips sexdentatus Börner
Ips typographus Heer
Sternochetus mangiferae Fabricius

(b) Bacteria

Curtobacterium flaccumfaciens pv. flaccumfaciens (Hedges) Collins and Jones

(c) Fungi

Glomerella gossypii Edgerton
Gremmeniella abietina (Lag.) Morelet
Hypoxylon mammatum (Wahl.) J. Miller

1.1.2.2. Terms of Reference: Appendix 2

List of harmful organisms for which pest categorisation is requested per group. The list below follows the categorisation included in the annexes of Directive 2000/29/EC.

Annex IAI

(a) Insects, mites and nematodes, at all stages of their development

Group of Cicadellidae (non-EU) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*), such as:

1) *Carneocephala fulgida* Nottingham
2) *Draeculacephala minerva* Ball
3) *Graphocephala atropunctata* (Signoret)

Group of Tephritidae (non-EU) such as:

1) *Anastrepha fraterculus* (Wiedemann)
2) *Anastrepha ludens* (Loew)
3) *Anastrepha obliqua* Macquart
4) *Anastrepha suspensa* (Loew)
5) *Dacus ciliatus* Loew
6) *Dacus curcurbitae* Coquillet
7) *Dacus dorsalis* Hendel
8) *Dacus tryoni* (Froggatt)
9) *Dacus tsuneonis* Miyake
10) *Dacus zonatus* Saund.
11) *Epochra canadensis* (Loew)
12) *Pardalaspis cyanescens* Bezzi
13) *Pardalaspis quinaria* Bezzi
14) *Pterandrus rosa* (Karsch)
15) *Rhacochlaena japonica* Ito
16) *Rhagoletis completa* Cresson
17) *Rhagoletis fausta* (Osten-Sacken)
18) *Rhagoletis indifferens* Curran
19) *Rhagoletis mendax* Curran
20) *Rhagoletis pomonella* Walsh
21) *Rhagoletis suavis* (Loew)

(c) Viruses and virus-like organisms

Group of potato viruses and virus-like organisms such as:

1) Andean potato latent virus
2) Andean potato mottle virus
3) Arracacha virus B, oca strain
4) Potato black ringspot virus
5) Potato virus T
6) non-EU isolates of potato viruses A, M, S, V, X and Y (including Yo, Yn and Yc) and Potato leafroll virus

Group of viruses and virus-like organisms of Cydonia Mill., Fragaria L., Malus Mill., Prunus L., Pyrus L., Ribes L.,Rubus L. and Vitis L., such as:

1) Blueberry leaf mottle virus
2) Cherry rasp leaf virus (American)
3) Peach mosaic virus (American)
4) Peach phony rickettsia
5) Peach rosette mosaic virus
6) Peach rosette mycoplasm
7) Peach X-disease mycoplasm
8) Peach yellows mycoplasm
9) Plum line pattern virus (American)
10) Raspberry leaf curl virus (American)
11) Strawberry witches' broom mycoplasma
12) Non-EU viruses and virus-like organisms of *Cydonia Mill., Fragaria L., Malus Mill., Prunus L., Pyrus L., Ribes L., Rubus L.* and *Vitis L.*

Annex IIAI

(a) Insects, mites and nematodes, at all stages of their development

Group of *Margarodes* (non-EU species) such as:

1) *Margarodes vitis* (Phillipi)
2) *Margarodes vredendalensis* de Klerk
3) *Margarodes prieskaensis* Jakubski

1.1.2.3. Terms of Reference: Appendix 3

List of harmful organisms for which pest categorisation is requested. The list below follows the annexes of Directive 2000/29/EC.

Annex IAI

(a) Insects, mites and nematodes, at all stages of their development

Acleris spp. (non-EU)
Amauromyza maculosa (Malloch)
Anomala orientalis Waterhouse
Arrhenodes minutus Drury
Choristoneura spp. (non-EU)
Conotrachelus nenuphar (Herbst)
Dendrolimus sibiricus Tschetverikov
Diabrotica barberi Smith and Lawrence
Diabrotica undecimpunctata howardi Barber
Diabrotica undecimpunctata undecimpunctata Mannerheim
Diabrotica virgifera zeae Krysan & Smith
Diaphorina citri Kuway
Heliothis zea (Boddie)
Hirschmanniella spp., other than *Hirschmanniella gracilis* (de Man) Luc and Goodey
Liriomyza sativae Blanchard
Longidorus diadecturus Eveleigh and Allen
Monochamus spp. (non-EU)
Myndus crudus Van Duzee
Nacobbus aberrans (Thorne) Thorne and Allen
Naupactus leucoloma Boheman
Premnotrypes spp. (non-EU)
Pseudopityophthorus minutissimus (Zimmermann)
Pseudopityophthorus pruinosus (Eichhoff)
Scaphoideus luteolus (Van Duzee)
Spodoptera eridania (Cramer)
Spodoptera frugiperda (Smith)
Spodoptera litura (Fabricus)
Thrips palmi Karny
Xiphinema americanum Cobb sensu lato (non-EU populations)
Xiphinema californicum Lamberti and Bleve-Zacheo

(b) Fungi

Ceratocystis fagacearum (Bretz) Hunt
Chrysomyxa arctostaphyli Dietel
Cronartium spp. (non-EU)
Endocronartium spp. (non-EU)
Guignardia laricina (Saw.) Yamamoto and Ito
Gymnosporangium spp. (non-EU)
Inonotus weirii (Murril) Kotlaba and Pouzar
Melampsora farlowii (Arthur) Davis
Mycosphaerella larici-leptolepis Ito et al.
Mycosphaerella populorum G. E. Thompson
Phoma andina Turkensteen
Phyllosticta solitaria Ell. and Ev.
Septoria lycopersici Speg. var. *malagutii* Ciccarone and Boerema
Thecaphora solani Barrus
Trechispora brinkmannii (Bresad.) Rogers

(c) Viruses and virus-like organisms

Tobacco ringspot virus
Tomato ringspot virus
Bean golden mosaic virus
Cowpea mild mottle virus
Lettuce infectious yellows virus
Pepper mild tigré virus
Squash leaf curl virus
Euphorbia mosaic virus
Florida tomato virus

(d) Parasitic plants

Arceuthobium spp. (non-EU)

Annex IAII

(a) Insects, mites and nematodes, at all stages of their development

Meloidogyne fallax Karssen
Popillia japonica Newman
Rhizoecus hibisci Kawai and Takagi

(b) Bacteria

Clavibacter michiganensis (Smith) Davis et al. ssp. *sepedonicus* (Spieckermann and Kotthoff) Davis et al.
Ralstonia solanacearum (Smith) Yabuuchi et al.

(c) Fungi

Melampsora medusae Thümen
Synchytrium endobioticum (Schilbersky) Percival

Annex I B

(a) Insects, mites and nematodes, at all stages of their development

Leptinotarsa decemlineata Say
Liriomyza bryoniae (Kaltenbach)

(b) Viruses and virus-like organisms

Beet necrotic yellow vein virus

1.2. Interpretation of the Terms of Reference

Lopholeucaspis japonica Cockerell (1897) is the current valid name for the species listed as *Leucaspis japonica* Ckll in Annex IIAI (see Section 3.1.1). Therefore, the species under scrutiny in this opinion will be referred to using its currently valid name. *L. japonica* is one of a number of pests listed in the Appendices to the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a quarantine pest or those of a regulated non-quarantine pest (RNQP) for the area of the European Union (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.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *L. japonica* 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. Relevant papers 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) and relevant publications.

The Greek National Plant Protection Organisation (NPPO) was contacted in order to clarify the current status of the pest in their territory.

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 database was 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 and is a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. The Europhyt database manages 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 (MS) and the phytosanitary measures taken to eradicate or avoid their spread.

2.2. Methodologies

The Panel performed the pest categorisation for *L. japonica,* following guiding principles and steps presented in the European Food Safety Authority (EFSA) guidance on the harmonised framework for pest risk assessment (EFSA PLH Panel, 2010) and as defined in the International Standard for Phytosanitary Measures No 11 (FAO, 2013) and No 21 (FAO, 2004).

In accordance with the guidance on a harmonised framework for pest risk assessment in the EU (EFSA PLH Panel, 2010), this work was initiated following an evaluation of the EU plant health regime. Therefore, to facilitate the decision-making process, in the conclusions of the pest categorisation, the Panel addresses explicitly each criterion for a Union quarantine pest and for a Union RNQP in accordance with Regulation (EU) 2016/2031 on protective measures against pests of plants and includes additional information required in accordance with the specific ToR received by the European Commission. In addition, for each conclusion, the Panel provides a short description of its associated uncertainty.

Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. All relevant criteria have to be met for the pest to potentially qualify either as a quarantine pest or as a RNQP. If one of the criteria is not met, the pest will not qualify. A pest that does not qualify as a quarantine pest may still qualify as a RNQP that needs to be addressed in the opinion. For the pests regulated in the protected zones only, the scope of the categorisation is the territory of the protected zone; thus, the criteria refer to the protected zone instead of the EU territory.

It should be noted that 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, the Panel will present a summary of the observed pest impacts. Economic impacts are expressed in terms of yield and quality losses and not in monetary terms, whereas addressing social impacts is outside the remit of the Panel, in agreement with EFSA guidance on a harmonised framework for pest risk assessment (EFSA PLH Panel, 2010).

Table 1: Pest categorisation criteria under evaluation, as 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	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Identity of the pest (Section 3.1)	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, or has it been shown to produce consistent symptoms and to be transmissible?	Is the identity of the pest established, 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 widely distributed within the EU? Describe the pest distribution briefly!	Is the pest present in the EU territory? If not, it cannot be a protected zone quarantine organism	Is the pest present in the EU territory? If not, it cannot be a regulated non-quarantine pest. (A regulated non-quarantine pest must be present in the risk assessment area)

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Criterion in Regulation (EU) 2016/2031 regarding protected zone quarantine pest (articles 32–35)	Criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest
Regulatory status (Section 3.3)	If the pest is present in the EU but not widely distributed in the risk assessment area, it should be under official control or expected to be under official control in the near future	The protected zone system aligns with the pest-free area system under the International Plant Protection Convention (IPPC). The pest satisfies the IPPC definition of a quarantine pest that is not present in the risk assessment area (i.e. protected zone)	Is the pest regulated as a quarantine pest? If currently regulated as a quarantine pest, are there grounds to consider its status could be revoked?
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!	Is the pest able to enter into, become established in and spread within the protected zone areas? Is entry by natural spread from EU areas where the pest is present possible?	Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects? Clearly state if plants for planting is the main pathway!
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?	Would the pests' introduction have an economic or environmental impact on the protected zone areas?	Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?
Available measures (Section 3.6)	Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?	Are there measures available to prevent the entry into, establishment within or spread of the pest within the protected zone areas such that the risk becomes mitigated? Is it possible to eradicate the pest in a restricted area within 24 months (or a period longer than 24 months where the biology of the organism so justifies) after the presence of the pest was confirmed in the protected zone?	Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?
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	A statement as to whether (1) all criteria assessed by EFSA above for consideration as potential protected zone quarantine pest were met, and (2) if not, which one(s) were not met	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential regulated non-quarantine pest were met, and (2) if not, which one(s) were not met

The Panel will not indicate in its conclusions of the pest categorisation whether to continue the risk assessment process, but following the agreed two-step approach, will continue only if requested by the risk managers. However, during the categorisation process, experts may identify key elements and knowledge gaps that could contribute significant uncertainty to a future assessment of risk. It would be useful to identify and highlight such gaps so that potential future requests can specifically target the major elements of uncertainty, perhaps suggesting specific scenarios to examine.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

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

Yes, *Lopholeucaspis japonica* (Cockerell, 1897) is a well-defined insect species in the order Hemiptera, suborder Sternorhyncha, family Diaspididae.

Lopholeucaspis japonica (Cockerell, 1897) was originally described as *Leucaspis japonicus* by Cockerell in 1897 from specimens found in 1896 on *Cytisus* sp. imported from Japan into the US. It has also been known as *Leucaspis japonica* (Fernald, 1903), *Leucaspis* (*Euleucaspis*) *japonica* (Lindiger, 1906), *Leucaspis japonica* var. *darwinensis* (Green, 1916), *Leucodiaspis iaponica* (Lindinger, 1932), *Leucodiaspis hydrangeae* (Takahashi, 1934), *Leucodiaspis japonica* (Takahashi, 1934), *Leucodiaspis japonica darwiniensis* (Takahashi, 1934), *Leucaspis hydrangeae* (Takahashi, 1934), *Lopholeucaspis japonica darwiniensis* (Balachowsky, 1953), *Lopholeucaspis menoni* (Borchsenius, 1964), *Lopholeucaspis darwinienis* (Borchsenius, 1966) and *Leucaspis menoni* (Takagi, 1969). This insect is also known by the common names of 'Japanese maple scale' and 'pear white scale' (EPPO, 2004; García Morales et al., 2016).

3.1.2. Biology of the pest

Lopholeucaspis japonica is a polyphagous-armoured scale insect which preferentially feeds on smooth barked woody trees and shrubs (see Section 3.4.1). As all armoured scales (fam. Diaspididae), only crawlers (early first instar nymphs) and adult winged males are able to actively disperse as all other stages (two immature nymphal stages and adult females) are sessile. Crawlers can also easily disperse by wind or travelling on other winged insects including whiteflies, psyllids a nd leafhoppers (Magsig-Castillo et al., 2010). In India, *L. japonica* was observed to disperse from a single-infested tree in a pomegranate orchard to 58 neighbouring plants from March to December of the same year (Harsur et al., 2018). *L. japonica* has been reported to overwinter as fertilised females in Japan (Murakami, 1970) and in Pennsylvania (Stimmel, 1995) but as second instar nymphs in the Caucasus (Kozarzhevskaya, 1956). In the Far East, overwintering *L. japonica* females can endure temperatures of −20 to −25°C (EPPO, 1997). Oviposition starts in late March and can extend until late June–early July, giving rise to a first generation of crawlers, which can be found from late May until early August. These first instars begin to form a waxy cover just 3 d after egg hatch. This cover hampers the chemical control of this stage, which is usually the target stage of this type of treatments against Diaspididae (Frank et al., 2013). Male second instars moult into winged adults that look for a mate. Fertilised females can lay from 25 to 60 eggs that hatch beneath their scale covering (EPPO, 1997; García Morales et al., 2016). First adult males and females of the new generation can be found from July and originate a second generation, which overlaps with the first one (García Morales et al., 2016). This overlapping may explain why some authors report this species as univoltine (Murakami, 1970; Stimmel, 1995) while others consider this scale as bivoltine (Kozarzhevskaya, 1956; Tabatadze and Yasnosh, 2001; Gill et al., 2013; Addesso et al., 2016; Harsur et al., 2018). However, *L. japonica* most likely has one generation per year in colder climates and at least two overlapping generations in warmer locations (Addesso et al., 2016). Indeed, monitoring conducted in Maryland (USA) reported two generations with peaks at 1,143 Growing Degree Days (GDD) and 3,022 GDD using a lower thermal development threshold of 10°C from January, 1 (Gill et al., 2013).

3.1.3. Intraspecific diversity

No intraspecific diversity within the species *L. japonica* has been reported.

3.1.4. Detection and identification of the pest

Are detection and identification methods available for the pest?

Yes, EPPO has a specific standard PM 7/54(1) dealing with *L. japonica* (EPPO, 2004).

Small-sized populations of *L. japonica* are difficult to detect whereas heavy infestations give bark a greyish-white appearance, which can eventually result in premature leaf fall, branch dieback and even plant death.

The taxonomy of the Coccoidea is based on characters of the adult female. Therefore, a slide preparation of a teneral female is required for identification to species level. Adult females can be found on the bark of their tree and shrub hosts (see Section 3.4.1), where other development stages can also be found. The shield of adult females is narrow, elongate (1.0–1.8 mm long), straight or slightly curved and dark. The female body under the shield is pyriform, elongate and remains enclosed in the exuvia of the second nymphal instar, which thickens and takes on a horn-like shape (EPPO, 2004).

3.2. Pest distribution

Although *L. japonica* has been reported from all continents (Table 2), the only record from Africa (Congo) is considered as unreliable and the pest no longer occurs in Australia. Therefore, Africa and Oceania are considered free of this insect species (EPPO, online).

3.2.1. Pest distribution outside the EU

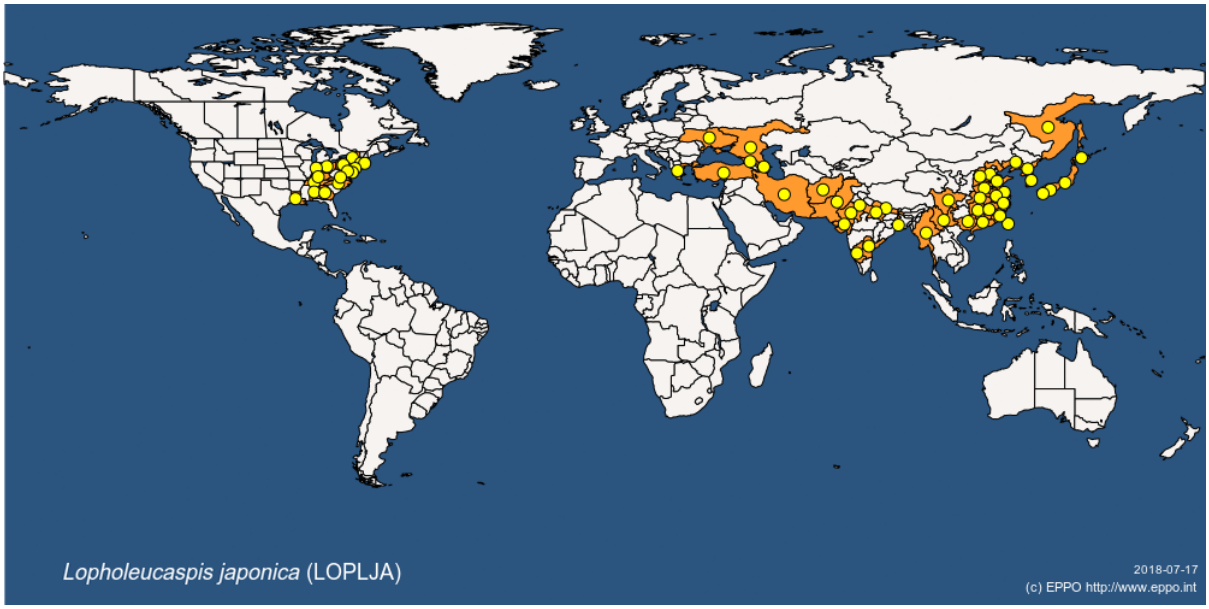

Figure 1: Global distribution map for *Lopholeucaspis japonica* (extracted from the EPPO Global Database updated by EPPO on 19 June 2018 and accessed on 20 July 2018. https://gd.eppo.int/taxon/LOPLJA/distribution)

Table 2: Current distribution of *Lopholeucaspis japonica* outside Europe based on information from the EPPO Global Database

Region	Country	Sub-national distribution (e.g. States/ Provinces)	Occurrence
North America	USA		Present, restricted distribution
		Connecticut	Present, no details
		Delaware	Present, no details
		Georgia	Present, no details
		Kentucky	Present, no details
		Louisiana	Present, no details
		Maryland	Present, few occurrences
		New Jersey	Present, no details
		New York	Present, no details
		North Carolina	Present, no details
		Pennsylvania	Present, no details
		Rhode Island	Present, no details
		Tennessee	Present, no details
		Virginia	Present, no details
		Washington DC	Present, no details
South America	Brazil		Present, no details
Asia	Afghanistan		Present, no details
	Burma		Present, no details
	China		Present, widespread
		Anhui	Present, widespread
		Fujian	Present, widespread
		Guangdong	Present, restricted distribution
		Guangxi	Present, restricted distribution
		Henan	Present, no details
		Hubei	Present, widespread
		Hunan	Present, restricted distribution
		Jiangsu	Present, widespread
		Jiangxi	Present, widespread
		Liaoning	Present, no details
		Shandong	Present, no details
		Shanxi	Present, no details
		Sichuan	Present, widespread
		Yunnan	Present, restricted distribution
		Zhejiang	Present, widespread
	India		Present, restricted distribution
		Andhra Pradesh	Present, no details
		Gujarat	Present, no details
		Haryana	Present, no details
		Rajasthan	Present, no details
		Uttar Pradesh	Present, no details
		West Bengal	Present, no details
	Iran		Present, no details
	Japan		Present, widespread
		Hokkaido	Present, widespread
		Honshu	Present, widespread
		Kyushu	Present, widespread
		Shikoku	Present, widespread

Region	Country	Sub-national distribution (e.g. States/ Provinces)	Occurrence
	Democratic People's Republic of Korea		Present, no details
	Republic of Korea		Present, no details
	Myanmar		Absent, unreliable record
	Nepal		Present, no details
	Pakistan		Present, no details
	Taiwan		Present, restricted distribution
	Turkey*		Present, no details
Europe	Azerbaijan		Present, no details
	Georgia		Present, restricted distribution
	Russia		Present, restricted distribution
		Far East	Present, no details
		Southern Russia	Present, restricted distribution
	Turkey*		Present, no details
	Ukraine		Present, restricted distribution
Oceania	Australia		Absent, pest no longer present
		Northern Territory	Absent, pest no longer present
Africa	Congo		Absent, unreliable record

*: Turkey is listed under both Asia and Europe as it is not known whether the pest was found in the European or the Asian part of Turkey.

3.2.2. Pest distribution in the EU

Is the pest present in the EU territory? If present, is the pest widely distributed within the EU?

No, *Lopholeucaspis japonica* is not present in the EU territory. However, a report from 1985 reported a finding in mainland Greece in 1983. It has not been found in Greece again.

Table 3: Current distribution of *Lopholeucaspis japonica* in the 28 EU MS based on information from the EPPO Global Database and other sources if relevant

Country	EPPO Global Database Last update: 13 September 2017 Date accessed: 8 March 2018	Other sources
Austria	–	
Belgium	–	
Bulgaria	–	
Croatia	Absent, intercepted only	Milek and Simala (2013) reported an interception
Cyprus	–	
Czech Republic	–	
Denmark	–	
Estonia	–	
Finland	–	
France	–	
Germany	Absent, invalid record	
Greece	Absent, pest no longer present.	Although *L. japonica* was found on olives in Greece in 1983 (Kozár and Walter, 1985), it has not been found again, as confirmed by NPPO.
Hungary	–	
Ireland	–	

Country	EPPO Global Database Last update: 13 September 2017 Date accessed: 8 March 2018	Other sources
Italy	–	Absent, only intercepted in 1999 (Pellizzari and Vettorazzo, 1999)
Latvia	–	
Lithuania	–	
Luxembourg	–	
Malta	–	
Netherlands	Absent, confirmed by survey	
Poland	–	
Portugal	–	
Romania	–	
Slovak Republic	Absent, intercepted only	
Slovenia	Absent, no pest record	
Spain	–	
Sweden	–	
United Kingdom	–	

–: no information available

3.3. Regulatory status

3.3.1. Council Directive 2000/29/EC

Lopholeucaspis japonica is listed in Council Directive 2000/29/EC as *Leucaspis japonica* Ckll. Details are presented in Tables 3 and 4.

Table 4: *Lopholeucaspis japonica* in Council Directive 2000/29/EC

Annex II, Part A	**Harmful organisms whose introduction into, and spread within, all Member States shall be banned if they are present on certain plants or plant products**	
Section I	**Harmful organisms not known to occur in the Community and relevant for the entire Community**	
(a)	Insects, mites and nematodes, at all stages of their development	
	Species	Subject of contamination
17.	*Leucaspis japonica* Ckll.	Plants of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, other than fruit and seeds

3.3.2. Legislation addressing the hosts of *Lopholeucaspis japonica*

Table 5: Regulated hosts and commodities that may involve *Lopholeucaspis japonica* in Annexes III, IV and V of Council Directive 2000/29/EC

Annex III, Part A	**Plants, plant products and other objects the introduction of which shall be prohibited in all Member States**	
	Description	Country of origin
16	Plants of *Citrus* L, *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, other than fruit and seeds	Third countries
Annex IV, Part A	**Special requirements which shall be laid down by all member states for the introduction and movement of plants, plant products and other objects into and within all member states**	
Section I	**Plants, plant products and other objects originating outside the community**	
	Plants, plant products and other objects	Special requirements

16.1	Fruits of *Citrus* L, *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, originating in third countries	The fruits should be free from peduncles and leaves and the packaging should bear an appropriate origin mark.
16.5	Fruits of *Citrus* L, *Fortunella* Swingle, *Poncirus* Raf., and their hybrids, originating in third countries	Without prejudice to the provisions applicable to the fruits in Annex IV(A)(I) (16.1), (16.2) and (16.3), official statement that: (a) the fruits originate in areas known to be free from the relevant organism; or, if this requirement cannot be met; (b) no signs of the relevant organism have been observed at the place of production and in its immediate vicinity since the beginning of the last complete cycle of vegetation, on official inspections carried out at least monthly during the three months prior to harvesting, and none of the fruits harvested at the place of production has shown, in appropriate official examination, signs of the relevant organism, or if this requirement can also not be met; (c) the fruits have shown, in appropriate official examination on representative samples, to be free from the relevant organism in all stages of their development; or, if this requirement can also not be met; (d) the fruits have been subjected to an appropriate treatment, any acceptable vapour heat treatment, cold treatment, or quick freeze treatment, which has been shown to be efficient against the relevant organism without damaging the fruit, and, where not available, chemical treatment as far as it is acceptable by Community legislation.
Annex V	**Plants, plant products and other objects which must be subject to a plant health inspection (at the place of production if originating in the Community, before being moved within the Community—in the country of origin or the consignor country, if originating outside the Community) before being permitted to enter the Community**	
Part B	**Plants, plant products and other objects originating in territories, other than those territories referred to in Part A**	
Section I	**Plants, plant products and other objects which are potential carriers of harmful organisms of relevance for the entire Community**	
1	Plants, intended for planting, other than seeds but including seeds of [. . .] *Citrus* L., *Fortunella* Swingle and *Poncirus* Raf., and their hybrids [. . .]	
3	Fruits of: — *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf., and their hybrids [. . .]	

3.4. Entry, establishment and spread in the EU

3.4.1. Host range

Lopholeucaspis japonica is a polyphagous species which has been reported on more than 60 different dicotyledoneous genera in 35 families (see Appendix A for details).

3.4.2. Entry

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

Yes, *L. japonica* could enter the EU on plants for planting, excluding seeds, and on cut flowers or branches. It has been intercepted in the EU and was once found on olive in Greece in 1983.

The main pathways of entry for *L. japonica* are:

- Host plants for planting excluding seeds (including artificially dwarfed plants)
- Host cut flowers or branches

Host plants for planting included in the Rutaceae family (e.g. *Citrus* spp.) are prohibited from entering the EU and, therefore, can be considered as a closed pathway. However, for the remaining hosts, potential pathways (mostly plants for planting (excluding seeds) and cut flowers or branches remain open.

There are three records of interception of *L. japonica* in the Europhyt database, one in 1995 on various artificially dwarfed plants imported from China, and two in 1999 on plants of *Acer* sp. imported from China.

3.4.3. Establishment

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

Yes, there are hosts within suitable climatic regions in the EU, comparable to regions in Asia and North America where *L. japonica* occurs.

3.4.3.1. EU distribution of main host plants

Many plant species reported as hosts of *L. japonica* (Appendix A) occur in the EU. Some of them occur in the wild (e.g. *Fagus* sp., *Ilex* sp., *Tilia* spp.), while others are cultivated (e.g. *Citrus* sp., *Diospyros kaki, Ficus carica, Olea europaea*) or used in parks and recreational areas (e.g. *Camellia* sp., *Magnolia* sp., *Wisteria* sp.). In general, potential hosts can be found all over the EU. Citrus, which according to EPPO (1997) is the crop most at risk in the EU, can be found on the Mediterranean coastal districts of the Union (Table 4).

Table 6: Citrus cultivation area (10^3 ha) in the EU. Source: Eurostat (data extracted on 07 June 2017)

Country	2011	2012	2013	2014	2015
Spain	317.61	310.50	306.31	302.46	298.72
Italy	160.72	146.79	163.59	140.16	149.10
Greece	52.06	50.61	49.88	49.54	46.92
Portugal	19.59	19.85	19.82	19.80	20.21
France	3.77	3.89	4.34	4.16	4.21
Cyprus	3.06	3.21	2.63	2.69	2.84
Croatia	2.12	1.88	2.17	2.17	2.21
EU (28 MS)	558.93	536.73	548.75	520.99	524.21

3.4.3.2. Climatic conditions affecting establishment

L. japonica occurs in different regions of the World (see Figure 1) including areas where climate types match those occurring in the EU. Furthermore, overwintering females have been reported to endure temperatures from −20 to −25°C in eastern Asia (EPPO, 1997). Because suitable hosts occur across the EU, biotic and abiotic conditions are conducive for establishment.

3.4.4. Spread

Is the pest able to spread within the EU territory following establishment? How?

Yes. As most of the development stages of *L. japonica* are sessile, it mostly depends on the movement of plants for planting for spread.

RNQPs: Is spread mainly via specific plants for planting, rather than via natural spread or via movement of plant products or other objects?

Yes, plants for planting, excluding seeds, are indeed the main means of spread of *L. japonica*.

Only crawlers and adult-winged males of *L. japonica* are able to actively disperse as all other stages are sessile. Indeed, in India, *L. japonica* was observed to disperse from a single-infested tree to 58 neighbouring trees in a pomegranate orchard in 9–10 months (Harsur et al., 2018). Therefore, this species mostly depends on the movement of infested plant material for long-distance spread.

3.5. Impacts

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

***Yes**, L. japonica* has been reported as a serious pest in different parts of the world, some areas of which have climatic conditions similar to those in the EU.

RNQPs: Does the presence of the pest on plants for planting have an economic impact, as regards the intended use of those plants for planting?[4]

Yes, the presence of *L. japonica* on plants for planting would have an economic impact.

L. japonica is as an important pest (Miller and Davidson, 2005). It is considered as an important pest of citrus in Azerbaijan, Georgia and other southern areas of the Former Soviet Union, where it is also injurious to other fruit trees and ornamentals as well (Konstantinova, 1992; Tabatadze and Yasnosh, 2001). In the USA, it is considered a pest of maple (*Acer* spp.) and pyracantha (Miller and Davidson, 2005; Frank et al., 2013), deciduous fruits (Kozár, 1990) and holly (McComb, 1986). It is also a pest of tea in China (García Morales et al., 2016). Although *L. japonica* is not always a major pest, it can cause branch dieback and heavy infestations can even kill a tree (EPPO, 1997; García Morales et al., 2016).

3.6. Availability and limits of mitigation measures

Are there measures available to prevent the entry into, establishment within or spread of the pest within the EU such that the risk becomes mitigated?

Yes, the same measures already in place for citrus could be applied to other host plants for planting and cut branches.

RNQPs: Are there measures available to prevent pest presence on plants for planting such that the risk becomes mitigated?

Yes, sourcing plants for planting from pest free areas

3.6.1. Phytosanitary measures

Currently, the organism is regulated for plants for planting of Plants of *Citrus* L., *Fortunella* Swingle, *Poncirus* Raf. and their hybrids, other than fruit and seeds (see Section 3.3.2). As the list of potential hosts includes many non-regulated plants, existing phytosanitary measures targeting citrus plants in the EU legislation could be extended to plants for planting, excluding seeds and cut flowers and branches of the remaining hosts.

3.6.1.1. Biological or technical factors limiting the feasibility and effectiveness of measures to prevent the entry, establishment and spread of the pest

- Small populations are difficult to detect
- Crawlers produce a waxy cover just 3 d after egg hatch which protects this stage, which is the common target of pesticides applied against other Diaspididae, against chemical treatments
- Females can endure extremely low temperatures (−20 to −25°C), which may hamper the application of any cold treatment on plants for planting in transit.

3.6.1.2. Biological or technical factors limiting the ability to prevent the presence of the pest on plants for planting

- Small populations are difficult to detect.

3.6.2. Pest control methods

- Chemical control targeting peak crawler production
- Natural/biological control with different natural enemies (predators and parasitoids) can keep many potential disapidid pests under economic injury densities.

[4] See section 2.1 on what falls outside EFSA's remit.

- Mating disruption has been successfully implemented against other armoured scale pests (i.e. *Aonidiella aurantii* in citrus)
- Pruning can affect diaspidid populations either directly by removal of infested branches and indirectly by increasing exposure to unfavourable conditions (sunlight, wind).
- Use of pest-free plants for planting is a key for delaying colonisation of new spots as infested plants for planting is the main dispersal mechanism of this insect pest.

3.7. Uncertainty

Lopholeucaspis japonica was found in 1983 in Attica, Greece, on olives. Although, it has not been found again in Greece, there is uncertainty about the possibility that small undetectable populations may be present.

4. Conclusions

L japonica satisfies the criteria assessed by EFSA that enable it to be considered a potential quarantine pest. *L. japonica* does not satisfy the criteria assessed by EFSA for it to be considered a potential RNQP (Table 7).

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	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	The identity of the pest is well established. There is an EPPO standard dealing with the detection and identification of *L. japonica*	The identity of the pest is well established. There is an EPPO standard dealing with the detection and identification of *L. japonica*	None
Absence/ presence of the pest in the EU territory (Section 3.2)	The pest is not present in the EU. Therefore, the criterion of either the absence or presence with restricted distribution for UQP is fulfilled.	The pest is not present in the EU. Therefore, the criterion of widespread distribution within the EU for RNQP is not satisfied.	*L. japonica* was found once in Attica, Greece, on olives. Although, it has not been found again in Greece, there is uncertainty about the possibility that small undetectable populations may be present.
Regulatory status (Section 3.3)	The pest is regulated as a quarantine pest (Annex IIAI). Citrus, Fortunella, Poncirus and their hybrids are regulated hosts.	The pest is regulated as a quarantine pest (Annex IIAI). There are no scientific reasons to revoke this status.	None
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	The pest could enter and establish in the EU. The main pathways are plants for planting excluding seeds and cut branches of its many hosts.	As most of the developmental stages of this pest are sessile, spread is mainly via specific plants of planting.	None
Potential for consequences in the EU territory (Section 3.5)	According to the information available *L. japonica* is an important pest of many crops including Citrus.	The presence of *L. japonica* on plants for planting has a direct impact on the fate of these plants for planting, which may die prematurely in case of heavy attack.	None

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union regulated non-quarantine pest	Key uncertainties
Available measures (Section 3.6)	Phytosanitary measures including sourcing plants for planting and cut branches from pest-free areas may mitigate the risk of entry.	The production of plants for planting in pest-free environments may mitigate the presence of the pest on plants for planting.	None
Conclusion on pest categorisation (Section 4)	All the criteria assessed by EFSA for consideration of *L. japonica* as a potential UQP (i.e. restricted distribution in the EU, impact reported outside the EU) are met.	Not all the criteria assessed by EFSA for consideration of *L. japonica* as a potential RNQP (i.e. widespread distribution in the EU) are met.	None
Aspects of assessment to focus on/ scenarios to address in future if appropriate			

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Abbreviations

EPPO European and Mediterranean Plant Protection Organization
FAO Food and Agriculture Organization
GDD Growing Degree Days
IPPC International Plant Protection Convention
MS Member State
NPPO National Plant Protection Organisation
PLH EFSA Panel on Plant Health
RNQP Regulated non-quarantine pest
TFEU Treaty on the Functioning of the European Union
ToR Terms of Reference

Appendix A – Reported hosts of *Lopholeucaspis japonica*

Family	Species	Source
Altinigiaceae	*Liquidambar formosana*	García Morales et al. (2016)
Aquifoliae	*Ilex* sp.	García Morales et al. (2016)
Betulaceae	*Alnus* sp.	García Morales et al. (2016)
	Alnus japonica	García Morales et al. (2016)
	Betula sp.	EPPO (1997)
	Carpinus sp.	Addesso et al. (2016)
	Corylus avellana	García Morales et al. (2016)
Buxaceae	*Buxus sempervirens*	García Morales et al. (2016)
Caprifoliaceae	*Lonicera caprifolium*	García Morales et al. (2016)
Celastraceae	*Celastrus* sp.	García Morales et al. (2016)
	Celastrus orbiculatus	García Morales et al. (2016)
	Euonymus sp.	García Morales et al. (2016)
	Euonymus japonicus	García Morales et al. (2016)
Cornaceae	*Cornus* sp.	García Morales et al. (2016)
	Cornus kousa	Hoover (2013)
Ebenaceae	*Diospyros* sp.	García Morales et al. (2016)
	Diospyros kaki	EPPO (1997) and García Morales et al. (2016)
Ericaceae	*Oxydendrum* sp.	Addesso et al. (2016)
Euphorbiaceae	*Euphorbia* sp.	García Morales et al. (2016)
Fabaceae	*Cladrastis* sp.	Addesso et al. (2016)
	Cytisus sp.	EPPO (1997) and García Morales et al. (2016)
	Cytisus scoparius	García Morales et al. (2016)
	Gleditsia sp.	Addesso et al. (2016)
	Robinia sp.	García Morales et al. (2016)
	Wisteria sp.	García Morales et al. (2016)
Fagaceae	*Castanea* sp.	García Morales et al. (2016)
	Cercis sp.	Addesso et al. (2016)
	Fagus sp.	García Morales et al. (2016)
Hamamelidaceae	*Hammamelis* sp.	Addesso et al. (2016)
	Distylium racemosum	García Morales et al. (2016)
Hydrangeaceae	*Hydrangea* sp.	García Morales et al. (2016)
	Hydrangea integrifolia	García Morales et al. (2016)
	Hydrangea quercifolia	Fulcher et al. (2011)
Lauraceae	*Laurus* sp.	EPPO (1997) and García Morales et al. (2016)
Lythraceae	*Punica granatum*	Harsur et al. (2018)
Magnoliaceae	*Magnolia* sp.	EPPO (1997) and García Morales et al. (2016)
	Magnolia grandiflora	García Morales et al. (2016)
Malvaceae	*Tilia* sp.	EPPO (1997)
	Tilia miqueliana	García Morales et al. (2016)
Menyanthaceae	*Menyanthes* sp.	EPPO (1997) and García Morales et al. (2016)
Moraceae	*Ficus* sp.	García Morales et al. (2016)
	Ficus carica	García Morales et al. (2016)
	Ficus opposita	García Morales et al. (2016)
	Ficus racemosa	García Morales et al. (2016)
	Ficus religiosa	García Morales et al. (2016)
	Morus alba	García Morales et al. (2016)
Oleaceae	*Fraxinus* sp.	García Morales et al. (2016)
	Ligustrum sp.	García Morales et al. (2016)

Family	Species	Source
	Olea europaea	Kozár and Walter (1985)
	Syringa sp.	EPPO (1997) and García Morales et al. (2016)
	Syringa reticulata	Fulcher et al. (2011)
	Syringa vulgaris	García Morales et al. (2016)
Paeoniaceae	*Paeonia* sp.	García Morales et al. (2016)
	Paeonia suffruticosa	García Morales et al. (2016)
Pentaphylacaceae	*Eurya crenatifolia*	García Morales et al. (2016)
Pittosporaceae	*Pittosporum tobira*	García Morales et al. (2016)
Rhamnaceae	*Ziziphus* sp.	García Morales et al. (2016)
Rosacaeae	*Amelanchier* sp.	Addesso et al. (2016)
	Chaenomeles sp.	García Morales et al. (2016)
	Chaenomeles speciosa	García Morales et al. (2016)
	Cotoneaster sp.	García Morales et al. (2016)
	Cydonia sp.	García Morales et al. (2016)
	Cydonia oblonga	García Morales et al. (2016)
	Malus sp.	García Morales et al. (2016)
	Malus pumila	EPPO (1997) and García Morales et al. (2016)
	Mespilus germanica	García Morales et al. (2016)
	Prunus sp.	García Morales et al. (2016)
	Prunus avium	EPPO (1997)
	Prunus mume	García Morales et al. (2016)
	Pyracantha sp.	García Morales et al. (2016)
	Pyrus sp.	García Morales et al. (2016)
	Pyrus pyrifolia	EPPO (1997) and García Morales et al. (2016)
	Rosa sp.	EPPO (1997) and García Morales et al. (2016)
Rutaceae	*Citrus* sp.	EPPO (1997) and García Morales et al. (2016)
	Citrus aurantium	García Morales et al. (2016)
	Citrus maxima	García Morales et al. (2016)
	Citrus nobilis	Tabatadze & Yasnosh (1999)
	Citrus trifoliata	García Morales et al. (2016)
Salicaceae	*Populus* sp.	García Morales et al. (2016)
	Salix sp.	García Morales et al. (2016)
	Salix aegyptiaca	García Morales et al. (2016)
Salvadoraceae	*Salvadora* sp.	García Morales et al. (2016)
Sapindaceae	*Acer* sp.	EPPO (1997)
	Acer palmatum	García Morales et al. (2016)
	Acer rubrum	Hoover (2013)
	Acer sachharum	García Morales et al. (2016)
	Acer velutinum	García Morales et al. (2016)
Saxifragaceae	*Itea* sp.	García Morales et al. (2016)
Styracaceae	*Styrax* sp.	García Morales et al. (2016)
Theaceae	*Camelia* sp.	EPPO (1997) and García Morales et al. (2016)
	Camelia sinensis	García Morales et al. (2016)
	Stewartia	Addesso et al. (2016)
Ulmaceae	*Ulmus* sp.	García Morales et al. (2016)
	Zelkova sp.	García Morales et al. (2016)
	Zelkova serrata	García Morales et al. (2016)
Vitaceae	*Vitis* sp.	García Morales et al. (2016)
	Vitis vinifera	García Morales et al. (2016)